Part 4: Production of Relative Surplus-Value

Chapter 12: The Concept of Relative Surplus-Value

That portion of the working day which merely produces an equivalent for the value paid by the capitalist for his labour-power, has, up to this point, been treated by us as a constant magnitude, and such in fact it is, under given conditions of production and at a given stage in the economic development of society. Beyond this, his necessary labour-time, the labourer, we saw, could continue to work for 2, 3, 4, 6, &c., hours. The rate of surplus-value and the length of the working day depended on the magnitude of this prolongation. Though the necessary labour-time was constant, we saw, on the other hand, that the total working day was variable. Now suppose we have a working day whose length, and whose apportionment between necessary labour and surplus labour, are given. Let the whole line a c, a–b–c represent, for example, a working day of 12 hours; the portion of a b 10 hours of necessary labour, and the portion b c 2 hours of surplus labour. How now can the production of surplus-value be increased, i.e., how can the surplus labour be prolonged, without, or independently of, any prolongation of a c?

Although the length of a c is given, b c appears to be capable of prolongation, if not by extension beyond its end c, which is also the end of the working day a c, yet, at all events, by pushing back its starting-point b in the direction of a. Assume that b'–b in the line ab'bc is equal to half of b c

a——b'–b—c

or to one hour's labour-time. If now, in a c, the working day of 12 hours, we move the point b to b', b c becomes b' c; the surplus labour increases by one half, from 2 hours to 3 hours, although the working day remains as before at 12 hours. This extension of the surplus labour-time from b c to b' c, from 2 hours to 3 hours, is, however, evidently impossible, without a simultaneous contraction of the necessary labour-time from a b into a b', from 10 hours to 9 hours. The prolongation of the surplus labour would correspond to a shortening of the necessary labour; or a portion of the labour-time previously consumed, in reality, for the labourer's own benefit, would be converted into labour-time for the benefit of the capitalist. There would be an alteration, not in the length of the working day, but in its division into necessary labour-time and surplus labour-time.

On the other hand, it is evident that the duration of the surplus labour is given, when the length of the working day, and the value of labour-power, are given. The value of labour-power, i.e., the labour-time requisite to produce labour-power, determines the labour-time necessary for the reproduction of that value. If one working-hour be embodied in sixpence, and the value of a day's labour-power be five shillings, the labourer must work 10 hours a day, in order to replace the value paid by capital for his labour-power, or to produce an equivalent for the value of his daily necessary means of subsistence. Given the value of these means of subsistence, the value of his labour-power is given;[1] and given the value of his labour-power, the duration of his necessary labour-time is given. The duration of the surplus labour, however, is arrived at, by subtracting the necessary labour-time from the total working day. Ten hours subtracted from twelve, leave two, and it is not easy to see, how, under the given conditions, the surplus labour can possibly be prolonged beyond two hours. No doubt, the capitalist can, instead of five shillings, pay the labourer four shillings and sixpence or even less. For the reproduction of this value of four shillings and sixpence, nine hours' labour-time would suffice; and consequently three hours of surplus labour, instead of two, would accrue to the capitalist, and the surplus-value would rise from one shilling to eighteen-pence. This result, however, would be obtained only by lowering

the wages of the labourer below the value of his labour-power. With the four shillings and sixpence which he produces in nine hours, he commands one-tenth less of the necessaries of life than before, and consequently the proper reproduction of his labour-power is crippled. The surplus labour would in this case be prolonged only by an overstepping of its normal limits; its domain would be extended only by a usurpation of part of the domain of necessary labour-time. Despite the important part which this method plays in actual practice, we are excluded from considering it in this place, by our assumption, that all commodities, including labour-power, are bought and sold at their full value. Granted this, it follows that the labour-time necessary for the production of labour-power, or for the reproduction of its value, cannot be lessened by a fall in the labourer's wages below the value of his labour-power, but only by a fall in this value itself. Given the length of the working day, the prolongation of the surplus labour must of necessity originate in the curtailment of the necessary labour-time; the latter cannot arise from the former. In the example we have taken, it is necessary that the value of labour-power should actually fall by one-tenth, in order that the necessary labour-time may be diminished by one-tenth, i.e., from ten hours to nine, and in order that the surplus labour may consequently be prolonged from two hours to three.

Such a fall in the value of labour-power implies, however, that the same necessaries of life which were formerly produced in ten hours, can now be produced in nine hours. But this is impossible without an increase in the productiveness of labour. For example, suppose a shoe-maker, with given tools, makes in one working day of twelve hours, one pair of boots. If he must make two pairs in the same time, the productiveness of his labour must be doubled; and this cannot be done, except by an alteration in his tools or in his mode of working, or in both. Hence, the conditions of production, i.e., his mode of production, and the labour-process itself, must be revolutionised. By increase in the productiveness of labour, we mean, generally, an alteration in the labour-process, of such a kind as to shorten the labour-time socially necessary for the production of a commodity, and to endow a given quantity of labour with the power of producing a greater quantity of use-value.[2] Hitherto in treating of surplus-value, arising from a simple prolongation of the working day, we have assumed the mode of production to be given and invariable. But when surplus-value has to be produced by the conversion of necessary labour into surplus labour, it by no means suffices for capital to take over the labour-process in the form under which it has been historically handed down, and then simply to prolong the duration of that process. The technical and social conditions of the process, and consequently the very mode of production must be revolutionised, before the productiveness of labour can be increased. By that means alone can the value of labour-power be made to sink, and the portion of the working day necessary for the reproduction of that value, be shortened.

The surplus-value produced by prolongation of the working day, I call *absolute surplus-value*. On the other hand, the surplus-value arising from the curtailment of the necessary labour-time, and from the corresponding alteration in the respective lengths of the two components of the working day, I call *relative surplus-value.*

In order to effect a fall in the value of labour-power, the increase in the productiveness of labour must seize upon those branches of industry whose products determine the value of labour-power, and consequently either belong to the class of customary means of subsistence, or are capable of supplying the place of those means. But the value of a commodity is determined, not only by the quantity of labour which the labourer directly bestows upon that commodity, but also by the labour contained in the means of production. For instance, the value of a pair of boots depends not only on the cobbler's labour, but also on the value of the leather, wax, thread, &c. Hence, a fall in the value of labour-power is also brought about by an increase in the productiveness of

labour, and by a corresponding cheapening of commodities in those industries which supply the instruments of labour and the raw material, that form the material elements of the constant capital required for producing the necessaries of life. But an increase in the productiveness of labour in those branches of industry which supply neither the necessaries of life, nor the means of production for such necessaries, leaves the value of labour-power undisturbed.

The cheapened commodity, of course, causes only a pro tanto fall in the value of labour-power, a fall proportional to the extent of that commodity's employment in the reproduction of labour-power. Shirts, for instance, are a necessary means of subsistence, but are only one out of many. The totality of the necessaries of life consists, however, of various commodities, each the product of a distinct industry; and the value of each of those commodities enters as a component part into the value of labour-power. This latter value decreases with the decrease of the labour-time necessary for its reproduction; the total decrease being the sum of all the different curtailments of labour-time effected in those various and distinct industries. This general result is treated, here, as if it were the immediate result directly aimed at in each individual case. Whenever an individual capitalist cheapens shirts, for instance, by increasing the productiveness of labour he by no means necessarily aims at reducing the value of labour-power and shortening, pro tanto the necessary labour-time. But it is only in so far as he ultimately contributes to this result, that he assists in raising the general rate of surplus-value.[3] The general and necessary tendencies of capital must be distinguished from their forms of manifestation.

It is not our intention to consider, here, the way in which the laws, immanent in capitalist production, manifest themselves in the movements of individual masses of capital, where they assert themselves as coercive laws of competition, and are brought home to the mind and consciousness of the individual capitalist as the directing motives of his operations. But this much is clear; a scientific analysis of competition is not possible, before we have a conception of the inner nature of capital, just as the apparent motions of the heavenly bodies are not intelligible to any but him, who is acquainted with their real motions, motions which are not directly perceptible by the senses. Nevertheless, for the better comprehension of the production of relative surplus-value, we may add the following remarks, in which we assume nothing more than the results we have already obtained.

If one hour's labour is embodied in sixpence, a value of six shillings will be produced in a working day of 12 hours. Suppose, that with the prevailing productiveness of labour, 12 articles are produced in these 12 hours. Let the value of the means of production used up in each article be sixpence. Under these circumstances, each article costs one shilling: sixpence for the value of the means of production, and sixpence for the value newly added in working with those means. Now let some one capitalist contrive to double the productiveness of labour, and to produce in the working day of 12 hours, 24 instead of 12 such articles. The value of the means of production remaining the same, the value of each article will fall to ninepence, made up of sixpence for the value of the means of production and threepence for the value newly added by the labour. Despite the doubled productiveness of labour, the day's labour creates, as before, a new value of six shillings and no more, which, however, is now spread over twice as many articles. Of this value each article now has embodied in it 1/24th, instead of 1/12th, threepence instead of sixpence; or, what amounts to the same thing, only half an hour's instead of a whole hour's labour-time, is now added to the means of production while they are being transformed into each article. The individual value of these articles is now below their social value; in other words, they have cost less labour-time than the great bulk of the same article produced under the average social conditions. Each article costs, on an average, one shilling, and represents 2 hours of social labour; but under the altered mode of production it costs only ninepence, or contains only 1½ hours'

labour. The real value of a commodity is, however, not its individual value, but its social value; that is to say, the real value is not measured by the labour-time that the article in each individual case costs the producer, but by the labour-time socially required for its production. If therefore, the capitalist who applies the new method, sells his commodity at its social value of one shilling, he sells it for threepence above its individual value, and thus realises an extra surplus-value of threepence. On the other hand, the working day of 12 hours is, as regards him, now represented by 24 articles instead of 12. Hence, in order to get rid of the product of one working day, the demand must be double what it was, i.e., the market must become twice as extensive. Other things being equal, his commodities can command a more extended market only by a diminution of their prices. He will therefore sell them above their individual but under their social value, say at tenpence each. By this means he still squeezes an extra surplus-value of one penny out of each. This augmentation of surplus-value is pocketed by him, whether his commodities belong or not to the class of necessary means of subsistence that participate in determining the general value of labour-power. Hence, independently of this latter circumstance, there is a motive for each individual capitalist to cheapen his commodities, by increasing the productiveness of labour.

Nevertheless, even in this case, the increased production of surplus-value arises from the curtailment of the necessary labour-time, and from the corresponding prolongation of the surplus labour.[4] Let the necessary labour-time amount to 10 hours, the value of a day's labour-power to five shillings, the surplus labour-time to 2 hours, and the daily surplus-value to one shilling. But the capitalist now produces 24 articles, which he sells at tenpence a-piece, making twenty shillings in all. Since the value of the means of production is twelve shillings, 14 2/5 of these articles merely replace the constant capital advanced. The labour of the 12 hours' working day is represented by the remaining 9 3/5 articles. Since the price of the labour-power is five shillings, 6 articles represent the necessary labour-time, and 3 3/5 articles the surplus labour. The ratio of the necessary labour to the surplus labour, which under average social conditions was 5:1, is now only 5:3. The same result may be arrived at in the following way. The value of the product of the working day of 12 hours is twenty shillings. Of this sum, twelve shillings belong to the value of the means of production, a value that merely re-appears. There remain eight shillings, which are the expression in money, of the value newly created during the working day. This sum is greater than the sum in which average social labour of the same kind is expressed: twelve hours of the latter labour are expressed by six shillings only. The exceptionally productive labour operates as intensified labour; it creates in equal periods of time greater values than average social labour of the same kind. (See Ch. I. Sect 2. p. 44.) But our capitalist still continues to pay as before only five shillings as the value of a day's labour-power. Hence, instead of 10 hours, the labourer need now work only 7½ hours, in order to reproduce this value. His surplus labour is, therefore, increased by 2½ hours, and the surplus-value he produces grows from one, into three shillings. Hence, the capitalist who applies the improved method of production, appropriates to surplus labour a greater portion of the working day, than the other capitalists in the same trade. He does individually, what the whole body of capitalists engaged in producing relative surplus-value, do collectively. On the other hand, however, this extra surplus-value vanishes, so soon as the new method of production has become general, and has consequently caused the difference between the individual value of the cheapened commodity and its social value to vanish. The law of the determination of value by labour-time, a law which brings under its sway the individual capitalist who applies the new method of production, by compelling him to sell his goods under their social value, this same law, acting as a coercive law of competition, forces his competitors to adopt the new method.[5] The general rate of surplus-value is, therefore, ultimately affected by the whole process, only when the increase in the productiveness of labour, has seized upon those branches

of production that are connected with, and has cheapened those commodities that form part of, the necessary means of subsistence, and are therefore elements of the value of labour-power.

The value of commodities is in inverse ratio to the productiveness of labour. And so, too, is the value of labour-power, because it depends on the values of commodities. Relative surplus-value is, on the contrary, directly proportional to that productiveness. It rises with rising and falls with falling productiveness. The value of money being assumed to be constant, an average social working day of 12 hours always produces the same new value, six shillings, no matter how this sum may be apportioned between surplus-value and wages. But if, in consequence of increased productiveness, the value of the necessaries of life fall, and the value of a day's labour-power be thereby reduced from five shillings to three, the surplus-value increases from one shilling to three. Ten hours were necessary for the reproduction of the value of the labour-power; now only six are required. Four hours have been set free, and can be annexed to the domain of surplus labour. Hence there is immanent in capital an inclination and constant tendency, to heighten the productiveness of labour, in order to cheapen commodities, and by such cheapening to cheapen the labourer himself.[6]

The value of a commodity is, in itself, of no interest to the capitalist. What alone interests him, is the surplus-value that dwells in it, and is realisable by sale. Realisation of the surplus-value necessarily carries with it the refunding of the value that was advanced. Now, since relative surplus-value increases in direct proportion to the development of the productiveness of labour, while, on the other hand, the value of commodities diminishes in the same proportion; since one and the same process cheapens commodities, and augments the surplus-value contained in them; we have here the solution of the riddle: why does the capitalist, whose sole concern is the production of exchange-value, continually strive to depress the exchange-value of commodities? A riddle with which Quesnay, one of the founders of Political Economy, tormented his opponents, and to which they could give him no answer.

"You acknowledge," he says, "that the more expenses and the cost of labour can, in the manufacture of industrial products, be reduced without injury to production, the more advantageous is such reduction, because it diminishes the price of the finished article. And yet, you believe that the production of wealth, which arises from the labour of the workpeople, consists in the augmentation of the exchange-value of their products."[7]

The shortening of the working day is, therefore, by no means what is aimed at, in capitalist production, when labour is economised by increasing its productiveness.[8] It is only the shortening of the labour-time, necessary for the production of a definite quantity of commodities, that is aimed at. The fact that the workman, when the productiveness of his labour has been increased, produces, say 10 times as many commodities as before, and thus spends one-tenth as much labour-time on each, by no means prevents him from continuing to work 12 hours as before, nor from producing in those 12 hours 1,200 articles instead of 120. Nay, more, his working day may be prolonged at the same time, so as to make him produce, say 1,400 articles in 14 hours. In the treatises, therefore, of economists of the stamp of MacCulloch, Ure, Senior, and *tutti quanti* [the like], we may read upon one page, that the labourer owes a debt of gratitude to capital for developing his productiveness, because the necessary labour-time is thereby shortened, and on the next page, that he must prove his gratitude by working in future for 15 hours instead of 10. The object of all development of the productiveness of labour, within the limits of capitalist production, is to shorten that part of the working day, during which the workman must labour for his own benefit, and by that very shortening, to lengthen the other part of the day, during which he is at liberty to work gratis for the capitalist. How far this result is also attainable, without

cheapening commodities, will appear from an examination of the particular modes of producing relative surplus-value, to which examination we now proceed.

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[1] The value of his average daily wages is determined by what the labourer requires "so as to live, labour, and generate." (Wm. Petty: "Political Anatomy of Ireland," 1672, p. 64.) "The price of Labour is always constituted of the price of necessaries ... whenever ... the labouring man's wages will not, suitably to his low rank and station, as a labouring man, support such a family as is often the lot of many of them to have," he does not receive proper wages. (J. Vanderlint, l.c., p. 15.) "Le simple ouvrier, qui n'a que ses bras et son industrie, n'a rien qu'autant qu'il parvient à vendre à d'autres sa peine... En tout genre de travail il doit arriver, et il arrive en effet, que le salaire de l'ouvrier se borne à ce qui lui est nécessaire pour lui procurer sa subsistance." [The mere workman, who has only his arms and his industry, has nothing unless he succeeds in selling his labour to others ... In every kind of work it cannot fail to happen, as a matter of fact it does happen, that the wages of the workman are limited to what is necessary to procure him his subsistence.] (Turgot, "Réflexions, &c.," *Oeuvres*, éd. Daire t. I, p. 10.) "The price of the necessaries of life is, in fact, the cost of producing labour." (Malthus, "Inquiry into, &c., Rent," London, 1815, p. 48, note.)

[2] Quando si perfezionano le arti, che non è altro che la scoperta di nuove vie, onde si possa compiere una manufattura con meno gente o (che è lo stesso) in minor tempo di prima." (Galiani, l.c., p. 159.) "L'économie sur les frais de production ne peut donc être autre chose que l'économie sur la quantité de travail employé pour produire." [Perfection of the crafts means nothing other than the discovery of new ways of making a product with fewer people, or (which is the same thing) in less time than previously] (Sismondi, "Études," t. I. p. 22.)

[3] "Let us suppose ... the products ... of the manufacturer are doubled by improvement in machinery ... he will be able to clothe his workmen by means of a smaller proportion of the entire return ... and thus his profit will be raised. But in no other way will it be influenced." (Ramsay, l.c., pp. 168, 169.)

[4] "A man's profit does not depend upon his command of the produce of other men's labour, but upon his command of labour itself. If he can sell his goods at a higher price, while his workmen's wages remain unaltered, he is clearly benefited.... A smaller proportion of what he produces is sufficient to put that labour into motion, and a larger proportion consequently remains for himself." ("Outlines of Pol. Econ." London, 1832, pp. 49, 50.)

[5] "If my neighbour by doing much with little labour, can sell cheap, I must contrive to sell as cheap as he. So that every art, trade, or engine, doing work with labour of fewer hands, and consequently cheaper, begets in others a kind of necessity and emulation, either of using the same art, trade, or engine, or of inventing something like it, that every man may be upon the square, that no man may be able to undersell his neighbour." ("The Advantages of the East India Trade to England," London, 1720, p. 67.)

[6] "In whatever proportion the expenses of a labourer are diminished, in the same proportion will his wages be diminished, if the restraints upon industry are at the same time taken off." ("Considerations Concerning Taking off the Bounty on Corn Exported," &c., London, 1753, p. 7.) "The interest of trade requires, that corn and all provisions should be as cheap as possible; for whatever makes them dear, must make labour dear also ... in all countries, where industry is not restrained, the price of provisions must affect the price of labour. This will always be diminished when the necessaries of life grow cheaper." (I. c., p. 3.) "Wages are decreased in the same proportion as the powers of production increase. Machinery, it is true, cheapens the necessaries of life, but it also cheapens the labourer." ("A Prize Essay on the Comparative Merits of Competition and Co-operation." London, 1834, p. 27.)

[7] "Ils conviennent que plus on peut, sans préjudice, épargner de frais ou de travaux dispendieux dans la fabrication des ouvrages des artisans, plus cette épargne est profitable par la diminution des prix de ces ouvrages. Cependant ils croient que la production de richesse qui résulte des travaux des artisans

consiste dans l'augmentation de la valeur vénale de leurs ouvrages." (Quesnay: "Dialogues sur le Commerce et les Travaux des Artisans." pp. 188, 189.)

[8] "Ces spéculateurs si économes du travail des ouvriers qu'il faudrait qu'ils payassent." [These speculators, who are so economical of the labour of workers they would have to pay] (J. N. Bidaut: "Du Monopole qui s'établit dans les arts industriels et le commerce." Paris, 1828, p. 13.) "The employer will be always on the stretch to economise time and labour." (Dugald Stewart: Works ed. by Sir W. Hamilton, Edinburgh, v., viii., 1855. "Lectures on Polit. Econ.," p. 318.) "Their (the capitalists') interest is that the productive powers of the labourers they employ should be the greatest possible. On promoting that power their attention is fixed and almost exclusively fixed." (R. Jones: l.c., Lecture III.)

Chapter 13: Co-operation

Capitalist production only then really begins, as we have already seen, when each individual capital employs simultaneously a comparatively large number of labourers; when consequently the labour-process is carried on on an extensive scale and yields, relatively, large quantities of products. A greater number of labourers working together, at the same time, in one place (or, if you will, in the same field of labour), in order to produce the same sort of commodity under the mastership of one capitalist, constitutes, both historically and logically, the starting-point of capitalist production. With regard to the mode of production itself, manufacture, in its strict meaning, is hardly to be distinguished, in its earliest stages, from the handicraft trades of the guilds, otherwise than by the greater number of workmen simultaneously employed by one and the same individual capital. The workshop of the medieval master handicraftsman is simply enlarged.

At first, therefore, the difference is purely quantitative. We have shown that the surplus-value produced by a given capital is equal to the surplus-value produced by each workman multiplied by the number of workmen simultaneously employed. The number of workmen in itself does nor affect, either the rate of surplus-value, or the degree of exploitation of labour-power. If a working day of 12 hours be embodied in six shillings, 1,200 such days will be embodied in 1,200 times 6 shillings. In one case 12 × 1,200 working-hours, and in the other 12 such hours are incorporated in the product. In the production of value a number of workmen rank merely as so many individual workmen; and it therefore makes no difference in the value produced whether the 1,200 men work separately, or united under the control of one capitalist.

Nevertheless, within certain limits, a modification takes place. The labour realised in value, is labour of an average social quality; is consequently the expenditure of average labour-power. Any average magnitude, however, is merely the average of a number of separate magnitudes all of one kind, but differing as to quantity. In every industry, each individual labourer, be he Peter or Paul, differs from the average labourer. These individual differences, or “errors” as they are called in mathematics, compensate one another, and vanish, whenever a certain minimum number of workmen are employed together. The celebrated sophist and sycophant, Edmund Burke, goes so far as to make the following assertion, based on his practical observations as a farmer; viz., that “in so small a platoon” as that of five farm labourers, all individual differences in the labour vanish, and that consequently any given five adult farm labourers taken together, will in the same time do as much work as any other five.[1] But, however that may be, it is clear, that the collective working day of a large number of workmen simultaneously employed, divided by the number of these workmen, gives one day of average social labour. For example, let the working day of each individual be 12 hours. Then the collective working day of 12 men simultaneously employed, consists of 144 hours; and although the labour of each of the dozen men may deviate more or less from average social labour, each of them requiring a different time for the same operation, yet since the working day of each is one-twelfth of the collective working day of 144 hours, it possesses the qualities of an average social working day. From the point of view, however, of the capitalist who employs these 12 men, the working day is that of the whole dozen. Each individual man’s day is an aliquot part of the collective working day, no matter whether the 12 men assist one another in their work, or whether the connexion between their operations consists merely in the fact, that the men are all working for the same capitalist. But if the 12 men are employed in six pairs, by as many different small masters, it will be quite a matter of chance, whether each of these masters produces the same value, and consequently whether he realises the general rate of

surplus-value. Deviations would occur in individual cases. If one workman required considerably more time for the production of a commodity than is socially necessary, the duration of the necessary labour-time would, in his case, sensibly deviate from the labour-time socially necessary on an average; and consequently his labour would not count as average labour, nor his labour-power as average labour-power. It would either be not saleable at all, or only at something below the average value of labour-power. A fixed minimum of efficiency in all labour is therefore assumed, and we shall see, later on, that capitalist production provides the means of fixing this minimum. Nevertheless, this minimum deviates from the average, although on the other hand the capitalist has to pay the average value of labour-power. Of the six small masters, one would therefore squeeze out more than the average rate of surplus-value, another less. The inequalities would be compensated for the society at large, but not for the individual masters. Thus the laws of the production of value are only fully realised for the individual producer, when he produces as a capitalist, and employs a number of workmen together, whose labour, by its collective nature, is at once stamped as average social labour.[2]

Even without an alteration in the system of working, the simultaneous employment of a large number of labourers effects a revolution in the material conditions of the labour-process. The buildings in which they work, the store-houses for the raw material, the implements and utensils used simultaneously or in turns by the workmen; in short, a portion of the means of production, are now consumed in common. On the one hand, the exchange-value of these means of production is not increased; for the exchange-value of a commodity is not raised by its use-value being consumed more thoroughly and to greater advantage. On the other hand, they are used in common, and therefore on a larger scale than before. A room where twenty weavers work at twenty looms must be larger than the room of a single weaver with two assistants. But it costs less labour to build one workshop for twenty persons than to build ten to accommodate two weavers each; thus the value of the means of production that are concentrated for use in common on a large scale does not increase in direct proportion to the expansion and to the increased useful effect of those means. When consumed in common, they give up a smaller part of their value to each single product; partly because the total value they part with is spread over a greater quantity of products, and partly because their value, though absolutely greater, is, having regard to their sphere of action in the process, relatively less than the value of isolated means of production. Owing to this, the value of a part of the constant capital falls, and in proportion to the magnitude of the fall, the total value of the commodity also falls. The effect is the same as if the means of production had cost less. The economy in their application is entirely owing to their being consumed in common by a large number of workmen. Moreover, this character of being necessary conditions of social labour, a character that distinguishes them from the dispersed and relatively more costly means of production of isolated, independent labourers, or small masters, is acquired even when the numerous workmen assembled together do not assist one another, but merely work side by side. A portion of the instruments of labour acquires this social character before the labour-process itself does so.

Economy in the use of the means of production has to be considered under two aspects. First, as cheapening commodities, and thereby bringing about a fall in the value of labour-power. Secondly, as altering the ratio of the surplus-value to the total capital advanced, i.e., to the sum of the values of the constant and variable capital. The latter aspect will not be considered until we come to the third book, to which, with the object of treating them in their proper connexion, we also relegate many other points that relate to the present question. The march of our analysis compels this splitting up of the subject-matter, a splitting up that is quite in keeping with the spirit of capitalist production. For since, in this mode of production, the workman finds the instruments

of labour existing independently of him as another man's property, economy in their use appears, with regard to him, to be a distinct operation, one that does not concern him, and which, therefore, has no connexion with the methods by which his own personal productiveness is increased.

When numerous labourers work together side by side, whether in one and the same process, or in different but connected processes, they are said to co-operate, or to work in co-operation.[3]

Just as the offensive power of a squadron of cavalry, or the defensive power of a regiment of infantry is essentially different from the sum of the offensive or defensive powers of the individual cavalry or infantry soldiers taken separately, so the sum total of the mechanical forces exerted by isolated workmen differs from the social force that is developed, when many hands take part simultaneously in one and the same undivided operation, such as raising a heavy weight, turning a winch, or removing an obstacle.[4] In such cases the effect of the combined labour could either not be produced at all by isolated individual labour, or it could only be produced by a great expenditure of time, or on a very dwarfed scale. Not only have we here an increase in the productive power of the individual, by means of co-operation, but the creation of a new power, namely, the collective power of masses.[5]

Apart from the new power that arises from the fusion of many forces into one single force, mere social contact begets in most industries an emulation and a stimulation of the animal spirits that heighten the efficiency of each individual workman. Hence it is that a dozen persons working together will, in their collective working day of 144 hours, produce far more than twelve isolated men each working 12 hours, or than one man who works twelve days in succession.[6] The reason of this is that man is, if not as Aristotle contends, a political,[7] at all events a social animal.

Although a number of men may be occupied together at the same time on the same, or the same kind of work, yet the labour of each, as a part of the collective labour, may correspond to a distinct phase of the labour-process, through all whose phases, in consequence of co-operation, the subject of their labour passes with greater speed. For instance, if a dozen masons place themselves in a row, so as to pass stones from the foot of a ladder to its summit, each of them does the same thing; nevertheless, their separate acts form connected parts of one total operation; they are particular phases, which must be gone through by each stone; and the stones are thus carried up quicker by the 24 hands of the row of men than they could be if each man went separately up and down the ladder with his burden.[8] The object is carried over the same distance in a shorter time. Again, a combination of labour occurs whenever a building, for instance, is taken in hand on different sides simultaneously; although here also the co-operating masons are doing the same, or the same kind of work. The 12 masons, in their collective working day of 144 hours, make much more progress with the building than one mason could make working for 12 days, or 144 hours. The reason is, that a body of men working in concert has hands and eyes both before and behind, and is, to a certain degree, omnipresent. The various parts of the work progress simultaneously.

In the above instances we have laid stress upon the point that the men do the same, or the same kind of work, because this, the most simple form of labour in common, plays a great part in co-operation, even in its most fully developed stage. If the work be complicated, then the mere number of the men who co-operate allows of the various operations being apportioned to different hands, and, consequently, of being carried on simultaneously. The time necessary for the completion of the whole work is thereby shortened.[9]

In many industries, there are critical periods, determined by the nature of the process, during which certain definite results must be obtained. For instance, if a flock of sheep has to be shorn, or a field of wheat to be cut and harvested, the quantity and quality of the product depends on the

work being begun and ended within a certain time. In these cases, the time that ought to be taken by the process is prescribed, just as it is in herring fishing. A single person cannot carve a working day of more than, say 12 hours, out of the natural day, but 100 men co-operating extend the working day to 1,200 hours. The shortness of the time allowed for the work is compensated for by the large mass of labour thrown upon the field of production at the decisive moment. The completion of the task within the proper time depends on the simultaneous application of numerous combined working days; the amount of useful effect depends on the number of labourers; this number, however, is always smaller than the number of isolated labourers required to do the same amount of work in the same period.[10] It is owing to the absence of this kind of co-operation that, in the western part of the United States, quantities of corn, and in those parts of East India where English rule has destroyed the old communities, quantities of cotton, are yearly wasted.[11]

On the one hand, co-operation allows of the work being carried on over an extended space; it is consequently imperatively called for in certain undertakings, such as draining, constructing dykes, irrigation works, and the making of canals, roads and railways. On the other hand, while extending the scale of production, it renders possible a relative contraction of the arena. This contraction of arena simultaneous with, and arising from, extension of scale, whereby a number of useless expenses are cut down, is owing to the conglomeration of labourers, to the aggregation of various processes, and to the concentration of the means of production.[12]

The combined working day produces, relatively to an equal sum of isolated working days, a greater quantity of use-values, and, consequently, diminishes the labour-time necessary for the production of a given useful effect. Whether the combined working day, in a given case, acquires this increased productive power, because it heightens the mechanical force of labour, or extends its sphere of action over a greater space, or contracts the field of production relatively to the scale of production, or at the critical moment sets large masses of labour to work, or excites emulation between individuals and raises their animal spirits, or impresses on the similar operations carried on by a number of men the stamp of continuity and many-sidedness, or performs simultaneously different operations, or economises the means of production by use in common, or lends to individual labour the character of average social labour whichever of these be the cause of the increase, the special productive power of the combined working day is, under all circumstances, the social productive power of labour, or the productive power of social labour. This power is due to co-operation itself. When the labourer co-operates systematically with others, he strips off the fetters of his individuality, and develops the capabilities of his species.[13]

As a general rule, labourers cannot co-operate without being brought together: their assemblage in one place is a necessary condition of their co-operation. Hence wage-labourers cannot co-operate, unless they are employed simultaneously by the same capital, the same capitalist, and unless therefore their labour-powers are bought simultaneously by him. The total value of these labour-powers, or the amount of the wages of these labourers for a day, or a week, as the case may be, must be ready in the pocket of the capitalist, before the workmen are assembled for the process of production. The payment of 300 workmen at once, though only for one day, requires a greater outlay of capital, than does the payment of a smaller number of men, week by week, during a whole year. Hence the number of the labourers that co-operate, or the scale of co-operation, depends, in the first instance, on the amount of capital that the individual capitalist can spare for the purchase of labour-power; in other words, on the extent to which a single capitalist has command over the means of subsistence of a number of labourers.

And as with the variable, so it is with the constant capital. For example, the outlay on raw material is 30 times as great, for the capitalist who employs 300 men, as it is for each of the 30

capitalists who employ 10 men. The value and quantity of the instruments of labour used in common do not, it is true, increase at the same rate as the number of workmen, but they do increase very considerably. Hence, concentration of large masses of the means of production in the hands of individual capitalists, is a material condition for the co-operation of wage-labourers, and the extent of the co-operation or the scale of production, depends on the extent of this concentration.

We saw in a former chapter, that a certain minimum amount of capital was necessary, in order that the number of labourers simultaneously employed, and, consequently, the amount of surplus-value produced, might suffice to liberate the employer himself from manual labour, to convert him from a small master into a capitalist, and thus formally to establish capitalist production. We now see that a certain minimum amount is a necessary condition for the conversion of numerous isolated and independent processes into one combined social process.

We also saw that at first, the subjection of labour to capital was only a formal result of the fact, that the labourer, instead of working for himself, works for and consequently under the capitalist. By the co-operation of numerous wage-labourers, the sway of capital develops into a requisite for carrying on the labour-process itself, into a real requisite of production. That a capitalist should command on the field of production, is now as indispensable as that a general should command on the field of battle.

All combined labour on a large scale requires, more or less, a directing authority, in order to secure the harmonious working of the individual activities, and to perform the general functions that have their origin in the action of the combined organism, as distinguished from the action of its separate organs. A single violin player is his own conductor; an orchestra requires a separate one. The work of directing, superintending, and adjusting, becomes one of the functions of capital, from the moment that the labour under the control of capital, becomes co-operative. Once a function of capital, it acquires special characteristics.

The directing motive, the end and aim of capitalist production, is to extract the greatest possible amount of surplus-value,[14] and consequently to exploit labour-power to the greatest possible extent. As the number of the co-operating labourers increases, so too does their resistance to the domination of capital, and with it, the necessity for capital to overcome this resistance by counterpressure. The control exercised by the capitalist is not only a special function, due to the nature of the social labour-process, and peculiar to that process, but it is, at the same time, a function of the exploitation of a social labour-process, and is consequently rooted in the unavoidable antagonism between the exploiter and the living and labouring raw material he exploits.

Again, in proportion to the increasing mass of the means of production, now no longer the property of the labourer, but of the capitalist, the necessity increases for some effective control over the proper application of those means.[15] Moreover, the co-operation of wage labourers is entirely brought about by the capital that employs them. Their union into one single productive body and the establishment of a connexion between their individual functions, are matters foreign and external to them, are not their own act, but the act of the capital that brings and keeps them together. Hence the connexion existing between their various labours appears to them, ideally, in the shape of a preconceived plan of the capitalist, and practically in the shape of the authority of the same capitalist, in the shape of the powerful will of another, who subjects their activity to his aims. If, then, the control of the capitalist is in substance two-fold by reason of the two-fold nature of the process of production itself, which, on the one hand, is a social process for producing use-values, on the other, a process for creating surplus-value in form that control is despotic. As co-operation extends its scale, this despotism takes forms peculiar to itself. Just as at

first the capitalist is relieved from actual labour so soon as his capital has reached that minimum amount with which capitalist production, as such, begins, so now, he hands over the work of direct and constant supervision of the individual workmen, and groups of workmen, to a special kind of wage-labourer. An industrial army of workmen, under the command of a capitalist, requires, like a real army, officers (managers), and sergeants (foremen, overlookers), who, while the work is being done, command in the name of the capitalist. The work of supervision becomes their established and exclusive function. When comparing the mode of production of isolated peasants and artisans with production by slave-labour, the political economist counts this labour of superintendence among the *faux frais* of production.[16] But, when considering the capitalist mode of production, he, on the contrary, treats the work of control made necessary by the co-operative character of the labour-process as identical with the different work of control, necessitated by the capitalist character of that process and the antagonism of interests between capitalist and labourer.[17] It is not because he is a leader of industry that a man is a capitalist; on the contrary, he is a leader of industry because he is a capitalist. The leadership of industry is an attribute of capital, just as in feudal times the functions of general and judge, were attributes of landed property.[18]

The labourer is the owner of his labour-power until he has done bargaining for its sale with the capitalist; and he can sell no more than what he has i.e., his individual, isolated labour-power. This state of things is in no way altered by the fact that the capitalist, instead of buying the labour-power of one man, buys that of 100, and enters into separate contracts with 100 unconnected men instead of with one. He is at liberty to set the 100 men to work, without letting them co-operate. He pays them the value of 100 independent labour-powers, but he does not pay for the combined labour-power of the hundred. Being independent of each other, the labourers are isolated persons, who enter into relations with the capitalist, but not with one another. This co-operation begins only with the labour-process, but they have then ceased to belong to themselves. On entering that process, they become incorporated with capital. As co-operators, as members of a working organism, they are but special modes of existence of capital. Hence, the productive power developed by the labourer when working in co-operation, is the productive power of capital. This power is developed gratuitously, whenever the workmen are placed under given conditions, and it is capital that places them under such conditions. Because this power costs capital nothing, and because, on the other hand, the labourer himself does not develop it before his labour belongs to capital, it appears as a power with which capital is endowed by Nature - a productive power that is immanent in capital.

The colossal effects of simple co-operation are to be seen in the gigantic structures of the ancient Asiatics, Egyptians, Etruscans, &c.

> "It has happened in times past that these Oriental States, after supplying the expenses of their civil and military establishments, have found themselves in possession of a surplus which they could apply to works of magnificence or utility and in the construction of these their command over the hands and arms of almost the entire non-agricultural population has produced stupendous monuments which still indicate their power. The teeming valley of the Nile ... produced food for a swarming non-agricultural population, and this food, belonging to the monarch and the priesthood, afforded the means of erecting the mighty monuments which filled the land.... In moving the colossal statues and vast masses of which the transport creates wonder, human labour almost alone, was prodigally used.... The number of the labourers and the concentration of their efforts sufficed. We see mighty coral reefs rising from the depths of the ocean into islands and firm land,

> yet each individual depositor is puny, weak, and contemptible. The non-agricultural labourers of an Asiatic monarchy have little but their individual bodily exertions to bring to the task, but their number is their strength, and the power of directing these masses gave rise to the palaces and temples, the pyramids, and the armies of gigantic statues of which the remains astonish and perplex us. It is that confinement of the revenues which feed them, to one or a few hands, which makes such undertakings possible."[19]

This power of Asiatic and Egyptian kings, Etruscan theocrats, &c., has in modern society been transferred to the capitalist, whether he be an isolated, or as in joint-stock companies, a collective capitalist.

Co-operation, such as we find it at the dawn of human development, among races who live by the chase,[20] or, say, in the agriculture of Indian communities, is based, on the one hand, on ownership in common of the means of production, and on the other hand, on the fact, that in those cases, each individual has no more torn himself off from the navel-string of his tribe or community, than each bee has freed itself from connexion with the hive. Such co-operation is distinguished from capitalistic co-operation by both of the above characteristics. The sporadic application of co-operation on a large scale in ancient times, in the middle ages, and in modern colonies, reposes on relations of dominion and servitude, principally on slavery. The capitalistic form, on the contrary, pre-supposes from first to last, the free wage-labourer, who sells his labour-power to capital. Historically, however, this form is developed in opposition to peasant agriculture and to the carrying on of independent handicrafts whether in guilds or not.[21] From the standpoint of these, capitalistic co-operation does not manifest itself as a particular historical form of co-operation, but co-operation itself appears to be a historical form peculiar to, and specifically distinguishing, the capitalist process of production.

Just as the social productive power of labour that is developed by co-operation, appears to be the productive power of capital, so co-operation itself, contrasted with the process of production carried on by isolated independent labourers, or even by small employers, appears to be a specific form of the capitalist process of production. It is the first change experienced by the actual labour-process, when subjected to capital. This change takes place spontaneously. The simultaneous employment of a large number of wage-labourers, in one and the same process, which is a necessary condition of this change, also forms the starting-point of capitalist production. This point coincides with the birth of capital itself. If then, on the one hand, the capitalist mode of production presents itself to us historically, as a necessary condition to the transformation of the labour-process into a social process, so, on the other hand, this social form of the labour-process presents itself, as a method employed by capital for the more profitable exploitation of labour, by increasing that labour's productiveness.

In the elementary form, under which we have hitherto viewed it, co-operation is a necessary concomitant of all production on a large scale, but it does not, in itself, represent a fixed form characteristic of a particular epoch in the development of the capitalist mode of production. At the most it appears to do so, and that only approximately, in the handicraft-like beginnings of manufacture,[22] and in that kind of agriculture on a large scale, which corresponds to the epoch of manufacture, and is distinguished from peasant agriculture, mainly by the number of the labourers simultaneously employed, and by the mass of the means of production concentrated for their use. Simple co-operation is always the prevailing form, in those branches of production in which capital operates on a large scale, and division of labour and machinery play but a subordinate part.

Co-operation ever constitutes the fundamental form of the capitalist mode of production, nevertheless the elementary form of co-operation continues to subsist as a particular form of capitalist production side by side with the more developed forms of that mode of production.

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[1] "Unquestionably, there is a good deal of difference between the value of one man's labour and that of another from strength, dexterity, and honest application. But I am quite sure, from my best observation, that any given five men will, in their total, afford a proportion of labour equal to any other five within the periods of life I have stated; that is, that among such five men there will be one possessing all the qualifications of a good workman, one bad, and the other three middling, and approximating to the first, and the last. So that in so small a platoon as that of even five, you will find the full complement of all that five men can earn." (E. Burke, 1. c., pp. 15, 16.) Compare Quételet on the average individual.

[2] Professor Roscher claims to have discovered that one needlewoman employed by Mrs. Roscher during two days, does more work than two needlewomen employed together during one day. The learned professor should not study the capitalist process of production in the nursery, nor under circumstances where the principal personage, the capitalist, is wanting.

[3] "Concours de forces." (Destutt de Tracy, l.c., p. 80.)

[4] "There are numerous operations of so simple a kind as not to admit a division into parts, which cannot be performed without the co-operation of many pairs of hands. I would instance the lifting of a large tree on to a wain ... everything, in short, which cannot be done unless a great many pairs of hands help each other in the same undivided employment and at the same time." (E. G. Wakefield: "A View of the Art of Colonisation." London, 1849, p. 168.)

[5] "As one man cannot, and ten men must strain to lift a ton of weight, yet 100 men can do it only by the strength of a finger of each of them." (John Betters: "Proposals for Raising a Colledge of Industry." London, 1696, p. 21.)

[6] "There is also" (when the same number of men are employed by one farmer on 300 acres, instead of by ten farmers with 30 acres a piece) "an advantage in the proportion of servants, which will not so easily be understood but by practical men; for it is natural to say, as 1 is to 4, so are 3 to 12; but this will not hold good in practice; for in harvest time and many other operations which require that kind of despatch by the throwing many hands together, the work is better and more expeditiously done: f i. in harvest, 2 drivers, 2 loaders, 2 pitchers, 2 rakers, and the rest at the rick, or in the barn, will despatch double the work that the same number of hands would do if divided into different gangs on different farms." ("An Inquiry into the Connexion between the Present Price of Provisions and the Size of Farms." By a Farmer. London, 1773, pp. 7, 8.)

[7] Strictly, Aristotle's definition is that man is by nature a town-citizen. This is quite as characteristic of ancient classical society as Franklin's definition of man, as a tool-making animal, is characteristic of Yankeedom.

[8] "On doit encore remarquer que cette division partielle de travail peut se faire quand même les ouvriers sont occupés d'une même besogne. Des maçons par exemple, occupés à faire passer de mains en mains des briques à un échafaudage supérieur, font tous la même besogne, et pourtant il existe parmi eux une espèce de division de travail, qui consiste en ce que chacun d'eux fait passer la brique par un espace donné, et que tous ensemble la font parvenir beaucoup plus promptement à l'endroit marqué qu'ils ne le feraient si chacun d'eux portait sa brique séparément jusqu'à l'échafaudage supérieur." [It should be noted further that this partial division of labour can occur even when the

workers are engaged in the same task. Masons, for example, engaged in passing bricks from hand to hand to a higher stage of the building, are all performing the same task, and yet there does exist amongst them a sort of division of labour. This consists in the fact that each of them passes the brick through a given space, and, taken together, they make it arrive much more quickly at the required spot than they would do if each of them carried his brick separately to the upper storey] (F. Skarbek: "Théorie des richesses sociales." Paris, 1839, t. I, pp. 97, 98.)

[9] "Est-il question d'exécuter un travail compliqué, plusieurs choses doivent être faites simultanément. L'un en fait une pendant que l'autre en fait une autre, et tous contribuent à l'effet qu'un seul homme n'aurait pu produire. L'un rame pendant que l'autre tient le gouvernail, et qu'un troisième jette le filet on harponne le poisson, et la pêche a un succès impossible sans ce concours." [Is it a question of undertaking a complex piece of labour? Many things must be done simultaneously. One person does one thing, while another does something else, and they all contribute to an effect that a single man would be unable to produce. One rows while the other holds the rudder, and a third casts the net or harpoons the fish; in this way fishing enjoys a success that would be impossible without this co-operation] (Destutt de Tracy, l.c.)

[10] "The doing of it (agricultural work) at the critical juncture is of so much the greater consequence." ("An Inquiry into the Connexion between the Present Price," &c., p. 9.) "In agriculture, there is no more important factor than that of time." (Liebig: "Ueber Theorie und Praxis in der Landwirtschaft." 1856, p. 23.)

[11] "The next evil is one which one would scarcely expect to find in a country which exports more labour than any other in the world, with the exception, perhaps, of China and England – the impossibility of procuring a sufficient number of hands to clean the cotton. The consequence of this is that large quantities of the crop are left unpicked, while another portion is gathered from the ground when it has fallen, and is of course discoloured and partially rotted, so that for want of labour at the proper season the cultivator is actually forced to submit to the loss of a large part of that crop for which England is so anxiously looking." ("Bengal Hurkaru." Bi-Monthly Overland Summary of News, 22nd July, 1861.)

[12] In the progress of culture "all, and perhaps more than all, the capital and labour which once loosely occupied 500 acres, are now concentrated for the more complete tillage of 100." Although "relatively to the amount of capital and labour employed, space is concentrated, it is an enlarged sphere of production, as compared to the sphere of production formerly occupied or worked upon by one single independent agent of production." (R. Jones: "An Essay on the Distribution of Wealth," part I. On Rent. London, 1831. p. 191.)

[13] "La forza di ciascuno uomo è minima, ma la riunione delle minime forze forma una forza totale maggiore anche della somma delle forze medesime fino a che le forze per essere riunite possono diminuere il tempo ed accrescere lo spazio della loro azione." (G. R. Carli, Note to P. Verri, l.c., t. xv., p. 196.)

[14] "Profits ... is the sole end of trade." (J. Vanderlint, l.c., p. 11.)

[15] That Philistine paper, the *Spectator*, states that after the introduction of a sort of partnership between capitalist and workmen in the "Wirework Company of Manchester," "the first result was a sudden decrease in waste, the men not seeing why they should waste their own property any more than any other master's, and waste is, perhaps, next to bad debts, the greatest source of manufacturing loss." The same paper finds that the main defect in the Rochdale co-operative experiments is this: "They showed that associations of workmen could manage shops, mills, and almost all forms of industry with success, and they immediately improved the condition of the men; but then they did not leave a clear place for masters." Quelle horreur!

[16] Professor Cairnes, after stating that the superintendence of labour is a leading feature of production by slaves in the Southern States of North America, continues: “The peasant proprietor (of the North), appropriating the whole produce of his toil, needs no other stimulus to exertion. Superintendence is here completely dispensed with.” (Cairnes, l.c., pp. 48, 49.)

[17] Sir James Steuart, a writer altogether remarkable for his quick eye for the characteristic social distinctions between different modes of production, says: “Why do large undertakings in the manufacturing way ruin private industry, but by coming nearer to the simplicity of slaves?” (“Prin. of Pol. Econ.,” London, 1767, v. I., pp. 167, 168.)

[18] Auguste Comte and his school might therefore have shown that feudal lords are an eternal necessity in the same way that they have done in the case of the lords of capital.

[19] R. Jones. “Textbook of Lectures,” &c., pp. 77, 78. The ancient Assyrian, Egyptian, and other collections in London, and in other European capitals, make us eye-witnesses of the modes of carrying on that co-operative labour.

[20] Linguet is improbably right, when in his “Théorie des Lois Civiles,” he declares hunting to be the first form of co-operation, and man-hunting (war) one of the earliest forms of hunting.

[21] Peasant agriculture on a small scale, and the carrying on of independent handicrafts, which together form the basis of the feudal mode of production, and after the dissolution of that system, continue side by side with the capitalist mode, also form the economic foundation of the classical communities at their best, after the primitive form of ownership of land in common had disappeared, and before slavery had seized on production in earnest.

[22] “Whether the united skill, industry, and emulation of many together on the same work be not the way to advance it? And whether it had been otherwise possible for England, to have carried on her Woollen Manufacture to so great a perfection?” (Berkeley. “The Querist.” London, 1751, p. 56, par. 521.)

Chapter 14: Division of Labour and Manufacture

Section 1: Two-Fold Origin of Manufacture

That co-operation which is based on division of labour, assumes its typical form in manufacture, and is the prevalent characteristic form of the capitalist process of production throughout the manufacturing period properly so called. That period, roughly speaking, extends from the middle of the 16th to the last third of the 18th century.

Manufacture takes its rise in two ways:

(1.) By the assemblage, in one workshop under the control of a single capitalist, of labourers belonging to various independent handicrafts, but through whose hands a given article must pass on its way to completion. A carriage, for example, was formerly the product of the labour of a great number of independent artificers, such as wheelwrights, harness-makers, tailors, locksmiths, upholsterers, turners, fringe-makers, glaziers, painters, polishers, gilders, &c. In the manufacture of carriages, however, all these different artificers are assembled in one building where they work into one another's hands. It is true that a carriage cannot be gilt before it has been made. But if a number of carriages are being made simultaneously, some may be in the hands of the gilders while others are going through an earlier process. So far, we are still in the domain of simple co-operation, which finds its materials ready to hand in the shape of men and things. But very soon an important change takes place. The tailor, the locksmith, and the other artificers, being now exclusively occupied in carriage-making, each gradually loses, through want of practice, the ability to carry on, to its full extent, his old handicraft. But, on the other hand, his activity now confined in one groove, assumes the form best adapted to the narrowed sphere of action. At first, carriage manufacture is a combination of various independent handicrafts. By degrees, it becomes the splitting up of carriage-making into its various detail processes, each of which crystallises into the exclusive function of a particular workman, the manufacture, as a whole, being carried on by the men in conjunction. In the same way, cloth manufacture, as also a whole series of other manufactures, arose by combining different handicrafts together under the control of a single capitalist.[1]

(2.) Manufacture also arises in a way exactly the reverse of this - namely, by one capitalist employing simultaneously in one workshop a number of artificers, who all do the same, or the same kind of work, such as making paper, type, or needles. This is co-operation in its most elementary form. Each of these artificers (with the help, perhaps, of one or two apprentices), makes the entire commodity, and he consequently performs in succession all the operations necessary for its production. He still works in his old handicraft-like way. But very soon external circumstances cause a different use to be made of the concentration of the workmen on one spot, and of the simultaneousness of their work. An increased quantity of the article has perhaps to be delivered within a given time. The work is therefore re-distributed. Instead of each man being allowed to perform all the various operations in succession, these operations are changed into disconnected, isolated ones, carried on side by side; each is assigned to a different artificer, and the whole of them together are performed simultaneously by the co-operating workmen. This accidental repartition gets repeated, develops advantages of its own, and gradually ossifies into a systematic division of labour. The commodity, from being the individual product of an independent artificer, becomes the social product of a union of artificers, each of whom performs one, and only one, of the constituent partial operations. The same operations which, in the case of a papermaker belonging to a German Guild, merged one into the other as the successive acts of one artificer, became in the Dutch paper manufacture so many partial operations carried on side

by side by numerous co-operating labourers. The needlemaker of the Nuremberg Guild was the cornerstone on which the English needle manufacture was raised. But while in Nuremberg that single artificer performed a series of perhaps 20 operations one after another, in England it was not long before there were 20 needlemakers side by side, each performing one alone of those 20 operations, and in consequence of further experience, each of those 20 operations was again split up, isolated, and made the exclusive function of a separate workman.

The mode in which manufacture arises, its growth out of handicrafts, is therefore two-fold. On the one hand, it arises from the union of various independent handicrafts, which become stripped of their independence and specialised to such an extent as to be reduced to mere supplementary partial processes in the production of one particular commodity. On the other hand, it arises from the co-operation of artificers of one handicraft; it splits up that particular handicraft into its various detail operations, isolating, and making these operations independent of one another up to the point where each becomes the exclusive function of a particular labourer. On the one hand, therefore, manufacture either introduces division of labour into a process of production, or further develops that division; on the other hand, it unites together handicrafts that were formerly separate. But whatever may have been its particular starting-point, its final form is invariably the same - a productive mechanism whose parts are human beings.

For a proper understanding of the division of labour in manufacture, it is essential that the following points be firmly grasped. First, the decomposition of a process of production into its various successive steps coincides, here, strictly with the resolution of a handicraft into its successive manual operations. Whether complex or simple, each operation has to be done by hand, retains the character of a handicraft, and is therefore dependent on the strength, skill, quickness, and sureness, of the individual workman in handling his tools. The handicraft continues to be the basis. This narrow technical basis excludes a really scientific analysis of any definite process of industrial production, since it is still a condition that each detail process gone through by the product must be capable of being done by hand and of forming, in its way, a separate handicraft. It is just because handicraft skill continues, in this way, to be the foundation of the process of production, that each workman becomes exclusively assigned to a partial function, and that for the rest of his life, his labour-power is turned into the organ of this detail function.

Secondly, this division of labour is a particular sort of co-operation, and many of its disadvantages spring from the general character of co-operation, and not from this particular form of it.

Section 2: The Detail Labourer and his Implements

If we now go more into detail, it is, in the first place, clear that a labourer who all his life performs one and the same simple operation, converts his whole body into the automatic, specialised implement of that operation. Consequently, he takes less time in doing it, than the artificer who performs a whole series of operations in succession. But the collective labourer, who constitutes the living mechanism of manufacture, is made up solely of such specialised detail labourers. Hence, in comparison with the independent handicraft, more is produced in a given time, or the productive power of labour is increased.[2] Moreover, when once this fractional work is established as the exclusive function of one person, the methods it employs become perfected. The workman’s continued repetition of the same simple act, and the concentration of his attention on it, teach him by experience how to attain the desired effect with the minimum of exertion. But since there are always several generations of labourers living at one time, and working together at

the manufacture of a given article, the technical skill, the tricks of the trade thus acquired, become established, and are accumulated and handed down.[3]

Manufacture, in fact, produces the skill of the detail labourer, by reproducing, and systematically driving to an extreme within the workshop, the naturally developed differentiation of trades which it found ready to hand in society at large. On the other hand, the conversion of fractional work into the life-calling of one man, corresponds to the tendency shown by earlier societies, to make trades hereditary; either to petrify them into castes, or whenever definite historical conditions beget in the individual a tendency to vary in a manner incompatible with the nature of castes, to ossify them into guilds. Castes and guilds arise from the action of the same natural law, that regulates the differentiation of plants and animals into species and varieties, except that, when a certain degree of development has been reached, the heredity of castes and the exclusiveness of guilds are ordained as a law of society.[4]

> "The muslins of Dakka in fineness, the calicoes and other piece goods of Coromandel in brilliant and durable colours, have never been surpassed. Yet they are produced without capital, machinery, division of labour, or any of those means which give such facilities to the manufacturing interest of Europe. The weaver is merely a detached individual, working a web when ordered of a customer, and with a loom of the rudest construction, consisting sometimes of a few branches or bars of wood, put roughly together. There is even no expedient for rolling up the warp; the loom must therefore be kept stretched to its full length, and becomes so inconveniently large, that it cannot be contained within the hut of the manufacturer, who is therefore compelled to ply his trade in the open air, where it is interrupted by every vicissitude of the weather."[5]

It is only the special skill accumulated from generation to generation, and transmitted from father to son, that gives to the Hindu, as it does to the spider, this proficiency. And yet the work of such a Hindu weaver is very complicated, compared with that of a manufacturing labourer.

An artificer, who performs one after another the various fractional operations in the production of a finished article, must at one time change his place, at another his tools. The transition from one operation to another interrupts the flow of his labour, and creates, so to say, gaps in his working day. These gaps close up so soon as he is tied to one and the same operation all day long; they vanish in proportion as the changes in his work diminish. The resulting increased productive power is owing either to an increased expenditure of labour-power in a given time i.e., to increased intensity of labour or to a decrease in the amount of labour-power unproductively consumed. The extra expenditure of power, demanded by every transition from rest to motion, is made up for by prolonging the duration of the normal velocity when once acquired. On the other hand, constant labour of one uniform kind disturbs the intensity and flow of a man's animal spirits, which find recreation and delight in mere change of activity.

The productiveness of labour depends not only on the proficiency of the workman, but on the perfection of his tools. Tools of the same kind, such as knives, drills, gimlets, hammers, &c., may be employed in different processes; and the same tool may serve various purposes in a single process. But so soon as the different operations of a labour-process are disconnected the one from the other, and each fractional operation acquires in the hands of the detail labourer a suitable and peculiar form, alterations become necessary in the implements that previously served more than one purpose. The direction taken by this change is determined by the difficulties experienced in consequence of the unchanged form of the implement. Manufacture is characterised by the differentiation of the instruments of labour - a differentiation whereby implements of a given sort acquire fixed shapes, adapted to each particular application, and by the specialisation of those

instruments, giving to each special implement its full play only in the hands of a specific detail labourer. In Birmingham alone 500 varieties of hammers are produced, and not only is each adapted to one particular process, but several varieties often serve exclusively for the different operations in one and the same process. The manufacturing period simplifies, improves, and multiplies the implements of labour, by adapting them to the exclusively special functions of each detail labourer.[6] It thus creates at the same time one of the material conditions for the existence of machinery, which consists of a combination of simple instruments.

The detail labourer and his implements are the simplest elements of manufacture. Let us now turn to its aspect as a whole.

Section 3: The Two Fundamental Forms of Manufacture: Heterogeneous Manufacture, Serial Manufacture

The organisation of manufacture has two fundamental forms which, in spite of occasional blending, are essentially different in kind, and, moreover, play very distinct parts in the subsequent transformation of manufacture into modern industry carried on by machinery. This double character arises from the nature of the article produced. This article either results from the mere mechanical fitting together of partial products made independently, or owes its completed shape to a series of connected processes and manipulations.

A locomotive, for instance, consists of more than 5,000 independent parts. It cannot, however, serve as an example of the first kind of genuine manufacture, for it is a structure produced by modern mechanical industry. But a watch can; and William Petty used it to illustrate the division of labour in manufacture. Formerly the individual work of a Nuremberg artificer, the watch has been transformed into the social product of an immense number of detail labourers, such as mainspring makers, dial makers, spiral spring makers, jewelled hole makers, ruby lever makers, hand makers, case makers, screw makers, gilders, with numerous subdivisions, such as wheel makers (brass and steel separate), pin makers, movement makers, acheveur de pignon (fixes the wheels on the axles, polishes the facets, &c.), pivot makers, planteur de finissage (puts the wheels and springs in the works), finisseur de barillet (cuts teeth in the wheels, makes the holes of the right size, &c.), escapement makers, cylinder makers for cylinder escapements, escapement wheel makers, balance wheel makers, raquette makers (apparatus for regulating the watch), the planteur d'échappement (escapement maker proper); then the repasseur de barillet (finishes the box for the spring, &c.), steel polishers, wheel polishers, screw polishers, figure painters, dial enamellers (melt the enamel on the copper), fabricant de pendants (makes the ring by which the case is hung), finisseur de charnière (puts the brass hinge in the cover, &c.), faiseur de secret (puts in the springs that open the case), graveur, ciseleur, polisseur de boîte, &c., &c., and last of all the repasseur, who fits together the whole watch and hands it over in a going state. Only a few parts of the watch pass through several hands; and all these membra disjecta come together for the first time in the hand that binds them into one mechanical whole. This external relation between the finished product, and its various and diverse elements makes it, as well in this case as in the case of all similar finished articles, a matter of chance whether the detail labourers are brought together in one workshop or not. The detail operations may further be carried on like so many independent handicrafts, as they are in the Cantons of Vaud and Neufchâtel; while in Geneva there exist large watch manufactories where the detail labourers directly co-operate under the control of a single capitalist. And even in the latter case the dial, the springs, and the case, are seldom made in the factory itself. To carry on the trade as a manufacture, with concentration of workmen, is, in the watch trade, profitable only under exceptional conditions, because

competition is greater between the labourers who desire to work at home, and because the splitting up of the work into a number of heterogeneous processes, permits but little use of the instruments of labour in common, and the capitalist, by scattering the work, saves the outlay on workshops, &c.[7] Nevertheless the position of this detail labourer who, though he works at home, does so for a capitalist (manufacturer, établisseur), is very different from that of the independent artificer, who works for his own customers.[8]

The second kind of manufacture, its perfected form, produces articles that go through connected phases of development, through a series of processes step by step, like the wire in the manufacture of needles, which passes through the hands of 72 and sometimes even 92 different detail workmen.

In so far as such a manufacture, when first started, combines scattered handicrafts, it lessens the space by which the various phases of production are separated from each other. The time taken in passing from one stage to another is shortened, so is the labour that effectuates this passage.[9] In comparison with a handicraft, productive power is gained, and this gain is owing to the general co-operative character of manufacture. On the other hand, division of labour, which is the distinguishing principle of manufacture, requires the isolation of the various stages of production and their independence of each other. The establishment and maintenance of a connexion between the isolated functions necessitates the incessant transport of the article from one hand to another, and from one process to another. From the standpoint of modern mechanical industry, this necessity stands forth as a characteristic and costly disadvantage, and one that is immanent in the principle of manufacture.[10]

If we confine our attention to some particular lot of raw materials, of rags, for instance, in paper manufacture, or of wire in needle manufacture, we perceive that it passes in succession through a series of stages in the hands of the various detail workmen until completion. On the other hand, if we look at the workshop as a whole, we see the raw material in all the stages of its production at the same time. The collective labourer, with one set of his many hands armed with one kind of tools, draws the wire, with another set, armed with different tools, he, at the same time, straightens it, with another, he cuts it, with another, points it, and so on. The different detail processes, which were successive in time, have become simultaneous, go on side by side in space. Hence, production of a greater quantum of finished commodities in a given time.[11] This simultaneity, it is true, is due to the general co-operative form of the process as a whole; but Manufacture not only finds the conditions for co-operation ready to hand, it also, to some extent, creates them by the sub-division of handicraft labour. On the other hand, it accomplishes this social organisation of the labour-process only by riveting each labourer to a single fractional detail.

Since the fractional product of each detail labourer is, at the same time, only a particular stage in the development of one and the same finished article, each labourer, or each group of labourers, prepares the raw material for another labourer or group. The result of the labour of the one is the starting-point for the labour of the other. The one workman therefore gives occupation directly to the other. The labour-time necessary in each partial process, for attaining the desired effect, is learnt by experience; and the mechanism of Manufacture, as a whole, is based on the assumption that a given result will be obtained in a given time. It is only on this assumption that the various supplementary labour-processes can proceed uninterruptedly, simultaneously, and side by side. It is clear that this direct dependence of the operations, and therefore of the labourers, on each other, compels each one of them to spend on his work no more than the necessary time, and thus a continuity, uniformity, regularity, order,[12] and even intensity of labour, of quite a different kind, is begotten than is to be found in an independent handicraft or even in simple co-operation. The

rule, that the labour-time expended on a commodity should not exceed that which is socially necessary for its production, appears, in the production of commodities generally, to be established by the mere effect of competition; since, to express ourselves superficially, each single producer is obliged to sell his commodity at its market-price. In Manufacture, on the contrary, the turning out of a given quantum of product in a given time is a technical law of the process of production itself.[13]

Different operations take, however, unequal periods, and yield therefore, in equal times unequal quantities of fractional products. If, therefore, the same labourer has, day after day, to perform the same operation, there must be a different number of labourers for each operation; for instance, in type manufacture, there are four founders and two breakers to one rubber: the founder casts 2,000 type an hour, the breaker breaks up 4,000, and the rubber polishes 8,000. Here we have again the principle of co-operation in its simplest form, the simultaneous employment of many doing the same thing; only now, this principle is the expression of an organic relation. The division of labour, as carried out in Manufacture, not only simplifies and multiplies the qualitatively different parts of the social collective labourer, but also creates a fixed mathematical relation or ratio which regulates the quantitative extent of those parts i.e., the relative number of labourers, or the relative size of the group of labourers, for each detail operation. It develops, along with the qualitative sub-division of the social labour-process, a quantitative rule and proportionality for that process.

When once the most fitting proportion has been experimentally established for the numbers of the detail labourers in the various groups when producing on a given scale, that scale can be extended only by employing a multiple of each particular group.[14] There is this to boot, that the same individual can do certain kinds of work just as well on a large as on a small scale; for instance, the labour of superintendence, the carriage of the fractional product from one stage to the next, &c. The isolation of such functions, their allotment to a particular labourer, does not become advantageous till after an increase in the number of labourers employed; but this increase must affect every group proportionally.

The isolated group of labourers to whom any particular detail function is assigned, is made up of homogeneous elements, and is one of the constituent parts of the total mechanism. In many manufactures, however, the group itself is an organised body of labour, the total mechanism being a repetition or multiplication of these elementary organisms. Take, for instance, the manufacture of glass bottles. It may be resolved into three essentially different stages. First, the preliminary stage, consisting of the preparation of the components of the glass, mixing the sand and lime, &c., and melting them into a fluid mass of glass.[15] Various detail labourers are employed in this first stage, as also in the final one of removing the bottles from the drying furnace, sorting and packing them, &c. In the middle, between these two stages, comes the glass melting proper, the manipulation of the fluid mass. At each mouth of the furnace, there works a group, called “the hole,” consisting of one bottlemaker or finisher, one blower, one gatherer, one putter-up or whetter-off, and one taker-in. These five detail workers are so many special organs of a single working organism that acts only as a whole, and therefore can operate only by the direct co-operation of the whole five. The whole body is paralysed if but one of its members be wanting. But a glass furnace has several openings (in England from 4 to 6), each of which contains an earthenware melting-pot full of molten glass, and employs a similar five-membered group of workers. The organisation of each group is based on division of labour, but the bond between the different groups is simple co-operation, which, by using in common one of the means of production, the furnace, causes it to be more economically consumed. Such a furnace, with its 4-6 groups, constitutes a glass house; and a glass manufactory comprises a number of

such glass houses, together with the apparatus and workmen requisite for the preparatory and final stages.

Finally, just as Manufacture arises in part from the combination of various handicrafts, so, too, it develops into a combination of various manufactures. The larger English glass manufacturers, for instance, make their own earthenware melting-pots, because, on the quality of these depends, to a great extent, the success or failure of the process. The manufacture of one of the means of production is here united with that of the product. On the other hand, the manufacture of the product may be united with other manufactures, of which that product is the raw material, or with the products of which it is itself subsequently mixed. Thus, we find the manufacture of flint glass combined with that of glass cutting and brass founding; the latter for the metal settings of various articles of glass. The various manufactures so combined form more or less separate departments of a larger manufacture, but are at the same time independent processes, each with its own division of labour. In spite of the many advantages offered by this combination of manufactures, it never grows into a complete technical system on its own foundation. That happens only on its transformation into an industry carried on by machinery.

Early in the manufacturing period, the principle of lessening the necessary labour-time in the production of commodities[16], was accepted and formulated: and the use of machines, especially for certain simple first processes that have to be conducted on a very large scale, and with the application of great force, sprang up here and there. Thus, at an early period in paper manufacture, the tearing up of the rags was done by paper-mills; and in metal works, the pounding of the ores was effected by stamping mills.[17] The Roman Empire had handed down the elementary form of all machinery in the water-wheel.[18]

The handicraft period bequeathed to us the great inventions of the compass, of gunpowder, of type-printing, and of the automatic clock. But, on the whole, machinery played that subordinate part which Adam Smith assigns to it in comparison with division of labour.[19] The sporadic use of machinery in the 17th century was of the greatest importance, because it supplied the great mathematicians of that time with a practical basis and stimulant to the creation of the science of mechanics.

The collective labourer, formed by the combination of a number of detail labourers, is the machinery specially characteristic of the manufacturing period. The various operations that are performed in turns by the producer of a commodity, and coalesce one with another during the progress of production, lay claim to him in various ways. In one operation he must exert more strength, in another more skill, in another more attention; and the same individual does not possess all these qualities in an equal degree. After Manufacture has once separated, made independent, and isolated the various operations, the labourers are divided, classified, and grouped according to their predominating qualities. If their natural endowments are, on the one hand, the foundation on which the division of labour is built up, on the other hand, Manufacture, once introduced, develops in them new powers that are by nature fitted only for limited and special functions. The collective labourer now possesses, in an equal degree of excellence, all the qualities requisite for production, and expends them in the most economical manner, by exclusively employing all his organs, consisting of particular labourers, or groups of labourers, in performing their special functions.[20] The one-sidedness and the deficiencies of the detail labourer become perfections when he is a part of the collective labourer.[21] The habit of doing only one thing converts him into a never failing instrument, while his connexion with the whole mechanism compels him to work with the regularity of the parts of a machine.[22]

Since the collective labourer has functions, both simple and complex, both high and low, his members, the individual labour-powers, require different degrees of training, and must therefore

have different values. Manufacture, therefore, develops a hierarchy of labour-powers, to which there corresponds a scale of wages. If, on the one hand, the individual labourers are appropriated and annexed for life by a limited function; on the other hand, the various operations of the hierarchy are parcelled out among the labourers according to both their natural and their acquired capabilities.[23] Every process of production, however, requires certain simple manipulations, which every man is capable of doing. They too are now severed from their connexion with the more pregnant moments of activity, and ossified into exclusive functions of specially appointed labourers. Hence, Manufacture begets, in every handicraft that it seizes upon, a class of so-called unskilled labourers, a class which handicraft industry strictly excluded. If it develops a one-sided speciality into a perfection, at the expense of the whole of a man's working capacity, it also begins to make a speciality of the absence of all development. Alongside of the hierarchic gradation there steps the simple separation of the labourers into skilled and unskilled. For the latter, the cost of apprenticeship vanishes; for the former, it diminishes, compared with that of artificers, in consequence of the functions being simplified. In both cases the value of labour-power falls.[24] An exception to this law holds good whenever the decomposition of the labour-process begets new and comprehensive functions, that either had no place at all, or only a very modest one, in handicrafts. The fall in the value of labour-power, caused by the disappearance or diminution of the expenses of apprenticeship, implies a direct increase of surplus-value for the benefit of capital; for everything that shortens the necessary labour-time required for the reproduction of labour-power, extends the domain of surplus labour.

Section 4: Division of Labour in Manufacture, and Division of Labour in Society

We first considered the origin of Manufacture, then its simple elements, then the detail labourer and his implements, and finally, the totality of the mechanism. We shall now lightly touch upon the relation between the division of labour in manufacture, and the social division of labour, which forms the foundation of all production of commodities.

If we keep labour alone in view, we may designate the separation of social production into its main divisions or *genera* – viz., agriculture, industries, &c., as division of labour in general, and the splitting up of these families into species and sub-species, as division of labour in particular, and the division of labour within the workshop as division of labour in singular or in detail.[25]

Division of labour in a society, and the corresponding tying down of individuals to a particular calling, develops itself, just as does the division of labour in manufacture, from opposite starting-points. Within a family,[26] and after further development within a tribe, there springs up naturally a division of labour, caused by differences of sex and age, a division that is consequently based on a purely physiological foundation, which division enlarges its materials by the expansion of the community, by the increase of population, and more especially, by the conflicts between different tribes, and the subjugation of one tribe by another. On the other hand, as I have before remarked, the exchange of products springs up at the points where different families, tribes, communities, come in contact; for, in the beginning of civilisation, it is not private individuals but families, tribes, &c., that meet on an independent footing. Different communities find different means of production, and different means of subsistence in their natural environment. Hence, their modes of production, and of living, and their products are different. It is this spontaneously developed difference which, when different communities come in contact, calls forth the mutual exchange of products, and the consequent gradual conversion of those products into commodities. Exchange does not create the differences between the spheres of production, but brings what are

already different into relation, and thus converts them into more or less inter-dependent branches of the collective production of an enlarged society. In the latter case, the social division of labour arises from the exchange between spheres of production, that are originally distinct and independent of one another. In the former, where the physiological division of labour is the starting-point, the particular organs of a compact whole grow loose, and break off, principally owing to the exchange of commodities with foreign communities, and then isolate themselves so far, that the sole bond, still connecting the various kinds of work, is the exchange of the products as commodities. In the one case, it is the making dependent what was before independent; in the other case, the making independent what was before dependent.

The foundation of every division of labour that is well developed, and brought about by the exchange of commodities, is the separation between town and country.[27] It may be said, that the whole economic history of society is summed up in the movement of this antithesis. We pass it over, however, for the present.

Just as a certain number of simultaneously employed labourers are the material pre-requisites for division of labour in manufacture, so are the number and density of the population, which here correspond to the agglomeration in one workshop, a necessary condition for the division of labour in society.[28] Nevertheless, this density is more or less relative. A relatively thinly populated country, with well-developed means of communication, has a denser population than a more numerously populated country, with badly-developed means of communication; and in this sense the Northern States of the American Union, for instance, are more thickly populated than India.[29]

Since the production and the circulation of commodities are the general pre-requisites of the capitalist mode of production, division of labour in manufacture demands, that division of labour in society at large should previously have attained a certain degree of development. Inversely, the former division reacts upon and develops and multiplies the latter. Simultaneously, with the differentiation of the instruments of labour, the industries that produce these instruments, become more and more differentiated.[30] If the manufacturing system seize upon an industry, which, previously, was carried on in connexion with others, either as a chief or as a subordinate industry, and by one producer, these industries immediately separate their connexion, and become independent. If it seize upon a particular stage in the production of a commodity, the other stages of its production become converted into so many independent industries. It has already been stated, that where the finished article consists merely of a number of parts fitted together, the detail operations may re-establish themselves as genuine and separate handicrafts. In order to carry out more perfectly the division of labour in manufacture, a single branch of production is, according to the varieties of its raw material, or the various forms that one and the same raw material may assume, split up into numerous, and to some extent, entirely new manufactures. Accordingly, in France alone, in the first half of the 18th century, over 100 different kinds of silk stuffs were woven, and, in Avignon, it was law, that “every apprentice should devote himself to only one sort of fabrication, and should not learn the preparation of several kinds of stuff at once.” The territorial division of labour, which confines special branches of production to special districts of a country, acquires fresh stimulus from the manufacturing system, which exploits every special advantage.[31] The Colonial system and the opening out of the markets of the world, both of which are included in the general conditions of existence of the manufacturing period, furnish rich material for developing the division of labour in society. It is not the place, here, to go on to show how division of labour seizes upon, not only the economic, but every other sphere of society, and everywhere lays the foundation of that all engrossing system of specialising and sorting men, that development in a man of one single faculty at the expense of all other faculties,

which caused A. Ferguson, the master of Adam Smith, to exclaim: "We make a nation of Helots, and have no free citizens."[32]

But, in spite of the numerous analogies and links connecting them, division of labour in the interior of a society, and that in the interior of a workshop, differ not only in degree, but also in kind. The analogy appears most indisputable where there is an invisible bond uniting the various branches of trade. For instance the cattle-breeder produces hides, the tanner makes the hides into leather, and the shoemaker, the leather into boots. Here the thing produced by each of them is but a step towards the final form, which is the product of all their labours combined. There are, besides, all the various industries that supply the cattle-breeder, the tanner, and the shoemaker with the means of production. Now it is quite possible to imagine, with Adam Smith, that the difference between the above social division of labour, and the division in manufacture, is merely subjective, exists merely for the observer, who, in a manufacture, can see with one glance, all the numerous operations being performed on one spot, while in the instance given above, the spreading out of the work over great areas, and the great number of people employed in each branch of labour, obscure the connexion.[33] But what is it that forms the bond between the independent labours of the cattle-breeder, the tanner, and the shoemaker? It is the fact that their respective products are commodities. What, on the other hand, characterises division of labour in manufactures? The fact that the detail labourer produces no commodities.[34] It is only the common product of all the detail labourers that becomes a commodity.[35] Division of labour in society is brought about by the purchase and sale of the products of different branches of industry, while the connexion between the detail operations in a workshop, is due to the sale of the labour-power of several workmen to one capitalist, who applies it as combined labour-power. The division of labour in the workshop implies concentration of the means of production in the hands of one capitalist; the division of labour in society implies their dispersion among many independent producers of commodities. While within the workshop, the iron law of proportionality subjects definite numbers of workmen to definite functions, in the society outside the workshop, chance and caprice have full play in distributing the producers and their means of production among the various branches of industry. The different spheres of production, it is true, constantly tend to an equilibrium: for, on the one hand, while each producer of a commodity is bound to produce a use-value, to satisfy a particular social want, and while the extent of these wants differs quantitatively, still there exists an inner relation which settles their proportions into a regular system, and that system one of spontaneous growth; and, on the other hand, the law of the value of commodities ultimately determines how much of its disposable working-time society can expend on each particular class of commodities. But this constant tendency to equilibrium, of the various spheres of production, is exercised, only in the shape of a reaction against the constant upsetting of this equilibrium. The *a priori* system on which the division of labour, within the workshop, is regularly carried out, becomes in the division of labour within the society, an *a posteriori*, nature-imposed necessity, controlling the lawless caprice of the producers, and perceptible in the barometrical fluctuations of the market-prices. Division of labour within the workshop implies the undisputed authority of the capitalist over men, that are but parts of a mechanism that belongs to him. The division of labour within the society brings into contact independent commodity-producers, who acknowledge no other authority but that of competition, of the coercion exerted by the pressure of their mutual interests; just as in the animal kingdom, the *bellum omnium contra omnes* [war of all against all – Hobbes] more or less preserves the conditions of existence of every species. The same bourgeois mind which praises division of labour in the workshop, life-long annexation of the labourer to a partial operation, and his complete subjection to capital, as being an organisation of labour that increases its productiveness - that same bourgeois mind denounces with equal vigour every conscious attempt to socially control and regulate the process

of production, as an inroad upon such sacred things as the rights of property, freedom and unrestricted play for the bent of the individual capitalist. It is very characteristic that the enthusiastic apologists of the factory system have nothing more damning to urge against a general organisation of the labour of society, than that it would turn all society into one immense factory.

If, in a society with capitalist production, anarchy in the social division of labour and despotism in that of the workshop are mutual conditions the one of the other, we find, on the contrary, in those earlier forms of society in which the separation of trades has been spontaneously developed, then crystallised, and finally made permanent by law, on the one hand, a specimen of the organisation of the labour of society, in accordance with an approved and authoritative plan, and on the other, the entire exclusion of division of labour in the workshop, or at all events a mere dwarflike or sporadic and accidental development of the same.[36]

Those small and extremely ancient Indian communities, some of which have continued down to this day, are based on possession in common of the land, on the blending of agriculture and handicrafts, and on an unalterable division of labour, which serves, whenever a new community is started, as a plan and scheme ready cut and dried. Occupying areas of from 100 up to several thousand acres, each forms a compact whole producing all it requires. The chief part of the products is destined for direct use by the community itself, and does not take the form of a commodity. Hence, production here is independent of that division of labour brought about, in Indian society as a whole, by means of the exchange of commodities. It is the surplus alone that becomes a commodity, and a portion of even that, not until it has reached the hands of the State, into whose hands from time immemorial a certain quantity of these products has found its way in the shape of rent in kind. The constitution of these communities varies in different parts of India. In those of the simplest form, the land is tilled in common, and the produce divided among the members. At the same time, spinning and weaving are carried on in each family as subsidiary industries. Side by side with the masses thus occupied with one and the same work, we find the "chief inhabitant," who is judge, police, and tax-gatherer in one; the book-keeper, who keeps the accounts of the tillage and registers everything relating thereto; another official, who prosecutes criminals, protects strangers travelling through and escorts them to the next village; the boundary man, who guards the boundaries against neighbouring communities; the water-overseer, who distributes the water from the common tanks for irrigation; the Brahmin, who conducts the religious services; the schoolmaster, who on the sand teaches the children reading and writing; the calendar-Brahmin, or astrologer, who makes known the lucky or unlucky days for seed-time and harvest, and for every other kind of agricultural work; a smith and a carpenter, who make and repair all the agricultural implements; the potter, who makes all the pottery of the village; the barber, the washerman, who washes clothes, the silversmith, here and there the poet, who in some communities replaces the silversmith, in others the schoolmaster. This dozen of individuals is maintained at the expense of the whole community. If the population increases, a new community is founded, on the pattern of the old one, on unoccupied land. The whole mechanism discloses a systematic division of labour; but a division like that in manufactures is impossible, since the smith and the carpenter, &c., find an unchanging market, and at the most there occur, according to the sizes of the villages, two or three of each, instead of one.[37] The law that regulates the division of labour in the community acts with the irresistible authority of a law of Nature, at the same time that each individual artificer, the smith, the carpenter, and so on, conducts in his workshop all the operations of his handicraft in the traditional way, but independently, and without recognising any authority over him. The simplicity of the organisation for production in these self-sufficing communities that constantly reproduce themselves in the same form, and when accidentally destroyed, spring up again on the spot and with the same name[38] - this

simplicity supplies the key to the secret of the unchangeableness of Asiatic societies, an unchangeableness in such striking contrast with the constant dissolution and refounding of Asiatic States, and the never-ceasing changes of dynasty. The structure of the economic elements of society remains untouched by the storm-clouds of the political sky.

The rules of the guilds, as I have said before, by limiting most strictly the number of apprentices and journeymen that a single master could employ, prevented him from becoming a capitalist. Moreover, he could not employ his journeymen in many other handicrafts than the one in which he was a master. The guilds zealously repelled every encroachment by the capital of merchants, the only form of free capital with which they came in contact. A merchant could buy every kind of commodity, but labour as a commodity he could not buy. He existed only on sufferance, as a dealer in the products of the handicrafts. If circumstances called for a further division of labour, the existing guilds split themselves up into varieties, or founded new guilds by the side of the old ones; all this, however, without concentrating various handicrafts in a single workshop. Hence, the guild organisation, however much it may have contributed by separating, isolating, and perfecting the handicrafts, to create the material conditions for the existence of manufacture, excluded division of labour in the workshop. On the whole, the labourer and his means of production remained closely united, like the snail with its shell, and thus there was wanting the principal basis of manufacture, the separation of the labourer from his means of production, and the conversion of these means into capital.

While division of labour in society at large, whether such division be brought about or not by exchange of commodities, is common to economic formations of society the most diverse, division of labour in the workshop, as practised by manufacture, is a special creation of the capitalist mode of production alone.

Section 5: The Capitalistic Character of Manufacture

An increased number of labourers under the control of one capitalist is the natural starting-point, as well of co-operation generally, as of manufacture in particular. But the division of labour in manufacture makes this increase in the number of workmen a technical necessity. The minimum number that any given capitalist is bound to employ is here prescribed by the previously established division of labour. On the other hand, the advantages of further division are obtainable only by adding to the number of workmen, and this can be done only by adding multiples of the various detail groups. But an increase in the variable component of the capital employed necessitates an increase in its constant component, too, in the workshops, implements, &c., and, in particular, in the raw material, the call for which grows quicker than the number of workmen. The quantity of it consumed in a given time, by a given amount of labour, increases in the same ratio as does the productive power of that labour in consequence of its division. Hence, it is a law, based on the very nature of manufacture, that the minimum amount of capital, which is bound to be in the hands of each capitalist, must keep increasing; in other words, that the transformation into capital of the social means of production and subsistence must keep extending.[39]

In manufacture, as well as in simple co-operation, the collective working organism is a form of existence of capital. The mechanism that is made up of numerous individual detail labourers belongs to the capitalist. Hence, the productive power resulting from a combination of labours appears to be the productive power of capital. Manufacture proper not only subjects the previously independent workman to the discipline and command of capital, but, in addition, creates a hierarchic gradation of the workmen themselves. While simple co-operation leaves the mode of working by the individual for the most part unchanged, manufacture thoroughly

revolutionises it, and seizes labour-power by its very roots. It converts the labourer into a crippled monstrosity, by forcing his detail dexterity at the expense of a world of productive capabilities and instincts; just as in the States of La Plata they butcher a whole beast for the sake of his hide or his tallow. Not only is the detail work distributed to the different individuals, but the individual himself is made the automatic motor of a fractional operation,[40] and the absurd fable of Menenius Agrippa, which makes man a mere fragment of his own body, becomes realised.[41] If, at first, the workman sells his labour-power to capital, because the material means of producing a commodity fail him, now his very labour-power refuses its services unless it has been sold to capital. Its functions can be exercised only in an environment that exists in the workshop of the capitalist after the sale. By nature unfitted to make anything independently, the manufacturing labourer develops productive activity as a mere appendage of the capitalist's workshop.[42] As the chosen people bore in their features the sign manual of Jehovah, so division of labour brands the manufacturing workman as the property of capital.

The knowledge, the judgement, and the will, which, though in ever so small a degree, are practised by the independent peasant or handicraftsman, in the same way as the savage makes the whole art of war consist in the exercise of his personal cunning these faculties are now required only for the workshop as a whole. Intelligence in production expands in one direction, because it vanishes in many others. What is lost by the detail labourers, is concentrated in the capital that employs them.[43] It is a result of the division of labour in manufactures, that the labourer is brought face to face with the intellectual potencies of the material process of production, as the property of another, and as a ruling power. This separation begins in simple co-operation, where the capitalist represents to the single workman, the oneness and the will of the associated labour. It is developed in manufacture which cuts down the labourer into a detail labourer. It is completed in modern industry, which makes science a productive force distinct from labour and presses it into the service of capital.[44]

In manufacture, in order to make the collective labourer, and through him capital, rich in social productive power, each labourer must be made poor in individual productive powers.

> "Ignorance is the mother of industry as well as of superstition. Reflection and fancy are subject to err; but a habit of moving the hand or the foot is independent of either. Manufactures, accordingly, prosper most where the mind is least consulted, and where the workshop may ... be considered as an engine, the parts of which are men."[45]

As a matter of fact, some few manufacturers in the middle of the 18th century preferred, for certain operations that were trade secrets, to employ half-idiotic persons.[46]

> "The understandings of the greater part of men," says Adam Smith, "are necessarily formed by their ordinary employments. The man whose whole life is spent in performing a few simple operations ... has no occasion to exert his understanding... He generally becomes as stupid and ignorant as it is possible for a human creature to become."

After describing the stupidity of the detail labourer he goes on:

> "The uniformity of his stationary life naturally corrupts the courage of his mind... It corrupts even the activity of his body and renders him incapable of exerting his strength with vigour and perseverance in any other employments than that to which he has been bred. His dexterity at his own particular trade seems in this manner to be acquired at the expense of his intellectual, social, and martial

> virtues. But in every improved and civilised society, this is the state into which the labouring poor, that is, the great body of the people, must necessarily fall."[47]

For preventing the complete deterioration of the great mass of the people by division of labour, A. Smith recommends education of the people by the State, but prudently, and in homeopathic doses. G. Garnier, his French translator and commentator, who, under the first French Empire, quite naturally developed into a senator, quite as naturally opposes him on this point. Education of the masses, he urges, violates the first law of the division of labour, and with it

> "our whole social system would be proscribed." "Like all other divisions of labour," he says, "that between hand labour and head labour [48] is more pronounced and decided in proportion as society (he rightly uses this word, for capital, landed property and their State) becomes richer. This division of labour, like every other, is an effect of past, and a cause of future progress... ought the government then to work in opposition to this division of labour, and to hinder its natural course? Ought it to expend a part of the public money in the attempt to confound and blend together two classes of labour, which are striving after division and separation?"[49]

Some crippling of body and mind is inseparable even from division of labour in society as a whole. Since, however, manufacture carries this social separation of branches of labour much further, and also, by its peculiar division, attacks the individual at the very roots of his life[50], it is the first to afford the materials for, and to give a start to, industrial pathology.

> "To subdivide a man is to execute him, if he deserves the sentence, to assassinate him if he does not... The subdivision of labour is the assassination of a people." [51]

Co-operation based on division of labour, in other words, manufacture, commences as a spontaneous formation. So soon as it attains some consistence and extension, it becomes the recognised methodical and systematic form of capitalist production. History shows how the division of labour peculiar to manufacture, strictly so called, acquires the best adapted form at first by experience, as it were behind the backs of the actors, and then, like the guild handicrafts, strives to hold fast that form when once found, and here and there succeeds in keeping it for centuries. Any alteration in this form, except in trivial matters, is solely owing to a revolution in the instruments of labour. Modern manufacture wherever it arises - I do not here allude to modern industry based on machinery - either finds the disjecta membra poetae ready to hand, and only waiting to be collected together, as is the case in the manufacture of clothes in large towns, or it can easily apply the principle of division, simply by exclusively assigning the various operations of a handicraft (such as book-binding) to particular men. In such cases, a week's experience is enough to determine the proportion between the numbers of the hands necessary for the various functions.[52]

By decomposition of handicrafts, by specialisation of the instruments of labour, by the formation of detail labourers, and by grouping and combining the latter into a single mechanism, division of labour in manufacture creates a qualitative gradation, and a quantitative proportion in the social process of production; it consequently creates a definite organisation of the labour of society, and thereby develops at the same time new productive forces in the society. In its specific capitalist form - and under the given conditions, it could take no other form than a capitalistic one - manufacture is but a particular method of begetting relative surplus-value, or of augmenting at the expense of the labourer the self-expansion of capital - usually called social wealth, "Wealth of Nations," &c. It increases the social productive power of labour, not only for the benefit of the capitalist instead of for that of the labourer, but it does this by crippling the individual labourers. It creates new conditions for the lordship of capital over labour. If, therefore, on the one hand, it

presents itself historically as a progress and as a necessary phase in the economic development of society, on the other hand, it is a refined and civilised method of exploitation.

Political Economy, which as an independent science, first sprang into being during the period of manufacture, views the social division of labour only from the standpoint of manufacture,[53] and sees in it only the means of producing more commodities with a given quantity of labour, and, consequently, of cheapening commodities and hurrying on the accumulation of capital. In most striking contrast with this accentuation of quantity and exchange-value, is the attitude of the writers of classical antiquity, who hold exclusively by quality and use-value.[54] In consequence of the separation of the social branches of production, commodities are better made, the various bents and talents of men select a suitable field,[55] and without some restraint no important results can be obtained anywhere.[56] Hence both product and producer are improved by division of labour. If the growth of the quantity produced is occasionally mentioned, this is only done with reference to the greater abundance of use-values. There is not a word alluding to exchange-value or to the cheapening of commodities. This aspect, from the standpoint of use-value alone, is taken as well by Plato,[57] who treats division of labour as the foundation on which the division of society into classes is based, as by Xenophon[58], who with characteristic bourgeois instinct, approaches more nearly to division of labour within the workshop. Plato's Republic, in so far as division of labour is treated in it, as the formative principle of the State, is merely the Athenian idealisation of the Egyptian system of castes, Egypt having served as the model of an industrial country to many of his contemporaries also, amongst others to Isocrates,[59] and it continued to have this importance to the Greeks of the Roman Empire.[60]

During the manufacturing period proper, i.e., the period during which manufacture is the predominant form taken by capitalist production, many obstacles are opposed to the full development of the peculiar tendencies of manufacture. Although manufacture creates, as we have already seen, a simple separation of the labourers into skilled and unskilled, simultaneously with their hierarchic arrangement in classes, yet the number of the unskilled labourers, owing to the preponderating influence of the skilled, remains very limited. Although it adapts the detail operations to the various degrees of maturity, strength, and development of the living instruments of labour, thus conducing to exploitation of women and children, yet this tendency as a whole is wrecked on the habits and the resistance of the male labourers. Although the splitting up of handicrafts lowers the cost of forming the workman, and thereby lowers his value, yet for the more difficult detail work, a longer apprenticeship is necessary, and, even where it would be superfluous, is jealously insisted upon by the workmen. In England, for instance, we find the laws of apprenticeship, with their seven years' probation, in full force down to the end of the manufacturing period; and they are not thrown on one side till the advent of Modern Industry. Since handicraft skill is the foundation of manufacture, and since the mechanism of manufacture as a whole possesses no framework, apart from the labourers themselves, capital is constantly compelled to wrestle with the insubordination of the workmen.

> "By the infirmity of human nature," says friend Ure, "it happens that the more skilful the workman, the more self-willed and intractable he is apt to become, and of course the less fit a component of a mechanical system in which ... he may do great damage to the whole"[61]

Hence throughout the whole manufacturing period there runs the complaint of want of discipline among the workmen[62]. And had we not the testimony of contemporary writers, the simple facts, that during the period between the 16th century and the epoch of Modern Industry, capital failed to become the master of the whole disposable working-time of the manufacturing labourers, that manufactures are short-lived, and change their locality from one country to another with the

emigrating or immigrating workmen, these facts would speak volumes. “Order must in one way or another be established,” exclaims in 1770 the oft-cited author of the “Essay on Trade and Commerce.” “Order,” re-echoes Dr. Andrew Ure 66 years later, “Order” was wanting in manufacture based on “the scholastic dogma of division of labour,” and “Arkwright created order.”

At the same time manufacture was unable, either to seize upon the production of society to its full extent, or to revolutionise that production to its very core. It towered up as an economic work of art, on the broad foundation of the town handicrafts, and of the rural domestic industries. At a given stage in its development, the narrow technical basis on which manufacture rested, came into conflict with requirements of production that were created by manufacture itself.

One of its most finished creations was the workshop for the production of the instruments of labour themselves, including especially the complicated mechanical apparatus then already employed.

> A machine-factory, says Ure, “displayed the division of labour in manifold gradations - the file, the drill, the lathe, having each its different workman in the order of skill.” (P. 21.)

This workshop, the product of the division of labour in manufacture, produced in its turn - machines. It is they that sweep away the handicraftsman’s work as the regulating principle of social production. Thus, on the one hand, the technical reason for the life-long annexation of the workman to a detail function is removed. On the other hand, the fetters that this same principle laid on the dominion of capital, fall away.

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[1] To give a more modern instance: The silk spinning and weaving of Lyon and Nîmes “est toute patriarcale; elle emploie beaucoup de femmes et d’enfants, mais sans les épuiser ni les corrompre; elle les laisse dans leur belles valises de la Drôme, du Var, de l’Isère, de Vaucluse, pour y élever des vers et dévider leurs cocons; jamais elle n’entre dans une véritable fabrique. Pour être aussi bien observé ... le principe de la division du travail s’y revêt d’un caractère spécial. Il y a bien des dévideuses, des moulineurs, des teinturiers, des encolleurs, puis des tisserands; mais ils ne sont pas réunis dans un même établissement, ne dépendent pas d’un même maître, tous ils sont indépendants” [... is entirely patriarchal; it employs a large number of women and children, but without exhausting or ruining them; it allows them to stay in their beautiful valleys of the Drôme, the Var, the Isère, the Vaucluse, cultuvating their silkworms and unwinding their cocoons; it never becomes a true factory industry. However, the principle of the division of labour takes on a special character here. There do indeed exist winders, throwsters. dyers, sizers, and finally weavers; but they are not assembled in the same workshop, nor are they dependent on a single master; they are all independent] (A. Blanqui: “Cours, d’Econ. Industrielle.” Recueilli par A. Blaise. Paris, 1838-39, p. 79.) Since Blanqui wrote this, the various independent labourers have, to some extent, been united in factories. [And since Marx wrote the above, the power-loom has invaded these factories, and is now 1886 rapidly superseding the hand-loom. (*Added in the 4th German edition*. The Krefeld silk industry also has its tale to tell anent this subject.) F. E.]

[2] “The more any manufacture of much variety shall be distributed and assigned to different artists, the same must needs be better done and with greater expedition, with less loss of time and labour.” (“The Advantages of the East India Trade,” Lond., 1720, p. 71.)

[3] “Easy labour is transmitted skill.” (Th. Hodgskin, “Popular Political Economy,” p. 48.)

[4] “The arts also have ... in Egypt reached the requisite degree of perfection. For it is the only country where artificers may not in any way meddle with the affairs of another class of citizens, but must follow that calling alone which by law is hereditary in their clan.... In other countries it is found that

tradesmen divide their attention between too many objects. At one time they try agriculture, at another they take to commerce, at another they busy themselves with two or three occupations at once. In free countries, they mostly frequent the assemblies of the people.... In Egypt, on the contrary, every artificer is severely punished if he meddles with affairs of State, or carries on several trades at once. Thus there is nothing to disturb their application to their calling.... Moreover, since, they inherit from their forefathers numerous rules, they are eager to discover fresh advantages" (Diodorus Siculus: Bibl. Hist. I. 1. c., 74.)

[5] "Historical and descriptive account of Brit. India, &c.," by Hugh Murray and James Wilson, &c., Edinburgh 1832, v. II., p. 449. The Indian loom is upright, i.e., the warp is stretched vertically.

[6] Darwin in his epoch-making work on the origin of species, remarks, with reference to the natural organs of plants and animals: "So long as one and the same organ has different kinds of work to perform, a ground for its changeability may possibly be found in this, that natural selection preserves or suppresses each small variation of form less carefully than if that organ were destined for one special purpose alone. Thus, knives that are adapted to cut all sorts of things, may, on the whole, be of one shape; but an implement destined to be used exclusively in one way must have a different shape for every different use."

[7] In the year 1854 Geneva produced 80,000 watches, which is not one-fifth of the production in the Canton of Neufchâtel. La Chaux-de-Fond alone, which we may look upon as a huge watch manufactory, produces yearly twice as many as Geneva. From 1850-61 Geneva produced 720,000 watches. See "Report from Geneva on the Watch Trade" in "Reports by H. M.'s Secretaries of Embassy and Legation on the Manufactures, Commerce, &c., No. 6, 1863." The want of connexion alone, between the processes into which the production of articles that merely consist of parts fitted together is split up, makes it very difficult to convert such a manufacture into a branch of modem industry carried on by machinery; but in the case of a watch there are two other impediments in addition, the minuteness and delicacy of its parts, and its character as an article of luxury. Hence their variety, which is such, that in the best London houses scarcely a dozen watches are made alike in the course of a year. The watch manufactory of Messrs. Vacheron & Constantin, in which machinery has been employed with success, produces at the most three or four different varieties of size and form.

[8] In watchmaking, that classical example of heterogeneous manufacture, we may study with great accuracy the above-mentioned differentiation and specialisation of the instruments of labour caused by the sub-division of handicrafts.

[9] "In so close a cohabitation of the people, the carriage must needs be less." ("The Advantages of the East India Trade," p. 106.)

[10] "The isolation of the different stages of manufacture, consequent upon the employment of manual labour, adds immensely to the cost of production, the loss mainly arising from the mere removals from one process to another." ("The Industry of Nations." Lond., 1855, Part II, p. 200.)

[11] "It (the division of labour) produces also an economy of time by separating the work into its different branches, all of which may be carried on into execution at the same moment.... By carrying on all the different processes at once, which an individual must have executed separately, it becomes possible to produce a multitude of pins completely finished in the same time as a single pin might have been either cut or pointed." (Dugald Stewart, l.c., p. 319.)

[12] "The more variety of artists to every manufacture... the greater the order and regularity of every work, the same must needs be done in less time, the labour must be less." ("The Advantages," &c., p. 68.)

[13] Nevertheless, the manufacturing system, in many branches of industry, attains this result but very imperfectly, because it knows not how to control with certainty the general chemical and physical conditions of the process of production.

[14] "When (from the peculiar nature of the produce of each manufactory), the number of processes into which it is most advantageous to divide it is ascertained, as well as the number of individuals to be employed, then all other manufactories which do not employ a direct multiple of this number will produce the article at a greater cost.... Hence arises one of the causes of the great size of manufacturing establishments." (C. Babbage. "On the Economy of Machinery," 1st ed. London. 1832. Ch. xxi, pp. 172-73.)

[15] In England, the melting-furnace is distinct from the glass-furnace in which the glass is manipulated. In Belgium, one and the same furnace serves for both processes.

[16] This can be seen from W. Petty, John Bellers, Andrew Yarranton, "The Advantages of the East India Trade," and J. Vanderlint, not to mention others.

[17] Towards the end of the 16th century, mortars and sieves were still used in France for pounding and washing ores.

[18] The whole history of the development of machinery can be traced in the history of the corn mill. The factory in England is still a "mill." In German technological works of the first decade of this century, the term "Mühle" is still found in use, not only for all machinery driven by the forces of Nature, but also for all manufactures where apparatus in the nature of machinery is applied.

[19] As will be seen more in detail in the fourth book of this work, Adam Smith has not established a single new proposition relating to division of labour. What, however, characterises him as the political economist par excellence of the period of Manufacture, is the stress he lays on division of labour. The subordinate part which he assigns to machinery gave occasion in the early days of modern mechanical industry to the polemic of Lauderdale, and, at a later period, to that of Ure. A. Smith also confounds differentiation of the instruments of labour, in which the detail labourers themselves took an active part, with the invention of machinery; in this latter, it is not the workmen in manufactories, but learned men, handicraftsman, and even peasants (Brindley), who play a part.

[20] "The master manufacturer, by dividing the work to be executed into different processes, each requiring different degrees of skill or of force, can purchase exactly that precise quantity of both which is necessary for each process; whereas, if the whole work were executed by one workman, that person must possess sufficient skill to perform the most difficult, and sufficient strength to execute the most laborious of the operations into which the article is divided." (Ch. Babbage, l.c., ch. xix.)

[21] For instance, abnormal development of some muscles, curvature of bones, &c.

[22] The question put by one of the Inquiry Commissioners, How the young persons are kept steadily to their work, is very correctly answered by Mr. Wm. Marshall, the general manager of a glass manufactory: "They cannot well neglect their work; when they once begin, they must go on; they are just the same as parts of a machine." ("Children's Empl. Comm.," 4th Rep., 1865, p. 247.)

[23] Dr. Ure, in his apotheosis of Modern Mechanical Industry, brings out the peculiar character of manufacture more sharply than previous economists, who had not his polemical interest in the matter, and more sharply even than his contemporaries Babbage, e.g., who, though much his superior as a mathematician and mechanician, treated mechanical industry from the standpoint of manufacture alone. Ure says, "This appropriation ... to each, a workman of appropriate value and cost was naturally assigned, forms the very essence of division of labour." On the other hand, he describes this division as "adaptation of labour to the different talents of men," and lastly, characterises the whole manufacturing system as "a system for the division or gradation of labour," as "the division of labour into degrees of skill," &c. (Ure, l.c., pp. 19-23 passim.)

[24] "Each handicraftsman being ... enabled to perfect himself by practice in one point, became ... a cheaper workman." (Ure, l.c., p. 19.)

[25] "Division of labour proceeds from the separation of professions the most widely different to that division, where several labourers divide between them the preparation of one and the same product, as in manufacture." (Storch: "Cours d'Econ. Pol.," Paris Edn. t. I., p. 173.) "Nous rencontrons chez les peuples parvenus à un certain degré de civilisation trois genres de divisions d'industrie: la première, que nous nommerons générale, amène la distinction des producteurs en agriculteurs, manufacturiers et commerçants, elle se rapporte aux trois principales branches d'industrie nationale; la seconde qu'on pourrait appeler spéciale, est la division de chaque genre d'industrie en espèces ... la troisième division d'industrie, celle enfin qu'on devrait qualifier de division de la besogne on de travail proprement dit, est celle qui s'établit dans les arts et les métiers séparés ... qui s'établit dans la plupart des manufactures et des ateliers." [Among peoples which have reached a certain level of civilisation, we meet with three kinds of division of labour: the first, which we shall call general, brings about the division of the producers into agriculturalists, manufacturers, and traders, it corresponds to the three main branches of the nation's labour; the second, which one could call particular, is the division of labour of each branch into species. ... The third division of labour, which one could designate as a division of tasks, or of labour properly so called, is that which grows up in the individual crafts and trades ... which is established in the majority of the manufactories and workshops] (Skarbek, l.c., pp. 84, 85.)

[26] *Note to the third edition.* Subsequent very searching study of the primitive condition of man, led the author to the conclusion, that it was not the family that originally developed into the tribe, but that, on the contrary, the tribe was the primitive and spontaneously developed form of human association, on the basis of blood relationship, and that out of the first incipient loosening of the tribal bonds, the many and various forms of the family were afterwards developed. [F. E.]

[27] Sir James Steuart is the economist who has handled this subject best. How little his book, which appeared ten years before the "Wealth of Nations," is known, even at the present time, may be judged from the fact that the admirers of Malthus do not even know that the first edition of the latter's work on population contains, except in the purely declamatory part, very little but extracts from Steuart, and in a less degree, from Wallace and Townsend.

[28] "There is a certain density of population which is convenient, both for social intercourse, and for that combination of powers by which the produce of labour is increased." (James Mill, l.c., p. 50.) "As the number of labourers increases, the productive power of society augments in the compound ratio of that increase, multiplied by the effects of the division of labour." (Th. Hodgskin, l.c., pp. 125, 126.)

[29] In consequence of the great demand for cotton after 1861, the production of cotton, in some thickly populated districts of India, was extended at the expense of rice cultivation. In consequence there arose local famines, the defective means of communication not permitting the failure of rice in one district to be compensated by importation from another.

[30] Thus the fabrication of shuttles formed as early as the 17th century, a special branch of industry in Holland.

[31] Whether the woollen manufacture of England is not divided into several parts or branches appropriated to particular places, where they are only or principally manufactured; fine cloths in Somersetshire, coarse in Yorkshire, long ells at Exeter, soies at Sudbury, crapes at Norwich, linseys at Kendal, blankets at Whitney, and so forth." (Berkeley: "The Querist," 1751, § 520.)

[32] A. Ferguson: "History of Civil Society." Edinburgh, 1767; Part iv, sect. ii., p. 285.

[33] In manufacture proper, he says, the division of labour appears to be greater, because "those employed in every different branch of the work can often be collected into the same workhouse, and

placed at once under the view of the spectator. In those great manufactures, (!) on the contrary, which are destined to supply the great wants of the great body of the people, every different branch of the work employs so great a number of workmen, that it is impossible to collect them all into the same workhouse ... the division is not near so obvious." (A. Smith: "Wealth of Nations," bk. i, ch. i.) The celebrated passage in the same chapter that begins with the words, "Observe the accommodation of the most common artificer or day-labourer in a civilised and thriving country," &c., and then proceeds to depict what an enormous number and variety of industries contribute to the satisfaction of the wants of an ordinary labourer, is copied almost word for word from B. de Mandeville's Remarks to his "Fable of the Bees, or Private Vices, Publick Benefits." (First ed., without the remarks, 1706; with the remarks, 1714.)

[34] "There is no longer anything which we can call the natural reward of individual labour. Each labourer produces only some part of a whole, and each part, having no value or utility in itself, there is nothing on which the labourer can seize, and say: It is my product, this I will keep to myself." ("Labour Defended against the Claims of Capital." Lond., 1825, p. 25.) The author of this admirable work is the Th. Hodgskin I have already cited.

[35] This distinction between division of labour in society and in manufacture, was practically illustrated to the Yankees. One of the new taxes devised at Washington during the civil war, was the duty of 6% "on all industrial products." Question: What is an industrial product? Answer of the legislature: A thing is produced "when it is made," and it is made when it is ready for sale. Now, for one example out of many. The New York and Philadelphia manufacturers had previously been in the habit of "making" umbrellas with all their belongings. But since an umbrella is a *mixtum compositum* of very heterogeneous parts, by degrees these parts became the products of various separate industries, carried on independently in different places. They entered as separate commodities into the umbrella manufactory, where they were fitted together. The Yankees have given to articles thus fitted together, the name of "assembled articles," a name they deserve, for being an assemblage of taxes. Thus the umbrella "assembles," first, 6% on the price of each of its elements, and a further 6% on its own total price.

[36] "On peut... établir en règle générale, que moins l'autorité préside à la division du travail dans l'intérieur de la société, plus la division du travail se développe dans l'intérieur de l'atelier, et plus elle y est soumise à l'autorité d'un seul. Ainsi l'autorité dans l'atelier et celle dans la société, par rapport à la division du travail, sont en raison inverse l'une de l'autre." [It can ... be laid down as a general rule that the less authority presides over the division of labour inside society, the more the division of labour develops inside the workshop, and the more it is subjected there to the authority of a single person. Thus authority in the workshop and authority in society in relation to the division of labour, are in inverse ratio to each other] (Karl Marx, "Misère," &c., pp. 130-131.)

[37] Lieut.-Col. Mark Wilks: "Historical Sketches of the South of India." Lond., 1810-17, v. I., pp. 118-20. A good description of the various forms of the Indian communities is to be found in George Campbell's "Modern India." Lond., 1852.

[38] "Under this simple form ... the inhabitants of the country have lived from time immemorial. The boundaries of the villages have been but seldom altered; and though the villages themselves have been sometimes injured, and even desolated by war, famine, and disease, the same name, the same limits, the same interests, and even the same families, have continued for ages. The inhabitants give themselves no trouble about the breaking up and division of kingdoms; while the village remains entire, they care not to what power it is transferred, or to what sovereign it devolves; its internal economy remains unchanged." (Th. Stamford Raffles, late Lieut. Gov. of Java: "The History of Java." Lond., 1817, Vol. I., p. 285.)

[39] "It is not sufficient that the capital" (the writer should have said the necessary means of subsistence and of production) "required for the subdivision of handicrafts should be in readiness in the society: it must also be accumulated in the hands of the employers in sufficiently large quantities to enable them to conduct their operations on a large scale.... The more the division increases, the more does the constant employment of a given number of labourers require a greater outlay of capital in tools, raw material, &c." (Storch: "Cours d'Econ. Polit." Paris Ed., t. I., pp. 250, 251.) "La concentration des instruments de production et la division du travail sont aussi inséparables l'une de l'autre que le sont, dans le régime politique, la concentration des pouvoirs publics et la division des intérêts privés." [The concentration of the instruments of production and the division of labour are as inseparable one from the other, as are, in the political sphere, the concentration of public powers and the division of private interests.] (Karl Marx, l.c., p. 134.)

[40] Dugald Stewart calls manufacturing labourers "living automatons ... employed in the details of the work." (I. c., p. 318.)

[41] In corals, each individual is, in fact, the stomach of the whole group; but it supplies the group with nourishment, instead of, like the Roman patrician, withdrawing it.

[42] "L'ouvrier qui porte dans ses bras tout un métier, peut aller partout exercer son industrie et trouver des moyens de subsister: l'autre (the manufacturing labourer) n'est qu'un accessoire qui, séparé de ses confrères, n'a plus ni capacité, ni indépendance, et qui se trouve force d'accepter la loi qu'on juge à propos de lui imposer." [The worker who is the master of a whole craft can work and find the means of subsistence anywhere; the other (the manufacturing labourer) is only an appendage who, when he is separated from his fellows, possesses neither capability nor independence, and finds himself forced to accept any law it is thought fit to impose] (Storch, l.c., Petersb. edit., 1815, t. I., p. 204.)

[43] A. Ferguson, l.c., p. 281: "The former may have gained what the other has lost."

[44] "The man of knowledge and the productive labourer come to be widely divided from each other, and knowledge, instead of remaining the handmaid of labour in the hand of the labourer to increase his productive powers ... has almost everywhere arrayed itself against labour ... systematically deluding and leading them (the labourers) astray in order to render their muscular powers entirely mechanical and obedient." (W. Thompson: "An Inquiry into the Principles of the Distribution of Wealth." London, 1824, p. 274.)

[45] A. Ferguson, l.c., p. 280.

[46] J. D. Tuckett: "A History of the Past and Present State of the Labouring Population." Lond., 1846.

[47] A. Smith: "Wealth of Nations," Bk. v., ch. i, art. ii. Being a pupil of A. Ferguson who showed the disadvantageous effects of division of labour, Adam Smith was perfectly clear on this point. In the introduction to his work, where he *ex professo* praises division of labour, he indicates only in a cursory manner that it is the source of social inequalities. It is not till the 5th Book, on the Revenue of the State, that he reproduces Ferguson. In my "Misère de la Philosophie," I have sufficiently explained the historical connexion between Ferguson, A. Smith, Lemontey, and Say, as regards their criticisms of Division of Labour, and have shown, for the first time, that Division of Labour as practised in manufactures, is a specific form of the capitalist mode of production.

[48] Ferguson had already said, l.c., p. 281: "And thinking itself, in this age of separations, may become a peculiar craft."

[49] G. Garnier, vol. V. of his translation of A. Smith, pp. 4-5.

[50] Ramazzini, professor of practical medicine at Padua, published in 1713 his work "De morbis artificum," which was translated into French 1781, reprinted 1841 in the "Encyclopédie des Sciences Médicales. 7me Dis. Auteurs Classiques." The period of Modern Mechanical Industry has, of course, very much enlarged his catalogue of labour's diseases. See "Hygiène physique et morale de l'ouvrier

dans les grandes villes en général et dans la ville de Lyon en particulier. Par le Dr. A. L. Fonteret, Paris, 1858," and "Die Krankheiten, welche verschiednen Ständen, Altern und Geschlechtern eigenthümlich sind. 6 Vols. Ulm, 1860," and others. In 1854 the Society of Arts appointed a Commission of Inquiry into industrial pathology. The list of documents collected by this commission is to be seen in the catalogue of the "Twickenham Economic Museum." Very important are the official "Reports on Public Health." See also Eduard Reich, M. D. "Ueber die Entartung des Menschen," Erlangen, 1868.

[51] (D. Urquhart: "Familiar Words." Lond., 1855, p. 119.) Hegel held very heretical views on division of labour. In his "Rechtsphilosophie" he says: "By well educated men we understand in the first instance, those who can do everything that others do."

[52] The simple belief in the inventive genius exercised a priori by the individual capitalist in division of labour, exists now-a-days only among German professors, of the stamp of Herr Roscher, who, to recompense the capitalist from whose Jovian head division of labour sprang ready formed, dedicates to him "various wages" (diverse *Arbeitslöhne*). The more or less extensive application of division of labour depends on length of purse, not on greatness of genius.

[53] The older writers, like Petty and the anonymous author of "Advantages of the East India Trade," bring out the capitalist character of division of labour as applied in manufacture more than A. Smith does.

[54] Amongst the moderns may be excepted a few writers of the 18th century, like Beccaria and James Harris, who with regard to division of labour almost entirely follow the ancients. Thus, Beccaria: "Ciascuno prova coll'esperienza, che applicando la mano e l'ingegno sempre allo stesso genere di opere e di produtte, egli più facili, più abbondanti e migliori ne traca risultati, di quello che se ciascuno isolatamente le cose tutte a se necessarie soltanto facesse.... Dividendosi in tal maniera per la comune e privata utilità gli uomini in varie classi e condizioni." [Everyone knows from experience that if the hands and the intelligence are always applied to the same kind of work and the same products, these will be produced more easily, in greater abundance, and in higher quality, than if each individual makes for himself all the things he needs ... In this way, men are divided up into various classes and conditions, to their own advantage and to that of the commodity.](Cesare Beccaria: "Elementi di Econ: Pubblica," ed. Custodi, Parte Moderna, t. xi, p. 29.) James Harris, afterwards Earl of Malmesbury, celebrated for the "Diaries" of his embassy at St. Petersburg, says in a note to his "Dialogue Concerning Happiness," Lond., 1741, reprinted afterwards in "Three Treatises, 3 Ed., Lond., 1772: "The whole argument to prove society natural (i.e., by division of employments) ... is taken from the second book of Plato's Republic."

[55] Thus, in the Odyssey xiv., 228, ["Αλλος γαρ ταλλοισιν ανερ επιτερπεται εργοις" For different men take joy in different works] and Archilochus in Sextus Empiricus, ["αλλος αλλω επ εργο καρδιην ιαινεται." men differ as to things cheer their hearts]

[56] ["Πολλ ηπισταιο εργα, χαχως δ ηπιστανο παντα." He could do many works, but all of them badly – Homer] Every Athenian considered himself superior as a producer of commodities to a Spartan; for the latter in time of war had men enough at his disposal but could not command money, as Thucydides makes Pericles say in the speech inciting the Athenians to the Peloponnesian war: ["σωμασι τε ετοιμοτεροι οι αυτονργοι των□αντηρωπων η χρημασι πολεμειν" people producing for their own consumption will rather let war have their bodies than their money] (Thuc.: 1, I. c. 41.) Nevertheless, even with regard to material production, [autarceia self-sufficiency], as opposed to division of labour remained their ideal, ["παρων γαρ το, ευ, παρα τουτων χαι το αυταρεσς." For with the latter there is well-being, but with the former

there is independence.] It should be mentioned here that at the date of the fall of the 30 Tyrants there were still not 5,000 Athenians without landed property.

[57] With Plato, division of labour within the community is a development from the multifarious requirements, and the limited capacities of individuals. The main point with him is, that the labourer must adapt himself to the work, not the work to the labourer; which latter is unavoidable, if he carries on several trades at once, thus making one or the other of them subordinate. ["Ου γαρ ετηελει το πραττομενον τεν του πραττονιος σχηολεν περιμενειν, αλλ αναγκε το ν πραττοντα το πραττομενο επακολοοτηειν με εν παρεργου μερει. Αναγκε. Εκ δε τουτον πλειο τε εκαστα γιγνεται και καλλιον και ραον, οταν εις εν καια πηψσιν και εν καιρο σχ ηολεν τον αλλον αγον, πραττε."] [For the workman must wait upon the work; it will not wait upon his leisure and allow itself to be done in a spare moment. — Yes, he must,— So the conclusion is that more will be produced of every thing and the work will be more easily and better done, when every man is set free from all other occupations to do, at the right time, the one thing for which he is naturally fitted.] (Rep. 1. 2. Ed. Baiter, Orelli, &c.) So in Thucydides, l.c., c. 142: "Seafaring is an art like any other, and cannot, as circumstances require, be carried on as a subsidiary occupation; nay, other subsidiary occupations cannot be carried on alongside of this one." If the work, says Plato, has to wait for the labourer, the critical point in the process is missed and the article spoiled, "εργου χαιρον διολλυται." [If someone lets slip ...] The same Platonic idea is found recurring in the protest of the English bleachers against the clause in the Factory Act that provides fixed mealtimes for all operatives. Their business cannot wait the convenience of the workmen, for "in the various operations of singeing, washing, bleaching, mangling, calendering, and dyeing, none of them can be stopped at a given moment without risk of damage ... to enforce the same dinner hour for all the workpeople might occasionally subject valuable goods to the risk of danger by incomplete operations." *Le platonisme où va-t-il se nicher!* [Where will Platonism be found next!]

[58] Xenophon says, it is not only an honour to receive food from the table of the King of Persia, but such food is much more tasty than other food. "And there is nothing wonderful in this, for as the other arts are brought to special perfection in the great towns, so the royal food is prepared in a special way. For in the small towns the same man makes bedsteads, doors, ploughs, and tables: often, too, he builds houses into the bargain, and is quite content if he finds custom sufficient for his sustenance. It is altogether impossible for a man who does so many things to do them all well. But in the great towns, where each can find many buyers, one trade is sufficient to maintain the man who carries it on. Nay, there is often not even need of one complete trade, but one man makes shoes for men, another for women. Here and there one man gets a living by sewing, another by cutting out shoes; one does nothing but cut out clothes, another nothing but sew the pieces together. It follows necessarily then, that he who does the simplest kind of work, undoubtedly does it better than anyone else. So it is with the art of cooking." (Xen. Cyrop. I. viii., c. 2.) Xenophon here lays stress exclusively upon the excellence to be attained in use-value, although he well knows that the gradations of the division of labour depend on the extent of the market.

[59] He (Busiris) divided them all into special castes ... commanded that the same individuals should always carry on the same trade, for he knew that they who change their occupations become skilled in none; but that those who constantly stick to one occupation bring it to the highest perfection. In truth, we shall also find that in relation to the arts and handicrafts, they have outstripped their rivals more than a master does a bungler; and the contrivances for maintaining the monarchy and the other institutions of their State are so admirable that the most celebrated philosophers who treat of this subject praise the constitution of the Egyptian State above all others. (Isocrates, Busiris, c. 8.)

[60] Cf. Diodorus Siculus.

[61] Ure, l.c., p. 20.

[62] This is more the case in England than in France, and more in France than in Holland.

Chapter 15: Machinery and Modern Industry

Section 1 : The Development of Machinery

John Stuart Mill says in his “Principles of Political Economy":

> “It is questionable if all the mechanical inventions yet made have lightened the day’s toil of any human being.” [1]

That is, however, by no means the aim of the capitalistic application of machinery. Like every other increase in the productiveness of labour, machinery is intended to cheapen commodities, and, by shortening that portion of the working day, in which the labourer works for himself, to lengthen the other portion that he gives, without an equivalent, to the capitalist. In short, it is a means for producing surplus-value.

In manufacture, the revolution in the mode of production begins with the labour-power, in modern industry it begins with the instruments of labour. Our first inquiry then is, how the instruments of labour are converted from tools into machines, or what is the difference between a machine and the implements of a handicraft? We are only concerned here with striking and general characteristics; for epochs in the history of society are no more separated from each other by hard and fast lines of demarcation, than are geological epochs.

Mathematicians and mechanicians, and in this they are followed by a few English economists, call a tool a simple machine, and a machine a complex tool. They see no essential difference between them, and even give the name of machine to the simple mechanical powers, the lever, the inclined plane, the screw, the wedge, &c.[2] As a matter of fact, every machine is a combination of those simple powers, no matter how they may be disguised. From the economic standpoint this explanation is worth nothing, because the historical element is wanting. Another explanation of the difference between tool and machine is that in the case of a tool, man is the motive power, while the motive power of a machine is something different from man, as, for instance, an animal, water, wind, and so on.[3] According to this, a plough drawn by oxen, which is a contrivance common to the most different epochs, would be a machine, while Claussen’s circular loom, which, worked by a single labourer, weaves 96,000 picks per minute, would be a mere tool. Nay, this very loom, though a tool when worked by hand, would, if worked by steam, be a machine. And since the application of animal power is one of man’s earliest inventions, production by machinery would have preceded production by handicrafts. When in 1735, John Wyatt brought out his spinning machine, and began the industrial revolution of the 18th century, not a word did he say about an ass driving it instead of a man, and yet this part fell to the ass. He described it as a machine “to spin without fingers.”[4]

All fully developed machinery consists of three essentially different parts, the motor mechanism, the transmitting mechanism, and finally the tool or working machine. The motor mechanism is that which puts the whole in motion. It either generates its own motive power, like the steam-engine, the caloric engine, the electromagnetic machine, &c., or it receives its impulse from some already existing natural force, like the water-wheel from a head of water, the wind-mill from wind, &c. The transmitting mechanism, composed of fly-wheels, shafting, toothed wheels, pullies, straps, ropes, bands, pinions, and gearing of the most varied kinds, regulates the motion, changes its form where necessary, as for instance, from linear to circular, and divides and distributes it among the working machines. These two first parts of the whole mechanism are there, solely for putting the working machines in motion, by means of which motion the subject

of labour is seized upon and modified as desired. The tool or working machine is that part of the machinery with which the industrial revolution of the 18th century started. And to this day it constantly serves as such a starting-point, whenever a handicraft, or a manufacture, is turned into an industry carried on by machinery.

On a closer examination of the working machine proper, we find in it, as a general rule, though often, no doubt, under very altered forms, the apparatus and tools used by the handicraftsman or manufacturing workman; with this difference, that instead of being human implements, they are the implements of a mechanism, or mechanical implements. Either the entire machine is only a more or less altered mechanical edition of the old handicraft tool, as, for instance, the power-loom,[5] or the working parts fitted in the frame of the machine are old acquaintances, as spindles are in a mule, needles in a stocking-loom, saws in a sawing-machine, and knives in a chopping machine. The distinction between these tools and the body proper of the machine, exists from their very birth; for they continue for the most part to be produced by handicraft, or by manufacture, and are afterwards fitted into the body of the machine, which is the product of machinery.[6] The machine proper is therefore a mechanism that, after being set in motion, performs with its tools the same operations that were formerly done by the workman with similar tools. Whether the motive power is derived from man, or from some other machine, makes no difference in this respect. From the moment that the tool proper is taken from man, and fitted into a mechanism, a machine takes the place of a mere implement. The difference strikes one at once, even in those cases where man himself continues to be the prime mover. The number of implements that he himself can use simultaneously, is limited by the number of his own natural instruments of production, by the number of his bodily organs. In Germany, they tried at first to make one spinner work two spinning-wheels, that is, to work simultaneously with both hands and both feet. This was too difficult. Later, a treddle spinning-wheel with two spindles was invented, but adepts in spinning, who could spin two threads at once, were almost as scarce as two-headed men. The Jenny, on the other hand, even at its very birth, spun with 12-18 spindles, and the stocking-loom knits with many thousand needles at once. The number of tools that a machine can bring into play simultaneously, is from the very first emancipated from the organic limits that hedge in the tools of a handicraftsman.

In many manual implements the distinction between man as mere motive power, and man as the workman or operator properly so called, is brought into striking contrast. For instance, the foot is merely the prime mover of the spinning-wheel, while the hand, working with the spindle, and drawing and twisting, performs the real operation of spinning. It is this last part of the handicraftsman's implement that is first seized upon by the industrial revolution, leaving to the workman, in addition to his new labour of watching the machine with his eyes and correcting its mistakes with his hands, the merely mechanical part of being the moving power. On the other hand, implements, in regard to which man has always acted as a simple motive power, as, for instance, by turning the crank of a mill,[7] by pumping, by moving up and down the arm of a bellows, by pounding with a mortar, &c., such implements soon call for the application of animals, water[8] and wind as motive powers. Here and there, long before the period of manufacture, and also, to some extent, during that period, these implements pass over into machines, but without creating any revolution in the mode of production. It becomes evident, in the period of modern industry, that these implements, even under their form of manual tools, are already machines. For instance, the pumps with which the Dutch, in 1836-7, emptied the Lake of Harlem, were constructed on the principle of ordinary pumps; the only difference being, that their pistons were driven by cyclopean steam-engines, instead of by men. The common and very imperfect bellows of the blacksmith is, in England, occasionally converted into a blowing-engine,

by connecting its arm with a steam-engine. The steam-engine itself, such as it was at its invention, during the manufacturing period at the close of the 17th century, and such as it continued to be down to 1780,[9] did not give rise to any industrial revolution. It was, on the contrary, the invention of machines that made a revolution in the form of steam-engines necessary. As soon as man, instead of working with an implement on the subject of his labour, becomes merely the motive power of an implement-machine, it is a mere accident that motive power takes the disguise of human muscle; and it may equally well take the form of wind, water or steam. Of course, this does not prevent such a change of form from producing great technical alterations in the mechanism that was originally constructed to be driven by man alone. Now-a-days, all machines that have their way to make, such as sewing-machines, bread-making machines, &c., are, unless from their very nature their use on a small scale is excluded, constructed to be driven both by human and by purely mechanical motive power.

The machine, which is the starting-point of the industrial revolution, supersedes the workman, who handles a single tool, by a mechanism operating with a number of similar tools, and set in motion by a single motive power, whatever the form of that power may be.[10] Here we have the machine, but only as an elementary factor of production by machinery.

Increase in the size of the machine, and in the number of its working tools, calls for a more massive mechanism to drive it; and this mechanism requires, in order to overcome its resistance, a mightier moving power than that of man, apart from the fact that man is a very imperfect instrument for producing uniform continued motion. But assuming that he is acting simply as a motor, that a machine has taken the place of his tool, it is evident that he can be replaced by natural forces. Of all the great motors handed down from the manufacturing period, horse-power is the worst, partly because a horse has a head of his own, partly because he is costly, and the extent to which he is applicable in factories is very restricted.[11] Nevertheless the horse was extensively used during the infancy of modern industry. This is proved, as well by the complaints of contemporary agriculturists, as by the term “horse-power,” which has survived to this day as an expression for mechanical force.

Wind was too inconstant and uncontrollable, and besides, in England, the birthplace of modern industry, the use of water power preponderated even during the manufacturing period. In the 17th century attempts had already been made to turn two pairs of millstones with a single water-wheel. But the increased size of the gearing was too much for the water power, which had now become insufficient, and this was one of the circumstances that led to a more accurate investigation of the laws of friction. In the same way the irregularity caused by the motive power in mills that were put in motion by pushing and pulling a lever, led to the theory, and the application, of the fly-wheel, which afterwards plays so important a part in modern industry.[12] In this way, during the manufacturing period, were developed the first scientific and technical elements of Modern Mechanical Industry. Arkwright’s throstle spinning mill was from the very first turned by water. But for all that, the use of water, as the predominant motive power, was beset with difficulties. It could not be increased at will, it failed at certain seasons of the year, and, above all, it was essentially local.[13] Not till the invention of Watt’s second and so-called double-acting steam-engine, was a prime mover found, that begot its own force by the consumption of coal and water, whose power was entirely under man’s control, that was mobile and a means of locomotion, that was urban and not, like the waterwheel, rural, that permitted production to be concentrated in towns instead of, like the water-wheels, being scattered up and down the country,[14] that was of universal technical application, and, relatively speaking, little affected in its choice of residence by local circumstances. The greatness of Watt’s genius showed itself in the specification of the patent that he took out in April, 1784. In that specification his steam-engine is described, not as

an invention for a specific purpose, but as an agent universally applicable in Mechanical Industry. In it he points out applications, many of which, as for instance, the steam-hammer, were not introduced till half a century later. Nevertheless he doubted the use of steam-engines in navigation. His successors, Boulton and Watt, sent to the exhibition of 1851 steam-engines of colossal size for ocean steamers.

As soon as tools had been converted from being manual implements of man into implements of a mechanical apparatus, of a machine, the motive mechanism also acquired an independent form, entirely emancipated from the restraints of human strength. Thereupon the individual machine, that we have hitherto been considering, sinks into a mere factor in production by machinery. One motive mechanism was now able to drive many machines at once. The motive mechanism grows with the number of the machines that are turned simultaneously, and the transmitting mechanism becomes a wide-spreading apparatus.

We now proceed to distinguish the co-operation of a number of machines of one kind from a complex system of machinery.

In the one case, the product is entirely made by a single machine, which performs all the various operations previously done by one handicraftsman with his tool; as, for instance, by a weaver with his loom; or by several handicraftsman successively, either separately or as members of a system of Manufacture.[15] For example, in the manufacture of envelopes, one man folded the paper with the folder, another laid on the gum, a third turned the flap over, on which the device is impressed, a fourth embossed the device, and so on; and for each of these operations the envelope had to change hands. One single envelope machine now performs all these operations at once, and makes more than 3,000 envelopes in an hour. In the London exhibition of 1862, there was an American machine for making paper cornets. It cut the paper, pasted, folded, and finished 300 in a minute. Here, the whole process, which, when carried on as Manufacture, was split up into, and carried out by, a series of operations, is completed by a single machine, working a combination of various tools. Now, whether such a machine be merely a reproduction of a complicated manual implement, or a combination of various simple implements specialised by Manufacture, in either case, in the factory, *i.e.*, in the workshop in which machinery alone is used, we meet again with simple co-operation; and, leaving the workman out of consideration for the moment, this co-operation presents itself to us, in the first instance, as the conglomeration in one place of similar and simultaneously acting machines. Thus, a weaving factory is constituted of a number of power-looms, working side by side, and a sewing factory of a number of sewing-machines all in the same building. But there is here a technical oneness in the whole system, owing to all the machines receiving their impulse simultaneously, and in an equal degree, from the pulsations of the common prime mover, by the intermediary of the transmitting mechanism; and this mechanism, to a certain extent, is also common to them all, since only particular ramifications of it branch off to each machine. Just as a number of tools, then, form the organs of a machine, so a number of machines of one kind constitute the organs of the motive mechanism.

A real machinery system, however, does not take the place of these independent machines, until the subject of labour goes through a connected series of detail processes, that are carried out by a chain of machines of various kinds, the one supplementing the other. Here we have again the co-operation by division of labour that characterises Manufacture; only now, it is a combination of detail machines. The special tools of the various detail workmen, such as those of the beaters, cambers, spinners, &c., in the woollen manufacture, are now transformed into the tools of specialised machines, each machine constituting a special organ, with a special function, in the system. In those branches of industry in which the machinery system is first introduced, Manufacture itself furnishes, in a general way, the natural basis for the division, and consequent

organisation, of the process of production.[16] Nevertheless an essential difference at once manifests itself. In Manufacture it is the workmen who, with their manual implements, must, either singly or in groups, carry on each particular detail process. If, on the one hand, the workman becomes adapted to the process, on the other, the process was previously made suitable to the workman. This subjective principle of the division of labour no longer exists in production by machinery. Here, the process as a whole is examined objectively, in itself, that is to say, without regard to the question of its execution by human hands, it is analysed into its constituent phases; and the problem, how to execute each detail process, and bind them all into a whole, is solved by the aid of machines, chemistry, &c.[17] But, of course, in this case also, theory must be perfected by accumulated experience on a large scale. Each detail machine supplies raw material to the machine next in order; and since they are all working at the same time, the product is always going through the various stages of its fabrication, and is also constantly in a state of transition, from one phase to another. Just as in Manufacture, the direct co-operation of the detail labourers establishes a numerical proportion between the special groups, so in an organised system of machinery, where one detail machine is constantly kept employed by another, a fixed relation is established between their numbers, their size, and their speed. The collective machine, now an organised system of various kinds of single machines, and of groups of single machines, becomes more and more perfect, the more the process as a whole becomes a continuous one, i.e., the less the raw material is interrupted in its passage from its first phase to its last; in other words, the more its passage from one phase to another is effected, not by the hand of man, but by the machinery itself. In Manufacture the isolation of each detail process is a condition imposed by the nature of division of labour, but in the fully developed factory the continuity of those processes is, on the contrary, imperative.

A system of machinery, whether it reposes on the mere co-operation of similar machines, as in weaving, or on a combination of different machines, as in spinning, constitutes in itself a huge automaton, whenever it is driven by a self-acting prime mover. But although the factory as a whole be driven by its steam-engine, yet either some of the individual machines may require the aid of the workman for some of their movements (such aid was necessary for the running in of the mule carriage, before the invention of the self-acting mule, and is still necessary in fine-spinning mills); or, to enable a machine to do its work, certain parts of it may require to be handled by the workman like a manual tool; this was the case in machine-makers' workshops, before the conversion of the slide rest into a self-actor. As soon as a machine executes, without man's help, all the movements requisite to elaborate the raw material, needing only attendance from him, we have an automatic system of machinery, and one that is susceptible of constant improvement in its details. Such improvements as the apparatus that stops a drawing frame, whenever a sliver breaks, and the self-acting stop, that stops the power-loom so soon as the shuttle bobbin is emptied of weft, are quite modern inventions. As an example, both of continuity of production, and of the carrying out of the automatic principle, we may take a modern paper mill. In the paper industry generally, we may advantageously study in detail not only the distinctions between modes of production based on different means of production, but also the connexion of the social conditions of production with those modes: for the old German paper-making furnishes us with a sample of handicraft production; that of Holland in the 17th and of France in the 18th century with a sample of manufacturing in the strict sense; and that of modern England with a sample of automatic fabrication of this article. Besides these, there still exist, in India and China, two distinct antique Asiatic forms of the same industry.

An organised system of machines, to which motion is communicated by the transmitting mechanism from a central automaton, is the most developed form of production by machinery.

Here we have, in the place of the isolated machine, a mechanical monster whose body fills whole factories, and whose demon power, at first veiled under the slow and measured motions of his giant limbs, at length breaks out into the fast and furious whirl of his countless working organs.

There were mules and steam-engines before there were any labourers, whose exclusive occupation it was to make mules and steam-engines; just as men wore clothes before there were such people as tailors. The inventions of Vaucanson, Arkwright, Watt, and others, were, however, practicable, only because those inventors found, ready to hand, a considerable number of skilled mechanical workmen, placed at their disposal by the manufacturing period. Some of these workmen were independent handicraftsman of various trades, others were grouped together in manufactures, in which, as before-mentioned, division of labour was strictly carried out. As inventions increased in number, and the demand for the newly discovered machines grew larger, the machine-making industry split up, more and more, into numerous independent branches, and division of labour in these manufactures was more and more developed. Here, then, we see in Manufacture the immediate technical foundation of modern industry. Manufacture produced the machinery, by means of which modern industry abolished the handicraft and manufacturing systems in those spheres of production that it first seized upon. The factory system was therefore raised, in the natural course of things, on an inadequate foundation. When the system attained to a certain degree of development, it had to root up this ready-made foundation, which in the meantime had been elaborated on the old lines, and to build up for itself a basis that should correspond to its methods of production. Just as the individual machine retains a dwarfish character, so long as it is worked by the power of man alone, and just as no system of machinery could be properly developed before the steam-engine took the place of the earlier motive powers, animals, wind, and even water; so, too, modern industry was crippled in its complete development, so long as its characteristic instrument of production, the machine, owed its existence to personal strength and personal skill, and depended on the muscular development, the keenness of sight, and the cunning of hand, with which the detail workmen in manufactures, and the manual labourers in handicrafts, wielded their dwarfish implements. Thus, apart from the dearness of the machines made in this way, a circumstance that is ever present to the mind of the capitalist, the expansion of industries carried on by means of machinery, and the invasion by machinery of fresh branches of production, were dependent on the growth of a class of workmen, who, owing to the almost artistic nature of their employment, could increase their numbers only gradually, and not by leaps and bounds. But besides this, at a certain stage of its development, modern industry became technologically incompatible with the basis furnished for it by handicraft and Manufacture. The increasing size of the prime movers, of the transmitting mechanism, and of the machines proper, the greater complication, multiformity and regularity of the details of these machines, as they more and more departed from the model of those originally made by manual labour, and acquired a form, untrammelled except by the conditions under which they worked,[18] the perfecting of the automatic system, and the use, every day more unavoidable, of a more refractory material, such as iron instead of wood - the solution of all these problems, which sprang up by the force of circumstances, everywhere met with a stumbling-block in the personal restrictions, which even the collective labourer of Manufacture could not break through, except to a limited extent. Such machines as the modern hydraulic press, the modern power-loom, and the modern carding engine, could never have been furnished by Manufacture.

A radical change in the mode of production in one sphere of industry involves a similar change in other spheres. This happens at first in such branches of industry as are connected together by being separate phases of a process, and yet are isolated by the social division of labour, in such a way, that each of them produces an independent commodity. Thus spinning by machinery made

weaving by machinery a necessity, and both together made the mechanical and chemical revolution that took place in bleaching, printing, and dyeing, imperative. So too, on the other hand, the revolution in cotton-spinning called forth the invention of the gin, for separating the seeds from the cotton fibre; it was only by means of this invention, that the production of cotton became possible on the enormous scale at present required.[19] But more especially, the revolution in the modes of production of industry and agriculture made necessary a revolution in the general conditions of the social process of production, i.e., in the means of communication and of transport. In a society whose pivot, to use an expression of Fourier, was agriculture on a small scale, with its subsidiary domestic industries, and the urban handicrafts, the means of communication and transport were so utterly inadequate to the productive requirements of the manufacturing period, with its extended division of social labour, its concentration of the instruments of labour, and of the workmen, and its colonial markets, that they became in fact revolutionised. In the same way the means of communication and transport handed down from the manufacturing period soon became unbearable trammels on modern industry, with its feverish haste of production, its enormous extent, its constant flinging of capital and labour from one sphere of production into another, and its newly-created connexions with the markets of the whole world. Hence, apart from the radical changes introduced in the construction of sailing vessels, the means of communication and transport became gradually adapted to the modes of production of mechanical industry, by the creation of a system of river steamers, railways, ocean steamers, and telegraphs. But the huge masses of iron that had now to be forged, to be welded, to be cut, to be bored, and to be shaped, demanded, on their part, cyclopean machines, for the construction of which the methods of the manufacturing period were utterly inadequate.

Modern Industry had therefore itself to take in hand the machine, its characteristic instrument of production, and to construct machines by machines. It was not till it did this, that it built up for itself a fitting technical foundation, and stood on its own feet. Machinery, simultaneously with the increasing use of it, in the first decades of this century, appropriated, by degrees, the fabrication of machines proper. But it was only during the decade preceding 1866, that the construction of railways and ocean steamers on a stupendous scale called into existence the cyclopean machines now employed in the construction of prime movers.

The most essential condition to the production of machines by machines was a prime mover capable of exerting any amount of force, and yet under perfect control. Such a condition was already supplied by the steam-engine. But at the same time it was necessary to produce the geometrically accurate straight lines, planes, circles, cylinders, cones, and spheres, required in the detail parts of the machines. This problem Henry Maudsley solved in the first decade of this century by the invention of the slide rest, a tool that was soon made automatic, and in a modified form was applied to other constructive machines besides the lathe, for which it was originally intended. This mechanical appliance replaces, not some particular tool, but the hand itself, which produces a given form by holding and guiding the cutting tool along the iron or other material operated upon. Thus it became possible to produce the forms of the individual parts of machinery

> "with a degree of ease, accuracy, and speed, that no accumulated experience of the hand of the most skilled workman could give."[20]

If we now fix our attention on that portion of the machinery employed in the construction of machines, which constitutes the operating tool, we find the manual implements re-appearing, but on a cyclopean scale. The operating part of the boring machine is an immense drill driven by a steam-engine; without this machine, on the other hand, the cylinders of large steam-engines and of hydraulic presses could not be made. The mechanical lathe is only a cyclopean reproduction of the ordinary foot-lathe; the planing machine, an iron carpenter, that works on iron with the same

tools that the human carpenter employs on wood; the instrument that, on the London wharves, cuts the veneers, is a gigantic razor; the tool of the shearing machine, which shears iron as easily as a tailor's scissors cut cloth, is a monster pair of scissors; and the steam-hammer works with an ordinary hammer head, but of such a weight that not Thor himself could wield it.[21] These steam-hammers are an invention of Nasmyth, and there is one that weighs over 6 tons and strikes with a vertical fall of 7 feet, on an anvil weighing 36 tons. It is mere child's-play for it to crush a block of granite into powder, yet it is no less capable of driving, with a succession of light taps, a nail into a piece of soft wood.[22]

The implements of labour, in the form of machinery, necessitate the substitution of natural forces for human force, and the conscious application of science, instead of rule of thumb. In Manufacture, the organisation of the social labour-process is purely subjective; it is a combination of detail labourers; in its machinery system, modern industry has a productive organism that is purely objective, in which the labourer becomes a mere appendage to an already existing material condition of production. In simple co-operation, and even in that founded on division of labour, the suppression of the isolated, by the collective, workman still appears to be more or less accidental. Machinery, with a few exceptions to be mentioned later, operates only by means of associated labour, or labour in common. Hence the co-operative character of the labour-process is, in the latter case, a technical necessity dictated by the instrument of labour itself.

Section 2: The Value Transferred by Machinery to the Product

We saw that the productive forces resulting from co-operation and division of labour cost capital nothing. They are natural forces of social labour. So also physical forces, like steam, water, &c., when appropriated to productive processes, cost nothing. But just as a man requires lungs to breathe with, so he requires something that is work of man's hand, in order to consume physical forces productively. A water-wheel is necessary to exploit the force of water, and a steam-engine to exploit the elasticity of steam. Once discovered, the law of the deviation of the magnetic needle in the field of an electric current, or the law of the magnetisation of iron, around which an electric current circulates, cost never a penny.[23] But the exploitation of these laws for the purposes of telegraphy, &c., necessitates a costly and extensive apparatus. The tool, as we have seen, is not exterminated by the machine. From being a dwarf implement of the human organism, it expands and multiplies into the implement of a mechanism created by man. Capital now sets the labourer to work, not with a manual tool, but with a machine which itself handles the tools. Although, therefore, it is clear at the first glance that, by incorporating both stupendous physical forces, and the natural sciences, with the process of production, modern industry raises the productiveness of labour to an extraordinary degree, it is by no means equally clear, that this increased productive force is not, on the other hand, purchased by an increased expenditure of labour. Machinery, like every other component of constant capital, creates no new value, but yields up its own value to the product that it serves to beget. In so far as the machine has value, and, in consequence, parts with value to the product, it forms an element in the value of that product. Instead of being cheapened, the product is made dearer in proportion to the value of the machine. And it is clear as noon-day, that machines and systems of machinery, the characteristic instruments of labour of Modern Industry, are incomparably more loaded with value than the implements used in handicrafts and manufactures.

In the first place, it must be observed that the machinery, while always entering as a whole into the labour-process, enters into the value-begetting process only by bits. It never adds more value than it loses, on an average, by wear and tear. Hence there is a great difference between the value of a machine, and the value transferred in a given time by that machine to the product. The longer

the life of the machine in the labour-process, the greater is that difference. It is true, no doubt, as we have already seen, that every instrument of labour enters as a whole into the labour-process, and only piece-meal, proportionally to its average daily loss by wear and tear, into the value-begetting process. But this difference between the instrument as a whole and its daily wear and tear, is much greater in a machine than in a tool, because the machine, being made from more durable material, has a longer life; because its employment, being regulated by strictly scientific laws, allows of greater economy in the wear and tear of its parts, and in the materials it consumes; and lastly, because its field of production is incomparably larger than that of a tool. After making allowance, both in the case of the machine and of the tool, for their average daily cost, that is for the value they transmit to the product by their average daily wear and tear, and for their consumption of auxiliary substance, such as oil, coal, and so on, they each do their work gratuitously, just like the forces furnished by Nature without the help of man. The greater the productive power of the machinery compared with that of the tool, the greater is the extent of its gratuitous service compared with that of the tool. In modern industry man succeeded for the first time in making the product of his past labour work on a large scale gratuitously, like the forces of Nature.[24]

In treating of Co-operation and Manufacture, it was shown that certain general factors of production, such as buildings, are, in comparison with the scattered means of production of the isolated workman, economised by being consumed in common, and that they therefore make the product cheaper. In a system of machinery, not only is the framework of the machine consumed in common by its numerous operating implements, but the prime mover, together with a part of the transmitting mechanism, is consumed in common by the numerous operative machines.

Given the difference between the value of the machinery, and the value transferred by it in a day to the product, the extent to which this latter value makes the product dearer, depends in the first instance, upon the size of the product; so to say, upon its area. Mr. Baynes, of Blackburn, in a lecture published in 1858, estimates that

> "each real mechanical horse-power[25] will drive 450 self-acting mule spindles, with preparation, or 200 throstle spindles, or 15 looms for 40 inch cloth with the appliances for warping, sizing, &c."

In the first case, it is the day's produce of 450 mule spindles, in the second, of 200 throstle spindles, in the third, of 15 power-looms, over which the daily cost of one horse-power, and the wear and tear of the machinery set in motion by that power, are spread; so that only a very minute value is transferred by such wear and tear to a pound of yarn or a yard of cloth. The same is the case with the steam-hammer mentioned above. Since its daily wear and tear, its coal-consumption, &c., are spread over the stupendous masses of iron hammered by it in a day, only a small value is added to a hundred weight of iron; but that value would be very great, if the cyclopean instrument were employed in driving in nails.

Given a machine's capacity for work, that is, the number of its operating tools, or, where it is a question of force, their mass, the amount of its product will depend on the velocity of its working parts, on the speed, for instance, of the spindles, or on the number of blows given by the hammer in a minute. Many of these colossal hammers strike seventy times in a minute, and Ryder's patent machine for forging spindles with small hammers gives as many as 700 strokes per minute.

Given the rate at which machinery transfers its value to the product, the amount of value so transferred depends on the total value of the machinery.[26] The less labour it contains, the less value it imparts to the product. The less value it gives up, so much the more productive it is, and so much the more its services approximate to those of natural forces. But the production of machinery by machinery lessens its value relatively to its extension and efficacy.

An analysis and comparison of the prices of commodities produced by handicrafts or manufactures, and of the prices of the same commodities produced by machinery, shows generally, that, in the product of machinery, the value due to the instruments of labour increases relatively, but decreases absolutely. In other words, its absolute amount decreases, but its amount, relatively to the total value of the product, of a pound of yarn, for instance, increases.[27]

It is evident that whenever it costs as much labour to produce a machine as is saved by the employment of that machine, there is nothing but a transposition of labour; consequently the total labour required to produce a commodity is not lessened or the productiveness of labour is not increased. It is clear, however, that the difference between the labour a machine costs, and the labour it saves, in other words, that the degree of its productiveness does not depend on the difference between its own value and the value of the implement it replaces. As long as the labour spent on a machine, and consequently the portion of its value added to the product, remains smaller than the value added by the workman to the product with his tool, there is always a difference of labour saved in favour of the machine. The productiveness of a machine is therefore measured by the human labour-power it replaces. According to Mr. Baynes, 2 operatives are required for the 450 mule spindles, inclusive of preparation machinery,[28] that are driven by one-horse power; each self-acting mule spindle, working ten hours, produces 13 ounces of yarn (average number of thickness); consequently 2½ operatives spin weekly 365 5/8 lbs. of yarn. Hence, leaving waste on one side, 366 lbs. of cotton absorb, during their conversion into yarn, only 150 hours' labour, or fifteen days' labour of ten hours each. But with a spinning-wheel, supposing the hand-spinner to produce thirteen ounces of yarn in sixty hours, the same weight of cotton would absorb 2,700 days' labour of ten hours each, or 27,000 hours' labour.[29] Where blockprinting, the old method of printing calico by hand, has been superseded by machine printing, a single machine prints, with the aid of one man or boy, as much calico of four colours in one hour, as it formerly took 200 men to do.[30] Before Eli Whitney invented the cotton gin in 1793, the separation of the seed from a pound of cotton cost an average day's labour. By means of his invention one negress was enabled to clean 100 lbs. daily; and since then, the efficacy of the gin has been considerably increased. A pound of cotton wool, previously costing 50 cents to produce, included after that invention more unpaid labour, and was consequently sold with greater profit, at 10 cents. In India they employ for separating the wool from the seed, an instrument, half machine, half tool, called a churka; with this one man and a woman can clean 28 lbs. daily. With the churka invented some years ago by Dr. Forbes, one man and a boy produce 250 lbs. daily. If oxen, steam, or water, be used for driving it, only a few boys and girls as feeders are required. Sixteen of these machines driven by oxen do as much work in a day as formerly 750 people did on an average.[31]

As already stated, a steam-plough does as much work in one hour at a cost of three-pence, as 66 men at a cost of 15 shillings. I return to this example in order to clear up an erroneous notion. The 15 shillings are by no means the expression in money of all the labour expended in one hour by the 66 men. If the ratio of surplus labour to necessary labour were 100%, these 66 men would produce in one hour a value of 30 shillings, although their wages, 15 shillings, represent only their labour for half an hour. Suppose, then, a machine cost as much as the wages for a year of the 150 men it displaces, say £3,000; this £3,000 is by no means the expression in money of the labour added to the object produced by these 150 men before the introduction of the machine, but only of that portion of their year's labour which was expended for themselves and represented by their wages. On the other hand, the £3,000, the money-value of the machine, expresses all the labour expended on its production, no matter in what proportion this labour constitutes wages for the workman, and surplus-value for the capitalist. Therefore, though a machine cost as much as

the labour-power displaced by it costs, yet the labour materialised in it is even then much less than the living labour it replaces. [32]

The use of machinery for the exclusive purpose of cheapening the product, is limited in this way, that less labour must be expended in producing the machinery than is displaced by the employment of that machinery, For the capitalist, however, this use is still more limited. Instead of paying for the labour, he only pays the value of the labour-power employed; therefore, the limit to his using a machine is fixed by the difference between the value of the machine and the value of the labour-power replaced by it. Since the division of the day's work into necessary and surplus labour differs in different countries, and even in the same country at different periods, or in different branches of industry; and further, since the actual wage of the labourer at one time sinks below the value of his labour-power, at another rises above it, it is possible for the difference between the price of the machinery and the price of the labour-power replaced by that machinery to vary very much, although the difference between the quantity of labour requisite to produce the machine and the total quantity replaced by it, remain constant.[33] But it is the former difference alone that determines the cost, to the capitalist, of producing a commodity, and, through the pressure of competition, influences his action. Hence the invention now-a-days of machines in England that are employed only in North America; just as in the sixteenth and seventeenth centuries, machines were invented in Germany to be used only in Holland, and just as many a French invention of the eighteenth century was exploited in England alone. In the older countries, machinery, when employed in some branches of industry, creates such a redundancy of labour in other branches that in these latter the fall of wages below the value of labour-power impedes the use of machinery, and, from the standpoint of the capitalist, whose profit comes, not from a diminution of the labour employed, but of the labour paid for, renders that use superfluous and often impossible. In some branches of the woollen manufacture in England the employment of children has during recent years been considerably diminished, and in some cases has been entirely abolished. Why? Because the Factory Acts made two sets of children necessary, one working six hours, the other four, or each working five hours. But the parents refused to sell the "half-timers" cheaper than the "full-timers." Hence the substitution of machinery for the "half-timers."[34] Before the labour of women and of children under 10 years of age was forbidden in mines, capitalists considered the employment of naked women and girls, often in company with men, so far sanctioned by their moral code, and especially by their ledgers, that it was only after the passing of the Act that they had recourse to machinery. The Yankees have invented a stone-breaking machine. The English do not make use of it, because the "wretch" [35]who does this work gets paid for such a small portion of his labour, that machinery would increase the cost of production to the capitalist.[36] In England women are still occasionally used instead of horses for hauling canal boats[37], because the labour required to produce horses and machines is an accurately known quantity, while that required to maintain the women of the surplus-population is below all calculation. Hence nowhere do we find a more shameful squandering of human labour-power for the most despicable purposes than in England, the land of machinery.

Section 3: The Proximate Effects of Machinery on the Workman

The starting-point of modern industry is, as we have shown, the revolution in the instruments of labour, and this revolution attains its most highly developed form in the organised system of machinery in a factory. Before we inquire how human material is incorporated with this objective organism, let us consider some general effects of this revolution on the labourer himself.

A. Appropriation of Supplementary Labour-Power by Capital. The Employment of Women and Children

In so far as machinery dispenses with muscular power, it becomes a means of employing labourers of slight muscular strength, and those whose bodily development is incomplete, but whose limbs are all the more supple. The labour of women and children was, therefore, the first thing sought for by capitalists who used machinery. That mighty substitute for labour and labourers was forthwith changed into a means for increasing the number of wage-labourers by enrolling, under the direct sway of capital, every member of the workman's family, without distinction of age or sex. Compulsory work for the capitalist usurped the place, not only of the children's play, but also of free labour at home within moderate limits for the support of the family.[38]

The value of labour-power was determined, not only by the labour-time necessary to maintain the individual adult labourer, but also by that necessary to maintain his family. Machinery, by throwing every member of that family on to the labour-market, spreads the value of the man's labour-power over his whole family. It thus depreciates his labour-power. To purchase the labour-power of a family of four workers may, perhaps, cost more than it formerly did to purchase the labour-power of the head of the family, but, in return, four days' labour takes the place of one, and their price falls in proportion to the excess of the surplus labour of four over the surplus labour of one. In order that the family may live, four people must now, not only labour, but expend surplus labour for the capitalist. Thus we see, that machinery, while augmenting the human material that forms the principal object of capital's exploiting power,[39] at the same time raises the degree of exploitation.

Machinery also revolutionises out and out the contract between the labourer and the capitalist, which formally fixes their mutual relations. Taking the exchange of commodities as our basis, our first assumption was that capitalist and labourer met as free persons, as independent owners of commodities; the one possessing money and means of production, the other labour-power. But now the capitalist buys children and young persons under age. Previously, the workman sold his own labour-power, which he disposed of nominally as a free agent. Now he sells wife and child. He has become a slave-dealer.[40] The demand for children's labour often resembles in form the inquiries for negro slaves, such as were formerly to be read among the advertisements in American journals.

> "My attention," says an English factory inspector, "was drawn to an advertisement in the local paper of one of the most important manufacturing towns of my district, of which the following is a copy: Wanted, 12 to 20 young persons, not younger than what can pass for 13 years. Wages, 4 shillings a week. Apply &c." [41]

The phrase "what can pass for 13 years," has reference to the fact, that by the Factory Act, children under 13 years may work only 6 hours. A surgeon officially appointed must certify their age. The manufacturer, therefore, asks for children who look as if they were already 13 years old. The decrease, often by leaps and bounds in the number of children under 13 years employed in factories, a decrease that is shown in an astonishing manner by the English statistics of the last 20 years, was for the most part, according to the evidence of the factory inspectors themselves, the work of the certifying surgeons, who overstated the age of the children, agreeably to the capitalist's greed for exploitation, and the sordid trafficking needs of the parents. In the notorious district of Bethnal Green, a public market is held every Monday and Tuesday morning, where children of both sexes from 9 years of age upwards, hire themselves out to the silk manufacturers. "The usual terms are 1s. 8d. a week (this belongs to the parents) and '2d. for myself and tea.' The

contract is binding only for the week. The scene and language while this market is going on are quite disgraceful." [42] It has also occurred in England, that women have taken "children from the workhouse and let any one have them out for 2s. 6d. a week."[43] In spite of legislation, the number of boys sold in Great Britain by their parents to act as live chimney-sweeping machines (although there exist plenty of machines to replace them) exceeds 2,000.[44] The revolution effected by machinery in the juridical relations between the buyer and the seller of labour-power, causing the transaction as a whole to lose the appearance of a contract between free persons, afforded the English Parliament an excuse, founded on juridical principles, for the interference of the state with factories. Whenever the law limits the labour of children to 6 hours in industries not before interfered with, the complaints of the manufacturers are always renewed. They allege that numbers of the parents withdraw their children from the industry brought under the Act, in order to sell them where "freedom of labour" still rules, i.e., where children under 13 years are compelled to work like grown-up people, and therefore can be got rid of at a higher price. But since capital is by nature a leveller, since it exacts in every sphere of production equality in the conditions of the exploitation of labour, the limitation by law of children's labour, in one branch of industry, becomes the cause of its limitation in others.

We have already alluded to the physical deterioration as well of the children and young-persons as of the women, whom machinery, first directly in the factories that shoot up on its basis, and then indirectly in all the remaining branches of industry, subjects to the exploitation of capital. In this place, therefore, we dwell only on one point, the enormous mortality, during the first few years of their life, of the children of the operatives. In sixteen of the registration districts into which England is divided, there are, for every 100,000 children alive under the age of one year, only 9,000 deaths in a year on an average (in one district only 7,047); in 24 districts the deaths are over 10,000, but under 11,000; in 39 districts, over 11,000, but under 12,000; in 48 districts over 12,000, but under 13,000; in 22 districts over 20,000; in 25 districts over 21,000; in 17 over 22,000; in 11 over 23,000; in Hoo, Wolverhampton, Ashton-under-Lyne, and Preston, over 24,000; in Nottingham, Stockport, and Bradford, over 25,000; in Wisbeach, 16,000; and in Manchester, 26,125.[45] As was shown by an official medical inquiry in the year 1861, the high death-rates are, apart from local causes, principally due to the employment of the mothers away from their homes, and to the neglect and maltreatment, consequent on her absence, such as, amongst others, insufficient nourishment, unsuitable food, and dosing with opiates; besides this, there arises an unnatural estrangement between mother and child, and as a consequence intentional starving and poisoning of the children.[46] In those agricultural districts, "where a minimum in the employment of women exists, the death-rate is on the other hand very low." [47] The Inquiry Commission of 1861 led, however, to the unexpected result, that in some purely agricultural districts bordering on the North Sea, the death-rate of children under one year old almost equalled that of the worst factory districts. Dr. Julian Hunter was therefore commissioned to investigate this phenomenon on the spot. His report is incorporated with the "Sixth Report on Public Health."[48] Up to that time it was supposed, that the children were decimated by malaria, and other diseases peculiar to low-lying and marshy districts. But the inquiry showed the very opposite, namely, that the same cause which drove away malaria, the conversion of the land, from a morass in winter and a scanty pasture in summer, into fruitful corn land, created the exceptional death-rate of the infants.[49] The 70 medical men, whom Dr. Hunter examined in that district, were "wonderfully in accord" on this point. In fact, the revolution in the mode of cultivation had led to the introduction of the industrial system.

Married women, who work in gangs along with boys and girls, are, for a stipulated sum of money, placed at the disposal of the farmer, by a man called the "undertaker," who contracts for

the whole gang. “These gangs will sometimes travel many miles from their own village; they are to be met morning and evening on the roads, dressed in short petticoats, with suitable coats and boots, and sometimes trousers, looking wonderfully strong and healthy, but tainted with a customary immorality and heedless of the fatal results which their love of this busy and independent life is bringing on their unfortunate offspring who are pining at home.”[50]

Every phenomenon of the factory districts is here reproduced, including, but to a greater extent, ill-disguised infanticide, and dosing children with opiates.[51]

> “My knowledge of such evils,” says Dr. Simon, the medical officer of the Privy Council and editor in chief of the Reports on Public Health, “may excuse the profound misgiving with which I regard any large industrial employment of adult women.”[52]

“Happy indeed,” exclaims Mr. Baker, the factory inspector, in his official report, “happy indeed will it be for the manufacturing districts of England, when every married woman having a family is prohibited from working in any textile works at all.”[53]

The moral degradation caused by the capitalistic exploitation of women and children has been so exhaustively depicted by F. Engels in his “Lage der Arbeitenden Klasse Englands,” and other writers, that I need only mention the subject in this place. But the intellectual desolation artificially produced by converting immature human beings into mere machines for the fabrication of surplus-value, a state of mind clearly distinguishable from that natural ignorance which keeps the mind fallow without destroying its capacity for development, its natural fertility, this desolation finally compelled even the English Parliament to make elementary education a compulsory condition to the “productive” employment of children under 14 years, in every industry subject to the Factory Acts. The spirit of capitalist production stands out clearly in the ludicrous wording of the so-called education clauses in the Factory Acts, in the absence of an administrative machinery, an absence that again makes the compulsion illusory, in the opposition of the manufacturers themselves to these education clauses, and in the tricks and dodges they put in practice for evading them.

> “For this the legislature is alone to blame, by having passed a delusive law, which, while it would seem to provide that the children employed in factories shall be *educated,* contains no enactment by which that professed end can be secured. It provides nothing more than that the children shall on certain days of the week, and for a certain number of hours (three) in each day, be inclosed within the four walls of a place called a school, and that the employer of the child shall receive weekly a certificate to that effect signed by a person designated by the subscriber as a schoolmaster or schoolmistress.”[54]

Previous to the passing of the amended Factory Act, 1844, it happened, not unfrequently, that the certificates of attendance at school were signed by the schoolmaster or schoolmistress with a cross, as they themselves were unable to write.

> “On one occasion, on visiting a place called a school, from which certificates of school attendance, had issued, I was so struck with the ignorance of the master, that I said to him: ‘Pray, sir, can you read?’ His reply was: ‘Aye, summat!’ and as a justification of his right to grant certificates, he added: ‘At any rate, I am before my scholars.’”

The inspectors, when the Bill of 1844 was in preparation, did not fail to represent the disgraceful state of the places called schools, certificates from which they were obliged to admit as a

compliance with the laws, but they were successful only in obtaining thus much, that since the passing of the Act of 1845,

> the figures in the school certificate must be filled up in the handwriting of the schoolmaster, who must also sign his Christian and surname in full."[55]

Sir John Kincaid, factory inspector for Scotland, relates experiences of the same kind.

> "The first school we visited was kept by a Mrs. Ann Killin. Upon asking her to spell her name, she straightway made a mistake, by beginning with the letter C, but correcting herself immediately, she said her name began with a K. On looking at her signature, however, in the school certificate books, I noticed that she spelt it in various ways, while her handwriting left no doubt as to her unfitness to teach. She herself also acknowledged that she could not keep the register ... In a second school I found the schoolroom 15 feet long, and 10 feet wide, and counted in this space 75 children, who were gabbling something unintelligible"[56] But it is not only in the miserable places above referred to that the children obtain certificates of school attendance without having received instruction of any value, for in many schools where there is a competent teacher, his efforts are of little avail from the distracting crowd of children of all ages, from infants of 3 years old and upwards; his livelihood, miserable at the best, depending on the pence received from the greatest number of children whom it is possible to cram into the space. To this is to be added scanty school furniture, deficiency of books, and other materials for teaching, and the depressing effect upon the poor children themselves of a close, noisome atmosphere. I have been in many such schools, where I have seen rows of children doing absolutely nothing; and this is certified as school attendance, and, in statistical returns, such children are set down as being educated."[57]

In Scotland the manufacturers try all they can to do without the children that are obliged to attend school.

> "It requires no further argument to prove that the educational clauses of the Factory Act, being held in such disfavour among mill-owners, tend in a great measure to exclude that class of children alike from the employment and the benefit of education contemplated by this Act."[58]

Horribly grotesque does this appear in print works, which are regulated by a special Act. By that Act,

> "every child, before being employed in a print work must have attended school for at least 30 days, and not less than 150 hours, during the six months immediately preceding such first day of employment, and during the continuance of its employment in the print works, it must attend for a like period of 30 days, and 150 hours during every successive period of six months.... The attendance at school must be between 8 a.m. and 6 p.m. No attendance of less than 2½ hours, nor more than 5 hours on any one day, shall be reckoned as part of the 150 hours. Under ordinary circumstances the children attend school morning and afternoon for 30 days, for at least 5 hours each day, and upon the expiration of the 30 days, the statutory total of 150 hours having been attained, having, in their language, made up their book, they return to the print work, where they continue until the six months have expired, when another instalment of school attendance becomes due, and they again seek the school until the book is again made up.... Many boys having attended school for the required number of hours, when they return to

> school after the expiration of their six months' work in the print work, are in the same condition as when they first attended school as print-work boys, that they have lost all they gained by their previous school attendance.... In other print works the children's attendance at school is made to depend altogether upon the exigencies of the work in the establishment. The requisite number of hours is made up each six months, by instalments consisting of from 3 to 5 hours at a time, spreading over, perhaps, the whole six months.... For instance, the attendance on one day might be from 8 to 11 a.m., on another day from 1 p.m. to 4 p.m., and the child might not appear at school again for several days, when it would attend from 3 p.m. to 6 p.m.; then it might attend for 3 or 4 days consecutively, or for a week, then it would not appear in school for 3 weeks or a month, after that upon some odd days at some odd hours when the operative who employed it chose to spare it; and thus the child was, as it were, buffeted from school to work, from work to school, until the tale of 150 hours was told."[59]

By the excessive addition of women and children to the ranks of the workers, machinery at last breaks down the resistance which the male operatives in the manufacturing period continued to oppose to the despotism of capital.[60]

B. Prolongation of the Working day

If machinery be the most powerful means for increasing the productiveness of labour – i.e., for shortening the working-time required in the production of a commodity, it becomes in the hands of capital the most powerful means, in those industries first invaded by it, for lengthening the working day beyond all bounds set by human nature. It creates, on the one hand, new conditions by which capital is enabled to give free scope to this its constant tendency, and on the other hand, new motives with which to whet capital's appetite for the labour of others.

In the first place, in the form of machinery, the implements of labour become automatic, things moving and working independent of the workman. They are thenceforth an industrial *perpetuum mobile*, that would go on producing forever, did it not meet with certain natural obstructions in the weak bodies and the strong wills of its human attendants. The automaton, as capital, and because it is capital, is endowed, in the person of the capitalist, with intelligence and will; it is therefore animated by the longing to reduce to a minimum the resistance offered by that repellent yet elastic natural barrier, man.[61] This resistance is moreover lessened by the apparent lightness of machine work, and by the more pliant and docile character of the women and children employed on it.[62]

The productiveness of machinery is, as we saw, inversely proportional to the value transferred by it to the product. The longer the life of the machine, the greater is the mass of the products over which the value transmitted by the machine is spread, and the less is the portion of that value added to each single commodity. The active lifetime of a machine is, however, clearly dependent on the length of the working day, or on the duration of the daily labour-process multiplied by the number of days for which the process is carried on.

The wear and tear of a machine is not exactly proportional to its working-time. And even if it were so, a machine working 16 hours daily for 7½ years, covers as long a working period as, and transmits to the total product no more value than, the same machine would if it worked only 8 hours daily for 15 years. But in the first case the value of the machine would be reproduced twice as quickly as in the latter, and the capitalist would, by this use of the machine, absorb in 7½ years as much surplus-value as in the second case he would in 15.

The material wear and tear of a machine is of two kinds. The one arises from use, as coins wear away by circulating, the other from non-use, as a sword rusts when left in its scabbard. The latter kind is due to the elements. The former is more or less directly proportional, the latter to a certain extent inversely proportional, to the use of the machine.[63]

But in addition to the material wear and tear, a machine also undergoes, what we may call a moral depreciation. It loses exchange-value, either by machines of the same sort being produced cheaper than it, or by better machines entering into competition with it.[64] In both cases, be the machine ever so young and full of life, its value is no longer determined by the labour actually materialised in it, but by the labour-time requisite to reproduce either it or the better machine. It has, therefore, lost value more or less. The shorter the period taken to reproduce its total value, the less is the danger of moral depreciation; and the longer the working day, the shorter is that period. When machinery is first introduced into an industry, new methods of reproducing it more cheaply follow blow upon blow[65], and so do improvements, that not only affect individual parts and details of the machine, but its entire build. It is, therefore, in the early days of the life of machinery that this special incentive to the prolongation of the working day makes itself felt most acutely.[66]

Given the length of the working day, all other circumstances remaining the same, the exploitation of double the number of workmen demands, not only a doubling of that part of constant capital which is invested in machinery and buildings, but also of that part which is laid out in raw material and auxiliary substances. The lengthening of the working day, on the other hand, allows of production on an extended scale without any alteration in the amount of capital laid out on machinery and buildings.[67] Not only is there, therefore, an increase of surplus-value, but the outlay necessary to obtain it diminishes. It is true that this takes place, more or less, with every lengthening of the working day; but in the case under consideration, the change is more marked, because the capital converted into the instruments of labour preponderates to a greater degree. [68] The development of the factory system fixes a constantly increasing portion of the capital in a form, in which, on the one hand, its value is capable of continual self-expansion, and in which, on the other hand, it loses both use-value and exchange-value whenever it loses contact with living labour. “When a labourer,” said Mr. Ashworth, a cotton magnate, to Professor Nassau W. Senior, “lays down his spade, he renders useless, for that period, a capital worth eighteen-pence. When one of our people leaves the mill, he renders useless a capital that has cost £100,000.”[69] Only fancy! making “useless” for a single moment, a capital that has cost £100,000! It is, in truth, monstrous, that a single one of our people should ever leave the factory! The increased use of machinery, as Senior after the instruction he received from Ashworth clearly perceives, makes a constantly increasing lengthening of the working day “desirable.” [70]

Machinery produces relative surplus-value; not only by directly depreciating the value of labour-power, and by indirectly cheapening the same through cheapening the commodities that enter into its reproduction, but also, when it is first introduced sporadically into an industry, by converting the labour employed by the owner of that machinery, into labour of a higher degree and greater efficacy, by raising the social value of the article produced above its individual value, and thus enabling the capitalist to replace the value of a day’s labour-power by a smaller portion of the value of a day’s product. During this transition period, when the use of machinery is a sort of monopoly, the profits are therefore exceptional, and the capitalist endeavours to exploit thoroughly “the sunny time of this his first love,” by prolonging the working day as much as possible. The magnitude of the profit whets his appetite for more profit.

As the use of machinery becomes more general in a particular industry, the social value of the product sinks down to its individual value, and the law that surplus-value does not arise from the

labour-power that has been replaced by the machinery, but from the labour-power actually employed in working with the machinery, asserts itself. Surplus-value arises from variable capital alone, and we saw that the amount of surplus-value depends on two factors, viz., the rate of surplus-value and the number of the workmen simultaneously employed. Given the length of the working day, the rate of surplus-value is determined by the relative duration of the necessary labour and of the surplus labour in a day. The number of the labourers simultaneously employed depends, on its side, on the ratio of the variable to the constant capital. Now, however much the use of machinery may increase the surplus labour at the expense of the necessary labour by heightening the productiveness of labour, it is clear that it attains this result, only by diminishing the number of workmen employed by a given amount of capital. It converts what was formerly variable capital, invested in labour-power, into machinery which, being constant capital, does not produce surplus-value. It is impossible, for instance, to squeeze as much surplus-value out of 2 as out of 24 labourers. If each of these 24 men gives only one hour of surplus labour in 12, the 24 men give together 24 hours of surplus labour, while 24 hours is the total labour of the two men. Hence, the application of machinery to the production of surplus-value implies a contradiction which is immanent in it, since of the two factors of the surplus-value created by a given amount of capital, one, the rate of surplus-value, cannot be increased, except by diminishing the other, the number of workmen. This contradiction comes to light, as soon as by the general employment of machinery in a given industry, the value of the machine-produced commodity regulates the value of all commodities of the same sort; and it is this contradiction, that in its turn, drives the capitalist, without his being conscious of the fact,[71] to excessive lengthening of the working day, in order that he may compensate the decrease in the relative number of labourers exploited, by an increase not only of the relative, but of the absolute surplus labour.

If, then, the capitalistic employment of machinery, on the one hand, supplies new and powerful motives to an excessive lengthening of the working day, and radically changes, as well the methods of labour, as also the character of the social working organism, in such a manner as to break down all opposition to this tendency, on the other hand it produces, partly by opening out to the capitalist new strata of the working-class, previously inaccessible to him, partly by setting free the labourers it supplants, a surplus working population,[72] which is compelled to submit to the dictation of capital. Hence that remarkable phenomenon in the history of modern industry, that machinery sweeps away every moral and natural restriction on the length of the working day. Hence, too, the economic paradox, that the most powerful instrument for shortening labour-time, becomes the most unfailing means for placing every moment of the labourer's time and that of his family, at the disposal of the capitalist for the purpose of expanding the value of his capital. "If," dreamed Aristotle, the greatest thinker of antiquity, "if every tool, when summoned, or even of its own accord, could do the work that befits it, just as the creations of Daedalus moved of themselves, or the tripods of Hephaestos went of their own accord to their sacred work, if the weavers' shuttles were to weave of themselves, then there would be no need either of apprentices for the master workers, or of slaves for the lords." [73]And Antipatros, a Greek poet of the time of Cicero, hailed the invention of the water-wheel for grinding corn, an invention that is the elementary form of all machinery, as the giver of freedom to female slaves, and the bringer back of the golden age.[74] Oh! those heathens! They understood, as the learned Bastiat, and before him the still wiser MacCulloch have discovered, nothing of Political Economy and Christianity. They did not, for example, comprehend that machinery is the surest means of lengthening the working day. They perhaps excused the slavery of one on the ground that it was a means to the full development of another. But to preach slavery of the masses, in order that a few crude and half-educated parvenus, might become "eminent spinners," "extensive sausage-makers," and "influential shoe-black dealers," to do this, they lacked the bump of Christianity.

C. Intensification of Labour

The immoderate lengthening of the working day, produced by machinery in the hands of capital, leads to a reaction on the part of society, the very sources of whose life are menaced; and, thence, to a normal working day whose length is fixed by law. Thenceforth a phenomenon that we have already met with, namely, the intensification of labour, develops into great importance. Our analysis of absolute surplus-value had reference primarily to the extension or duration of the labour, its intensity being assumed as given. We now proceed to consider the substitution of a more intensified labour for labour of more extensive duration, and the degree of the former.

It is self-evident, that in proportion as the use of machinery spreads, and the experience of a special class of workmen habituated to machinery accumulates, the rapidity and intensity of labour increase as a natural consequence. Thus in England, during half a century, lengthening of the working day went hand in hand with increasing intensity of factory labour. Nevertheless the reader will clearly see, that where we have labour, not carried on by fits and starts, but repeated day after day with unvarying uniformity, a point must inevitably be reached, where extension of the working day and intensity of the labour mutually exclude one another, in such a way that lengthening of the working day becomes compatible only with a lower degree of intensity, and a higher degree of intensity, only with a shortening of the working day. So soon as the gradually surging revolt of the working-class compelled Parliament to shorten compulsorily the hours of labour, and to begin by imposing a normal working day on factories proper, so soon consequently as an increased production of surplus-value by the prolongation of the working day was once for all put a stop to, from that moment capital threw itself with all its might into the production of relative surplus-value, by hastening on the further improvement of machinery. At the same time a change took place in the nature of relative surplus-value. Generally speaking, the mode of producing relative surplus-value consists in raising the productive power of the workman, so as to enable him to produce more in a given time with the same expenditure of labour. Labour-time continues to transmit as before the same value to the total product, but this unchanged amount of exchange-value is spread over more use-value; hence the value of each single commodity sinks. Otherwise, however, so soon as the compulsory shortening of the hours of labour takes place. The immense impetus it gives the development of productive power, and to economy in the means of production, imposes on the workman increased expenditure of labour in a given time, heightened tension of labour-power, and closer filling up of the pores of the working day, or condensation of labour to a degree that is attainable only within the limits of the shortened working day. This condensation of a greater mass of labour into a given period thenceforward counts for what it really is, a greater quantity of labour. In addition to a measure of its extension, i.e., duration, labour now acquires a measure of its intensity or of the degree of its condensation or density.[75] The denser hour of the ten hours' working day contains more labour, i.e., expended labour-power than the more porous hour of the twelve hours' working day. The product therefore of one of the former hours has as much or more value than has the product of 1 1/5 of the latter hours. Apart from the increased yield of relative surplus-value through the heightened productiveness of labour, the same mass of value is now produced for the capitalist say by 3 1/3 hours of surplus labour, and 6 2/3 hours of necessary labour, as was previously produced by four hours of surplus labour and eight hours of necessary labour.

We now come to the question: How is the labour intensified?

The first effect of shortening the working day results from the self-evident law, that the efficiency of labour-power is in an inverse ratio to the duration of its expenditure. Hence, within certain limits what is lost by shortening the duration is gained by the increasing tension of labour-power. That the workman moreover really does expend more labour-power, is ensured by the mode in

which the capitalist pays him.[76] In those industries, such as potteries, where machinery plays little or no part, the introduction of the Factory Acts has strikingly shown that the mere shortening of the working day increases to a wonderful degree the regularity, uniformity, order, continuity, and energy of the labour.[77] It seemed, however, doubtful whether this effect was produced in the factory proper, where the dependence of the workman on the continuous and uniform motion of the machinery had already created the strictest discipline. Hence, when in 1844 the reduction of the working day to less than twelve hours was being debated, the masters almost unanimously declared

> "that their overlookers in the different rooms took good care that the hands lost no time," that "the extent of vigilance and attention on the part of the workmen was hardly capable of being increased," and, therefore, that the speed of the machinery and other conditions remaining unaltered, "to expect in a well-managed factory any important result from increased attention of the workmen was an absurdity."[78]

This assertion was contradicted by experiments. Mr. Robert Gardner reduced the hours of labour in his two large factories at Preston, on and after the 20th April, 1844, from twelve to eleven hours a day. The result of about a year's working was that "the same amount of product for the same cost was received, and the workpeople as a whole earned in eleven hours as much wages as they did before in twelve."[79] I pass over the experiments made in the spinning and carding rooms, because they were accompanied by an increase of 2% in the speed of the machines. But in the weaving department, where, moreover, many sorts of figured fancy articles were woven, there was not the slightest alteration in the conditions of the work. The result was: "From 6th January to 20th April, 1844, with a twelve hours' day, average weekly wages of each hand 10s. 1½d., from 20th April to 29th June, 1844, with day of eleven hours, average weekly wages 10s. 3½d."[80] Here we have more produced in eleven hours than previously in twelve, and entirely in consequence of more steady application and economy of time by the workpeople. While they got the same wages and gained one hour of spare time, the capitalist got the same amount produced and saved the cost of coal, gas, and other such items, for one hour. Similar experiments, and with the like success, were carried out in the mills of Messrs. Horrocks and Jacson.[81]

The shortening of the hours of labour creates, to begin with, the subjective conditions for the condensation of labour, by enabling the workman to exert more strength in a given time. So soon as that shortening becomes compulsory, machinery becomes in the hands of capital the objective means, systematically employed for squeezing out more labour in a given time. This is effected in two ways: by increasing the speed of the machinery, and by giving the workman more machinery to tent. Improved construction of the machinery is necessary, partly because without it greater pressure cannot be put on the workman, and partly because the shortened hours of labour force the capitalist to exercise the strictest watch over the cost of production. The improvements in the steam-engine have increased the piston speed, and at the same time have made it possible, by means of a greater economy of power, to drive with the same or even a smaller consumption of coal more machinery with the same engine. The improvements in the transmitting mechanism have lessened friction, and, what so strikingly distinguishes modern from the older machinery, have reduced the diameter and weight of the shafting to a constantly decreasing minimum. Finally, the improvements in the operative machines have, while reducing their size, increased their speed and efficiency, as in the modern power-loom; or, while increasing the size of their framework, have also increased the extent and number of their working parts, as in spinning-mules, or have added to the speed of these working parts by imperceptible alterations of detail, such as those which ten years ago increased the speed of the spindles in self-acting mules by one-fifth.

The reduction of the working day to 12 hours dates in England from 1832. In 1836 a manufacturer stated:

> "The labour now undergone in the factories is much greater than it used to be ... compared with thirty or forty years ago ... owing to the greater attention and activity required by the greatly increased speed which is given to the machinery."[82]

In the year 1844, Lord Ashley, now Lord Shaftesbury, made in the House of Commons the following statements, supported by documentary evidence:

> "The labour performed by those engaged in the processes of manufacture, is three times as great as in the beginning of such operations. Machinery has executed, no doubt, the work that would demand the sinews of millions of men; but it has also prodigiously multiplied the labour of those who are governed by its fearful movements.... In 1815, the labour of following a pair of mules spinning cotton of No. 40 – reckoning 12 hours to the working day – involved a necessity of walking 8 miles. In 1832, the distance travelled in following a pair of mules, spinning cotton yarn of the same number, was 20 miles, and frequently more. In 1835" (query – 1815 or 1825?) "the spinner put up daily, on each of these mules, 820 stretches, making a total of 1,640 stretches in the course of the day. In 1832, the spinner put up on each mule 2,200 stretches, making a total of 4,400. In 1844, 2,400 stretches, making a total of 4,800; and in some cases the amount of labour required is even still greater.... I have another document sent to me in 1842, stating that the labour is progressively increasing - increasing not only because the distance to be travelled is greater, but because the quantity of goods produced is multiplied, while the hands are fewer in proportion than before; and, moreover, because an inferior species of cotton is now often spun, which it is more difficult to work.... In the carding-room there has also been a great increase of labour. One person there does the work formerly divided between two. In the weaving-room, where a vast number of persons are employed, and principally females ... the labour has increased within the last few years fully 10 per cent., owing to the increased speed of the machinery in spinning. In 1838, the number of hanks spun per week was 18,000, in 1843 it amounted to 21,000. In 1819, the number of picks in power-loom-weaving per minute was 60 – in 1842 it was 140, showing a vast increase of labour."[83]

In the face of this remarkable intensity of labour which had already been reached in 1844 under the Twelve Hours' Act, there appeared to be a justification for the assertion made at that time by the English manufacturers, that any further progress in that direction was impossible, and therefore that every further reduction of the hours of labour meant a lessened production. The apparent correctness of their reasons will be best shown by the following contemporary statement by Leonard Horner, the factory inspector, their ever watchful censor.

> "Now, as the quantity produced must, in the main, be regulated by the speed of the machinery, it must be the interest of the mill-owner to drive it at the utmost rate of speed consistent with these following conditions, viz., the preservation of the machinery from too rapid deterioration; the preservation of the quality of the article manufactured; and the capability of the workman to follow the motion without a greater exertion than he can sustain for a constancy. One of the most important problems, therefore, which the owner of a factory has to solve is to find out the maximum speed at which he can run, with a due regard to the above

> conditions. It frequently happens that he finds he has gone too fast, that breakages and bad work more than counterbalance the increased speed, and that he is obliged to slacken his pace. I therefore concluded, that as an active and intelligent mill-owner would find out the safe maximum, it would not be possible to produce as much in eleven hours as in twelve. I further assumed that the operative paid by piecework, would exert himself to the utmost consistent with the power of continuing at the same rate."[84]

Horner, therefore, came to the conclusion that a reduction of the working hours below twelve would necessarily diminish production.[85] He himself, ten years later, cites his opinion of 1845 in proof of how much he under-estimated in that year the elasticity of machinery, and of man's labour-power, both of which are simultaneously stretched to an extreme by the compulsory shortening of the working day.

We now come to the period that follows the introduction of the Ten Hours' Act in 1847 into the English cotton, woollen, silk, and flax mills.

> "The speed of the spindles has increased upon throstles 500, and upon mules 1,000 revolutions a minute, i.e., the speed of the throstle spindle, which in 1839 was 4,500 times a minute, is now (1862) 5,000; and of the mule spindle, that was 5,000, is now 6,000 times a minute, amounting in the former case to one-tenth, and in the second case to one-fifth additional increase." [86]

James Nasmyth, the eminent civil engineer of Patricroft, near Manchester, explained in a letter to Leonard Horner, written in 1852, the nature of the improvements in the steam-engine that had been made between the years 1848 and 1852. After remarking that the horse-power of steam-engines, being always estimated in the official returns according to the power of similar engines in 1828[87], is only nominal, and can serve only as an index of their real power, he goes on to say:

> "I am confident that from the same weight of steam-engine machinery, we are now obtaining at least 50 per cent. more duty or work performed on the average, and that in many cases the identical steam-engines which in the days of the restricted speed of 220 feet per minute, yielded 50 horsepower, are now yielding upwards of 100..." "The modern steam-engine of 100 horse-power is capable of being driven at a much greater force than formerly, arising from improvements in its construction, the capacity and construction of the boilers, &c...." "Although the same number of hands are employed in proportion to the horse-power as at former periods, there are fewer hands employed in proportion to the machinery."[88] "In the year 1850, the factories of the United Kingdom employed 134,217 nominal horse-power to give motion to 25,638,716 spindles and 301,445 looms. The number of spindles and looms in 1856 was respectively 33,503,580 of the former, and 369,205 of the latter, which, reckoning the force of the nominal horse-power required to be the same as in 1850, would require a force equal to 175,000 horses, but the actual power given in the return for 1856 is 161,435, less by above 10,000 horses than, calculating upon the basis of the return of 1850, the factories ought to have required in 1856." [89] "The facts thus brought out by the Return (of 1856) appear to be that the factory system is increasing rapidly; that although the same number of hands are employed in proportion to the horse-power as at former periods, there are fewer hands employed in proportion to the machinery; that the steam-engine is enabled to drive an increased weight of machinery by economy of force and other methods, and that an increased quantity of work can be turned off

> by improvements in machinery, and in methods of manufacture, by increase of speed of the machinery, and by a variety of other causes." [90]

> "The great improvements made in machines of every kind have raised their productive power very much. Without any doubt, the shortening of the hours of labour... gave the impulse to these improvements. The latter, combined with the more intense strain on the workman, have had the effect, that at least as much is produced in the shortened (by two hours or one-sixth) working day as was previously produced during the longer one."[91]

One fact is sufficient to show how greatly the wealth of the manufacturers increased along with the more intense exploitation of labour-power. From 1838 to 1850, the average proportional increase in English cotton and other factories was 32%, while from 1850 to 1856 it amounted to 86%.

But however great the progress of English industry had been during the 8 years from 1848 to 1856 under the influence of a working day of 10 hours, it was far surpassed during the next period of 6 years from 1856 to 1862. In silk factories, for instance, there were in 1856, spindles 1,093,799; in 1862, 1,388,544; in 1856, looms 9,260; in 1862, 10,709. But the number of operatives was, in 1856, 56,131; in 1862, 52,429. The increase in the spindles was therefore 26.9% and in the looms 15.6%, while the number of the operatives decreased 7%. In the year 1850 there were employed in worsted mills 875,830 spindles; in 1856, 1,324,549 (increase 51.2%), and in 1862, 1,289,172 (decrease 2.7%). But if we deduct the doubling spindles that figure in the numbers for 1856, but not in those for 1862, it will be found that after 1856 the number of spindles remained nearly stationary. On the other hand, after 1850, the speed of the spindles and looms was in many cases doubled. The number of power-looms in worsted mills was, in 1850, 32,617; in 1856, 38,956; in 1862, 43,048. The number of the operatives was, in 1850, 79,737; in 1856, 87,794; in 1862, 86,063; included in these, however, the children under 14 years of age were, in 1850, 9,956; in 1856, 11,228; in 1862, 13,178. In spite, therefore, of the greatly increased number of looms in 1862, compared with 1856, the total number of the workpeople employed decreased, and that of the children exploited increased.[92]

On the 27th April, 1863, Mr. Ferrand said in the House of Commons:

> "I have been informed by delegates from 16 districts of Lancashire and Cheshire, in whose behalf I speak, that the work in the factories is, in consequence of the improvements in machinery, constantly on the increase. Instead of as formerly one person with two helps tenting two looms, one person now tents three looms without helps, and it is no uncommon thing for one person to tent four. Twelve hours' work, as is evident from the facts adduced, is now compressed into less than 10 hours. It is therefore self-evident, to what an enormous extent the toil of the factory operative has increased during the last 10 years."[93]

Although, therefore, the Factory Inspectors unceasingly and with justice, commend the results of the Acts of 1844 and 1850, yet they admit that the shortening of the hours of labour has already called forth such an intensification of the labour as is injurious to the health of the workman and to his capacity for work.

> "In most of the cotton, worsted, and silk mills, an exhausting state of excitement necessary to enable the workers satisfactorily to mind the machinery, the motion of which has been greatly accelerated within the last few years, seems to me not unlikely to be one of the causes of that excess of mortality from lung disease, which Dr. Greenhow has pointed out in his recent report on this subject."[94]

There cannot be the slightest doubt that the tendency that urges capital, so soon as a prolongation of the hours of labour is once for all forbidden, to compensate itself, by a systematic heightening of the intensity of labour, and to convert every improvement in machinery into a more perfect means of exhausting the workman, must soon lead to a state of things in which a reduction of the hours of labour will again be inevitable.[95] On the other hand, the rapid advance of English industry between 1848 and the present time, under the influence of a day of 10 hours, surpasses the advance made between 1833 and 1847, when the day was 12 hours long, by far more than the latter surpasses the advance made during the half century after the first introduction of the factory system, when the working day was without limits.[96]

Section 4: The Factory

At the commencement of this chapter we considered that which we may call the body of the factory, i.e., machinery organised into a system. We there saw how machinery, by annexing the labour of women and children, augments the number of human beings who form the material for capitalistic exploitation, how it confiscates the whole of the workman's disposable time, by immoderate extension of the hours of labour, and how finally its progress, which allows of enormous increase of production in shorter and shorter periods, serves as a means of systematically getting more work done in a shorter time, or of exploiting labour-power more intensely. We now turn to the factory as a whole, and that in its most perfect form.

Dr. Ure, the Pindar of the automatic factory, describes it, on the one hand, as

> "Combined co-operation of many orders of workpeople, adult and young, in tending with assiduous skill, a system of productive machines, continuously impelled by a central power" (the prime mover); on the other hand, as "a vast automaton, composed of various mechanical and intellectual organs, acting in uninterrupted concert for the production of a common object, all of them being subordinate to a self-regulated moving force."

These two descriptions are far from being identical. In one, the collective labourer, or social body of labour, appears as the dominant subject, and the mechanical automaton as the object; in the other, the automaton itself is the subject, and the workmen are merely conscious organs, co-ordinate with the unconscious organs of the automaton, and together with them, subordinated to the central moving-power. The first description is applicable to every possible employment of machinery on a large scale, the second is characteristic of its use by capital, and therefore of the modern factory system. Ure prefers therefore, to describe the central machine, from which the motion comes, not only as an automaton, but as an autocrat. "In these spacious halls the benignant power of steam summons around him his myriads of willing menials."[97]

Along with the tool, the skill of the workman in handling it passes over to the machine. The capabilities of the tool are emancipated from the restraints that are inseparable from human labour-power. Thereby the technical foundation on which is based the division of labour in Manufacture, is swept away. Hence, in the place of the hierarchy of specialised workmen that characterises manufacture, there steps, in the automatic factory, a tendency to equalise and reduce to one and the same level every kind of work that has to be done by the minders of the machines;[98] in the place of the artificially produced differentiations of the detail workmen, step the natural differences of age and sex.

So far as division of labour re-appears in the factory, it is primarily a distribution of the workmen among the specialised machines; and of masses of workmen, not however organised into groups, among the various departments of the factory, in each of which they work at a number of similar

machines placed together; their co-operation, therefore, is only simple. The organised group, peculiar to manufacture, is replaced by the connexion between the head workman and his few assistants. The essential division is, into workmen who are actually employed on the machines (among whom are included a few who look after the engine), and into mere attendants (almost exclusively children) of these workmen. Among the attendants are reckoned more or less all "Feeders" who supply the machines with the material to be worked. In addition to these two principal classes, there is a numerically unimportant class of persons, whose occupation it is to look after the whole of the machinery and repair it from time to time; such as engineers, mechanics, joiners, &c. This is a superior class of workmen, some of them scientifically educated, others brought up to a trade; it is distinct from the factory operative class, and merely aggregated to it.[99] This division of labour is purely technical.

To work at a machine, the workman should be taught from childhood, in order that he may learn to adapt his own movements to the uniform and unceasing motion of an automaton. When the machinery, as a whole, forms a system of manifold machines, working simultaneously and in concert, the co-operation based upon it, requires the distribution of various groups of workmen among the different kinds of machines. But the employment of machinery does away with the necessity of crystallising this distribution after the manner of Manufacture, by the constant annexation of a particular man to a particular function.[100] Since the motion of the whole system does not proceed from the workman, but from the machinery, a change of persons can take place at any time without an interruption of the work. The most striking proof of this is afforded by the *relays system*, put into operation by the manufacturers during their revolt from 1848-1850. Lastly, the quickness with which machine work is learnt by young people, does away with the necessity of bringing up for exclusive employment by machinery, a special class of operatives.[101] With regard to the work of the mere attendants, it can, to some extent, be replaced in the mill by machines,[102] and owing to its extreme simplicity, it allows of a rapid and constant change of the individuals burdened with this drudgery.

Although then, technically speaking, the old system of division of labour is thrown overboard by machinery, it hangs on in the factory, as a traditional habit handed down from Manufacture, and is afterwards systematically re-moulded and established in a more hideous form by capital, as a means of exploiting labour-power. The life-long speciality of handling one and the same tool, now becomes the life-long speciality of serving one and the same machine. Machinery is put to a wrong use, with the object of transforming the workman, from his very childhood, into a part of a detail-machine.[103] In this way, not only are the expenses of his reproduction considerably lessened, but at the same time his helpless dependence upon the factory as a whole, and therefore upon the capitalist, is rendered complete. Here as everywhere else, we must distinguish between the increased productiveness due to the development of the social process of production, and that due to the capitalist exploitation of that process. In handicrafts and manufacture, the workman makes use of a tool, in the factory, the machine makes use of him. There the movements of the instrument of labour proceed from him, here it is the movements of the machine that he must follow. In manufacture the workmen are parts of a living mechanism. In the factory we have a lifeless mechanism independent of the workman, who becomes its mere living appendage.

> "The miserable routine of endless drudgery and toil in which the same mechanical process is gone through over and over again, is like the labour of Sisyphus. The burden of labour, like the rock, keeps ever falling back on the worn-out labourer."[104]

At the same time that factory work exhausts the nervous system to the uttermost, it does away with the many-sided play of the muscles, and confiscates every atom of freedom, both in bodily

and intellectual activity.[105] The lightening of the labour, even, becomes a sort of torture, since the machine does not free the labourer from work, but deprives the work of all interest. Every kind of capitalist production, in so far as it is not only a labour-process, but also a process of creating surplus-value, has this in common, that it is not the workman that employs the instruments of labour, but the instruments of labour that employ the workman. But it is only in the factory system that this inversion for the first time acquires technical and palpable reality. By means of its conversion into an automaton, the instrument of labour confronts the labourer, during the labour-process, in the shape of capital, of dead labour, that dominates, and pumps dry, living labour-power. The separation of the intellectual powers of production from the manual labour, and the conversion of those powers into the might of capital over labour, is, as we have already shown, finally completed by modern industry erected on the foundation of machinery. The special skill of each individual insignificant factory operative vanishes as an infinitesimal quantity before the science, the gigantic physical forces, and the mass of labour that are embodied in the factory mechanism and, together with that mechanism, constitute the power of the "master." This "master," therefore, in whose brain the machinery and his monopoly of it are inseparably united, whenever he falls out with his "hands," contemptuously tells them:

> "The factory operatives should keep in wholesome remembrance the fact that theirs is really a low species of skilled labour; and that there is none which is more easily acquired, or of its quality more amply remunerated, or which by a short training of the least expert can be more quickly, as well as abundantly, acquired.... The master's machinery really plays a far more important part in the business of production than the labour and the skill of the operative, which six months' education can teach, and a common labourer can learn."[106]

The technical subordination of the workman to the uniform motion of the instruments of labour, and the peculiar composition of the body of workpeople, consisting as it does of individuals of both sexes and of all ages, give rise to a barrack discipline, which is elaborated into a complete system in the factory, and which fully develops the before mentioned labour of overlooking, thereby dividing the workpeople into operatives and overlookers, into private soldiers and sergeants of an industrial army. "The main difficulty [in the automatic factory] ... lay ... above all in training human beings to renounce their desultory habits of work, and to identify themselves with the unvarying regularity of the complex automaton. To devise and administer a successful code of factory discipline, suited to the necessities of factory diligence, was the Herculean enterprise, the noble achievement of Arkwright! Even at the present day, when the system is perfectly organised and its labour lightened to the utmost, it is found nearly impossible to convert persons past the age of puberty, into useful factory hands."[107] The factory code in which capital formulates, like a private legislator, and at his own good will, his autocracy over his workpeople, unaccompanied by that division of responsibility, in other matters so much approved of by the bourgeoisie, and unaccompanied by the still more approved representative system, this code is but the capitalistic caricature of that social regulation of the labour-process which becomes requisite in co-operation on a great scale, and in the employment in common, of instruments of labour and especially of machinery. The place of the slave-driver's lash is taken by the overlooker's book of penalties. All punishments naturally resolve themselves into fines and deductions from wages, and the law-giving talent of the factory Lycurgus so arranges matters, that a violation of his laws is, if possible, more profitable to him than the keeping of them.[108] We shall here merely allude to the material conditions under which factory labour is carried on. Every organ of sense is injured in an equal degree by artificial elevation of the temperature, by the dust-laden atmosphere, by the deafening noise, not to mention danger to life and limb among the

thickly crowded machinery, which, with the regularity of the seasons, issues its list of the killed and wounded in the industrial battle.[109] Economy of the social means of production, matured and forced as in a hothouse by the factory system, is turned, in the hands of capital, into systematic robbery of what is necessary for the life of the workman while he is at work, robbery of space, light, air, and of protection to his person against the dangerous and unwholesome accompaniments of the productive process, not to mention the robbery of appliances for the comfort of the workman.[110] Is Fourier wrong when he calls factories “tempered bagnos"?[111]

Section 5: The Strife Between Workman and Machine

The contest between the capitalist and the wage-labourer dates back to the very origin of capital. It raged on throughout the whole manufacturing period. [112] But only since the introduction of machinery has the workman fought against the instrument of labour itself, the material embodiment of capital. He revolts against this particular form of the means of production, as being the material basis of the capitalist mode of production.

In the 17th century nearly all Europe experienced revolts of the workpeople against the ribbon-loom, a machine for weaving ribbons and trimmings, called in Germany Bandmühle, Schnurmühle, and Mühlenstuhl. These machines were invented in Germany. Abbé Lancellotti, in a work that appeared in Venice in 1636, but which was written in 1579, says as follows:

> “Anthony Müller of Danzig saw about 50 years ago in that town, a very ingenious machine, which weaves 4 to 6 pieces at once. But the Mayor being apprehensive that this invention might throw a large number of workmen on the streets, caused the inventor to be secretly strangled or drowned.”

In Leyden, this machine was not used till 1629; there the riots of the ribbon-weavers at length compelled the Town Council to prohibit it.

> “In hac urbe,” says Boxhorn (Inst. Pol., 1663), referring to the introduction of this machine into Leyden, “ante hos viginti circiter annos instrumentum quidam invenerunt textorium, quo solus plus panni et facilius conficere poterat, quan plures aequali tempore. Hinc turbae ortae et querulae textorum, tandemque usus hujus instrumenti a magistratu prohibitus est.”
> [In this town, about twenty years ago certain people invented an instrument for weaving, with which a single person could weave more cloth, and more easily, than many others in the same length of time. As a result there arose disturbances and complaints from the weavers, until the Town Council finally prohibited the use of this instrument.]

After making various decrees more or less prohibitive against this loom in 1632, 1639, &c., the States General of Holland at length permitted it to be used, under certain conditions, by the decree of the 15th December, 1661. It was also prohibited in Cologne in 1676, at the same time that its introduction into England was causing disturbances among the workpeople. By an imperial Edict of 19th Feb., 1685, its use was forbidden throughout all Germany. In Hamburg it was burnt in public by order of the Senate. The Emperor Charles VI., on 9th Feb., 1719, renewed the edict of 1685, and not till 1765 was its use openly allowed in the Electorate of Saxony. This machine, which shook Europe to its foundations, was in fact the precursor of the mule and the power-loom, and of the industrial revolution of the 18th century. It enabled a totally inexperienced boy, to set the whole loom with all its shuttles in motion, by simply moving a rod backwards and forwards, and in its improved form produced from 40 to 50 pieces at once.

About 1630, a wind-sawmill, erected near London by a Dutchman, succumbed to the excesses of the populace. Even as late as the beginning of the 18th century, sawmills driven by water overcame the opposition of the people, supported as it was by Parliament, only with great difficulty. No sooner had Everet in 1758 erected the first wool-shearing machine that was driven by water-power, than it was set on fire by 100,000 people who had been thrown out of work. Fifty thousand workpeople, who had previously lived by carding wool, petitioned Parliament against Arkwright's scribbling mills and carding engines. The enormous destruction of machinery that occurred in the English manufacturing districts during the first 15 years of this century, chiefly caused by the employment of the power-loom, and known as the Luddite movement, gave the anti-Jacobin governments of a Sidmouth, a Castlereagh, and the like, a pretext for the most reactionary and forcible measures. It took both time and experience before the workpeople learnt to distinguish between machinery and its employment by capital, and to direct their attacks, not against the material instruments of production, but against the mode in which they are used.[113]

The contests about wages in Manufacture, pre-suppose manufacture, and are in no sense directed against its existence. The opposition against the establishment of new manufactures, proceeds from the guilds and privileged towns, not from the workpeople. Hence the writers of the manufacturing period treat the division of labour chiefly as a means of virtually supplying a deficiency of labourers, and not as a means of actually displacing those in work. This distinction is self-evident. If it be said that 100 millions of people would be required in England to spin with the old spinning-wheel the cotton that is now spun with mules by 500,000 people, this does not mean that the mules took the place of those millions who never existed. It means only this, that many millions of workpeople would be required to replace the spinning machinery. If, on the other hand, we say, that in England the power-loom threw 800,000 weavers on the streets, we do not refer to existing machinery, that would have to be replaced by a definite number of workpeople, but to a number of weavers in existence who were actually replaced or displaced by the looms. During the manufacturing period, handicraft labour, altered though it was by division of labour, was yet the basis. The demands of the new colonial markets could not be satisfied owing to the relatively small number of town operatives handed down from the middle ages, and the manufactures proper opened out new fields of production to the rural population, driven from the land by the dissolution of the feudal system. At that time, therefore, division of labour and co-operation in the workshops, were viewed more from the positive aspect, that they made the workpeople more productive.[114] Long before the period of modern industry, co-operation and the concentration of the instruments of labour in the hands of a few, gave rise, in numerous countries where these methods were applied in agriculture, to great, sudden and forcible revolutions in the modes of production, and consequentially, in the conditions of existence, and the means of employment of the rural populations. But this contest at first takes place more between the large and the small landed proprietors, than between capital and wage labour; on the other hand, when the labourers are displaced by the instruments of labour, by sheep, horses, &c., in this case force is directly resorted to in the first instance as the prelude to the industrial revolution. The labourers are first driven from the land, and then come the sheep. Land grabbing on a great scale, such as was perpetrated in England, is the first step in creating a field for the establishment of agriculture on a great scale.[115] Hence this subversion of agriculture puts on, at first, more the appearance of a political revolution.

The instrument of labour, when it takes the form of a machine, immediately becomes a competitor of the workman himself.[116] The self-expansion of capital by means of machinery is thenceforward directly proportional to the number of the workpeople, whose means of livelihood have been destroyed by that machinery. The whole system of capitalist production is based on the

fact that the workman sells his labour-power as a commodity. Division of labour specialises this labour-power, by reducing it to skill in handling a particular tool. So soon as the handling of this tool becomes the work of a machine, then, with the use-value, the exchange-value too, of the workman's labour-power vanishes; the workman becomes unsaleable, like paper money thrown out of currency by legal enactment. That portion of the working-class, thus by machinery rendered superfluous, i.e., no longer immediately necessary for the self-expansion of capital, either goes to the wall in the unequal contest of the old handicrafts and manufactures with machinery, or else floods all the more easily accessible branches of industry, swamps the labour-market, and sinks the price of labour-power below its value. It is impressed upon the workpeople, as a great consolation, first, that their sufferings are only temporary ("a temporary inconvenience"), secondly, that machinery acquires the mastery over the whole of a given field of production, only by degrees, so that the extent and intensity of its destructive effect is diminished. The first consolation neutralises the second. When machinery seizes on an industry by degrees, it produces chronic misery among the operatives who compete with it. Where the transition is rapid, the effect is acute and felt by great masses. History discloses no tragedy more horrible than the gradual extinction of the English hand-loom weavers, an extinction that was spread over several decades, and finally sealed in 1838. Many of them died of starvation, many with families vegetated for a long time on 2½ d. a day.[117] On the other hand, the English cotton machinery produced an acute effect in India. The Governor General reported 1834-35:

> "The misery hardly finds a parallel in the history of commerce. The bones of the cotton-weavers are bleaching the plains of India."

No doubt, in turning them out of this "temporal" world, the machinery caused them no more than "a temporary inconvenience." For the rest, since machinery is continually seizing upon new fields of production, its temporary effect is really permanent. Hence, the character of independence and estrangement which the capitalist mode of production as a whole gives to the instruments of labour and to the product, as against the workman, is developed by means of machinery into a thorough antagonism.[118] Therefore, it is with the advent of machinery, that the workman for the first time brutally revolts against the instruments of labour.

The instrument of labour strikes down the labourer. This direct antagonism between the two comes out most strongly, whenever newly introduced machinery competes with handicrafts or manufactures, handed down from former times. But even in modern industry the continual improvement of machinery, and the development of the automatic system, has an analogous effect.

> "The object of improved machinery is to diminish manual labour, to provide for the performance of a process or the completion of a link in a manufacture by the aid of an iron instead of the human apparatus." [119]"The adaptation of power to machinery heretofore moved by hand, is almost of daily occurrence ... the minor improvements in machinery having for their object economy of power, the production of better work, the turning off more work in the same time, or in supplying the place of a child, a female, or a man, are constant, and although sometimes apparently of no great moment, have somewhat important results."[120] "Whenever a process requires peculiar dexterity and steadiness of hand, it is withdrawn, as soon as possible, from the cunning workman, who is prone to irregularities of many kinds, and it is placed in charge of a peculiar mechanism, so self-regulating that a child can superintend it." [121]"On the automatic plan skilled labour gets progressively superseded." [122]"The effect of improvements in machinery, not merely in superseding the necessity for the employment of the

> same quantity of adult labour as before, in order to produce a given result, but in substituting one description of human labour for another, the less skilled for the more skilled, juvenile for adult, female for male, causes a fresh disturbance in the rate of wages."[123] "The effect of substituting the self-acting mule for the common mule, is to discharge the greater part of the men spinners, and to retain adolescents and children."[124]

The extraordinary power of expansion of the factory system owing to accumulated practical experience, to the mechanical means at hand, and to constant technical progress, was proved to us by the giant strides of that system under the pressure of a shortened working day. But who, in 1860, the Zenith year of the English cotton industry, would have dreamt of the galloping improvements in machinery, and the corresponding displacement of working people, called into being during the following 3 years, under the stimulus of the American Civil War? A couple of examples from the Reports of the Inspectors of Factories will suffice on this point. A Manchester manufacturer states:

> "We formerly had 75 carding engines, now we have 12, doing the same quantity of work.... We are doing with fewer hands by 14, at a saving in wages of £10 a-week. Our estimated saving in waste is about 10% in the quantity of cotton consumed." "In another fine-spinning mill in Manchester, I was informed that through increased speed and the adoption of some self-acting processes, a reduction had been made, in number, of a fourth in one department, and of above half in another, and that the introduction of the combing machine in place of the second carding, had considerably reduced, the number of hands formerly employed in the carding-room."

Another spinning-mill is estimated to effect a saving of labour of 10%. The Messrs. Gilmour, spinners at Manchester, state: "In our blowing-room department we consider our expense with new machinery is fully one-third less in wages and hands ... in the jack-frame and drawing-frame room, about one-third less in expense, and likewise one-third less in hands; in the spinning room about one-third less in expenses. But this is not all; when our yarn goes to the manufacturers, it is so much better by the application of our new machinery, that they will produce a greater quantity of cloth, and cheaper than from the yarn produced by old machinery."[125] Mr. Redgrave further remarks in the same Report:

> "The reduction of hands against increased production is, in fact, constantly taking place, in woollen mills the reduction commenced some time since, and is continuing; a few days since, the master of a school in the neighbourhood of Rochdale said to me, that the great falling off in the girls' school is not only caused by the distress, but by the changes of machinery in the woollen mills, in consequence of which a reduction of 70 short-timers had taken place." [126]

The following table shows the total result of the mechanical improvements in the English cotton industry due to the American Civil War.

Number of Factories	1857	1861	1868
England and Wales	2,046	2,715	2,405
Scotland	152	163	131
Ireland	12	9	13
United Kingdom	2,210	2,887	2,549
Number of Power Looms	1857	1861	1868
England and Wales	275,590	368,125	344,719

Scotland	21,624	30,110	31,864
Ireland	1,633	1,757	2,746
United Kingdom	298,847	399,992	379,329
Number of Spindles	1857	1861	1868
England and Wales	25,818,576	28,352,125	30,478,228
Scotland	2,041,129	1,915,398	1,397,546
Ireland	150,512	119,944	124,240
United Kingdom	28,010,217	30,387,467	32,000,014
Number of Persons Employed	1857	1861	1868
England and Wales	341,170	407,598	357,052
Scotland	34,698	41,237	39,809
Ireland	3,345	2,734	4,203
United Kingdom	379,213	452,569	401,064

Hence, between 1861 and 1868, 338 cotton factories disappeared, in other words more productive machinery on a larger scale was concentrated in the hands of a smaller number of capitalists. The number of power-looms decreased by 20,663; but since their product increased in the same period, an improved loom must have yielded more than an old one. Lastly the number of spindles increased by 1,612,541, while the number of operatives decreased by 50,505. The "temporary" misery inflicted on the workpeople by the cotton-crisis, was heightened, and from being temporary made permanent, by the rapid and persistent progress of machinery.

But machinery not only acts as a competitor who gets the better of the workman, and is constantly on the point of making him superfluous. It is also a power inimical to him, and as such capital proclaims it from the roof tops and as such makes use of it. It is the most powerful weapon for repressing strikes, those periodical revolts of the working-class against the autocracy of capital.[127] According to Gaskell, the steam-engine was from the very first an antagonist of human power, an antagonist that enabled the capitalist to tread under foot the growing claims of the workmen, who threatened the newly born factory system with a crisis.[128] It would be possible to write quite a history of the inventions, made since 1830, for the sole purpose of supplying capital with weapons against the revolts of the working-class. At the head of these in importance, stands the self-acting mule, because it opened up a new epoch in the automatic system.[129]

Nasmyth, the inventor of the steam-hammer, gives the following evidence before the Trades' Union Commission, with regard to the improvements made by him in machinery and introduced in consequence of the wide-spread and long strikes of the engineers in 1851.

> "The characteristic feature of our modern mechanical improvements, is the introduction of self-acting tool machinery. What every mechanical workman has now to do, and what every boy can do, is not to work himself but to superintend the beautiful labour of the machine. The whole class of workmen that depend exclusively on their skill, is now done away with. Formerly, I employed four boys to every mechanic. Thanks to these new mechanical combinations, I have reduced the number of grown-up men from 1,500 to 750. The result was a considerable increase in my profits."

Ure says of a machine used in calico printing:

> "At length capitalists sought deliverance from this intolerable bondage" [namely the, in their eyes, burdensome terms of their contracts with the workmen] "in the

> resources of science, and were speedily re-instated in their legitimate rule, that of the head over the inferior members."

Speaking of an invention for dressing warps:

> "Then the combined malcontents, who fancied themselves impregnably entrenched behind the old lines of division of labour, found their flanks turned and their defences rendered useless by the new mechanical tactics, and were obliged to surrender at discretion."

With regard to the invention of the self-acting mule, he says:

> "A creation destined to restore order among the industrious classes.... This invention confirms the great doctrine already propounded, that when capital enlists science into her service, the refractory hand of labour will always be taught docility."[130]

Although Ure's work appeared 30 years ago, at a time when the factory system was comparatively but little developed, it still perfectly expresses the spirit of the factory, not only by its undisguised cynicism, but also by the naïveté with which it blurts out the stupid contradictions of the capitalist brain. For instance, after propounding the "doctrine" stated above, that capital, with the aid of science taken into its pay, always reduces the refractory hand of labour to docility, he grows indignant because

> "it (physico-mechanical science) has been accused of lending itself to the rich capitalist as an instrument for harassing the poor."

After preaching a long sermon to show how advantageous the rapid development of machinery is to the working-classes, he warns them, that by their obstinacy and their strikes they hasten that development.

> "Violent revulsions of this nature," he says, "display short-sighted man in the contemptible character of a self-tormentor."

A few pages before he states the contrary.

> "Had it not been for the violent collisions and interruptions resulting from erroneous views among the factory operatives, the factory system would have been developed still more rapidly and beneficially for all concerned." Then he exclaims again: "Fortunately for the state of society in the cotton districts of Great Britain, the improvements in machinery are gradual." "It" (improvement in machinery) "is said to lower the rate of earnings of adults by displacing a portion of them, and thus rendering their number superabundant as compared with the demand for their labour. It certainly augments the demand for the labour of children and increases the rate of *their* wages."

On the other hand, this same dispenser of consolation defends the lowness of the children's wages on the ground that it prevents parents from sending their children at too early an age into the factory. The whole of his book is a vindication of a working day of unrestricted length; that Parliament should forbid children of 13 years to be exhausted by working 12 hours a day, reminds his liberal soul of the darkest days of the Middle Ages. This does not prevent him from calling upon the factory operatives to thank Providence, who by means of machinery has given them the leisure to think of their "immortal interests."[131]

Section 6: The Theory of Compensation as Regards the Workpeople Displaced by Machinery

James Mill, MacCulloch, Torrens, Senior, John Stuart Mill, and a whole series besides, of bourgeois political economists, insist that all machinery that displaces workmen, simultaneously and necessarily sets free an amount of capital adequate to employ the same identical workmen. [132]

Suppose a capitalist to employ 100 workmen, at £30 a year each, in a carpet factory. The variable capital annually laid out amounts, therefore, to £3,000. Suppose, also, that he discharges 50 of his workmen, and employs the remaining 50 with machinery that costs him £1,500. To simplify matters, we take no account of buildings, coal, &c. Further suppose that the raw material annually consumed costs £3,000, both before and after the change.[133] Is any capital set free by this metamorphosis? Before the change, the total sum of £6,000 consisted half of constant, and half of variable capital. After the change it consists of £4,500 constant (£3,000 raw material and £1,500 machinery), and £1,500 variable capital. The variable capital, instead of being one half, is only one quarter, of the total capital. Instead of being set free, a part of the capital is here locked up in such a way as to cease to be exchanged against labour-power: variable has been changed into constant capital. Other things remaining unchanged, the capital of £6,000, can, in future, employ no more than 50 men. With each improvement in the machinery, it will employ fewer. If the newly introduced machinery had cost less than did the labour-power and implements displaced by it, if, for instance, instead of costing £1,500, it had cost only £1,000, a variable capital of £1,000 would have been converted into constant capital, and locked up; and a capital of £500 would have been set free. The latter sum, supposing wages unchanged, would form a fund sufficient to employ about 16 out of the 50 men discharged; nay, less than 16, for, in order to be employed as capital, a part of this £500 must now become constant capital, thus leaving only the remainder to be laid out in labour-power.

But, suppose, besides, that the making of the new machinery affords employment to a greater number of mechanics, can that be called compensation to the carpet-makers, thrown on the streets? At the best, its construction employs fewer men than its employment displaces. The sum of £1,500 that formerly represented the wages of the discharged carpet-makers, now represents in the shape of machinery: (1) the value of the means of production used in the construction of that machinery, (2) the wages of the mechanics employed in its construction, and (3) the surplus-value falling to the share of their “master.” Further, the machinery need not be renewed till it is worn out. Hence, in order to keep the increased number of mechanics in constant employment, one carpet manufacturer after another must displace workmen by machines.

As a matter of fact the apologists do not mean this sort of setting free.

They have in their minds the means of subsistence of the liberated work-people. It cannot be denied, in the above instance, that the machinery not only liberates 50 men, thus placing them at others’ disposal, but, at the same time, it withdraws from their consumption, and sets free, means of subsistence to the value of £1,500. The simple fact, by no means a new one, that machinery cuts off the workmen from their means of subsistence is, therefore, in economic parlance tantamount to this, that machinery liberates means of subsistence for the workman, or converts those means into capital for his employment. The mode of expression, you see, is everything. Nominibus mollire licet mala.

This theory implies that the £1,500 worth of means of subsistence was capital that was being expanded by the labour of the 50 men discharged. That, consequently, this capital falls out of employment so soon as they commence their forced holidays, and never rests till it has found a fresh investment, where it can again be productively consumed by these same 50 men. That

sooner or later, therefore, the capital and the workmen must come together again, and that, then, the compensation is complete. That the sufferings of the workmen displaced by machinery are therefore as transient as are the riches of this world.

In relation to the discharged workmen, the £1,500 worth of means of subsistence never was capital. What really confronted them as capital, was the sum of £1,500, afterwards laid out in machinery. On looking closer it will be seen that this sum represented part of the carpets produced in a year by the 50 discharged men, which part they received as wages from their employer in money instead of in kind. With the carpets in the form of money, they bought means of subsistence to the value of £1,500. These means, therefore, were to them, not capital, but commodities, and they, as regards these commodities, were not wage-labourers, but buyers. The circumstance that they were "freed" by the machinery, from the means of purchase, changed them from buyers into non-buyers. Hence a lessened demand for those commodities – voilà tout. If this diminution be not compensated by an increase from some other quarter, the market price of the commodities falls. If this state of things lasts for some time, and extends, there follows a discharge of workmen employed in the production of these commodities. Some of the capital that was previously devoted to production of necessary means of subsistence, has to become reproduced in another form. While prices fall, and capital is being displaced, the labourers employed in the production of necessary means of subsistence are in their turn "freed" from a part of their wages. Instead, therefore, of proving that, when machinery frees the workman from his means of subsistence, it simultaneously converts those means into capital for his further employment, our apologists, with their cut-and-dried law of supply and demand, prove, on the contrary, that machinery throws workmen on the streets, not only in that branch of production in which it is introduced, but also in those branches in which it is not introduced.

The real facts, which are travestied by the optimism of economists, are as follows: The labourers, when driven out of the workshop by the machinery, are thrown upon the labour market, and there add to the number of workmen at the disposal of the capitalists. In Part VII of this book it will be seen that this effect of machinery, which, as we have seen, is represented to be a compensation to the working class, is on the contrary a most frightful scourge. For the present I will only say this: The labourers that are thrown out of work in any branch of industry, can no doubt seek for employment in some other branch. If they find it, and thus renew the bond between them and the means of subsistence, this takes place only by the intermediary of a new and additional capital that is seeking investment; not at all by the intermediary of the capital that formerly employed them and was afterwards converted into machinery. And even should they find employment, what a poor look-out is theirs! Crippled as they are by division of labour, these poor devils are worth so little outside their old trade, that they cannot find admission into any industries, except a few of inferior kind, that are over-supplied with underpaid workmen.[134] Further, every branch of industry attracts each year a new stream of men, who furnish a contingent from which to fill up vacancies, and to draw a supply for expansion. So soon as machinery sets free a part of the workmen employed in a given branch of industry, the reserve men are also diverted into new channels of employment, and become absorbed in other branches; meanwhile the original victims, during the period of transition, for the most part starve and perish.

It is an undoubted fact that machinery, as such, is not responsible for "setting free" the workman from the means of subsistence. It cheapens and increases production in that branch which it seizes on, and at first makes no change in the mass of the means of subsistence produced in other branches. Hence, after its introduction, the society possesses as much, if not more, of the necessaries of life than before, for the labourers thrown out of work; and that quite apart from the enormous share of the annual produce wasted by the non-workers. And this is the point relied on

by our apologists! The contradictions and antagonisms inseparable from the capitalist employment of machinery, do not exist, they say, since they do not arise out of machinery, as such, but out of its capitalist employment! Since therefore machinery, considered alone, shortens the hours of labour, but, when in the service of capital, lengthens them; since in itself it lightens labour, but when employed by capital, heightens the intensity of labour; since in itself it is a victory of man over the forces of Nature, but in the hands of capital, makes man the slave of those forces; since in itself it increases the wealth of the producers, but in the hands of capital, makes them paupers - for all these reasons and others besides, says the bourgeois economist without more ado, it is clear as noon-day that all these contradictions are a mere semblance of the reality, and that, as a matter of fact, they have neither an actual nor a theoretical existence. Thus he saves himself from all further puzzling of the brain, and what is more, implicitly declares his opponent to be stupid enough to contend against, not the capitalistic employment of machinery, but machinery itself.

No doubt he is far from denying that temporary inconvenience may result from the capitalist use of machinery. But where is the medal without its reverse! Any employment of machinery, except by capital, is to him an impossibility. Exploitation of the workman by the machine is therefore, with him, identical with exploitation of the machine by the workman. Whoever, therefore, exposes the real state of things in the capitalistic employment of machinery, is against its employment in any way, and is an enemy of social progress![135] Exactly the reasoning of the celebrated Bill Sykes. “Gentlemen of the jury, no doubt the throat of this commercial traveller has been cut. But that is not my fault, it is the fault of the knife. Must we, for such a temporary inconvenience, abolish the use of the knife? Only consider! where would agriculture and trade be without the knife? Is it not as salutary in surgery, as it is knowing in anatomy? And in addition a willing help at the festive board? If you abolish the knife – you hurl us back into the depths of barbarism.”[136]

Although machinery necessarily throws men out of work in those industries into which it is introduced, yet it may, notwithstanding this, bring about an increase of employment in other industries. This effect, however, has nothing in common with the so-called theory of compensation. Since every article produced by a machine is cheaper than a similar article produced by hand, we deduce the following infallible law: If the total quantity of the article produced by machinery, be equal to the total quantity of the article previously produced by a handicraft or by manufacture, and now made by machinery, then the total labour expended is diminished. The new labour spent on the instruments of labour, on the machinery, on the coal, and so on, must necessarily be less than the labour displaced by the use of the machinery; otherwise the product of the machine would be as dear, or dearer, than the product of the manual labour. But, as a matter of fact, the total quantity of the article produced by machinery with a diminished number of workmen, instead of remaining equal to, by far exceeds the total quantity of the hand-made article that has been displaced. Suppose that 400,000 yards of cloth have been produced on power-looms by fewer weavers than could weave 100,000 yards by hand. In the quadrupled product there lies four times as much raw material. Hence the production of raw material must be quadrupled. But as regards the instruments of labour, such as buildings, coal, machinery, and so on, it is different; the limit up to which the additional labour required for their production can increase, varies with the difference between the quantity of the machine-made article, and the quantity of the same article that the same number of workmen could make by hand.

Hence, as the use of machinery extends in a given industry, the immediate effect is to increase production in the other industries that furnish the first with means of production. How far

employment is thereby found for an increased number of men, depends, given the length of the working day and the intensity of labour, on the composition of the capital employed, i.e., on the ratio of its constant to its variable component. This ratio, in its turn, varies considerably with the extent to which machinery has already seized on, or is then seizing on, those trades. The number of the men condemned to work in coal and metal mines increased enormously owing to the progress of the English factory system; but during the last few decades this increase of number has been less rapid, owing to the use of new machinery in mining.[137] A new type of workman springs into life along with the machine, namely, its maker. We have already learnt that machinery has possessed itself even of this branch of production on a scale that grows greater every day.[138] As to raw material,[139] there is not the least doubt that the rapid strides of cotton spinning, not only pushed on with tropical luxuriance the growth of cotton in the United States, and with it the African slave trade, but also made the breeding of slaves the chief business of the border slave-states. When, in 1790, the first census of slaves was taken in the United States, their number was 697,000; in 1861 it had nearly reached four millions. On the other hand, it is no less certain that the rise of the English woollen factories, together with the gradual conversion of arable land into sheep pasture, brought, about the superfluity of agricultural labourers that led to their being driven in masses into the towns. Ireland, having during the last twenty years reduced its population by nearly one half, is at this moment undergoing the process of still further reducing the number of its inhabitants, so as exactly to suit the requirements of its landlords and of the English woollen manufacturers.

When machinery is applied to any of the preliminary or intermediate stages through which the subject of labour has to pass on its way to completion, there is an increased yield of material in those stages, and simultaneously an increased demand for labour in the handicrafts or manufactures supplied by the produce of the machines. Spinning by machinery, for example, supplied yarn so cheaply and so abundantly that the hand-loom weavers were, at first, able to work full time without increased outlay. Their earnings accordingly rose.[140] Hence a flow of people into the cotton-weaving trade, till at length the 800,000 weavers, called into existence by the Jenny, the throstle and the mule, were overwhelmed by the power-loom. So also, owing to the abundance of clothing materials produced by machinery, the number of tailors, seamstresses and needlewomen, went on increasing until the appearance of the sewing-machine.

In proportion as machinery, with the aid of a relatively small number of workpeople, increases the mass of raw materials, intermediate products, instruments of labour, &c., the working-up of these raw materials and intermediate products becomes split up into numberless branches; social production increases in diversity. The factory system carries the social division of labour immeasurably further than does manufacture, for it increases the productiveness of the industries it seizes upon, in a far higher degree.

The immediate result of machinery is to augment surplus-value and the mass of products in which surplus-value is embodied. And, as the substances consumed by the capitalists and their dependents become more plentiful, so too do these orders of society. Their growing wealth, and the relatively diminished number of workmen required to produce the necessaries of life beget, simultaneously with the rise of new and luxurious wants, the means of satisfying those wants. A larger portion of the produce of society is changed into surplus-produce, and a larger part of the surplus-produce is supplied for consumption in a multiplicity of refined shapes. In other words, the production of luxuries increases.[141] The refined and varied forms of the products are also due to new relations with the markets of the world, relations that are created by modern industry. Not only are greater quantities of foreign articles of luxury exchanged for home products, but a greater mass of foreign raw materials, ingredients, and intermediate products, are used as means

of production in the home industries. Owing to these relations with the markets of the world, the demand for labour increases in the carrying trades, which split up into numerous varieties.[142]

The increase of the means of production and subsistence, accompanied by a relative diminution in the number of labourers, causes an increased demand for labour in making canals, docks, tunnels, bridges, and so on, works that can only bear fruit in the far future. Entirely new branches of production, creating new fields of labour, are also formed, as the direct result either of machinery or of the general industrial changes brought about by it. But the place occupied by these branches in the general production is, even in the most developed countries, far from important. The number of labourers that find employment in them is directly proportional to the demand, created by those industries, for the crudest form of manual labour. The chief industries of this kind are, at present, gas-works, telegraphs, photography, steam navigation, and railways. According to the census of 1861 for England and Wales, we find in the gas industry (gas-works, production of mechanical apparatus, servants of the gas companies, &c), 15,211 persons; in telegraphy, 2,399; in photography, 2,366; steam navigation, 3,570; and in railways, 70,599, of whom the unskilled "navvies," more or less permanently employed, and the whole administrative and commercial staff, make up about 28,000. The total number of persons, therefore, employed in these five new industries amounts to 94,145.

Lastly, the extraordinary productiveness of modern industry, accompanied as it is by both a more extensive and a more intense exploitation of labour-power in all other spheres of production, allows of the unproductive employment of a larger and larger part of the working-class, and the consequent reproduction, on a constantly extending scale, of the ancient domestic slaves under the name of a servant class, including men-servants, women-servants, lackeys, &c. According to the census of 1861, the population of England and Wales was 20,066,244; of these, 9,776,259 males, and 10,289,965 females. If we deduct from this population all who are too old or too young for work, all unproductive women, young persons and children, the "ideological" classes, such as government officials, priests, lawyers, soldiers, &c.; further, all who have no occupation but to consume the labour of others in the form of rent, interest, &c.; and, lastly, paupers, vagabonds, and criminals, there remain in round numbers eight millions of the two sexes of every age, including in that number every capitalist who is in any way engaged in industry, commerce, or finance. Among these 8 millions are:

	PERSONS
Agricultural labourers (including shepherds, farm servants, and maidservants living in the houses of farmers)	1,098,261
All who are employed in cotton, woollen, worsted, flax, hemp, silk, and jute factories, in stocking making and lace making by machinery	[143]642,607
All who are employed in coal mines and metal mines	565,835
All who are employed in metal works (blastfurnaces, rolling mills, &c.), and metal manufactures of every kind	[144] 396,998

The servant class	[145]1,208,648

All the persons employed in textile factories and in mines, taken together, number 1,208,442; those employed in textile factories and metal industries, taken together, number 1,039,605; in both cases less than the number of modern domestic slaves. What a splendid result of the capitalist exploitation of machinery!

Section 7: Repulsion and Attraction of Workpeople by the Factory System. Crises in the Cotton Trade

All political economists of any standing admit that the introduction of new machinery has a baneful effect on the workmen in the old handicrafts and manufactures with which this machinery at first competes. Almost all of them bemoan the slavery of the factory operative. And what is the great trump-card that they play? That machinery, after the horrors of the period of introduction and development have subsided, instead of diminishing, in the long run increases the number of the slaves of labour! Yes, Political Economy revels in the hideous theory, hideous to every "philanthropist" who believes in the eternal Nature-ordained necessity for capitalist production, that after a period of growth and transition, even its crowning success, the factory system based on machinery, grinds down more workpeople than on its first introduction it throws on the streets.[146]

It is true that in some cases, as we saw from instances of English worsted and silk factories, an extraordinary extension of the factory system may, at a certain stage of its development, be accompanied not only by a relative, but by an absolute decrease in the number of operatives employed. In the year 1860, when a special census of all the factories in the United Kingdom was taken by order of Parliament, the factories in those parts of Lancashire, Cheshire, and Yorkshire, included in the district of Mr. Baker, the factory inspector, numbered 652; 570 of these contained 85,622 power-looms, 6,819,146 spindles (exclusive of doubling spindles), employed 27,439 horse-power (steam), and 1,390 (water), and 94,119 persons. In the year 1865, the same factories contained, looms 95,163, spindles 7,025,031, had a steam-power of 28,925 horses, and a water-power of 1,445 horses, and employed 88,913 persons. Between 1860 and 1865, therefore, the increase in looms was 11%, in spindles 3%, and in engine-power 3%, while the number of persons employed decreased 5½%.[147] Between 1852 and 1862, considerable extension of the English woollen manufacture took place, while the number of hands employed in it remained almost stationary,

> "showing how greatly the introduction of new machines had superseded the labour of preceding periods."[148]

In certain cases, the increase in the number of hands employed is only apparent; that is, it is not due to the extension of the factories already established, but to the gradual annexation of connected trades; for instance, the increase in power-looms, and in the hands employed by them between 1838 and 1856, was, in the cotton trade, simply owing to the extension of this branch of industry; but in the other trades to the application of steam-power to the carpet-loom, to the ribbon-loom, and to the linen-loom, which previously had been worked by the power of men.[149] Hence the increase of the hands in these latter trades was merely a symptom of a diminution in the total number employed. Finally, we have considered this question entirely apart from the fact, that everywhere, except in the metal industries, young persons (under 18), and women and children form the preponderating element in the class of factory hands.

Nevertheless, in spite of the mass of hands actually displaced and virtually replaced by machinery, we can understand how the factory operatives, through the building of more mills and the extension of old ones in a given industry, may become more numerous than the manufacturing workmen and handicraftsman that have been displaced. Suppose, for example, that in the old mode of production, a capital of £500 is employed weekly, two-fifths being constant and three-fifths variable capital, *i.e.*, £200 being laid out in means of production, and £300, say £1 per man, in labour-power. On the introduction of machinery the composition of this capital becomes altered. We will suppose it to consist of four-fifths constant and one-fifth variable, which means that only £100 is now laid out in labour-power. Consequently, two-thirds of the workmen are discharged. If now the business extends, and the total capital employed grows to £1,500 under unchanged conditions, the number of operatives employed will increase to 300, just as many as before the introduction of the machinery. If the capital further grows to £2,000, 400 men will be employed, or one-third more than under the old system. Their numbers have, in point of fact, increased by 100, but relatively, i.e., in proportion to the total capital advanced, they have diminished by 800, for the £2,000 capital would, in the old state of things, have employed 1,200 instead of 400 men. Hence, a relative decrease in the number of hands is consistent with an actual increase. We assumed above that while the total capital increases, its composition remains the same, because the conditions of production remain constant. But we have already seen that, with every advance in the use of machinery, the constant component of capital, that part which consists of machinery, raw material, &c., increases, while the variable component, the part laid out in labour-power, decreases. We also know that in no other system of production is improvement so continuous, and the composition of the capital employed so constantly changing as in the factory system. These changes are, however, continually interrupted by periods of rest, during which there is a mere quantitative extension of the factories on the existing technical basis. During such periods the operatives increase in number. Thus, in 1835, the total number of operatives in the cotton, woollen, worsted, flax, and silk factories of the United Kingdom was only 354,684; while in 1861 the number of the power-loom weavers alone (of both sexes and of all ages, from eight years upwards), amounted to 230,654. Certainly, this growth appears less important when we consider that in 1838 the hand-loom weavers with their families still numbered 800,000,[150] not to mention those thrown out of work in Asia, and on the Continent of Europe.

In the few remarks I have still to make on this point, I shall refer to some actually existing relations, the existence of which our theoretical investigation has not yet disclosed.

So long as, in a given branch of industry, the factory system extends itself at the expense of the old handicrafts or of manufacture, the result is as sure as is the result of an encounter between an army furnished with breach-loaders, and one armed with bows and arrows. This first period, during which machinery conquers its field of action, is of decisive importance owing to the extraordinary profits that it helps to produce. These profits not only form a source of accelerated accumulation, but also attract into the favoured sphere of production a large part of the additional social capital that is being constantly created, and is ever on the look-out for new investments. The special advantages of this first period of fast and furious activity are felt in every branch of production that machinery invades. So soon, however, as the factory system has gained a certain breadth of footing and a definite degree of maturity, and, especially, so soon as its technical basis, machinery, is itself produced by machinery; so soon as coal mining and iron mining, the metal industries, and the means of transport have been revolutionised; so soon, in short, as the general conditions requisite for production by the modern industrial system have been established, this mode of production acquires an elasticity, a capacity for sudden extension by leaps and bounds

that finds no hindrance except in the supply of raw material and in the disposal of the produce. On the one hand, the immediate effect of machinery is to increase the supply of raw material in the same way, for example, as the cotton gin augmented the production of cotton.[151] On the other hand, the cheapness of the articles produced by machinery, and the improved means of transport and communication furnish the weapons for conquering foreign markets. By ruining handicraft production in other countries, machinery forcibly converts them into fields for the supply of its raw material. In this way East India was compelled to produce cotton, wool, hemp, jute, and indigo for Great Britain.[152] By constantly making a part of the hands "supernumerary," modern industry, in all countries where it has taken root, gives a spur to emigration and to the colonisation of foreign lands, which are thereby converted into settlements for growing the raw material of the mother country; just as Australia, for example, was converted into a colony for growing wool.[153] A new and international division of labour, a division suited to the requirements of the chief centres of modern industry springs up, and converts one part of the globe into a chiefly agricultural field of production, for supplying the other part which remains a chiefly industrial field. This revolution hangs together with radical changes in agriculture which we need not here further inquire into.[154]

On the motion of Mr. Gladstone, the House of Commons ordered, on the 17th February, 1867, a return of the total quantities of grain, corn, and flour, of all sorts, imported into, and exported from, the United Kingdom, between the years 1831 and 1866. I give below a summary of the result. The flour is given in quarters of corn. (See the Table on p. 426.)

QUINQUENNIAL PERIODS AND THE YEAR 1866								
ANNUAL AVERAGE	1831-1835	1836-1840	1841-1845	1846-1850	1851-1855	1856-1860	1861-1865	1866
Import	1,096,373	2,389,729	2,843,865	8,776,552	8,345,237	10,913,612	15,009,871	16,457,340
Export	225,263	251,770	139,056	155,461	307,491	341,150	302,754	216,218
Excess of import over export	871,110	2,137,959	2,704,809	8,621,091	8,037,746	10,572,462	14,707,117	16,241,122
POPULATION								
Yearly average in each period	24,621,107	25,929,507	27,262,569	27,797,598	27,572,923	28,391,544	29,381,460	29,935,404
Average quantity of corn etc,. in qrs., consumed annually per head over and above the home produce consumed	0.036	0.082	0.099	0.310	0.291	0.372	0.501	0.543

The enormous power, inherent in the factory system, of expanding by jumps, and the dependence of that system on the markets of the world, necessarily beget feverish production, followed by over-filling of the markets, whereupon contraction of the markets brings on crippling of production. The life of modern industry becomes a series of periods of moderate activity, prosperity, over-production, crisis and stagnation. The uncertainty and instability to which machinery subjects the employment, and consequently the conditions of existence, of the operatives become normal, owing to these periodic changes of the industrial cycle. Except in the periods of prosperity, there rages between the capitalists the most furious combat for the share of each in the markets. This share is directly proportional to the cheapness of the product. Besides the rivalry that this struggle begets in the application of improved machinery for replacing labour-power, and of new methods of production, there also comes a time in every industrial cycle, when a forcible reduction of wages beneath the value of labour-power, is attempted for the purpose of cheapening commodities.[155]

A necessary condition, therefore, to the growth of the number of factory hands, is a proportionally much more rapid growth of the amount of capital invested in mills. This growth, however, is conditioned by the ebb and flow of the industrial cycle. It is, besides, constantly interrupted by the technical progress that at one time virtually supplies the place of new workmen, at another, actually displaces old ones. This qualitative change in mechanical industry continually discharges hands from the factory, or shuts its doors against the fresh stream of recruits, while the purely quantitative extension of the factories absorbs not only the men thrown out of work, but also fresh contingents. The workpeople are thus continually both repelled and attracted, hustled from pillar to post, while, at the same time, constant changes take place in the sex, age, and skill of the levies.

The lot of the factory operatives will be best depicted by taking a rapid survey of the course of the English cotton industry.

From 1770 to 1815 this trade was depressed or stagnant for 5 years only. During this period of 45 years the English manufacturers had a monopoly of machinery and of the markets of the world. From 1815 to 1821 depression; 1822 and 1823 prosperity; 1824 abolition of the laws against Trades' Unions, great extension of factories everywhere; 1825 crisis; 1826 great misery and riots among the factory operatives; 1827 slight improvement; 1828 great increase in power-looms, and in exports; 1829 exports, especially to India, surpass all former years; 1830 glutted markets, great distress; 1831 to 1833 continued depression, the monopoly of the trade with India and China withdrawn from the East India Company; 1834 great increase of factories and machinery, shortness of hands. The new poor law furthers the migration of agricultural labourers into the factory districts. The country districts swept of children. White slave trade; 1835 great prosperity, contemporaneous starvation of the hand-loom weavers; 1836 great prosperity; 1837 and 1838 depression and crisis; 1839 revival; 1840 great depression, riots, calling out of the military; 1841 and 1842 frightful suffering among the factory operatives; 1842 the manufacturers lock the hands out of the factories in order to enforce the repeal of the Corn Laws. The operatives stream in thousands into the towns of Lancashire and Yorkshire, are driven back by the military, and their leaders brought to trial at Lancaster; 1843 great misery; 1844 revival; 1845 great prosperity; 1846 continued improvement at first, then reaction. Repeal of the Corn Laws; 1847 crisis, general reduction of wages by 10 and more per cent. in honour of the "big loaf"; 1848 continued depression; Manchester under military protection; 1849 revival; 1850 prosperity; 1851 falling prices, low wages, frequent strikes; 1852 improvement begins, strikes continue, the manufacturers threaten to import foreign hands; 1853 increasing exports. Strike for 8 months, and great misery at Preston; 1854 prosperity, glutted markets; 1855 news of failures stream in from

the United States, Canada, and the Eastern markets; 1856 great prosperity; 1857 crisis; 1858 improvement; 1859 great prosperity, increase in factories; 1860 Zenith of the English cotton trade, the Indian, Australian, and other markets so glutted with goods that even in 1863 they had not absorbed the whole lot; the French Treaty of Commerce, enormous growth of factories and machinery; 1861 prosperity continues for a time, reaction, the American Civil War, cotton famine: 1862 to 1863 complete collapse.

The history of the cotton famine is too characteristic to dispense with dwelling upon it for a moment. From the indications as to the condition of the markets of the world in 1860 and 1861, we see that the cotton famine came in the nick of time for the manufacturers, and was to some extent advantageous to them, a fact that was acknowledged in the reports of the Manchester Chamber of Commerce, proclaimed in Parliament by Palmerston and Derby, and confirmed by events.[156] No doubt, among the 2,887 cotton mills in the United Kingdom in 1861, there were many of small size. According to the report of Mr. A. Redgrave, out of the 2,109 mills included in his district, 392, or 19% employed less than ten horse-power each; 345, or 16% employed 10 H. P., and less than 20 H. P.; while 1,372 employed upwards of 20 H. P.[157] The majority of the small mills were weaving sheds, built during the period of prosperity after 1858, for the most part by speculators, of whom one supplied the yarn, another the machinery, a third the buildings, and were worked by men who had been overlookers, or by other persons of small means. These small manufacturers mostly went to the wall. The same fate would have overtaken them in the commercial crisis that was staved off only by the cotton famine. Although they formed one-third of the total number of manufacturers, yet their mills absorbed a much smaller part of the capital invested in the cotton trade. As to the extent of the stoppage, it appears from authentic estimates, that in October 1862, 60.3% of the spindles, and 58% of the looms were standing. This refers to the cotton trade as a whole, and, of course, requires considerable modification for individual districts. Only very few mills worked full time (60 hours a week), the remainder worked at intervals. Even in those few cases where full time was worked, and at the customary rate of piece-wage, the weekly wages of the operatives necessarily shrank, owing to good cotton being replaced by bad, Sea Island by Egyptian (in fine spinning mills), American and Egyptian by Surat, and pure cotton by mixings of waste and Surat. The shorter fibre of the Surat cotton and its dirty condition, the greater fragility of the thread, the substitution of all sorts of heavy ingredients for flour in sizing the warps, all these lessened the speed of the machinery, or the number of the looms that could be superintended by one weaver, increased the labour caused by defects in the machinery, and reduced the piece-wage by reducing the mass of the product turned off. Where Surat cotton was used, the loss to the operatives when on full time, amounted to 20, 30, and more per cent. But besides this, the majority of the manufacturers reduced the rate of piece-wage by 5, 7½, and 10 per cent. We can therefore conceive the situation of those hands who were employed for only 3, 3½ or 4 days a week, or for only 6 hours a day. Even in 1863, after a comparative improvement had set in, the weekly wages of spinners and of weavers were 3s. 4d., 3s. 10d., 4s. 6d. and 5s. 1d.[158] Even in this miserable state of things, however, the inventive spirit of the master never stood still, but was exercised in making deductions from wages. These were to some extent inflicted as a penalty for defects in the finished article that were really due to his bad cotton and to his unsuitable machinery. Moreover, where the manufacturer owned the cottages of the workpeople, he paid himself his rents by deducting the amount from these miserable wages. Mr. Redgrave tells us of self-acting minders (operatives who manage a pair of self-acting mules)

> “earning at the end of a fortnight’s full work 8s. 11d., and that from this sum was deducted the rent of the house, the manufacturer, however, returning half the rent as a gift. The minders took away the sum of 6s. 11d. In many places the self-

> acting minders ranged from 5s. to 9s. per week, and the weavers from 2s. to 6s. per week, during the latter part of 1862."[159]

Even when working short time the rent was frequently deducted from the wages of the operatives.[160] No wonder that in some parts of Lancashire a kind of famine fever broke out. But more characteristic than all this, was, the revolution that took place in the process of production at the expense of the workpeople. Experimenta in corpore vili, like those of anatomists on frogs, were formally made.

> "Although," says Mr. Redgrave, "I have given the actual earnings of the operatives in the several mills, it does not follow that they earn the same amount week by week. The operatives are subject to great fluctuation from the constant experimentalising of the manufacturers ... the earnings of the operatives rise and fall with the quality of the cotton mixings; sometimes they have been within 15 per cent. of former earnings, and then, in a week or two, they have fallen off from 50 to 60 per cent."[161]

These experiments were not made solely at the expense of the workman's means of subsistence. His five senses also had to pay the penalty.

> "The people who are employed in making up Surat cotton complain very much. They inform me, on opening the bales of cotton there is an intolerable smell, which causes sickness.... In the mixing, scribbling and carding rooms, the dust and dirt which are disengaged, irritate the air passages, and give rise to cough and difficulty of breathing. A disease of the skin, no doubt from the irritation of the dirt contained in the Surat cotton, also prevails.... The fibre being so short, a great amount of size, both animal and vegetable, is used.... Bronchitis is more prevalent owing to the dust. Inflammatory sore throat is common, from the same cause. Sickness and dyspepsia are produced by the frequent breaking of the weft, when the weaver sucks the weft through the eye of the shuttle." On the other hand, the substitutes for flour were a Fortunatus' purse to the manufacturers, by increasing the weight of the yarn. They caused "15 lbs. of raw material to weigh 26 lbs. after it was woven."[162]

In the Report of Inspectors of Factories for 30th April, 1864, we read as follows:

> "The trade is availing itself of this resource at present to an extent which is even discreditable. I have heard on good authority of a cloth weighing 8 lbs. which was made of 5 1/4 lbs. cotton and 2 3/4 lbs. size; and of another cloth weighing 5 1/4 lbs., of which 2 lbs. was size. These were ordinary export shirtings. In cloths of other descriptions, as much as 50 per cent. size is sometimes added; so that a manufacturer may, and does truly boast, that he is getting rich by selling cloth for less money per pound than he paid for the mere yarn of which they are composed." [163]

But the workpeople had to suffer, not only from the experiments of the manufacturers inside the mills, and of the municipalities outside, not only from reduced wages and absence of work, from want and from charity, and from the eulogistic speeches of lords and commons.

> "Unfortunate females who, in consequence of the cotton famine, were at its commencement thrown out of employment, and have thereby become outcasts of society; and now, though trade has revived, and work is plentiful, continue members of that unfortunate class, and are likely to continue so. There are also in the borough more youthful prostitutes than I have known for the last 25 years." [164]

We find then, in the first 45 years of the English cotton trade, from 1770 to 1815, only 5 years of crisis and stagnation; but this was the period of monopoly. The second period from 1815 to 1863 counts, during its 48 years, only 20 years of revival and prosperity against 28 of depression and stagnation. Between 1815 and 1830 the competition with the continent of Europe and with the United States sets in. After 1833, the extension of the Asiatic markets is enforced by "destruction of the human race" (the wholesale extinction of Indian hand-loom weavers). After the repeal of the Corn Laws, from 1846 to 1863, there are 8 years of moderate activity and prosperity against 9 years of depression and stagnation. The condition of the adult male operatives, even during the years of prosperity, may be judged from the note subjoined.[165]

Section 8: Revolution Effected in Manufacture, Handicrafts, and Domestic Industry by Modern Industry

A. Overthrow of Co-operation Based on Handicraft and on the Division of Labour

We have seen how machinery does away with co-operation based on handicrafts, and with manufacture based on the division of handicraft labour. An example of the first sort is the mowing-machine; it replaces co-operation between mowers. A striking example of the second kind, is the needle-making machine. According to Adam Smith, 10 men, in his day, made in co-operation, over 48,000 needles a-day. On the other hand, a single needle-machine makes 145,000 in a working day of 11 hours. One woman or one girl superintends four such machines, and so produces near upon 600,000 needles in a day, and upwards of 3,000,000 in a week.[166] A single machine, when it takes the place of co-operation or of manufacture, may itself serve as the basis of an industry of a handicraft character. Still, such a return to handicrafts is but a transition to the factory system, which, as a rule, makes its appearance so soon as the human muscles are replaced, for the purpose of driving the machines, by a mechanical motive power, such as steam or water. Here and there, but in any case only for a time, an industry may be carried on, on a small scale, by means of mechanical power. This is effected by hiring steam-power, as is done in some of the Birmingham trades, or by the use of small caloric-engines, as in some branches of weaving.[167] In the Coventry silk weaving industry the experiment of "cottage factories" was tried. In the centre of a square surrounded by rows of cottages, an engine-house was built and the engine connected by shafts with the looms in the cottages. In all cases the power was hired at so much per loom. The rent was payable weekly, whether the looms worked or not. Each cottage held from 2 to 6 looms; some belonged to the weaver, some were bought on credit, some were hired. The struggle between these cottage factories and the factory proper, lasted over 12 years. It ended with the complete ruin of the 300 cottage factories.[168] Wherever the nature of the process did not involve production on a large scale, the new industries that have sprung up in the last few decades, such as envelope making, steel-pen making, &c., have, as a general rule, first passed through the handicraft stage, and then the manufacturing stage, as short phases of transition to the factory stage. The transition is very difficult in those cases where the production of the article by manufacture consists, not of a series of graduated processes, but of a great number of disconnected ones. This circumstance formed a great hindrance to the establishment of steel-pen factories. Nevertheless, about 15 years ago, a machine was invented that automatically performed 6 separate operations at once. The first steel-pens were supplied by the handicraft system, in the year 1820, at £7 4s. the gross; in 1830 they-were supplied by manufacture at 8s., and today the factory system supplies them to the trade at from 2 to 6d. the gross.[169]

B. Reaction of the Factory System on Manufacture and Domestic Industries

Along with the development of the factory system and of the revolution in agriculture that accompanies it, production in all the other branches of industry not only extends, but alters its character. The principle, carried out in the factory system, of analysing the process of production into its constituent phases, and of solving the problems thus proposed by the application of mechanics, of chemistry, and of the whole range of the natural sciences, becomes the determining principle everywhere. Hence, machinery squeezes itself into the manufacturing industries first for one detail process, then for another. Thus the solid crystal of their organisation, based on the old division of labour, becomes dissolved, and makes way for constant changes. Independently of this, a radical change takes place in the composition of the collective labourer, a change of the persons working in combination. In contrast with the manufacturing period, the division of labour is thenceforth based, wherever possible, on the employment of women, of children of all ages, and of unskilled labourers, in one word, on cheap labour, as it is characteristically called in England. This is the case not only with all production on a large scale, whether employing machinery or not, but also with the so-called domestic industry, whether carried on in the houses of the workpeople or in small workshops. This modern so-called domestic industry has nothing, except the name, in common with the old-fashioned domestic industry, the existence of which pre-supposes independent urban handicrafts, independent peasant farming, and above all, a dwelling-house for the labourer and his family. That old-fashioned industry has now been converted into an outside department of the factory, the manufactory, or the warehouse. Besides the factory operatives, the manufacturing workmen and the handicraftsman, whom it concentrates in large masses at one spot, and directly commands, capital also sets in motion, by means, of invisible threads, another army; that of the workers in the domestic industries, who dwell in the large towns and are also scattered over the face of the country. An example: The shirt factory of Messrs. Tillie at Londonderry, which employs 1,000 operatives in the factory itself, and 9,000 people spread up and down the country and working in their own houses.[170]

The exploitation of cheap and immature labour-power is carried out in a more shameless manner in modern Manufacture than in the factory proper. This is because the technical foundation of the factory system, namely, the substitution of machines for muscular power, and the light character of the labour, is almost entirely absent in Manufacture, and at the same time women and over-young children are subjected, in a most unconscionable way, to the influence of poisonous or injurious substances. This exploitation is more shameless in the so-called domestic industry than in manufactures, and that because the power of resistance in the labourers decreases with their dissemination; because a whole series of plundering parasites insinuate themselves between the employer and the workman; because a domestic industry has always to compete either with the factory system, or with manufacturing in the same branch of production; because poverty robs the workman of the conditions most essential to his labour, of space, light and ventilation; because employment becomes more and more irregular; and, finally, because in these the last resorts of the masses made “redundant” by modern industry and Agriculture, competition for work attains its maximum. Economy in the means of production, first systematically carried out in the factory system, and there, from the very beginning, coincident with the most reckless squandering of labour-power, and robbery of the conditions normally requisite for labour – this economy now shows its antagonistic and murderous side more and more in a given branch of industry, the less the social productive power of labour and the technical basis for a combination of processes are developed in that branch.

C. Modern Manufacture

I now proceed, by a few examples, to illustrate the principles laid down above. As a matter of fact, the reader is already familiar with numerous instances given in the chapter on the working day. In the hardware manufactures of Birmingham and the neighbourhood, there are employed, mostly in very heavy work, 30,000 children and young persons, besides 10,000 women. There they are to be seen in the unwholesome brass-foundries, button factories, enamelling, galvanising, and lackering works.[171] Owing to the excessive labour of their workpeople, both adult and non-adult, certain London houses where newspapers and books are printed, have got the ill-omened name of "slaughterhouses."[172] Similar excesses are practised in book-binding, where the victims are chiefly women, girls, and children; young persons have to do heavy work in rope-walks and night-work in salt mines, candle manufactories, and chemical works; young people are worked to death at turning the looms in silk weaving, when it is not carried on by machinery.[173] One of the most shameful, the most dirty, and the worst paid kinds of labour, and one on which women and young girls are by preference employed, is the sorting of rags. It is well known that Great Britain, apart from its own immense store of rags, is the emporium for the rag trade of the whole world. They flow in from Japan, from the most remote States of South America, and from the Canary Islands. But the chief sources of their supply are Germany, France, Russia, Italy, Egypt, Turkey, Belgium, and Holland. They are used for manure, for making bedflocks, for shoddy, and they serve as the raw material of paper. The rag-sorters are the medium for the spread of small-pox and other infectious diseases, and they themselves are the first victims.[174] A classical example of over-work, of hard and inappropriate labour, and of its brutalising effects on the workman from his childhood upwards, is afforded not only by coal-mining and miners generally, but also by tile and brick making, in which industry the recently invented machinery is, in England, used only here and there. Between May and September the work lasts from 5 in the morning till 8 in the evening, and where the drying is done in the open air, it often lasts from 4 in the morning till 9 in the evening. Work from 5 in the morning till 7 in the evening is considered "reduced" and "moderate." Both boys and girls of 6 and even of 4 years of age are employed. They work for the same number of hours, often longer, than the adults. The work is hard and the summer heat increases the exhaustion. In a certain tile-field at Mosley, e.g., a young woman, 24 years of age, was in the habit of making 2,000 tiles a day, with the assistance of 2 little girls, who carried the clay for her, and stacked the tiles. These girls carried daily 10 tons up the slippery sides of the clay pits, from a depth of 30 feet, and then for a distance of 210 feet.

> "It is impossible for a child to pass through the purgatory of a tile-field without great moral degradation... the low language, which they are accustomed to hear from their tenderest years, the filthy, indecent, and shameless habits, amidst which, unknowing, and half wild, they grow up, make them in after-life lawless, abandoned, dissolute.... A frightful source of demoralisation is the mode of living. Each moulder, who is always a skilled labourer, and the chief of a group, supplies his 7 subordinates with board and lodging in his cottage. Whether members of his family or not, the men, boys, and girls all sleep in the cottage, which contains generally two, exceptionally 3 rooms, all on the ground floor, and badly ventilated. These people are so exhausted after the day's hard work, that neither the rules of health, of cleanliness, nor of decency are in the least observed. Many of these cottages are models of untidiness, dirt, and dust.... The greatest evil of the system that employs young girls on this sort of work, consists in this, that, as a rule, it chains them fast from childhood for the whole of their after-life to the most abandoned rabble. They become rough, foul-mouthed boys, before Nature has

> taught them that they are women. Clothed in a few dirty rags, the legs naked far above the knees, hair and face besmeared with dirt, they learn to treat all feelings of decency and of shame with contempt. During meal-times they lie at full length in the fields, or watch the boys bathing in a neighbouring canal. Their heavy day's work at length completed, they put on better clothes, and accompany the men to the public houses."

That excessive insobriety is prevalent from childhood upwards among the whole of this class, is only natural.

> "The worst is that the brickmakers despair of themselves. You might as well, said one of the better kind to a chaplain of Southallfield, try to raise and improve the devil as a brickie, sir!"[175]

As to the manner, in which capital effects an economy in the requisites of labour, in modern Manufacture (in which I include all workshops of larger size, except factories proper), official and most ample material bearing on it is to be found in the Public Health Reports IV. (1863) and VI. (1864). The description of the workshops, more especially those of the London printers and tailors, surpasses the most loathsome phantasies of our romance writers. The effect on the health of the workpeople is self-evident. Dr. Simon, the chief medical officer of the Privy Council and the official editor of the "Public Health Reports," says:

> "In my fourth Report (1863) I showed, how it is practically impossible for the workpeople to insist upon that which is their first sanitary right, viz., the right that, no matter what the work for which their employer brings them together, the labour, so far as it depends upon him, should be freed from all avoidably unwholesome conditions. I pointed out, that while the workpeople are practically incapable of doing themselves this sanitary justice, they are unable to obtain any effective support from the paid administrations of the sanitary police.... The life of myriads of workmen and workwomen is now uselessly tortured and shortened by the never-ending physical suffering that their mere occupation begets."[176]

In illustration of the way in which the workrooms influence the state of health Dr. Simon gives the following table of mortality.[177]

Number of Persons of all ages in the respective industries		Industry compared as regards health	Death-rate per 100,000 men in the respective industries between the stated ages		
			Age 25-35	Age 35-45	Age 45-55
958,265		Agriculture in England & Wales	743	805	1141
22,301 men 12,379 women	}	London tailors	958	1,262	2,093
13,803		London printers	894	1,747	2,367

D. Modern Domestic Industry

I now come to the so-called domestic industry. In order to get an idea of the horrors of this sphere, in which capital conducts its exploitation in the background of modern mechanical industry, one must go to the apparently quite idyllic trade of nail-making,[178] carried on in a few remote villages of England. In this place, however, it will be enough to give a few examples from those branches of the lace-making and straw-plaiting industries that are not yet carried on by the aid of machinery, and that as yet do not compete with branches carried on in factories or in manufactories.

Of the 150,000 persons employed in England in the production of lace, about 10,000 fall under the authority of the Factory Act, 1861. Almost the whole of the remaining 140,000 are women, young persons, and children of both sexes, the male sex, however, being weakly represented. The state of health of this cheap material for exploitation will be seen from the following table, computed by Dr. Trueman, physician to the Nottingham General Dispensary. Out of 686 female patients who were lace-makers, most of them between the ages of 17 and 24, the number of consumptive ones were:

1852. – 1 in 45. 1857. – 1 in 13.
1853. – 1 in 28. 1858. – 1 in 15.
1854. – 1 in 17. 1859. – 1 in 9.
1856. – 1 in 15. 1861. – 1 in 8.[179]

This progress in the rate of consumption ought to suffice for the most optimist of progressists, and for the biggest hawker of lies among the Free-trade bagmen of Germany.

The Factory Act of 1861 regulates the actual making of the lace, so far as it is done by machinery, and this is the rule in England. The branches that we are now about to examine, solely with regard to those of the workpeople who work at home, and not those who work in manufactories or warehouses, fall into two divisions, viz. (1), finishing; (2), mending. The former gives the finishing touches to the machine-made lace, and includes numerous sub-divisions.

The lace finishing is done either in what are called “mistresses’ houses,” or by women in their own houses, with or without the help of their children. The women who keep the “mistresses’ houses” are themselves poor. The workroom is in a private house. The mistresses take orders from manufacturers, or from warehousemen, and employ as many women, girls, and young children as the size of their rooms and the fluctuating demand of the business will allow. The number of the workwomen employed in these workrooms varies from 20 to 40 in some, and from 10 to 20 in others. The average age at which the children commence work is six years, but in many cases it is below five. The usual working-hours are from 8 in the morning till eight in the evening, with 1½ hours for meals, which are taken at irregular intervals, and often in the foul workrooms. When business is brisk, the labour frequently lasts from 8 or even 6 o’clock in the morning till 10, 11, or 12 o’clock at night. In English barracks the regulation space allotted to each soldier is 500-600 cubic feet, and in the military hospitals 1,200 cubic feet. But in those finishing sties there are but 67 to 100 cubic feet to each person. At the same time the oxygen of the air is consumed by gas-lights. In order to keep the lace clean, and although the floor is tiled or gagged, the children are often compelled, even in winter, to pull off their shoes.

> “It is not at all uncommon in Nottingham to find 14 to 20 children huddled together in a small room, of, perhaps, not more than 12 feet square, and employed for 15 hours out of the 24, at work that of itself is exhausting, from its weariness and monotony, and is besides carried on under every possible unwholesome condition.... Even the very youngest children work with a strained attention and a

> rapidity that is astonishing, hardly ever giving their fingers rest or glowering their motion. If a question be asked them, they never raise their eyes from their work from fear of losing a single moment."

The "long stick" is used by the mistresses as a stimulant more and more as the working hours are prolonged.

> "The children gradually tire and become as restless as birds towards the end of their long detention at an occupation that is monotonous, eye-straining, and exhausting from the uniformity in the posture of the body. Their work is like slavery." [180]

When women and their children work at home, which now-a-days means in a hired room, often in a garret, the state of things is, if possible, still worse. This sort of work is given out within a circle of 80 miles radius from Nottingham. On leaving the warehouses at 9 or 10 o'clock at night, the children are often given a bundle of lace to take home with them and finish. The Pharisee of a capitalist represented by one of his servants, accompanies this action, of course, with the unctuous phrase: "That's for mother," yet he knows well enough that the poor children must sit up and help.[181]

Pillow lace-making is chiefly carried on in England in two agricultural districts; one, the Honiton lace district, extending from 20 to 30 miles along the south coast of Devonshire, and including a few places in North Devon; the other comprising a great part of the counties of Buckingham, Bedford, and Northampton, and also the adjoining portions of Oxfordshire and Huntingdonshire. The cottages of the agricultural labourers are the places where the work is usually carried on. Many manufacturers employ upwards of 3,000 of these lace-makers, who are chiefly children and young persons of the female sex exclusively. The state of things described as incidental to lace finishing is here repeated, save that instead of the "mistresses' houses," we find what are called "lace-schools," kept by poor women in their cottages. From their fifth year and often earlier, until their twelfth or fifteenth year, the children work in these schools; during the first year the very young ones work from four to eight hours, and later on, from six in the morning till eight and ten o'clock at night.

> "The rooms are generally the ordinary living rooms of small cottages, the chimney stopped up to keep out draughts, the inmates kept warm by their own animal heat alone, and this frequently in winter. In other cases, these so-called school-rooms are like small store-rooms without fire-places.... The over-crowding in these dens and the consequent vitiation of the air are often extreme. Added to this is the injurious effect of drains, privies, decomposing substances, and other filth usual in the purlieus of the smaller cottages." With regard to space: "In one lace-school 18 girls and a mistress, 35 cubic feet to each person; in another, where the smell was unbearable, 18 persons and 24½ cubic feet per head. In this industry are to be found employed children of 2 and 2½ years."[182]

Where lace-making ends in the counties of Buckingham and Bedford, straw-plaiting begins, and extends over a large part of Hertfordshire and the westerly and northerly parts of Essex. In 1861, there were 40,043 persons employed in straw-plaiting and straw-hat making; of these 3,815 were males of all ages, the rest females, of whom 14,913, including about 7,000 children, were under 20 years of age. In the place of the lace-schools we find here the "straw-plait schools." The children commence their instruction in straw-plaiting generally in their 4th, often between their 3rd and 4th year. Education, of course, they get none. The children themselves call the elementary schools, "natural schools," to distinguish them from these blood-sucking institutions, in which they are kept at work simply to get through the task, generally 30 yards daily, prescribed

by their half-starved mothers. These same mothers often make them work at home, after school is over, till 10, 11, and 12 o'clock at night. The straw cuts their mouths, with which they constantly moisten it, and their fingers. Dr. Ballard gives it as the general opinion of the whole body of medical officers in London, that 300 cubic feet is the minimum space proper for each person in a bedroom or workroom. But in the straw-plait schools space is more sparingly allotted than in the lace-schools, "12 2/3, 17, 18½ and below 22 cubic feet for each person."

> "The smaller of these numbers, says one of the commissioners, Mr. White, represents less space than the half of what a child would occupy if packed in a box measuring 3 feet in each direction."

Thus do the children enjoy life till the age of 12 or 14. The wretched half-starved parents think of nothing but getting as much as possible out of their children. The latter, as soon as they are grown up, do not care a farthing, and naturally so, for their parents, and leave them.

> "It is no wonder that ignorance and vice abound in a population so brought up.... Their morality is at the lowest ebb,... a great number of the women have illegitimate children, and that at such an immature age that even those most conversant with criminal statistics are astounded."[183]

And the native land of these model families is the pattern Christian country for Europe; so says at least Count Montalembert, certainly a competent authority on Christianity!

Wages in the above industries, miserable as they are (the maximum wages of a child in the straw-plait schools rising in rare cases to 3 shillings), are reduced far below their nominal amount by the prevalence of the truck system everywhere, but especially in the lace districts.[184]

E. Passage of Modern Manufacture, and Domestic Industry into Modern Mechanical Industry. The Hastening of this Revolution by the Application of the Factory Acts to those Industries

The cheapening of labour-power, by sheer abuse of the labour of women and children, by sheer robbery of every normal condition requisite for working and living, and by the sheer brutality of overwork and night-work, meets at last with natural obstacles that cannot be overstepped. So also, when based on these methods, do the cheapening of commodities and capitalist exploitation in general. So soon as this point is at last reached – and it takes many years – the hour has struck for the introduction of machinery, and for the thenceforth rapid conversion of the scattered domestic industries and also of manufactures into factory industries.

An example, on the most colossal scale, of this movement is afforded by the production of wearing apparel. This industry, according to the classification of the Children's Employment Commission, comprises straw-hat makers, ladies'-hat makers, cap-makers, tailors, milliners and dressmakers, shirt-makers, corset-makers, glove-makers, shoemakers, besides many minor branches, such as the making of neck-ties, collars, &c. In 1861, the number of females employed in these industries, in England and Wales, amounted to 586,299, of these 115,242 at the least were under 20, and 16,650. under 15 years of age. The number of these workwomen in the United Kingdom in 1861, was 750,334. The number of males employed in England and Wales, in hat-making, shoemaking, glove-making and tailoring was 437,969; of these 14,964 under 15 years, 89,285 between 15 and 20, and 333,117 over 20 years. Many of the smaller branches are not included in these figures. But take the figures as they stand; we then have for England and Wales alone, according to the census of 1861, a total of 1,024,277 persons, about as many as are absorbed by agriculture and cattle breeding. We begin to understand what becomes of the

immense quantities of goods conjured up by the magic of machinery, and of the enormous masses of workpeople, which that machinery sets free.

The production of wearing apparel is carried on partly in manufactories in whose workrooms there is but a reproduction of that division of labour, the membra disjecta of which were found ready to hand; partly by small master-handicraftsmen; these, however, do not, as formerly, work for individual consumers, but for manufactories and warehouses, and to such an extent that often whole towns and stretches of country carry on certain branches, such as shoemaking, as a speciality; finally, on a very great scale by the so-called domestic workers, who form an external department of the manufactories, warehouses, and even of the workshops of the smaller masters.[185]

The raw material, &c., is supplied by mechanical industry, the mass of cheap human material (taillable à merci et miséricorde) is composed of the individuals "liberated" by mechanical industry and improved agriculture. The manufactures of this class owed their origin chiefly to the capitalist's need of having at hand an army ready equipped to meet any increase of demand.[186] These manufactures, nevertheless, allowed the scattered handicrafts and domestic industries to continue to exist as a broad foundation. The great production of surplus-value in these branches of labour, and the progressive cheapening of their articles, were and are chiefly due to the minimum wages paid, no more than requisite for a miserable vegetation, and to the extension of working-time up to the maximum endurable by the human organism. It was in fact by the cheapness of the human sweat and the human blood, which were converted into commodities, that the markets were constantly being extended, and continue daily to be extended; more especially was this the case with England's colonial markets, where, besides, English tastes and habits prevail. At last the critical point was reached. The basis of the old method, sheer brutality in the exploitation of the workpeople, accompanied more or less by a systematic division of labour, no longer sufficed for the extending markets and for the still more rapidly extending competition of the capitalists. The hour struck for the advent of machinery. The decisively revolutionary machine, the machine which attacks in an equal degree the whole of the numberless branches of this sphere of production, dressmaking, tailoring, shoemaking, sewing, hat-making, and many others, is the sewing-machine.

Its immediate effect on the workpeople is like that of all machinery, which, since the rise of modern industry, has seized upon new branches of trade. Children of too tender an age are sent adrift. The wage of the machine hands rises compared with that of the house-workers, many of whom belong to the poorest of the poor. That of the better situated handicraftsman, with whom the machine competes, sinks. The new machine hands are exclusively girls and young women. With the help of mechanical force, they destroy the monopoly that male labour had of the heavier work, and they drive off from the lighter work numbers of old women and very young children. The overpowering competition crushes the weakest of the manual labourers. The fearful increase in death from starvation during the last 10 years in London runs parallel with the extension of machine sewing.[187] The new workwomen turn the machines by hand and foot, or by hand alone, sometimes sitting, sometimes standing, according to the weight, size, and special make of the machine, and expend a great deal of labour-power. Their occupation is unwholesome, owing to the long hours, although in most cases they are not so long as under the old system. Wherever the sewing-machine locates itself in narrow and already over-crowded workrooms, it adds to the unwholesome influences.

"The effect," says Mr. Lord, "on entering low-ceiled workrooms in which 30 to 40 machine hands are working is unbearable.... The heat, partly due to the gas stoves used for warming the

irons, is horrible.... Even when moderate hours of work, i.e., from 8 in the morning till 6 in the evening, prevail in such places, yet 3 or 4 persons fall into a swoon regularly every day."[188]

The revolution in the industrial methods which is the necessary result of the revolution in the instruments of production, is effected by a medley of transition forms. These forms vary according to the extent to which the sewing-machine has become prevalent in one branch, of industry or the other, to the time during which it has been in operation, to the previous condition of the workpeople, to the preponderance of manufacture, of handicrafts or of domestic industry, to the rent of the workrooms,[189] &c. In dressmaking, for instance, where the labour for the most part was already organised, chiefly by simple co-operation, the sewing-machine at first formed merely a new factor in that manufacturing industry. In tailoring, shirtmaking, shoemaking, &c., all the forms are intermingled. Here the factory system proper. There middlemen receive the raw material from the capitalist *en chef*, and group around their sewing-machines, in "chambers" and "garrets," from 10 to 50 or more workwomen. Finally, as is always the case with machinery when not organised into a system, and when it can also be used in dwarfish proportions, handicraftsman and domestic workers, along with their families, or with a little extra labour from without, make use of their own sewing-machines.[190] The system actually prevalent in England is, that the capitalist concentrates a large number of machines on his premises, and then distributes the produce of those machines for further manipulation amongst the domestic workers.[191] The variety of the transition forms, however, does not conceal the tendency to conversion into the factory system proper. This tendency is nurtured by the very nature of the sewing-machine, the manifold uses of which push on the concentration, under one roof, and one management, of previously separated branches of a trade. It is also favoured by the circumstance that preparatory needlework, and certain other operations, are most conveniently done on the premises where the machine is at work; as well as by the inevitable expropriation of the hand sewers, and of the domestic workers who work with their own machines. This fate has already in part overtaken them. The constantly increasing amount of capital invested in sewing-machines,[192] gives the spur to the production of, and gluts the markets with, machine-made articles, thereby giving the signal to the domestic workers for the sale of their machines. The overproduction of sewing-machines themselves, causes their producers, in bad want of a sale, to let them out for so much a week, thus crushing by their deadly competition the small owners of machines.[193] Constant changes in the construction of the machines, and their ever-increasing cheapness, depreciate day by day the older makes, and allow of their being sold in great numbers, at absurd prices, to large capitalists, who alone can thus employ them at a profit. Finally, the substitution of the steam-engine for man gives in this, as in all similar revolutions, the finishing blow. At first, the use of steam power meets with mere technical difficulties, such as unsteadiness in the machines, difficulty in controlling their speed, rapid wear and tear of the lighter machines, &c., all of which are soon overcome by experience.[194] If, on the one hand, the concentration of many machines in large manufactories leads to the use of steam power, on the other hand, the competition of steam with human muscles hastens on the concentration of workpeople and machines in large factories. Thus England is at present experiencing, not only in the colossal industry of making wearing apparel, but in most of the other trades mentioned above, the conversion of manufacture, of handicrafts, and of domestic work into the factory system, after each of those forms of production, totally changed and disorganised under the influence of modern industry, has long ago reproduced, and even overdone, all the horrors of the factory system, without participating in any of the elements of social progress it contains.[195]

This industrial revolution which takes place spontaneously, is artificially helped on by the extension of the Factory Acts to all industries in which women, young persons and children are

employed. The compulsory regulation of the working day as regards its length, pauses, beginning and end, the system of relays of children, the exclusion of all children under a certain age, &c., necessitate on the one hand more machinery[196] and the substitution of steam as a motive power in the place of muscles.[197] On the other hand, in order to make up for the loss of time, an expansion occurs of the means of production used in common, of the furnaces, buildings, &c., in one word, greater concentration of the means of production and a correspondingly greater concourse of workpeople. The chief objection, repeatedly and passionately urged on behalf of each manufacture threatened with the Factory Act, is in fact this, that in order to continue the business on the old scale a greater outlay of capital will be necessary. But as regards labour in the so-called domestic industries and the intermediate forms between them and Manufacture, so soon as limits are put to the working day and to the employment of children, those industries go to the wall. Unlimited exploitation of cheap labour-power is the sole foundation of their power to compete.

One of the essential conditions for the existence of the factory system, especially when the length of the working day is fixed, is certainty in the result, i.e., the production in a given time of a given quantity of commodities, or of a given useful effect. The statutory pauses in the working day, moreover, imply the assumption that periodical and sudden cessation of the work does no harm to the article undergoing the process of production. This certainty in the result, and this possibility of interrupting the work are, of course, easier to be attained in the purely mechanical industries than in those in which chemical and physical processes play a part; as, for instance, in the earthenware trade, in bleaching, dyeing, baking, and in most of the metal industries. Wherever there is a workingday without restriction as to length, wherever there is night-work and unrestricted waste of human life, there the slightest obstacle presented by the nature of the work to a change for the better is soon looked upon as an everlasting barrier erected by Nature. No poison kills vermin with more certainty than the Factory Act removes such everlasting barriers. No one made a greater outcry over "impossibilities" than our friends the earthenware manufacturers. In 1864, however, they were brought under the Act, and within sixteen months every "impossibility" had vanished.

> "The improved method," called forth by the Act, "of making slip by pressure instead of by evaporation, the newly-constructed stoves for drying the ware in its green state, &c., are each events of great importance in the pottery art, and mark an advance which the preceding century could not rival.... It has even considerably reduced the temperature of the stoves themselves with a considerable saving of fuel, and with a readier effect on the ware."[198]

In spite of every prophecy, the cost-price of earthenware did not rise, but the quantity produced did, and to such an extent that the export for the twelve months, ending December, 1865, exceeded in value by £138,628 the average of the preceding three years. In the manufacture of matches it was thought to be an indispensable requirement, that boys, even while bolting their dinner, should go on dipping the matches in melted phosphorus, the poisonous vapour from which rose into their faces. The Factory Act (1864) made the saving of time a necessity, and so forced into existence a dipping machine, the vapour from which could not come in contact with the workers.[199] So, at the present time, in those branches of the lace manufacture not yet subject to the Factory Act, it is maintained that the meal-times cannot be regular owing to the different periods required by the various kinds of lace for drying, which periods vary from three minutes up to an hour and more. To this the Children's Employment Commissioners answer:

> "The circumstances of this case are precisely analogous to that of the paper-stainers, dealt with in our first report. Some of the principal manufacturers in the trade urged that in consequence of the nature of the materials used, and their

> various processes, they would be unable, without serious loss, to stop for meal-times at any given moment. But it was seen from the evidence that, by due care and previous arrangement, the apprehended difficulty would be got over; and accordingly, by clause 6 of section 6 of the Factory Acts Extension Act, passed during this Session of Parliament, an interval of eighteen months is given to them from the passing of the Act before they are required to conform to the meal hours, specified by the Factory Acts."[200]

Hardly had the Act been passed when our friends the manufacturers found out:

> "The inconveniences we expected to arise from the introduction of the Factory Acts into our branch of manufacture, I am happy to say, have not arisen. We do not find the production at all interfered with; in short, we produce more in the same time."[201]

It is evident that the English legislature, which certainly no one will venture to reproach with being overdosed with genius, has been led by experience to the conclusion that a simple compulsory law is sufficient to enact away all the so-called impediments, opposed by the nature of the process, to the restriction and regulation of the working day. Hence, on the introduction of the Factory Act into a given industry, a period varying from six to eighteen months is fixed within which it is incumbent on the manufacturers to remove all technical impediments to the working of the Act. Mirabeau's "Impossible! ne me dites jamais ce bête de mot!" is particularly applicable to modern technology. But though the Factory Acts thus artificially ripen the material elements necessary for the conversion of the manufacturing system into the factory system, yet at the same time, owing to the necessity they impose for greater outlay of capital, they hasten on the decline of the small masters, and the concentration of capital.[202]

Besides the purely technical impediments that are removable by technical means, the irregular habits of the workpeople themselves obstruct the regulation of the hours of labour. This is especially the case where piece-wage predominates, and where loss of time in one part of the day or week can be made good by subsequent over-time, or by night-work, a process which brutalises the adult workman, and ruins his wife and children.[203] Although this absence of regularity in the expenditure of labour-power is a natural and rude reaction against the tedium of monotonous drudgery, it originates, also, to a much greater degree from anarchy in production, anarchy that in its turn pre-supposes unbridled exploitation of labour-power by the capitalist. Besides the general periodic changes of the industrial cycle, and the special fluctuations in the markets to which each industry is subject, we may also reckon what is called "the season," dependent either on the periodicity of favourable seasons of the year for navigation; or on fashion, and the sudden placing of large orders that have to be executed in the shortest possible time. The habit of giving such orders becomes more frequent with the extension of railways and telegraphs.

> "The extension of the railway system throughout the country has tended very much to encourage giving short notice. Purchasers now come up from Glasgow, Manchester, and Edinburgh once every fortnight or so to the wholesale city warehouses which we supply, and give small orders requiring immediate execution, instead of buying from stock as they used to do. Years ago we were always able to work in the slack times, so as to meet demand of the next season, but now no one can say beforehand what will be the demand then."[204]

In those factories and manufactories that are not yet subject to the Factory Acts, the most fearful over-work prevails periodically during what is called the season, in consequence of sudden

orders. In the outside department of the factory, of the manufactory, and of the warehouse, the so-called domestic workers, whose employment is at the best irregular, are entirely dependent for their raw material and their orders on the caprice of the capitalist, who, in this industry, is not hampered by any regard for depreciation of his buildings and machinery, and risks nothing by a stoppage of work, but the skin of the worker himself. Here then he sets himself systematically to work to form an industrial reserve force that shall be ready at a moment's notice; during one part of the year he decimates this force by the most inhuman toil, during the other part, he lets it starve for want of work.

> "The employers avail themselves of the habitual irregularity in the homework, when any extra work is wanted at a push, so that the work goes on till 11, and 12 p.m. or 2 a.m., or as the usual phrase is, "all hours," and that in localities where "the stench is enough to knock you down, you go to the door, perhaps, and open it, but shudder to go further."[205] "They are curious men," said one of the witnesses, a shoemaker, speaking of the masters, "they think it does a boy no harm to work too hard for half the year, if he is nearly idle for the other half."[206]

In the same way as technical impediments, so, too, those "usages which have grown with the growth of trade" were and still are proclaimed by interested capitalists as obstacles due to the nature of the work. This was a favourite cry of the cotton lords at the time they were first threatened with the Factory Acts. Although their industry more than any other depends on navigation, yet experience has given them the lie. Since then, every pretended obstruction to business has been treated by the Factory inspectors as a mere sham.[207] The thoroughly conscientious investigations of the Children's Employment Commission prove that the effect of the regulation of the hours of work, in some industries, was to spread the mass of labour previously employed more evenly over the whole year[208] that this regulation was the first rational bridle on the murderous, meaningless caprices of fashion,[209] caprices that consort so badly with the system of modern industry; that the development of ocean navigation and of the means of communication generally, has swept away the technical basis on which season-work was really supported, [210]and that all other so-called unconquerable difficulties vanish before larger buildings, additional machinery, increase in the number of workpeople employed,[211] and the alterations caused by all these in the mode of conducting the wholesale trade.[212] But for all that, capital never becomes reconciled to such changes – and this is admitted over and over again by its own representatives – except "under the pressure of a General Act of Parliament"[213] for the compulsory regulation of the hours of labour.

Section 9: The Factory Acts. Sanitary and Educational Clauses of the same. Their General Extension in England

Factory legislation, that first conscious and methodical reaction of society against the spontaneously developed form of the process of production, is, as we have seen, just as much the necessary product of modern industry as cotton yarn, self-actors, and the electric telegraph. Before passing to the consideration of the extension of that legislation in England, we shall shortly notice certain clauses contained in the Factory Acts, and not relating to the hours of work.

Apart from their wording, which makes it easy for the capitalist to evade them, the sanitary clauses are extremely meagre, and, in fact, limited to provisions for whitewashing the walls, for insuring cleanliness in some other matters, for ventilation, and for protection against dangerous machinery. In the third book we shall return again to the fanatical opposition of the masters to those clauses which imposed upon them a slight expenditure on appliances for protecting the

limbs of their workpeople, an opposition that throws a fresh and glaring light on the Free-trade dogma, according to which, in a society with conflicting interests, each individual necessarily furthers the common weal by seeking nothing but his own personal advantage! One example is enough. The reader knows that during the last 20 years, the flax industry has very much extended, and that, with that extension, the number of scutching mills in Ireland has increased. In 1864 there were in that country 1,800 of these mills. Regularly in autumn and winter women and "young persons," the wives, sons, and daughters of the neighbouring small farmers, a class of people totally unaccustomed to machinery, are taken from field labour to feed the rollers of the scutching mills with flax. The accidents, both as regards number and kind, are wholly unexampled in the history of machinery. In one scutching mill, at Kildinan, near Cork, there occurred between 1852 and 1856, six fatal accidents and sixty mutilations; every one of which might have been prevented by the simplest appliances, at the cost of a few shillings. Dr. W. White, the certifying surgeon for factories at Downpatrick, states in his official report, dated the 15th December, 1865:

> "The serious accidents at the scutching mills are of the most fearful nature. In many cases a quarter of the body is torn from the trunk, and either involves death, or a future of wretched incapacity and suffering. The increase of mills in the country will, of course, extend these dreadful results, and it will be a great boon if they are brought under the legislature. I am convinced that by proper supervision of scutching mills a vast sacrifice of life and limb would be averted."[214]

What could possibly show better the character of the capitalist mode of production, than the necessity that exists for forcing upon it, by Acts of Parliament, the simplest appliances for maintaining cleanliness and health? In the potteries the Factory Act of 1864 "has whitewashed and cleansed upwards of 200 workshops, after a period of abstinence from any such cleaning, in many cases of 20 years, and in some, entirely," (this is the "abstinence" of the capitalist!) "in which were employed 27,800 artisans, hitherto breathing through protracted days and often nights of labour, a mephitic atmosphere, and which rendered an otherwise comparatively innocuous occupation, pregnant with disease and death. The Act has improved the ventilation very much."[215]

At the same time, this portion of the Act strikingly shows that the capitalist mode of production, owing to its very nature, excludes all rational improvement beyond a certain point. It has been stated over and over again that the English doctors are unanimous in declaring that where the work is continuous, 500 cubic feet is the very least space that should be allowed for each person. Now, if the Factory Acts, owing to their compulsory provisions, indirectly hasten on the conversion of small workshops into factories, thus indirectly attacking the proprietary rights of the smaller capitalists, and assuring a monopoly to the great ones, so, if it were made obligatory to provide the proper space for each workman in every workshop, thousands of small employers would, at one full swoop, be expropriated directly! The very root of the capitalist mode of production, i.e., the self-expansion of all capital, large or small, by means of the "free" purchase and consumption of labour-power, would be attacked. Factory legislation is therefore brought to a deadlock before these 500 cubic feet of breathing space. The sanitary officers, the industrial inquiry commissioners, the factory inspectors, all harp, over and over again, upon the necessity for those 500 cubic feet, and upon the impossibility of wringing them out of capital. They thus, in fact, declare that consumption and other lung diseases among the workpeople are necessary conditions to the existence of capital.[216]

Paltry as the education clauses of the Act appear on the whole, yet they proclaim elementary education to be an indispensable condition to the employment of children.[217] The success of those clauses proved for the first time the possibility of combining education and gymnastics[218] with

manual labour, and, consequently, of combining manual labour with education and gymnastics. The factory inspectors soon found out by questioning the schoolmasters, that the factory children, although receiving only one half the education of the regular day scholars, yet learnt quite as much and often more.

> "This can be accounted for by the simple fact that, with only being at school for one half of the day, they are always fresh, and nearly always ready and willing to receive instruction. The system on which they work, half manual labour, and half school, renders each employment a rest and a relief to the other; consequently, both are far more congenial to the child, than would be the case were he kept constantly at one. It is quite clear that a boy who has been at school all the morning, cannot (in hot weather particularly) cope with one who comes fresh and bright from his work."[219]

Further information on this point will be found in Senior's speech at the Social Science Congress at Edinburgh in 1863. He there shows, amongst other things, how the monotonous and uselessly long school hours of the children of the upper and middle classes, uselessly add to the labour of the teacher, "while he not only fruitlessly but absolutely injuriously, wastes the time, health, and energy of the children."[220] From the Factory system budded, as Robert Owen has shown us in detail, the germ of the education of the future, an education that will, in the case of every child over a given age, combine productive labour with instruction and gymnastics, not only as one of the methods of adding to the efficiency of production, but as the only method of producing fully developed human beings.

Modern industry, as we have seen, sweeps away by technical means the manufacturing division of labour, under which each man is bound hand and foot for life to a single detail-operation. At the same time, the capitalistic form of that industry reproduces this same division of labour in a still more monstrous shape; in the factory proper, by converting the workman into a living appendage of the machine; and everywhere outside the Factory, partly by the sporadic use of machinery and machine workers,[221] partly by re-establishing the division of labour on a fresh basis by the general introduction of the labour of women and children, and of cheap unskilled labour.

The antagonism between the manufacturing division of labour and the methods of modern industry makes itself forcibly felt. It manifests itself, amongst other ways, in the frightful fact that a great part of the children employed in modern factories and manufactures, are from their earliest years riveted to the most simple manipulations, and exploited for years, without being taught a single sort of work that would afterwards make them of use, even in the same manufactory or factory. In the English letter-press printing trade, for example, there existed formerly a system, corresponding to that in the old manufactures and handicrafts, of advancing the apprentices from easy to more and more difficult work. They went through a course of teaching till they were finished printers. To be able to read and write was for every one of them a requirement of their trade. All this was changed by the printing machine. It employs two sorts of labourers, one grown up, renters, the other, boys mostly from 11 to 17 years of age whose sole business is either to spread the sheets of paper under the machine, or to take from it the printed sheets. They perform this weary task, in London especially, for 14, 15, and 16 hours at a stretch, during several days in the week, and frequently for 36 hours, with only 2 hours' rest for meals and sleep.[222] A great part of them cannot read, and they are, as a rule, utter savages and very extraordinary creatures.

> "To qualify them for the work which they have to do, they require no intellectual training; there is little room in it for skill, and less for judgment; their wages, though rather high for boys, do not increase proportionately as they grow up, and

> the majority of them cannot look for advancement to the better paid and more responsible post of machine minder, because while each machine has but one minder, it has at least two, and often four boys attached to it."[223]

As soon as they get too old for such child's work, that is about 17 at the latest, they are discharged from the printing establishments. They become recruits of crime. Several attempts to procure them employment elsewhere, were rendered of no avail by their ignorance and brutality, and by their mental and bodily degradation.

As with the division of labour in the interior of the manufacturing workshops, so it is with the division of labour in the interior of society. So long as handicraft and manufacture form the general groundwork of social production, the subjection of the producer to one branch exclusively, the breaking up of the multifariousness of his employment[224] is a necessary step in the development. On that groundwork each separate branch of production acquires empirically the form that is technically suited to it, slowly perfects it, and, so soon as a given degree of maturity has been reached, rapidly crystallises that form. The only thing, that here and there causes a change, besides new raw material supplied by commerce, is the gradual alteration of the instruments of labour. But their form, too, once definitely settled by experience, petrifies, as is proved by their being in many cases handed down in the same form by one generation to another during thousands of years. A characteristic feature is, that, even down into the eighteenth century, the different trades were called "mysteries" (mystères);[225] into their secrets none but those duly initiated could penetrate. modern industry rent the veil that concealed from men their own social process of production, and that turned the various, spontaneously divided branches of production into so many riddles, not only to outsiders, but even to the initiated. The principle which it pursued, of resolving each process into its constituent movements, without any regard to their possible execution by the hand of man, created the new modern science of technology. The varied, apparently unconnected, and petrified forms of the industrial processes now resolved themselves into so many conscious and systematic applications of natural science to the attainment of given useful effects. Technology also discovered the few main fundamental forms of motion, which, despite the diversity of the instruments used, are necessarily taken by every productive action of the human body; just as the science of mechanics sees in the most complicated machinery nothing but the continual repetition of the simple mechanical powers.

Modern industry never looks upon and treats the existing form of a process as final. The technical basis of that industry is therefore revolutionary, while all earlier modes of production were essentially conservative.[226] By means of machinery, chemical processes and other methods, it is continually causing changes not only in the technical basis of production, but also in the functions of the labourer, and in the social combinations of the labour-process. At the same time, it thereby also revolutionises the division of labour within the society, and incessantly launches masses of capital and of workpeople from one branch of production to another. But if modern industry, by its very nature, therefore necessitates variation of labour, fluency of function, universal mobility of the labourer, on the other hand, in its capitalistic form, it reproduces the old division of labour with its ossified particularisations. We have seen how this absolute contradiction between the technical necessities of modern industry, and the social character inherent in its capitalistic form, dispels all fixity and security in the situation of the labourer; how it constantly threatens, by taking away the instruments of labour, to snatch from his hands his means of subsistence,[227] and, by suppressing his detail-function, to make him superfluous. We have seen, too, how this antagonism vents its rage in the creation of that monstrosity, an industrial reserve army, kept in misery in order to be always at the disposal of capital; in the incessant human sacrifices from among the working-class, in the most reckless squandering of labour-power and in the

devastation caused by a social anarchy which turns every economic progress into a social calamity. This is the negative side. But if, on the one hand, variation of work at present imposes itself after the manner of an overpowering natural law, and with the blindly destructive action of a natural law that meets with resistance[228] at all points, modern industry, on the other hand, through its catastrophes imposes the necessity of recognising, as a fundamental law of production, variation of work, consequently fitness of the labourer for varied work, consequently the greatest possible development of his varied aptitudes. It becomes a question of life and death for society to adapt the mode of production to the normal functioning of this law. Modern Industry, indeed, compels society, under penalty of death, to replace the detail-worker of to-day, grappled by life-long repetition of one and the same trivial operation, and thus reduced to the mere fragment of a man, by the fully developed individual, fit for a variety of labours, ready to face any change of production, and to whom the different social functions he performs, are but so many modes of giving free scope to his own natural and acquired powers.

One step already spontaneously taken towards effecting this revolution is the establishment of technical and agricultural schools, and of "écoles d'enseignement professionnel," in which the children of the working-men receive some little instruction in technology and in the practical handling of the various implements of labour. Though the Factory Act, that first and meagre concession wrung from capital, is limited to combining elementary education with work in the factory, there can be no doubt that when the working-class comes into power, as inevitably it must, technical instruction, both theoretical and practical, will take its proper place in the working-class schools. There is also no doubt that such revolutionary ferments, the final result of which is the abolition of the old division of labour, are diametrically opposed to the capitalistic form of production, and to the economic status of the labourer corresponding to that form. But the historical development of the antagonisms, immanent in a given form of production, is the only way in which that form of production can be dissolved and a new form established. "Ne sutor ultra crepidam" – this nec plus ultra of handicraft wisdom became sheer nonsense, from the moment the watchmaker Watt invented the steam-engine, the barber Arkwright, the throstle, and the working-jeweller, Fulton, the steamship.[229]

So long as Factory legislation is confined to regulating the labour in factories, manufactories, &c., it is regarded as a mere interference with the exploiting rights of capital. But when it comes to regulating the so-called "home-labour,"[230] it is immediately viewed as a direct attack on the patria potestas, on parental authority. The tender-hearted English Parliament long affected to shrink from taking this step. The force of facts, however, compelled it at last to acknowledge that modern industry, in overturning the economic foundation on which was based the traditional family, and the family labour corresponding to it, had also unloosened all traditional family ties. The rights of the children had to be proclaimed. The final report of the Ch. Empl. Comm. of 1866, states:

> "It is unhappily, to a painful degree, apparent throughout the whole of the evidence, that against no persons do the children of both sexes so much require protection as against their parents." The system of unlimited exploitation of children's labour in general and the so-called home-labour in particular is "maintained only because the parents are able, without check or control, to exercise this arbitrary and mischievous power over their young and tender offspring.... Parents must not possess the absolute power of making their children mere 'machines to earn so much weekly wage....' The children and young persons, therefore, in all such cases may justifiably claim from the legislature, as a natural right, that an exemption should be secured to them, from what destroys

> prematurely their physical strength, and lowers them in the scale of intellectual and moral beings."[231]

It was not, however, the misuse of parental authority that created the capitalistic exploitation, whether direct or indirect, of children's labour; but, on the contrary, it was the capitalistic mode of exploitation which, by sweeping away the economic basis of parental authority, made its exercise degenerate into a mischievous misuse of power. However terrible and disgusting the dissolution, under the capitalist system, of the old family ties may appear, nevertheless, modern industry, by assigning as it does an important part in the process of production, outside the domestic sphere, to women, to young persons, and to children of both sexes, creates a new economic foundation for a higher form of the family and of the relations between the sexes. It is, of course, just as absurd to hold the Teutonic-Christian form of the family to be absolute and final as it would be to apply that character to the ancient Roman, the ancient Greek, or the Eastern forms which, moreover, taken together form a series in historical development. Moreover, it is obvious that the fact of the collective working group being composed of individuals of both sexes and all ages, must necessarily, under suitable conditions, become a source of humane development; although in its spontaneously developed, brutal, capitalistic form, where the labourer exists for the process of production, and not the process of production for the labourer, that fact is a pestiferous source of corruption and slavery.[232]

The necessity for a generalisation of the Factory Acts, for transforming them from an exceptional law relating to mechanical spinning and weaving – those first creations of machinery – into a law affecting social production as a whole, arose, as we have seen, from the mode in which modern industry was historically developed. In the rear of that industry, the traditional form of manufacture, of handicraft, and of domestic industry, is entirely revolutionised; manufactures are constantly passing into the factory system, and handicrafts into manufactures; and lastly, the spheres of handicraft and of the domestic industries become, in a, comparatively speaking, wonderfully short time, dens of misery in which capitalistic exploitation obtains free play for the wildest excesses. There are two circumstances that finally turn the scale: first, the constantly recurring experience that capital, so soon as it finds itself subject to legal control at one point, compensates itself all the more recklessly at other points;[233] secondly, the cry of the capitalists for equality in the conditions of competition, i.e., for equal restrain on all exploitation of labour.[234] On this point let us listen to two heart-broken cries. Messrs. Cooksley of Bristol, nail and chain, &c., manufacturers, spontaneously introduced the regulations of the Factory Act into their business.

> "As the old irregular system prevails in neighbouring works, the Messrs. Cooksley are subject to the disadvantage of having their boys enticed to continue their labour elsewhere after 6 p.m. 'This,' they naturally say, 'is an unjustice and loss to us, as it exhausts a portion of the boy's strength, of which we ought to have the full benefit'."[235]

Mr. J. Simpson (paper box and bagmaker, London) states before the commissioners of the Ch. Empl. Comm.:

> "He would sign any petition for it" (legislative interference)... "As it was, he always felt restless at night, when he had closed his place, lest others should be working later than him and getting away his orders."[236]

Summarising, the Ch. Empl. Comm. says:

> "It would be unjust to the larger employers that their factories should be placed under regulation, while the hours of labour in the smaller places in their own

> branch of business were under no legislative restriction. And to the injustice arising from the unfair conditions of competition, in regard to hours, that would be created if the smaller places of work were exempt, would be added the disadvantage to the larger manufacturers, of finding their supply of juvenile and female labour drawn off to the places of work exempt from legislation. Further, a stimulus would be given to the multiplication of the smaller places of work, which are almost invariably the least favourable to the health, comfort, education, and general improvement of the people." [237]

In its final report the Commission proposes to subject to the Factory Act more than 1,400,000 children, young persons, and women, of which number about one half are exploited in small industries and by the so-called home-work.[238] It says,

> "But if it should seem fit to Parliament to place the whole of that large number of children, young persons and females under the protective legislation above adverted to ... it cannot be doubted that such legislation would have a most beneficent effect, not only upon the young and the feeble, who are its more immediate objects, but upon the still larger body of adult workers, who would in all these employments, both directly and indirectly, come immediately under its influence. It would enforce upon them regular and moderate hours; it would lead to their places of work being kept in a healthy and cleanly state; it would therefore husband and improve that store of physical strength on which their own well-being and that of the country so much depends; it would save the rising generation from that overexertion at an early age which undermines their constitutions and leads to premature decay; finally, it would ensure them – at least up to the age of 13 – the opportunity of receiving the elements of education, and would put an end to that utter ignorance ... so faithfully exhibited in the Reports of our Assistant Commissioners, and which cannot be regarded without the deepest pain, and a profound sense of national degradation."[239]

The Tory Cabinet[240] announced in the Speech from the Throne, on February 5, 1867, that it had framed the proposals of the Industrial Commission of Inquiry[241] into Bills. To get that far, another twenty years of *experimentum in corpore vili* had been required. Already in 1840 a Parliamentary Commission of Inquiry on the labour of children had been appointed. Its Report, in 1842, unfolded, in the words of Nassau W. Senior,

> "the most frightful picture of avarice, selfishness and cruelty on the part of masters and of parents, and of juvenile and infantile misery, degradation and destruction ever presented.... It may be supposed that it describes the horrors of a past age. But there is unhappily evidence that those horrors continue as intense as they were. A pamphlet published by Hardwicke about 2 years ago states that the abuses complained of in 1842, are in full bloom at the present day. It is a strange proof of the general neglect of the morals and health of the children of the working-class, that this report lay unnoticed for 20 years, during which the children, 'bred up without the remotest sign of comprehension as to what is meant by the term morals, who had neither knowledge, nor religion, nor natural affection,' were allowed to become the parents of the present generation."[242]

The social conditions having undergone a change, Parliament could not venture to shelve the demands of the Commission of 1862, as it had done those of the Commission of 1840. Hence in 1864, when the Commission had not yet published more than a part of its reports, the earthenware industries (including the potteries), makers of paperhangings, matches, cartridges, and caps, and

fustian cutters were made subject to the Acts in force in the textile industries. In the Speech from the Throne, on 5th February, 1867, the Tory Cabinet of the day announced the introduction of Bills, founded on the final recommendations of the Commission, which had completed its labours in 1866.

On the 15th August, 1867, the Factory Acts Extension Act, and on the 21st August, the Workshops' Regulation Act received the Royal Assent; the former Act having reference to large industries, the latter to small.

The former applies to blast-furnaces, iron' and copper mills, foundries, machine shops, metal manufactories, gutta-percha works, paper mills, glass-works, tobacco manufactories, letter-press printing (including newspapers), book-binding, in short to all industrial establishments of the above kind, in which 50 individuals or more are occupied simultaneously, and for not less than 100 days during the year.

To give an idea of the extent of the sphere embraced by the Workshops' Regulation Act in its application, we cite from its interpretation clause, the following passages:

> "*Handicraft* shall mean any manual labour exercised by way of trade, or for purposes of gain in, or incidental to, the making any article or part of an article, or in, or incidental to, the altering, repairing, ornamenting, finishing, or otherwise adapting for sale any article."
>
> "*Workshop* shall mean any room or place whatever in the open air or undercover, in which any handicraft is carried on by any child, young person, or woman, and to which and over which the person by whom such child, young person, or woman is employed, has the right of access and control."
>
> "*Employed* shall mean occupied in any handicraft, whether for wages or not, under a master or under a parent as herein defined."
>
> "*Parent* shall mean parent, guardian, or person, having the custody of, or control over, any... child or young person."

Clause 7, which imposes a penalty for employment of children, young persons, and women, contrary to the provisions of the Act, subjects to fines, not only the occupier of the workshop, whether parent or not, but even

> "the parent of, or the person deriving any direct benefit from the labour of, or having the control over, the child, young person or woman."

The Factory Acts Extension Act, which affects the large establishments, derogates from the Factory Act by a crowd of vicious exceptions and cowardly compromises with the masters.

The Workshops' Regulation Act, wretched in all its details, remained a dead letter in the hands of the municipal and local authorities who were charged with its execution. When, in 1871, Parliament withdrew from them this power, in order to confer it on the Factory Inspectors, to whose province it thus added by a single stroke more than one hundred thousand workshops, and three hundred brickworks, care was taken at the same time not to add more than eight assistants to their already undermanned staff.[243]

What strikes us, then, in the English legislation of 1867, is, on the one hand, the necessity imposed on the parliament of the ruling classes, of adopting in principle measures so extraordinary, and on so great a scale, against the excesses of capitalistic exploitation; and on the other hand, the hesitation, the repugnance, and the bad faith, with which it lent itself to the task of carrying those measures into practice.

The Inquiry Commission of 1862 also proposed a new regulation of the mining industry, an industry distinguished from others by the exceptional characteristic that the interests of landlord and capitalist there join hands. The antagonism of these two interests had been favourable to Factory legislation, while on the other hand the absence of that antagonism is sufficient to explain the delays and chicanery of the legislation on mines.

The Inquiry Commission of 1840 had made revelations so terrible, so shocking, and creating such a scandal all over Europe, that to salve its conscience Parliament passed the Mining Act of 1842, in which it limited itself to forbidding the employment underground in mines of children under 10 years of age and females.

Then another Act, The Mines' Inspecting Act of 1860, provides that mines shall be inspected by public officers nominated specially for that purpose, and that boys between the ages of 10 and 12 years shall not be employed, unless they have a school certificate, or go to school for a certain number of hours. This Act was a complete dead letter owing to the ridiculously small number of inspectors, the meagreness of their powers, and other causes that will become apparent as we proceed.

One of the most recent Blue books on mines is the "Report from the Select Committee on Mines, together with &c. Evidence, 23rd July, 1866." This Report is the work of a Parliamentary Committee selected from members of the House of Commons, and authorised to summon and examine witnesses. It is a thick folio volume in which the Report itself occupies only five lines to this effect; that the committee has nothing to say, and that more witnesses must be examined!

The mode of examining the witnesses reminds one of the cross-examination of witnesses in English courts of justice, where the advocate tries, by means of impudent, unexpected, equivocal and involved questions, put without connexion, to intimidate, surprise, and confound the witness, and to give a forced meaning to the answers extorted from him. In this inquiry the members of the committee themselves are the cross-examiners, and among them are to be found both mine-owners and mine exploiters; the witnesses are mostly working coal miners. The whole farce is too characteristic of the spirit of capital, not to call for a few extracts from this Report. For the sake of conciseness I have classified them. I may also add that every question and its answer are numbered in the English Blue books.

1. Employment in mines of boys of 10 years and upwards. – In the mines the work, inclusive of going and returning, usually lasts 14 or 15 hours, sometimes even from 3, 4 and 5 o'clock a.m., till 5 and 6 o'clock p.m. (n. 6, 452, 83). The adults work in two shifts, of eight hours each; but there is no alternation with the boys, on account of the expense (n. 80, 203, 204). The younger boys are chiefly employed in opening and shutting the ventilating doors in the various parts of the mine; the older ones are employed on heavier work, in carrying coal, &c. (n. 122, 739, 1747). They work these long hours underground until their 18th or 22nd year, when they are put to miner's work proper (n. 161). Children and young persons are at present worse treated, and harder worked than at any previous period (n. 1663-1667). The miners demand almost unanimously an act of Parliament prohibiting the employment in mines of children under 14. And now Hussey Vivian (himself an exploiter of mines) asks:

> "Would not the opinion of the workman depend upon the poverty of the workman's family?" Mr. Bruce: "Do you not think it would be a very hard case, where a parent had been injured, or where he was sickly, or where a father was dead, and there was only a mother, to prevent a child between 12 and 14 earning 1s. 7d. a day for the good of the family? ... You must lay down a general rule? ... Are you prepared to recommend legislation which would prevent the employment of children under 12 and 14, whatever the state of their parents might be?" "Yes."

(ns. 107-110). Vivian: “Supposing that an enactment were passed preventing the employment of children under the age of 14, would it not be probable that ... the parents of children would seek employment for their children in other directions, for instance, in manufacture?” “Not generally I think” (n. 174). Kinnaird: “Some of the boys are keepers of doors?” “Yes.” “Is there not generally a very great draught every time you open a door or close it?” “Yes, generally there is.” “It sounds a very easy thing, but it is in fact rather a painful one?” “He is imprisoned there just the same as if he was in a cell of a gaol.” Bourgeois Vivian: “Whenever a boy is furnished with a lamp cannot he read?” “Yes, he can read, if he finds himself in candles.... I suppose he would be found fault with if he were discovered reading; he is there to mind his business, he has a duty to perform, and he has to attend to it in the first place, and I do not think it would be allowed down the pit.” (ns. 139, 141, 143, 158, 160).

II. Education. – The working miners want a law for the compulsory education of their children, as in factories. They declare the clauses of the Act of 1860, which require a school certificate to be obtained before employing boys of 10 and 12 years of age, to be quite illusory. The examination of the witnesses on this subject is truly droll.

“Is it (the Act) required more against the masters or against the parents?” “It is required against both I think.” “You cannot say whether it is required against one more than against the other?” “No; I can hardly answer that question.” (ns. 115, 116). “Does there appear to be any desire on the part of the employers that the boys should have such hours as to enable them to go to school?” “No; the hours are never shortened for that purpose.” (n. 137) Mr. Kinnaird: “Should you say that the colliers generally improve their education; have you any instances of men who have, since they began to work, greatly improved their education, or do they not rather go back, and lose any advantage that they may have gained?” “They generally become worse: they do not improve; they acquire bad habits; they get on to drinking and gambling and such like, and they go completely to wreck.” (n. 211.) “Do they make any attempt of the kind (for providing instruction) by having schools at night?” “There are few collieries where night schools are held, and perhaps at those collieries a few boys do go to those schools; but they are so physically exhausted that it is to no purpose that they go there.” (n. 454.) “You are then,” concludes the bourgeois, “against education?” “Most certainly not; but,” &c. (n. 443.) “But are they (the employers) not compelled to demand them (school certificates)?” “By law they are; but I am not aware that they are demanded by the employers.” “Then it is your opinion, that this provision of the Act as to requiring certificates, is not generally carried out in the collieries?” “It is not carried out.” (ns. 443, 444.) “Do the men take a great interest in this question (of education)?” “The majority of them do.” (n. 717.) “Are they very anxious to see the law enforced?” “The majority are.” (n. 718.) “Do you think that in this country any law that you pass ... can really be effectual unless the population themselves assist in putting it into operation?” “Many a man might wish to object to employing a boy, but he would perhaps become marked by it.” (n. 720.) “Marked by whom?” “By his employers.” (n. 721.) “Do you think that the employers would find any fault with a man who obeyed the law... ?” “I believe they would.” (n. 722.) “Have you ever heard of any workman objecting to employ a boy between 10 and 12, who could not write or read?” “It is not left to men’s

option." (n. 123.) "Would you call for the interference of Parliament?" "I think that if anything effectual is to be done in the education of the colliers' children, it will have to be made compulsory by Act of Parliament." (n. 1634.) "Would you lay that obligation upon the colliers only, or all the workpeople of Great Britain?" "I came to speak for the colliers." (n. 1636.) "Why should you distinguish them (colliery boys) from other boys?" "Because I think they are an exception to the rule." (n. 1638.) "In what respect?" "In a physical respect." (n. 1639.) "Why should education be more valuable to them than to other classes of lads?" "I do not know that it is more valuable; but through the over-exertion in mines there is less chance for the boys that are employed there to get education, either at Sunday schools, or at day schools." (n. 1640.) "It is impossible to look at a question of this sort absolutely by itself?" (n. 1644.) "Is there a sufficiency of schools?" – "No"... (n. 1646). "If the State were to require that every child should be sent to school, would there be schools for the children to go to?" "No; but I think if the circumstances were to spring up, the schools would be forthcoming." (n. 1647.) "Some of them (the boys) cannot read and write at all, I suppose?" "The majority cannot... The majority of the men themselves cannot." (ns. 705, 725.)

III. Employment of women. – Since 1842 women are no more employed underground, but are occupied on the surface in loading the coal, &c., in drawing the tubs to the canals and railway waggons, in sorting, &c. Their numbers have considerably increased during the last three or four years. (n. 1727.) They are mostly the wives, daughters, and widows of the working miners, and their ages range from 12 to 50 or 60 years. (ns. 645, 1779.)

"What is the feeling among the working miners as to the employment of women?" "I think they generally condemn it." (n. 648.) "What objection do you see to it?" "I think it is degrading to the sex." (n. 649.) "There is a peculiarity of dress?" "Yes ... it is rather a man's dress, and I believe in some cases, it drowns all sense of decency." "Do the women smoke?" "Some do." "And I suppose it is very dirty work?" "Very dirty." "They get black and grimy?" "As black as those who are down the mines ... I believe that a woman having children (and there are plenty on the banks that have) cannot do her duty to her children." (ns. 650-654, 701.) "Do you think that those widows could get employment anywhere else, which would bring them in as much wages as that (from 8s. to 10s. a week)?" "I cannot speak to that." (n. 709.) "You would still be prepared, would you," (flint-hearted fellow!) "to prevent their obtaining a livelihood by these means?" "I would." (n. 710.) "What is the general feeling in the district ... as to the employment of women?" "The feeling is that it is degrading; and we wish as miners to have more respect to the fair sex than to see them placed on the pit bank... Some part of the work is very hard; some of these girls have raised as much as 10 tons of stuff a day." (ns. 1715,1717.) "Do you think that the women employed about the collieries are less moral than the women employed in the factories?" ". ..the percentage of bad ones may be a little more ... than with the girls in the factories." (n. 1237.) "But you are not quite satisfied with the state of morality in the factories?" "No." (n. 1733.) "Would you prohibit the employment of women in factories also?" "No, I would not." (n. 1734.) "Why not?" "I think it a more honourable occupation for them in the mills." (n. 1735.) "Still it is injurious to their morality, you think?" "Not so much as working on the pit bank; but it is more on the social position I take it; I do not take it on its moral ground alone. The

degradation, in its social bearing on the girls, is deplorable in the extreme. When these 400 or 500 girls become colliers' wives, the men suffer greatly from this degradation, and it causes them to leave their homes and drink." (n. 1736.) "You would be obliged to stop the employment of women in the ironworks as well, would you not, if you stopped it in the collieries?" "I cannot speak for any other trade." (n. 1737.) "Can you see any difference in the circumstances of women employed in ironworks, and the circumstances of women employed above ground in collieries?" "I have not ascertained anything as to that." (n. 1740.) "Can you see anything that makes a distinction between one class and the other?" "I have not ascertained that, but I know from house to house visitation, that it is a deplorable state of things in our district...." (n. 1741.) "Would you interfere in every case with the employment of women where that employment was degrading?" "It would become injurious, I think, in this way: the best feelings of Englishmen have been gained from the instruction of a mother. ..." (n. 1750.) "That equally applies to agricultural employments, does it not?" "Yes, but that is only for two seasons, and we have work all the four seasons." (n. 1751.) "They often work day and night, wet through to the skin, their constitution undermined and their health ruined." "You have not inquired into that subject perhaps?" "I have certainly taken note of it as I have gone along, and certainly I have seen nothing parallel to the effects of the employment of women on the pit bank.... It is the work of a man... a strong man." (ns. 1753, 1793, 1794.) "Your feeling upon the whole subject is that the better class of colliers who desire to raise themselves and humanise themselves, instead of deriving help from the women, are pulled down by them?" "Yes." (n. 1808.) After some further crooked questions from these bourgeois, the secret of their "sympathy" for widows, poor families, &c., comes out at last. "The coal proprietor appoints certain gentlemen to take the oversight of the workings, and it is their policy, in order to receive approbation, to place things on the most economical basis they can, and these girls are employed at from 1s. up to 1s. 6d. a day, where a man at the rate of 2s. 6d. a day would have to be employed." (n. 1816.)

IV. Coroner's inquests. –

"With regard to coroner's inquests in your district, have the workmen confidence in the proceedings at those inquests when accidents occur?" "No; they have not." (n. 360.) "Why not?" "Chiefly because the men who are generally chosen, are men who know nothing about mines and such like." "Are not workmen summoned at all upon the juries?" "Never but as witnesses to my knowledge." "Who are the people who are generally summoned upon these juries?" "Generally tradesmen in the neighbourhood ... from their circumstances they are sometimes liable to be influenced by their employers ... the owners of the works. They are generally men who have no knowledge, and can scarcely understand the witnesses who are called before them, and the terms which are used and such like." "Would you have the jury composed of persons who had been employed in mining?" "Yes, partly... they (the workmen) think that the verdict is not in accordance with the evidence given generally." (ns. 361, 364, 366, 368, 371, 375.) "One great object in summoning a jury is to have an impartial one, is it not?" "Yes, I should think so." "Do you think that the juries would be impartial if they were composed to a considerable extent of workmen?" "I cannot see any motive which the

> workmen would have to act partially ... they necessarily have a better knowledge of the operations in connexion with the mine." "You do not think there would be a tendency on the part of the workmen to return unfairly severe verdicts?" "No, I think not." (ns. 378, 379, 380.)

V. False weights and measures. – The workmen demand to be paid weekly instead of fortnightly, and by weight instead of by cubical contents of the tubs; they also demand protection against the use of false weights, &c. (n. 1071.)

> "If the tubs were fraudulently increased, a man could discontinue working by giving 14 days' notice?" "But if he goes to another place, there is the same thing going on there." (n. 1071.) "But he can leave that place where the wrong has been committed?" "It is general; wherever he goes, he has to submit to it." (n. 1072.) "Could a man leave by giving 14 days' notice?" "Yes." (n. 1073.) And yet they are not satisfied!

VI. Inspection of mines. – Casualties from explosions are not the only things the workmen suffer from. (n. 234, sqq.)

> "Our men complained very much of the bad ventilation of the collieries ... the ventilation is so bad in general that the men can scarcely breathe; they are quite unfit for employment of any kind after they have been for a length of time in connexion with their work; indeed, just at the part of the mine where I am working, men have been obliged to leave their employment and come home in consequence of that ... some of them have been out of work for weeks just in consequence of the bad state of the ventilation where there is not explosive gas ... there is plenty of air generally in the main courses, yet pains are not taken to get air into the workings where men are working." "Why do you not apply to the inspector?" "To tell the truth there are many men who are timid on that point; there have been cases of men being sacrificed and losing their employment in consequence of applying to the inspector." "Why is he a marked man for having complained?" "Yes..... And he finds it difficult to get employment in another mine?" "Yes." "Do you think the mines in your neighbourhood are sufficiently inspected to insure a compliance with the provisions of the Act?" "No; they are not inspected at all ... the inspector has been down just once in the pit, and it has been going seven years.... In the district to which I belong there are not a sufficient number of inspectors. We have one old man more than 70 years of age to inspect more than 130 collieries." "You wish to have a class of sub-inspectors?" "Yes." (ns. 234, 241, 251, 254, 274, 275, 554, 276, 293.) "But do you think it would be possible for Government to maintain such an army of inspectors as would be necessary to do all that you want them to do, without information from the men?" "No, I should think it would be next to impossible...." "It would be desirable the inspectors should come oftener?" "Yes, and without being sent for." (n. 280, 277.) "Do you not think that the effect of having these inspectors examining the collieries so frequently would be to shift the responsibility (!) of supplying proper ventilation from the owners of the collieries to the Government officials?" "No, I do not think that, I think that they should make it their business to enforce the Acts which are already in existence." (n. 285.) "When you speak of sub-inspectors, do you mean men at a less salary, and of an inferior stamp to the present inspectors?" "I would not have them inferior, if you could get them otherwise." (n. 294.) "Do you merely want more inspectors, or do you want a

> lower class of men as an inspector?" "A man who would knock about, and see that things are kept right; a man who would not be afraid of himself." (n. 295.) "If you obtained your wish in getting an inferior class of inspectors appointed, do you think that there would be no danger from want of skill, &c?" "I think not, I think that the Government would see after that, and have proper men in that position." (n. 297.)

This kind of examination becomes at last too much even for the chairman of the committee, and he interrupts with the observation:

> "You want a class of men who would look into all the details of the mine, and would go into all the holes and corners, and go into the real facts ... they would report to the chief inspector, who would then bring his scientific knowledge to bear on the facts they have stated?" (ns. 298, 299.) "Would it not entail very great expense if all these old workings were kept ventilated?" "Yes, expense might be incurred, but life would be at the same time protected." (n. 531.)

A working miner objects to the 17th section of the Act of 1860; he says,

> "At the present time, if the inspector of mines finds a part of the mine unfit to work in, he has to report it to the mine-owner and the Home Secretary. After doing that, there is given to the owner 20 days to look over the matter; at the end of 20 days he has the power to refuse making any alteration in the mine; but, when he refuses, the mine-owner writes to the Home Secretary, at the same time nominating five engineers, and from those five engineers named by the mine-owner himself, the Home Secretary appoints one, I think, as arbitrator, or appoints arbitrators from them; now we think in that case the mine-owner virtually appoints his own arbitrator." (n. 581.)

Bourgeois examiner, himself a mine-owner:

> "But ... is this a merely speculative objection?" (n. 586.) "Then you have a very poor opinion of the integrity of mining engineers?" "It is most certainly unjust and inequitable." (n. 588.) "Do not mining engineers possess a sort of public character, and do not you think that they are above making such a partial decision as you apprehend?" "I do not wish to answer such a question as that with respect to the personal character of those men. I believe that in many cases they would act very partially indeed, and that it ought not to be in their hands to do so, where men's lives are at stake." (n. 589.)

This same bourgeois is not ashamed to put this question: "Do you not think that the mine-owner also suffers loss from an explosion?" Finally, "Are not you workmen in Lancashire able to take care of your own interests without calling in the Government to help you?" "No." (n. 1042.)

In the year 1865 there were 3,217 coal mines in Great Britain, and 12 inspectors. A Yorkshire mine-owner himself calculates (*Times*, 26th January, 1867), that putting on one side their office work, which absorbs all their time, each mine can be visited but once in ten years by an inspector. No wonder that explosions have increased progressively, both in number and extent (sometimes with a loss of 200-300 men), during the last ten years. These are the beauties of "free" capitalist production! *[This sentence has been added to the English text in conformity with the 4th German edition. – Ed.*]

The very defective Act, passed in 1872, is the first that regulates the hours of labour of the children employed in mines, and makes exploiters and owners, to a certain extent, responsible for so-called accidents.

The Royal Commission appointed in 1867 to inquire into the employment in agriculture of children, young persons, and women, has published some very important reports. Several attempts to apply the principles of the Factory Acts, but in a modified form, to agriculture have been made, but have so far resulted in complete failure. All that I wish to draw attention to here is the existence of an irresistible tendency towards the general application of those principles.

If the general extension of factory legislation to all trades for the purpose of protecting the working-class both in mind and body has become inevitable, on the other hand, as we have already pointed out, that extension hastens on the general conversion of numerous isolated small industries into a few combined industries carried on upon a large scale; it therefore accelerates the concentration of capital and the exclusive predominance of the factory system. It destroys both the ancient and the transitional forms, behind which the dominion of capital is still in part concealed, and replaces them by the direct and open sway of capital; but thereby it also generalises the direct opposition to this sway. While in each individual workshop it enforces uniformity, regularity, order, and economy, it increases by the immense spur which the limitation and regulation of the working day give to technical improvement, the anarchy and the catastrophes of capitalist production as a whole, the intensity of labour, and the competition of machinery with the labourer. By the destruction of petty and domestic industries it destroys the last resort of the "redundant population," and with it the sole remaining safety-valve of the whole social mechanism. By maturing the material conditions, and the combination on a social scale of the processes of production, it matures the contradictions and antagonisms of the capitalist form of production, and thereby provides, along with the elements for the formation of a new society, the forces for exploding the old one.[244]

Section 10: Modern Industry and Agriculture

The revolution called forth by modern industry in agriculture, and in the social relations of agricultural producers, will be investigated later on. In this place, we shall merely indicate a few results by way of anticipation. If the use of machinery in agriculture is for the most part free from the injurious physical effect it has on the factory operative, its action in superseding the labourers is more intense, and finds less resistance, as we shall see later in detail. In the counties of Cambridge and Suffolk, for example, the area of cultivated land has extended very much within the last 20 years (up to 1868), while in the same period the rural population has diminished, not only relatively, but absolutely. In the United States it is as yet only virtually that agricultural machines replace labourers; in other words, they allow of the cultivation by the farmer of a larger surface, but do not actually expel the labourers employed. In 1861 the number of persons occupied in England and Wales in the manufacture of agricultural machines was 1,034, whilst the number of agricultural labourers employed in the use of agricultural machines and steam-engines did not exceed 1,205.

In the sphere of agriculture, modern industry has a more revolutionary effect than elsewhere, for this reason, that it annihilates the peasant, that bulwark of the old society, and replaces him by the wage-labourer. Thus the desire for social changes, and the class antagonisms are brought to the same level in the country as in the towns. The irrational, old-fashioned methods of agriculture are replaced by scientific ones. Capitalist production completely tears asunder the old bond of union which held together agriculture and manufacture in their infancy. But at the same time it creates the material conditions for a higher synthesis in the future, viz., the union of agriculture and industry on the basis of the more perfected forms they have each acquired during their temporary separation. Capitalist production, by collecting the population in great centres, and causing an ever-increasing preponderance of town population, on the one hand concentrates the historical

motive power of society; on the other hand, it disturbs the circulation of matter between man and the soil, i.e., prevents the return to the soil of its elements consumed by man in the form of food and clothing; it therefore violates the conditions necessary to lasting fertility of the soil. By this action it destroys at the same time the health of the town labourer and the intellectual life of the rural labourer.[245] But while upsetting the naturally grown conditions for the maintenance of that circulation of matter, it imperiously calls for its restoration as a system, as a regulating law of social production, and under a form appropriate to the full development of the human race. In agriculture as in manufacture, the transformation of production under the sway of capital, means, at the same time, the martyrdom of the producer; the instrument of labour becomes the means of enslaving, exploiting, and impoverishing the labourer; the social combination and organisation of labour-processes is turned into an organised mode of crushing out the workman's individual vitality, freedom, and independence. The dispersion of the rural labourers over larger areas breaks their power of resistance while concentration increases that of the town operatives. In modern agriculture, as in the urban industries, the increased productiveness and quantity of the labour set in motion are bought at the cost of laying waste and consuming by disease labour-power itself. Moreover, all progress in capitalistic agriculture is a progress in the art, not only of robbing the labourer, but of robbing the soil; all progress in increasing the fertility of the soil for a given time, is a progress towards ruining the lasting sources of that fertility. The more a country starts its development on the foundation of modern industry, like the United States, for example, the more rapid is this process of destruction. [246]Capitalist production, therefore, develops technology, and the combining together of various processes into a social whole, only by sapping the original sources of all wealth-the soil and the labourer.

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[1] Mill should have said, "of any human being not fed by other people's labour," for, without doubt, machinery has greatly increased the number of well-to-do idlers.

[2] See, for instance, Hutton: "Course of Mathematics."

[3] "From this point of view we may draw a sharp line of distinction between a tool and a machine: spades, hammers, chisels, &c., combinations of levers and of screws, in all of which, no matter how complicated they may be in other respects, man is the motive power, ... all this falls under the idea of a tool; but the plough, which is drawn by animal power, and wind-mills, &c., must be classed among machines." (Wilhelm Schulz: "Die Bewegung der Produktion." Zürich, 1843, p. 38.) In many respects a book to be recommended.

[4] Before his time, spinning machines, although very imperfect ones, had already been used, and Italy was probably the country of their first appearance. A critical history of technology would show how little any of the inventions of the 18th century are the work of a single individual. Hitherto there is no such book. Darwin has interested us in the history of Nature's Technology, i.e., in the formation of the organs of plants and animals, which organs serve as instruments of production for sustaining life. Does not the history of the productive organs of man, of organs that are the material basis of all social organisation, deserve equal attention? And would not such a history be easier to compile, since, as Vico says, human history differs from natural history in this, that we have made the former, but not the latter? Technology discloses man's mode of dealing with Nature, the process of production by which he sustains his life, and thereby also lays bare the mode of formation of his social relations, and of the mental conceptions that flow from them. Every history of religion, even, that fails to take account of this material basis, is uncritical. It is, in reality, much easier to discover by analysis the earthly core of the misty creations of religion, than, conversely, it is, to develop from the actual relations of life the corresponding celestialised forms of those relations. The latter method is the only materialistic, and therefore the only scientific one. The weak points in the abstract materialism of natural science, a materialism that excludes history and its process, are at once evident from the

abstract and ideological conceptions of its spokesmen, whenever they venture beyond the bounds of their own speciality.

[5] Especially in the original form of the power-loom, we recognise, at the first glance, the ancient loom. In its modern form, the power-loom has undergone essential alterations.

[6] It is only during the last 15 years (i.e., since about 1850), that a constantly increasing portion of these machine tools have been made in England by machinery, and that not by the same manufacturers who make the machines. Instances of machines for the fabrication of these mechanical tools are, the automatic bobbin-making engine, the cardsetting engine, shuttle-making machines, and machines for forging mule and throstle spindles.

[7] Moses says: "Thou shalt not muzzle the ox that treads the corn." The Christian philanthropists of Germany, on the contrary, fastened a wooden board round the necks of the serfs, whom they used as a motive power for grinding, in order to prevent them from putting flour into their mouths with their hands.

[8] It was partly the want of streams with a good fall on them, and partly their battles with superabundance of water in other respects, that compelled the Dutch to resort to wind as a motive power. The wind-mill itself they got from Germany, where its invention was the origin of a pretty squabble between the nobles, the priests, and the emperor, as to which of those three the wind "belonged." The air makes bondage, was the cry in Germany, at the same time that the wind was making Holland free. What it reduced to bondage in this case, was not the Dutchman, but the land for the Dutchman. In 1836, 12,000 windmills of 6,000 horse-power were still employed in Holland, to prevent two-thirds of the land from being reconverted into morasses.

[9] It was, indeed, very much improved by Watt's first so-called single acting engine; but, in this form, it continued to be a mere machine for raising water, and the liquor from salt mines.

[10] "The union of all these simple instruments, set in motion by a single motor, constitutes a machine." (Babbage, l.c.)

[11] In January, 1861, John C. Morton read before the Society of Arts a paper on "The forces employed in agriculture." He there states: "Every improvement that furthers the uniformity of the land makes the steam-engine more and more applicable to the production of pure mechanical force.... Horse-power is requisite wherever crooked fences and other obstructions prevent uniform action. These obstructions are vanishing day by day. For operations that demand more exercise of will than actual force, the only power applicable is that controlled every instant by the human mind-in other words, man-power." Mr. Morton then reduces steam-power, horse-power, and man-power, to the unit in general use for steam-engines, namely, the force required to raise 33,000 lbs. one foot in one minute, and reckons the cost of one horse-power from a steam-engine to be 3d., and from a horse to be 5½d. per hour. Further, if a horse must fully maintain its health, it can work no more than 8 hours a day. Three at the least out of every seven horses used on tillage land during the year can be dispensed with by using steam-power, at an expense not greater than that which, the horses dispensed with, would cost during the 3 or 4 months in which alone they can be used effectively. Lastly, steam-power, in those agricultural operations in which it can be employed, improves, in comparison with horse-power, the quality of the work. To do the work of a steam-engine would require 66 men, at a total cost of 15s. an hour, and to do the work of a horse, 32 men, at a total cost of 8s. an hour.

[12] Faulhaber, 1625; De Caus, 1688.

[13] The modern turbine frees the industrial exploitation of water-power from many of its former fetters.

[14] "In the early days of textile manufactures, the locality of the factory depended upon the existence of a stream having a sufficient fall to turn a water-wheel; and, although the establishment of the water-mills was the commencement of the breaking up of the domestic system of manufacture, yet the mills

necessarily situated upon streams, and frequently at considerable distances the one from the other, formed part of a rural, rather than an urban system; and it was not until the introduction of the steam-power as a substitute for the stream that factories were congregated in towns, and localities where the coal and water required for the production of steam were found in sufficient quantities. The steam-engine is the parent of manufacturing towns." (A. Redgrave in "Reports of the Insp. of Fact., 30th April, 1860," p. 36.)

[15] From the standpoint of division of labour in Manufacture, weaving was not simple, but, on the contrary, complicated manual labour; and consequently the power-loom is a machine that does very complicated work. It is altogether erroneous to suppose that modern machinery originally appropriated those operations alone, which division of labour had simplified. Spinning and weaving were, during the manufacturing period, split up into new species, and the implements were modified and improved; but the labour itself was in no way divided, and it retained its handicraft character. It is not the labour, but the instrument of labour, that serves as the starting-point of the machine.

[16] Before the epoch of Mechanical Industry, the wool manufacture was the predominating manufacture in England. Hence it was in this industry that, in the first half of the 18th century, the most experiments were made. Cotton, which required less careful preparation for its treatment by machinery, derived the benefit of the experience gained on wool, just as afterwards the manipulation of wool by machinery was developed on the lines of cotton-spinning and weaving by machinery. It was only during the 10 years immediately preceding 1866, that isolated details of the wool manufacture, such as woolcombing, were incorporated in the factory system. "The application of power to the process of combing wool ... extensively in operation since the introduction of the combingmachine, especially Lister's ... undoubtedly had the effect of throwing a very large number of men out of work. Wool was formerly combed by hand, most frequently in the cottage of the comber. It is now very generally combed in the factory, and hand-labour is superseded, except in some particular kinds of work, in which hand-combed wool is still preferred. Many of the hand-combers found employment in the factories, but the produce of the hand-combers bears so small a proportion to that of the machine, that the employment of a very large number of combers has passed away." ("Rep. of lnsp. of Fact. for 31st Oct., 1856," p. 16.)

[17] "The principle of the factory system, then, is to substitute ... the partition of a process into its essential constituents, for the division or graduation of labour among artisans." (Andrew Ure: "The Philosophy of Manufactures," Lond., 1835, p. 20.)

[18] The power-loom was at first made chiefly of wood; in its improved modern form it is made of iron. To what an extent the old forms of the instruments of production influenced their new forms at first starting, is shown by, amongst other things, the most superficial comparison of the present power-loom with the old one, of the modern blowing apparatus of a blast-furnace with the first inefficient mechanical reproduction of the ordinary bellows, and perhaps more strikingly than in any other way, by the attempts before the invention of the present locomotive, to construct a locomotive that actually had two feet, which after the fashion of a horse, it raised alternately from the ground. It is only after considerable development of the science of mechanics, and accumulated practical experience, that the form of a machine becomes settled entirely in accordance with mechanical principles, and emancipated from the traditional form of the tool that gave rise to it.

[19] Eli Whitney's cotton gin had until very recent times undergone less essential changes than any other machine of the 18th century. It is only during the last decade (i.e., since 1856) that another American, Mr. Emery, of Albany, New York, has rendered Whitney's gin antiquated by an improvement as simple as it is effective.

[20] "The Industry of Nations," Lond., 1855, Part II., p. 239. This work also remarks: 'Simple and outwardly unimportant as this appendage to lathes may appear, it is not, we believe, averring too much

to state, that its influence in improving and extending the use of machinery has been as great as that produced by Watt's improvements of the steam-engine itself. Its introduction went at once to perfect all machinery, to cheapen it, and to stimulate invention and improvement."

[21] One of these machines, used for forging paddle-wheel shafts in London, is called "Thor." It forges a shaft of 16½ tons with as much ease as a blacksmith forges a horseshoe.

[22] Wood-working machines that are also capable of being employed on a small scale are mostly American inventions.

[23] Science, generally speaking, costs the capitalist nothing, a fact that by no means hinders him from exploiting it. The science of others is as much annexed by capital as the labour of others. Capitalistic appropriation and personal appropriation, whether of science or of material wealth, are, however, totally different things. Dr. Ure himself deplores the gross ignorance of mechanical science existing among his dear machinery-exploiting manufacturers, and Liebig can a tale unfold about the astounding ignorance of chemistry displayed by English chemical manufacturers.

[24] Ricardo lays such stress on this effect of machinery (of which, in other connexions, he takes no more notice than he does of the general distinction between the labour process and the process of creating surplus-value), that he occasionally loses sight of the value given up by machines to the product, and puts machines on the same footing as natural forces. Thus "Adam Smith nowhere undervalues the services which the natural agents and machinery perform for us, but he very justly distinguishes the nature of the value which they add to commodities... as they perform their work gratuitously, the assistance which they afford us, adds nothing to value in exchange." (Ric., l.c., pp. 336, 337.) This observation of Ricardo is of course correct in so far as it is directed against J. B. Say, who imagines that machines render the "service" of creating value which forms a part of "profits."

[25] A horse-power is equal to a force of 33,000 foot-pounds per minute, i.e., to a force that raises 33,000 pounds one foot in a minute, or one pound 33,000 feet. This is the horse power meant in the text. In ordinary language, and also here and there in quotations in this work, a distinction is drawn between the "nominal" and the "commercial" or "indicated" horse-power of the same engine. The old or nominal horse-power is calculated exclusively from the length of piston-stroke, and the diameter of the cylinder, and leaves pressure of steam and piston speed out of consideration. It expresses practically this: This engine would be one of 50 horse-power, if it were driven with the same low pressure of steam, and the same slow piston speed, as in the days of Boulton and Watt. But the two latter factors have increased enormously since those days. In order to measure the mechanical force exerted today by an engine, an indicator has been invented which shows the pressure of the steam in the cylinder. The piston speed is easily ascertained. Thus the "indicated" or "commercial" horse-power of an engine is expressed by a mathematical formula, involving diameter of cylinder, length of stroke, piston speed, and steam pressure, simultaneously, and showing what multiple of 33,000 pounds is really raised by the engine in a minute. Hence, one "nominal" horse-power may exert three, four, or even five "indicated" or "real" horse-powers. This observation is made for the purpose of explaining various citations in the subsequent pages. — *F. E.*

[26] The reader who is imbued with capitalist notions will naturally miss here the "interest" that the machine, in proportion to its capital value, adds to the product. It is, however, easily seen that since a machine no more creates new value than any other part of constant capital, it cannot add any value under the name of "interest." It is also evident that here, where we are treating of the production of surplus-value, we cannot assume *a priori* the existence of any part of that value under the name of interest. The capitalist mode of calculating, which appears, *primâ facie*, absurd, and repugnant to the laws of the creation of value, will be explained in the third book of this work.

[27] This portion of value which is added by the machinery, decreases both absolutely and relatively, when the machinery does away with horses and other animals that are employed as mere moving

forces, and not as machines for changing the form of matter. It may here be incidentally observed, that Descartes, in defining animals as mere machines, saw with eyes of the manufacturing period, while to eyes of the middle ages, animals were assistants to man, as they were later to Von Haller in his "Restauration der Staatswissenschaften." That Descartes, like Bacon, anticipated an alteration in the form of production, and the practical subjugation of Nature by Man, as a result of the altered methods of thought, is plain from his "Discours de la Méthode." He there says: "Il est possible (by the methods he introduced in philosophy) de parvenir à des connaissances fort utiles à la vie, et qu'au lieu de cette philosophie spéculative qu'on enseigne dans les écoles, on en peut trouver une pratique, par laquelle, connaissant la force et les actions du feu, de l'eau, de l'air, des astres, et de tous les autres corps qui nous environnent, aussi distinctement que nous connaissons les divers métiers de nos artisans, nous les pourrions employer en même façon à tous les usages auxquels ils sont propres, et ainsi nous rendre comme maîtres et possesseurs de la nature" and thus "contribuer au perfectionnement de la vie humaine." [It is possible to attain knowledge very useful in life and, in place of the speculative philosophy taught in the schools, one can find a practical philosophy by which, given that we know the powers and the effectiveness of fire, water, air, the stars, and all the other bodies that surround us, as well and as accurately as we know the various trades of our craftsmen, we shall be able to employ them in the same manner as the latter to all uses to which they are adapted, and thus as it were make ourselves the masters and possessors of nature, and thus contributing to the perfection of human life.] In the preface to Sir Dudley North's "Discourses upon Trade" (1691) it is stated, that Descartes' method had begun to free Political Economy from the old fables and superstitious notions of gold, trade, &c. On the whole, however, the early English economists sided with Bacon and Hobbes as their philosophers; while, at a later period, the philosopher [...] of Political Economy in England, France, and Italy, was Locke.

[28] According to the annual report (1863) of the Essen chamber of commerce, there was produced in 1862, at the cast-steel works of Krupp, with its 161 furnaces, thirty-two steam-engines (in the year 1800 this was about the number of all the steam-engines working in Manchester), and fourteen steam-hammers (representing in all 1,236 horse-power) forty-nine forges, 203 tool-machines, and about 2,400 workmen - thirteen million pounds of cast steel. Here there are not two workmen to each horse-power.

[29] Babbage estimates that in Java the spinning labour alone adds 117% to the value of the cotton. At the same period (1832) the total value added to the cotton by machinery and labour in the fine-spinning industry, amounted to about 33% of the value of the cotton. ("On the Economy of Machinery," pp. 165, 166.)

[30] Machine printing also economises colour.

[31] See Paper read by Dr. Watson, Reporter on Products to the Government of India, before the Society of Arts, 17th April, 1860.

[32] "These mute agents (machines) are always the produce of much less labour than that which they displace, even when they are of the same money-value." (Ricardo, l.c., p. 40.)

[33] Hence in a communistic society there would be a very different scope for the employment of machinery than there can be in a bourgeois society.

[34] "Employers of labour would not unnecessarily retain two sets of children under thirteen.... In fact one class of manufacturers, the spinners of woollen yarn, now rarely employ children under thirteen years of age, i.e., half-timers. They have introduced improved and new machinery of various kinds, which altogether supersedes the employment of children (i.e., under 13 years); f. i., I will mention one process as an illustration of this diminution in the number of children, wherein by the addition of an apparatus, called a piecing machine, to existing machines, the work of six or four half-timers, according to the peculiarity of each machine, can be performed by one young person (over 13 years)...

the half-time system ‘stimulated’ the invention of the piecing machine.” (Reports of Insp. of Fact. for 31st Oct., 1858.)

[35] “Wretch” is the recognised term in English Political Economy for the agricultural labourer.

[36] “Machinery ... can frequently not be employed until labour (he means wages) rises.” (Ricardo, l.c., p. 479.)

[37] See “Report of the Social Science Congress, at Edinburgh.” Oct., 1863.

[38] Dr. Edward Smith, during the cotton crisis caused by the American Civil War, was sent by the English Government to Lancashire, Cheshire, and other places, to report on the sanitary condition of the cotton operatives. He reported, that from a hygienic point of view, and apart from the banishment of the operatives from the factory atmosphere, the crisis had several advantages. The women now had sufficient leisure to give their infants the breast, instead of poisoning them with “Godfrey’s cordial.” They had time to learn to cook. Unfortunately the acquisition of this art occurred at a time when they had nothing to cook. But from this we see how capital, for the purposes of its self-expansion, has usurped the labour necessary in the home of the family. This crisis was also utilised to teach sewing to the daughters of the workmen in sewing schools. An American revolution and a universal crisis, in order that the working girls, who spin for the whole world, might learn to sew!

[39] “The numerical increase of labourers has been great, through the growing substitution of female for male, and above all, of childish for adult labour. Three girls of 13, at wages of from 6 shillings to 8 shillings a week, have replaced the one man of mature age, of wages varying from 18 shillings to 45 shillings.” (Th. de Quincey: “The Logic of Political Econ.,” London, 1844. Note to p. 147.) Since certain family functions, such as nursing and suckling children, cannot be entirely suppressed, the mothers confiscated by capital, must try substitutes of some sort. Domestic work, such as sewing and mending, must be replaced by the purchase of ready-made articles. Hence, the diminished expenditure of labour in the house is accompanied by an increased expenditure of money. The cost of keeping the family increases, and balances the greater income. In addition to this, economy and judgment in the consumption and preparation of the means of subsistence becomes impossible. Abundant material relating to these facts, which are concealed by official Political Economy, is to be found in the Reports of the Inspectors of Factories, of the Children’s Employment Commission, and more especially in the Reports on Public Health.

[40] In striking contrast with the great fact, that the shortening of the hours of labour of women and children in English factories was exacted from capital by the male operatives, we find in the latest reports of the Children’s Employment Commission traits of the operative parents in relation to the traffic in children, that are truly revolting and thoroughly like slave-dealing. But the Pharisee of a capitalist, as may be seen from the same reports, denounces this brutality which he himself creates, perpetuates, and exploits, and which he moreover baptises “freedom of labour.” “Infant labour has been called into aid ... even to work for their own daily bread. Without strength to endure such disproportionate toil, without instruction to guide their future life, they have been thrown into a situation physically and morally polluted. The Jewish historian has remarked upon the overthrow of Jerusalem by Titus that it was no wonder it should have been destroyed, with such a signal destruction, when an inhuman mother sacrificed her own offspring to satisfy the cravings of absolute hunger.” (“Public Economy Concentrated.” Carlisle, 1833, p. 66.)

[41] A. Redgrave in “Reports of lnsp. of Fact. for 31st October, 1858,” pp. 40, 41.

[42] “Children’s Employment Commission, Fifth Report,” London, 1866, p. 81, n. 31. *[Added in the 4th German edition. — The Bethnal Green silk industry is now almost destroyed. — F. E.*]

[43] “Children’s Employment Commission, Third Report,” London, 1864, p. 53, n. 15.

[44] l.c., Fifth Report, p. 22, n. 137.

[45] "Sixth Report on Public Health," Lond., 1864, p. 34.

[46] "It (the inquiry of 1861)... showed, moreover, that while, with the described circumstances, infants perish under the neglect and mismanagement which their mothers' occupations imply, the mothers become to a grievous extent denaturalised towards their offspring - commonly not troubling themselves much at the death, and even sometimes... taking direct measures to insure it." (l.c.)

[47] l.c., p. 454.

[48] l.c., pp. 454-463. "Report by Dr. Henry Julian Hunter on the excessive mortality of infants in some rural districts of England."

[49] l.c., p. 35 and pp. 455, 456.

[50] l.c., p. 456.

[51] In the agricultural as well as in the factory districts the consumption of opium among the grown-up labourers, both male and female, is extending daily. "To push the sale of opiate... is the great aim of some enterprising wholesale merchants. By druggists it is considered the leading article." (l.c., p. 459.) Infants that take opiates "shrank up into little old men," or "wizened like little monkeys." (l.c., p. 460.) We here see how India and China avenged themselves on England.

[52] l.c., p. 37.

[53] "Rep. of Insp. of Fact. for 31st Oct., 1862," p. 59. Mr. Baker was formerly a doctor.

[54] L. Horner in "Reports of Insp. of Fact. for 30th June, 1857," p. 17.

[55] L. Horner in "Rep. of lnsp. of Fact. for 31st Oct., 1855," pp. 18, 19.

[56] Sir John Kincaid in "Rep. of Insp. of Fact. for 31st Oct., 1858," pp. 31, 32.

[57] L. Horner in "Reports, &c., for 31st Oct., 1857," pp. 17, 18.

[58] Sir J. Kincaid in "Reports, &c., 31st Oct., 1856," p. 66

[59] A. Redgrave in "Rep. of Insp. of Fact., 31st. Oct., 1857," pp. 41-42. In those industries where the Factory Act proper (not the Print Works Act referred to in the text) has been in force for some time, the obstacles in the way of the education clauses have, in recent years, been overcome. In industries not under the Act, the views of Mr. J. Geddes, a glass manufacturer, still extensively prevail. He informed Mr. White, one of the Inquiry Commissioners: "As far as I can see, the greater amount of education which a part of the working-class has enjoyed for some years past is an evil. It is dangerous, because it makes them independent." ("Children's Empl. Comm., Fourth Report," Lond., 1865, p. 253.)

[60] "Mr. E., a manufacturer ... informed me that he employed females exclusively at his power-looms ... gives a decided preference to married females, especially those who have families at home dependent on them for support; they are attentive, docile, more so than unmarried females, and are compelled to use their utmost exertions to procure the necessaries of life. Thus are the virtues, the peculiar virtues of the female character to be perverted to her injury – thus all that is most dutiful and tender in her nature is made a means of her bondage and suffering." (Ten Hours' Factory Bill. The Speech of Lord Ashley, March 15th, Lond., 1844, p. 20.)

[61] "Since the general introduction of machinery, human nature has been forced far beyond its average strength." (Rob. Owen: "Observations on the Effects of the Manufacturing System," 2nd Ed., London, 1817.)

[62] The English, who have a tendency to look upon the earliest form of appearance of a thing as the cause of its existence, are in the habit of attributing the long hours of work in factories to the extensive kidnapping of children, practised by capitalists in the infancy of the factory system, on workhouses and orphanages, by means of which robbery, unresisting material for exploitation was procured. Thus, for instance, Ficiden, himself a manufacturer, says: "It is evident that the long hours of work were

brought about by the circumstance of so great a number of destitute children being supplied from different parts of the country, that the masters were independent of the hands, and that having once established the custom by means of the miserable materials they had procured in this way, they could impose it on their neighbours with the greater facility." (J. Ficiden: "The Curse of the Factory System," Lond., 1836, p. I 1.) With reference to the labour of women, Saunders, the factory inspector, says in his report of 1844: "Amongst the female operatives there are some women who, for many weeks in succession, except for a few days, are employed from 6 a. m. till midnight, with less than 2 hours for meals, so that on 5 days of the week they have only 6 hours left out of the 24, for going to and from their homes and resting in bed."

[63] "Occasion... injury to the delicate moving parts of metallic mechanism by inaction." (Ure, l.c., p. 281.)

[64] The Manchester Spinner (*Times*, 26th Nov., 1862) before referred to says in relation to this subject: "It (namely, the "allowance for deterioration of machinery") is also intended to cover the loss which is constantly arising from the superseding of machines before they are worn out, by others of a new and better construction."

[65] "It has been estimated, roughly, that the first individual of a newly-invented machine will cost about five times as much as the construction of the second." (Babbage, l.c., p. 349.)

[66] "The improvements which took place not long ago in frames for making patent net were so great that a machine in good repair which had cost £1,200, sold a few years after for £60 ... improvements succeeded each other so rapidly, that machines which had never been finished were abandoned in the hands of their makers, because new improvements had superseded their utility." (Babbage, l.c., p. 233.) In these stormy, go-ahead times, therefore, the tulle manufacturers soon extended the working day, by means of double sets of hands, from the original 8 hours to 24.

[67] "It is self-evident, that, amid the ebbings and flowings of the markets and the alternate expansions and contractions of demand, occasions will constantly recur, in which the manufacturer may employ additional floating capital without employing additional fixed capital... if additional quantities of raw material can be worked up without incurring an additional expense for buildings and machinery." (R. Torrens: "On Wages and Combination." London, 1834, p. 64.)

[68] This circumstance is mentioned only for the sake of completeness, for I shall not consider the rate of profit, i.e., the ratio of the surplus-value to the total capital advanced, until I come to the third book.

[69] Senior, "Letters on the Factory Act." London, 1837, pp. 13, 14.

[70] "The great proportion of fixed to circulating capital ... makes long hours of work desirable." With the increased use of machinery, &c., "the motives to long hours of work will become greater, as the only means by which a large proportion of fixed capital can be made profitable." (l.c., pp. 11-13.) "There are certain expenses upon a mill which go on in the same proportion whether the mill be running short or full time, as, for instance, rent rates, and taxes, insurance against fire, wages of several permanent servants, deterioration of machinery, with various other charges upon a manufacturing establishment, the proportion of which to profits increases as the production decreases." ("Rep. of Insp. of Fact. for 31st Oct., 1862," p. 19.)

[71] Why it is, that the capitalist, and also the political economists who are imbued with his views, are unconscious of this immanent contradiction, will appear from the first part of the third book.

[72] It is one of the greatest merits of Ricardo to have seen in machinery not only the means of producing commodities, but of creating a "redundant population."

[73] F. Biese. "Die Philosophie des Aristoteles," Vol. 2. Berlin, 1842, p. 408.

[74] I give below the translation of this poem by Stolberg, because it brings into relief, quite in the spirit of former quotations referring to division of labour, the antithesis between the views of the ancients

and the moderns. “Spare the hand that grinds the corn, Oh, miller girls, and softly sleep. Let Chanticleer announce the morn in vain! Deo has commanded the work of the girls to be done by the Nymphs, and now they skip lightly over the wheels, so that the shaken axles revolve with their spokes and pull round the load of the revolving stones. Let us live the life of our fathers, and let us rest from work and enjoy the gifts that the Goddess sends us.”

“Schonet der mahlenden Hand, o Müllerinnen, und schlafet
Sanft! es verkünde der Hahn euch den Morgen umsonst!
Däo hat die Arbeit der Midchen den Nymphen befohlen,
Und itzt hüpfen sic leicht über die Räder dahin,
Daß die erschütterten Achsen mit ihren Speichen sich wälzen,
Und im Kreise die Last drehen des wälzenden Steins.
Laßt uns leben das Leben der Väter, und laBt uns der Gaben
Arbeitslos uns freun, welche die Göttin uns schenkt.”

(Gedichte aus dem Griechischen übersetzt von Christian Graf zu Stolberg, Hamburg, 1782.)

[75] There are, of course, always differences, in the intensities of the labour in various industries. But these differences are, as Adam Smith has shown, compensated to a partial extent by minor circumstances, peculiar to each sort of labour. Labour-time, as a measure of value, is not, however, affected in this case, except in so far as the duration of labour, and the degree of its intensity, are two antithetical and mutually exclusive expressions for one and the same quantity of labour.

[76] Especially by piece-work, a form we shall investigate in Part VI. of this book.

[77] See “Rep. of lnsp. of Fact. for 31st October, 1865.”

[78] Rep. of Insp. of Fact. for 1844 and the quarter ending 30th April, 1845, pp. 20-21.

[79] l.c., p. 19. Since the wages for piece-work were unaltered, the weekly wages depended on the quantity produced.

[80] l.c., p. 20.

[81] The moral element played an important part in the above experiments. The workpeople told the factory inspector: “We work with more spirit, we have the reward ever before us of getting away sooner at night, and one active and cheerful spirit pervades the whole mill, from the youngest piecer to the oldest hand, and we can greatly help each other.” (l.c., p. 21.)

[82] John Fielden, l.c., p. 32.

[83] Lord Ashley, l.c., pp. 6-9, passim.

[84] Rep. of Insp. of Fact. for Quarter ending 30th September, 1844, and from 1st October, 1844, to 30th April, 1845, p. 20.

[85] l.c., p. 22.

[86] “Rep. of lnsp. of Fact. for 31st October, 1862,” p. 62.

[87] This was altered in the “Parliamentary Return” of 1862. In it the actual horse-power of the modern steam engines and water wheels appears in place of the nominal. The doubling spindles, too, are no longer included in the spinning spindles (as was the case in the “Returns” of 1839, 1850, and 1856); further, in the case of woollen mills, the number of “gigs” is added, a distinction made between jute and hemp mills on the one hand and flax mills on the other, and finally stocking-weaving is for the first time inserted in the report.

[88] “Rep. of Insp. of Fact. for 31st October, 1856,” pp. 13-14, 20 and 1852, p. 23.

[89] l.c., pp. 14-15.

[90] l.c., p. 20.

[91] “Reports, &c., for 31st October, 1858,” pp. 9-10. Compare “Reports, &c., for 30th April, 1860,” p. 30, sqq.

[92] “Reports of lnsp. of Fact. for 31st Oct., 1862,” pp. 100 and 130.

[93] On 2 modern power-looms a weaver now makes in a week of 60 hours 26 pieces of certain quality, length, and breadth; while on the old power-looms he could make no more than 4 such pieces. The cost of weaving a piece of such cloth had already soon after 1850 fallen from 2s. 9d. to 5 1/8d.

“Thirty years ago (1841) one spinner with three placers was not required to attend to more than one pair of mules with 300-324 spindles. At the present time (1871) he has to mind with the help of 5 piecers 2,200 spindles, and produces not less than seven times as much yarn as in 1841.” (Alex. Redgrave, Factory Inspector – in the *Journal of Arts*, 5th January, 1872.)

[94] “Rep. of Insp. of Fact. for 31st Oct., 1861,” pp. 25, 26.

[95] The agitation for a working day of 8 hours has now (1867) begun in Lancashire among the factory operatives.

[96] The following few figures indicate the increase in the “factories” of the United Kingdom since 1848:

	Quantity Exported. **1848.**	Quantity Exported. **1851.**	Quantity Exported. **1860.**	Quantity Exported. **1865.**
COTTON				
Cotton yarn	lbs. 135,831,162	lbs. 143,966,106	lbs. 197,343,655	lbs. 103,751,455
Sewing thread	—	lbs. 4,392,176	lbs. 6,297,554	lbs. 4,648,611
Cotton cloth	yds. 1,091,373,930	yds. 1,543,161,789	yds. 2,776,218,427	yds. 2,015,237,851
FLAX & HEMP				
Yarn	lbs. 11,722,182	lbs. 18,841,326	lbs. 31,210,612	lbs. 36,777,334
Cloth	yds. 88,901,519	yds. 129,106,753	yds. 143,996,773	yds. 247,012.529
SILK				
Yarn	lbs. 466,825	lbs. 462,513	lbs. 897,402	lbs. 812,589
Cloth	—	yds. 1,181,455	yds. 1,307,293	yds. 2,869,837
WOOL				
Woollen and Worsted yarns	—	lbs. 14,670,880	lbs. 27,533,968	lbs. 31,669,267
Cloth	—	yds. 151,231,153	yds. 190,371,507	yds. 278,837,418

	Value Exported. **1848.** £	Value Exported. **1851.** £	Value Exported. **1860.** £	Value Exported. **1865.** £
COTTON				
Yarn	5,927,831	6,634,026	9,870,875	10,351,049
Cloth	16,753,369	23,454,810	42,141,505	46,903,796
FLAX & HEMP				
Yarn	493,449	951,426	1,801,272	2,505,497
Cloth	2,802,789	4,107,396	4,804,803	9,155,358
SILK				
Yarn	77,789	196,380	826,107	768,064
Cloth	—	1,130,398	1,587,303	1,409,221
WOOL				
Yarn	776,975	1,484,544	3,843,450	5,424,047
Cloth	5,733,828	8,377,183	12,156,998	20,102,259

See the Blue books “Statistical Abstract of the United Kingdom,” Nos. 8 and 13. Lond., 1861 and 1866. In Lancashire the number of mills increased only 4 per cent. between 1839 and 1850; 19 per cent. between 1850 and 1856; and 33 per cent. between 1856 and 1862; while the persons employed in them during each of the above periods of 11 years increased absolutely, but diminished relatively. (See “Rep. of Insp. of Fact., for 31st Oct., 1862,” p. 63.) The cotton trade preponderates in Lancashire. We may form an idea of the stupendous nature of the cotton trade in that district when we consider that, of the gross number of textile factories in the United Kingdom, it absorbs 45.2 per cent., of the spindles 83.3 per cent., of the power-looms 81.4 per cent., of the mechanical horse-power 72.6 per cent., and of the total number of persons employed 58.2 per cent. (l.c., pp. 62-63.)

[97] Ure, l.c., p. 18.

[98] Ure, l.c., P. 3 1. See Karl Marx, l.c., pp. 140-141.

[99] It looks very like intentional misleading by statistics (which misleading it would be possible to prove in detail in other cases too), when the English factory legislation excludes from its operation the

class of labourers last mentioned in the text, while the parliamentary returns expressly include in the category of factory operatives, not only engineers, mechanics, &c., but also managers, salesmen, messengers, warehousemen, packers, &c., in short everybody, except the owner of the factory himself.

[100] Ure grants this. He says, "in case of need," the workmen can be moved at the will of the manager from one machine to another, and he triumphantly exclaims: "Such a change is in flat contradiction with the old routine, that divides the labour, and to one workman assigns the task of fashioning the head of a needle, to another the sharpening of the point." He had much better have asked himself, why this "old routine" is departed from in the automatic factory, only "in case of need. "

[101] When distress is very great, as, for instance, during the American Civil War, the factory operative is now and then set by the Bourgeois to do the roughest of work, such as road-making, &c.. The English "ateliers nationaux" [national workshops] of 1862 and the following years, established for the benefit of the destitute cotton operatives, differ from the French of 1848 in this, that in the latter the workmen had to do unproductive work at the expense of the state, in the former they had to do productive municipal work to the advantage of the bourgeois, and that, too, cheaper than the regular workmen, with whom they were thus thrown into competition. "The physical appearance of the cotton operatives is unquestionably improved. This I attribute ... as to the men, to outdoor labour on public works." ("Rep. of Insp. of Fact., 31st Oct., 1863," p. 59.) The writer here alludes to the Preston factory operatives, who were employed on Preston Moor.

[102] An example: The various mechanical apparatus introduced since the Act of 1844 into woollen mills, for replacing the labour of children. So soon as it shall happen that the children of the manufacturers themselves have to go through a course of schooling as helpers in the mill, this almost unexplored territory of mechanics will soon make remarkable progress. "Of machinery, perhaps self-acting mules are as dangerous as any other kind. Most of the accidents from them happen to little children, from their creeping under the mules to sweep the floor whilst the mules are in motion. Several 'minders' have been fined for this offence, but without much general benefit. If machine makers would only invent a self-sweeper, by whose use the necessity for these little children to creep under the machinery might be prevented, it would be a happy addition to our protective measures." ("Reports of Insp. of Fact. for 31st. Oct., 1866," p. 63.)

[103] So much then for Proudhon's wonderful idea: he "construes" machinery not as a synthesis of instruments of labour, but as a synthesis of detail operations for the benefit of the labourer himself.

[104] F. Engels, l.c., p. 217. Even an ordinary and optimist Free-trader, like Mr. Molinari, goes so far as to say, "Un homme s'use plus vite en surveillant, quinze heures par jour, l'évolution uniforme d'un mécanisme, qu'en exercant, dans le même espace de temps, sa force physique. Ce travail de surveillance qui servirait peut-être d'utile gymnastique à l'intelligence, s'il n'était pas trop prolongé, détruit à la longue, par son excès, et l'intelligence, et le corps même." [A man becomes exhausted more quickly when he watches over the uniform motion of mechanism for fifteen hours a day, than when he applies his physical strength over the same period of time. This labour of surveillance, which might perhaps serve as a useful exercise for the mind, if it did not go on too long, destroys both the mind and the body in the long run, through excessive application] (G. de Molinari: "Études Économiques." Paris, 1846.)

[105] F. Engels, l.c., p. 216.

[106] "The Master Spinners' and Manufacturers' Defence Fund. Report of the Committee." Manchester, 1854, p. 17. We shall see hereafter, that the "master" can sing quite another song, when he is threatened with the loss of his "living" automaton.

[107] Ure, l.c., p. 15. Whoever knows the life history of Arkwright, will never dub this barber-genius "noble." Of all the great inventors of the 18th century, he was incontestably the greatest thiever of other people's inventions and the meanest fellow.

[108] "The slavery in which the bourgeoisie has bound the proletariat, comes nowhere more plainly into daylight than in the factory system. In it all freedom comes to an end both at law and in fact. The workman must be in the factory at half past five. If he come a few minutes late, he is punished; if he come 10 minutes late, he is not allowed to enter until after breakfast, and thus loses a quarter of a day's wage. He must eat, drink and sleep at word of command.... The despotic bell calls him from his bed, calls him from breakfast and dinner. And how does he fare in the mill? There the master is the absolute law-giver. He makes what regulations he pleases; he alters and makes additions to his code at pleasure; and if he insert the veriest nonsense, the courts say to the workman: Since you have entered into this contract voluntarily, you must now carry it out .... These workmen are condemned to live, from their ninth year till their death, under this mental and bodily torture." (F. Engels, l.c., p. 217, sq.) What, "the courts say," I will illustrate by two examples. One occurs at Sheffield at the end of 1866. In that town a workman had engaged himself for 2 years in a steelworks. In consequence of a quarrel with his employer he left the works, and declared that under no circumstances would he work for that master any more. He was prosecuted for breach of contract, and condemned to two months' imprisonment. (If the master break the contract, he can be proceeded against only in a civil action, and risks nothing but money damages.) After the workman has served his two months, the master invites him to return to the works, pursuant to the contract. Workman says: No, he has already been punished for the breach. The master prosecutes again, the court condemns again, although one of the judges, Mr. Shee, publicly denounces this as a legal monstrosity, by which a man can periodically, as long as he lives, be punished over and over again for the same offence or crime. This judgment was given not by the "Great Unpaid," the provincial Dogberries, but by one of the highest courts of justice in London. — [Added *in the 4th German edition. — This* has now been done away with. With few exceptions, e.g., when public gas-works are involved, the worker in England is now put on an equal footing with the employer in case of breach of contract and can be sued only civilly. — F. E.] The second case occurs in Wiltshire at the end of November 1863. About 30 power-loom weavers, in the employment of one Harrup, a cloth manufacturer at Leower's Mill, Westbury Leigh, struck work because master Harrup indulged in the agreeable habit of making deductions from their wages for being late in the morning; 6d. for 2 minutes; 1s. for 3 minutes, and 1s. 6d. for ten minutes. This is at the rate of 9s. per hour, and £4 10s. 0d. per diem; while the wages of the weavers on the average of a year, never exceeded 10s. to 12s. weekly. Harrup also appointed a boy to announce the starting time by a whistle, which he often did before six o'clock in the morning: and if the hands were not all there at the moment the whistle ceased, the doors were closed, and those hands who were outside were fined: and as there was no clock on the premises, the unfortunate hands were at the mercy of the young Harrup-inspired time-keeper. The hands on strike, mothers of families as well as girls, offered to resume work if the timekeeper were replaced by a clock, and a more reasonable scale of fines were introduced. Harrup summoned I9 women and girls before the magistrates for breach of contract. To the utter indignation of all present, they were each mulcted in a fine of 6d. and 2s. 6d. for costs. Harrup was followed from the court by a crowd of people who hissed him. A favourite operation with manufacturers is to punish the workpeople by deductions made from their wages on account of faults in the material worked on. This method gave rise in 1866 to a general strike in the English pottery districts. The reports of the Ch. Empl. Com. (1863-1866), give cases where the worker not only receives no wages, but becomes, by means of his labour, and of the penal regulations, the debtor to boot, of his worthy master. The late cotton crisis also furnished edifying examples of the sagacity shown by the factory autocrats in making deductions from wages. Mr. R. Baker, the Inspector of Factories, says, "I have myself had lately to direct prosecutions against one cotton mill occupier for having in these pinching and painful times deducted 10d. a piece from some of the young workers employed by him, for the surgeon's certificate (for which he himself had only paid 6d.), when only allowed by the law to deduct 3d., and by custom nothing at all .... And I have been informed of another, who, in order to keep without the law, but to attain the same object, charges the poor children

who work for him a shilling each, as a fee for learning them the art and mystery of cotton spinning, so soon as they are declared by the surgeon fit and proper persons for that occupation. There may therefore be undercurrent causes for such extraordinary exhibitions as strikes, not only wherever they arise, but particularly at such times as the present, which without explanation, render them inexplicable to the public understanding." He alludes here to a strike of power-loom weavers at Darwen, June, 1863. ("Reports of Insp. of Fact. for 30 April, 1863," pp. 50-51.) The reports always go beyond their official dates.

[109] The protection afforded by the Factory Acts against dangerous machinery has had a beneficial effect. "But ... there are other sources of accident which did not exist twenty years since; one especially, viz., the increased speed of the machinery. Wheels, rollers, spindles and shuttles are now propelled at increased and increasing rates; fingers must be quicker and defter in their movements to take up the broken thread, for, if placed with hesitation or carelessness, they are sacrificed.... A large number of accidents are caused by the eagerness of the workpeople to get through their work expeditiously. It must be remembered that it is of the highest importance to manufacturers that their machinery should be in motion, i.e., producing yarns and goods. Every minute's stoppage is not only a loss of power, but of production, and the workpeople are urged by the overlookers, who are interested in the quantity of work turned off, to keep the machinery in motion, and it is no less important to those of the operatives who are paid by the weight or piece, that the machines should be kept in motion. Consequently, although it is strictly forbidden in many, nay in most factories, that machinery should be cleaned while in motion, it is nevertheless the constant practice in most, if not in all, that the workpeople do, unreproved, pick out waste, wipe rollers and wheels, &c., while their frames are in motion. Thus from this cause only, 906 accidents have occurred during the six months.... Although a great deal of cleaning is constantly going on day by day, yet Saturday is generally the day set apart for the thorough cleaning of the machinery, and a great deal of this is done while the machinery is in motion." Since cleaning is not paid for, the workpeople seek to get done with it as speedily as possible. Hence "the number of accidents which occur on Fridays, and especially on Saturdays, is much larger than on any other day. On the former day the excess is nearly 12 per cent. over the average number of the four first days of the week, and on the latter day the excess is 25 per cent. over the average of the preceding five days; or, if the number of working-hours on Saturday being taken into account — 7½ hours on Saturday as compared with 10½ on other days — there is an excess of 65 per cent. on Saturdays over the average of the other five days." ("Rep. of Insp. of Fact., 31st Oct., 1866," pp. 9, 15, 16, 17.)

[110] In Part I. of Book III. I shall give an account of a recent campaign by the English manufacturers against the Clauses in the Factory Acts that protect the "hands" against dangerous machinery. For the present, let this one quotation from the official report of Leonard Horner suffice: "I have heard some mill-owners speak with inexcusable levity of some of the accidents; such, for instance, as the loss of a finger being a trifling matter. A working-man's living and prospects depend so much upon his fingers, that any loss of them is a very serious matter to him. When I have heard such inconsiderate remarks made, I have usually put this question: Suppose you were in want of an additional workman, and two were to apply, both equally well qualified in other respects, but one had lost a thumb or a forefinger, which would you engage? There never was a hesitation as to the answer...." The manufacturers have "mistaken prejudices against what they have heard represented as a pseudo-philanthropic legislation." ("Rep. of Insp. of Fact., 31st Oct., 1855.") These manufacturers are clever folk, and not without reason were they enthusiastic for the slave-holders' rebellion.

[111] In those factories that have been longest subject to the Factory Acts, with their compulsory limitation of the hours of labour, and other regulations, many of the older abuses have vanished. The very improvement of the machinery demands to a certain extent "improved construction of the

buildings," and this is an advantage to the workpeople. (See "Rep. of Insp. of Fact. for 31st Oct., 1863," p. 109.)

[112] See amongst others, John Houghton: "Husbandry and Trade Improved." London, 1727. "The Advantages of the East India Trade, 1720." John Bellers, l.c. "The masters and their workmen are, unhappily, in a perpetual war with each other. The invariable object of the former is to get their work done as cheaply as possible; and they do not fail to employ every artifice to this purpose, whilst the latter are equally attentive to every occasion of distressing their masters into a compliance with higher demands." ("An Enquiry into the Causes of the Present High Price of Provisions," pp. 61-62. Author, the Rev. Nathaniel Forster, quite on the side of the workmen.)

[113] In old-fashioned manufactures the revolts of the workpeople against machinery, even to this day, occasionally assume a savage character, as in the case of the Sheffield file cutters in 1865.

[114] Sir James Steuart also understands machinery quite in this sense. "Je considère donc les machines comme des moyens d'augmenter (virtuellement) le nombre des gens industrieux qu'on n'est pas obligé de nourrir.... En quoi l'effet d'une machine diffère-t-il de celui de nouveaux habitants?" (French trans. t. I., l. I., ch. XIX.) More naïve is Petty, who says, it replaces "Polygamy." The above point of view is, at the most, admissible only for some parts of the United States. On the other hand, "machinery can seldom be used with success to abridge the labour of an individual; more time would be lost in its construction than could be saved by its application. It is only really useful when it acts on great masses, when a single machine can assist the work of thousands. It is accordingly in the most populous countries, where there are most idle men, that it is most abundant.... It is not called into use by a scarcity of men, but by the facility with which they can be brought to work in masses." (Piercy Ravenstone: "Thoughts on the Funding System and its Effects." London, 1824, p. 45.)

[115] *[Note in the 4th German edition.* — This applies to Germany too. Where in our country agriculture on a large scale exists, hence particularly in the East, it has become possible only in consequence of the clearing of the estates ("Bauernlegen"), a practice which became widerspread in the 16th century and was particularly so since 1648. — *F. E.*]

[116] "Machinery and labour are in constant competition." Ricardo, l.c., p. 479.

[117] The competition between hand-weaving and power-weaving in England, before the passing of the Poor Law of 1833, was prolonged by supplementing the wages, which had fallen considerably below the minimum, with parish relief. "The Rev. Mr. Turner was, in 1827, rector of Wilmslow in Cheshire, a manufacturing district. The questions of the Committee of Emigration, and Mr. Turner's answers, show how the competition of human labour is maintained against machinery. 'Question: Has not the use of the power-loom superseded the use of the hand-loom? Answer: Undoubtedly; it would have superseded them much more than it has done, if the hand-loom weavers were not enabled to submit to a reduction of wages.' 'Question: But in submitting he has accepted wages which are insufficient to support him, and looks to parochial contribution as the remainder of his support? Answer: Yes, and in fact the competition between the hand-loom and the power-loom is maintained out of the poor-rates.' Thus degrading pauperism or expatriation, is the benefit which the industrious receive from the introduction of machinery, to be reduced from the respectable and in some degree independent mechanic, to the cringing wretch who lives on the debasing bread of charity. This they call a temporary inconvenience." ("A Prize Essay on the Comparative Merits of Competition and Co-operation." Lond., 1834, p. 29.)

[118] "The same cause which may increase the revenue of the country" (i.e., as Ricardo explains in the same passage, the revenues of landlords and capitalists, whose wealth, from the economic point of view, forms the Wealth of the Nation), "may at the same time render the population redundant and deteriorate the condition of the labourer." (Ricardo, l.c., p. 469.) "The constant aim and the tendency of every improvement in machinery is, in fact, to do away entirely with the labour of man, or to lessen

its price by substituting the labour of women and children for that of grown-up men, or of unskilled for that of skilled workmen." (Ure, l.c., t. I., p. 35.)

[119] "Rep. Insp. Fact. for 31st October, 1858," p. 43.

[120] "Rep. lnsp. Fact. for 31st October, 1856," p. 15.

[121] Ure, l.c., p. 19. "The great advantage of the machinery employed in brick-making consists in this, that the employer is made entirely independent of skilled labourers." ("Ch. Empl. Comm. V. Report," Lond., 1866, p. 130, n. 46.) Mr. A. Sturrock, superintendent of the machine department of the Great Northern Railway, says, with regard to the building of locomotives, &c.: "Expensive English workmen are being less used every day. The production of the workshops of England is being increased by the use of improved tools and these tools are again served by a low class of labour.... Formerly their skilled labour necessarily produced all the parts of engines. Now the parts of engines are produced by labour with less skill, but with good tools. By tools, I mean engineer's machinery, lathes, planing machines, drills, and so on." ("Royal Com. on Railways," Lond., 1867, Minutes of Evidence, n. 17, 862 and 17, 863.)

[122] Ure, l.c., p. 20.

[123] Ure, l.c., p. 321.

[124] Ure, l.c., p. 23.

[125] "Rep. Insp. Fact., 31st Oct., 1863," pp. 108,109.

[126] l.c., p. 109. The rapid improvement of machinery, during the crisis, allowed the English manufacturers, immediately after the termination of the American Civil War, and almost in no time, to glut the markets of the world again. Cloth, during the last six months of 1866, was almost unsaleable. Thereupon began the consignment of goods to India and China, thus naturally making the glut more intense. At the beginning of 1867 the manufacturers resorted to their usual way out of the difficulty, viz., reducing wages 5 per cent. The workpeople resisted, and said that the only remedy was to work short time, 4 days a-week; and their theory was the correct one. After holding out for some time, the self-elected captains of industry had to make up their minds to short time, with reduced wages in some places, and in others without.

[127] "The relation of master and man in the blown-flint bottle trades amounts to a chronic strike." Hence the impetus given to the manufacture of pressed glass, in which the chief operations are done by machinery. One firm in Newcastle, who formerly produced 350,000 lbs. of blown-flint glass, now produces in its place 3,000,500 lbs. of pressed glass. ("Ch. Empl. Comm., Fourth Rep.," 1865, pp. 262-263.)

[128] Gaskell. "The Manufacturing Population of England," London, 1833, pp. 3, 4.

[129] W. Fairbairn discovered several very important applications of machinery to the construction of machines, in consequence of strikes in his own workshops.

[130] Ure, l.c., pp. 368-370

[131] Ure, l.c., pp. 368, 7, 370, 280, 281, 321, 370, 475.

[132] Ricardo originally was also of this opinion, but afterwards expressly disclaimed it with the scientific impartiality and love of truth characteristic of him. See l.c., ch. xxxi. "On Machinery."

[133] *Nota bene*. My illustration is entirely on the lines of those given by the above named economists.

[134] A disciple of Ricardo, in answer to the insipidities of J. B. Say, remarks on this point: "Where division of labour is well developed, the skill of the labourer is available only in that particular branch in which it has been acquired; he himself is a sort of machine. It does not therefore help matters one jot, to repeat in parrot fashion, that things have a tendency to find their level. On looking around us we cannot but see, that they are unable to find their level for a long time; and that when they do find it,

the level is always lower than at the commencement of the process." ("An Inquiry into those Principles Respecting the Nature of Demand," &c., Lond. 1821, p. 72.)

[135] MacCulloch, amongst others, is a past master in this pretentious cretinism. "If," he says, with the affected naïveté of a child of 8 years, "if it be advantageous, to develop the skill of the workman more and more, so that he is capable of producing, with the same or with a less quantity of labour, a constantly increasing quantity of commodities, it must also be advantageous, that he should avail himself of the help of such machinery as will assist him most effectively in the attainment of this result." (MacCulloch: "Princ. of Pol. Econ.," Lond. 1830, p. 166.)

[136] "The inventor of the spinning machine has ruined India, a fact, however, that touches us but little." A. Thiers: De la propriété. — M. Thiers here confounds the spinning machine with the power-loom, "a fact, however, that touches us but little."

[137] According to the census of 1861 (Vol. II., Lond., 1863), the number of people employed in coal mines in England and Wales, amounted to 246,613 of which 73,545 were under, and 173,067 were over 20 years. Of those under 20, 835 were between 5 and 10 years, 30,701 between 10 and 15 years, 42,010 between 15 and 19 years. The number employed in iron, copper, lead, tin, and other mines of every description, was 319, 222.

[138] In England and Wales, in 1861, there were employed in making machinery, 60,807 persons, including the masters and their clerks, &c., also all agents and business people connected with this industry, but excluding the makers of small machines, such as sewing-machines, &c., as also the makers of the operative parts of machines, such as spindles. The total number of civil engineers amounted to 3,329.

[139] Since iron is one of the most important raw materials; let me here state that, in 1861, there were in England and Wales 125,771 operative iron founders, of whom 123,430 were males, 2,341 females. Of the former 30,810 were under, and 92,620 over 20 years.

[140] "A family of four grown-up persons, with two children as winders, earned at the end of the last, and the beginning of the present century, by ten hours' daily labour, £4 a week. If the work was very pressing, they could earn more.... Before that, they had always suffered from a deficient supply of yarn." (Gaskell, l.c., pp. 25-27.)

[141] F. Engels, in "Lage, &c.," points out the miserable condition of a large number of those who work on these very articles of luxury. See also numerous instances in the "Reports of the Children's Employment Commission."

[142] In 1861, in England and Wales, there were 94,665 sailors in the merchant service.

[143] Of these only 177,596 are males above 13 years of age.

[144] Of these, 30,501 are females.

[145] Of these, 137,447 males. None are included in the 1,208,648 who do not serve in private houses. Between 1861 and 1870 the number of male servants nearly doubled itself. It increased to 267,671. In the year 1847 there were 2,694 gamekeepers (for the landlords' preserves), in 1869 there were 4,921. The young servant girls in the houses of the London lower middle class are in common parlance called "slaveys."

[146] Ganilh, on the contrary, considers the final result of the factory system to be an absolutely less number of operatives, at whose expense an increased number of "gens honnêtes" live and develop their well-known "perfectibilité perfectible." Little as he understands the movement of production, at least he feels, that machinery must needs be a very fatal institution, if its introduction converts busy workmen into paupers, and its development calls more slaves of labour into existence than it has suppressed. It is not possible to bring out the cretinism of his standpoint, except by his own words: "Les classes condamnées à produire et à consommer diminuent, et les classes qui dirigent le travail,

qui soulagent, consolent, et éclairent toute la population, se multiplient ... et s'approprient tous les bienfaits qui résultent de la diminution des frais du travail, de l'abondance des productions, et du bon marché des consommations. Dans cette direction, l'espéce humaine s'élève aux plus hautes conceptions du génie, pénètre dans les profoundeurs mystérieuses de la religion, établit les principes salutaires de la morale (which consists in 's'approprier tous les beinfaits,' &c.), les lois tutélaires de la liberté (liberty of 'les classes condamnées à produire?') et du pouvoir, de l'obéissance et de la justice, du devoir et de la l'humanité." [The classes condemned to produce and to consume diminish, and the classes which direct labour, which relieve, console and enlighten the whole population, multiply ... and appropriate all the benefits which result from the diminution of the costs of labour, from the abundance of products and the cheapness of consumer goods. In this way, the human species rises to the highest creations of genius, penetrates the mysterious depths of religion, and establishes the salutory principles of morality, the laws for the protection of liberty, and power, of obedience and justice, of obligation and humanity] For this twaddle, see "Des Systèmes d'Economie Politique, &c., Par M. Ch. Ganilh," 2ème ed., Paris, 1821, t. I, p. 224, and see p. 212.

[147] "Reports of Insp. of Fact., 31 Oct., 1865," p. 58, sq. At the same time, however, means of employment for an increased number of hands was ready in 110 new mills with 11,625 looms, 628,576 spindles and 2,695 total horse-power of steam and water (l.c.).

[148] "Reports, &c., for 31 Oct., 1862," p. 79. At the end of 1871, Mr. A. Redgrave, the factory inspector, in a lecture given at Bradford, in the New Mechanics' Institution, said: "What has struck me for some time past is the altered appearance of the woollen factories. Formerly they were filled with women and children, now machinery seems to do all the work. At my asking for an explanation of this from a manufacturer, he gave me the following: 'Under the old system I employed 63 persons; after the introduction of improved machinery I reduced my hands to 33, and lately, in consequence of new and extensive alterations, I have been in a position to reduce those 33 to 13'."

[149] See "Reports, &c., 31 Oct., 1856," p. 16.

[150] "The sufferings of the hand-loom weavers were the subject of an inquiry by a Royal Commission, but although their distress was acknowledged and lamented, the amelioration of their condition was left, and probably necessarily so, to the chances and changes of time, which it may now be hoped" [20 years later!] "have nearly obliterated those miseries, and not improbably by the present great extention of the power-loom." ("Rep. Insp. of Fact., 31 Oct., 1856," p. 15.)

[151] Other ways in which machinery affects the production of raw material will be mentioned in the third book.

[152]

EXPORT OF COTTON FROM INDIA TO GREAT BRITAIN.	
1846. —	34,540,143 lbs.
1860. —	204,141,168 lbs.
1865. —	445,947,600 lbs.
EXPORT OF WOOL FROM INDIA TO GREAT BRITAIN.	
1846. —	4,570,581 lbs.
1860. —	20,214,173 lbs.

1865. —	20,679,111 lbs.

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EXPORT OF WOOL FROM THE CAPE TO GREAT BRITAIN.	
1846. —	2,958,457 lbs.
1860. —	16,574,345 lbs.
1865. —	29,920,623 lbs.
EXPORT OF WOOL FROM AUSTRALIA TO GREAT BRITAIN.	
1846. —	21,789,346 lbs.
1860. —	59,166,616 lbs.
1865. —	109,734,261 lbs.

[154] The economic development of the United States is itself a product of European, more especially of English modern industry. In their present form (1866) the States must still be considered a European colony. [*Added in the 4th German edition. — "Since then they have developed into country whose industry holds second place in the world, without on that account entirely losing their colonial character." — F. E.*]

EXPORT OF COTTON FROM THE UNITED STATES TO GREAT BRITAIN	
1846. —	401,949,393 lbs.
1852. —	765,630,543 lbs.
1859. —	961,707,264 lbs.
1860. —	1,115,890,608 lbs.

EXPORT OF CORN, &c., FROM THE UNITED STATES TO GREAT BRITAIN 1862		
Wheat, cwts	16,202,312	41,033,503
Barley, cwts	3,669,653	6,624,800
Oats, cwts	3,174,801	4,496,994
Rye, cwts	388,749	7,108

Flour, cwts	3,819,440	7,207,113
Buckwheat, cwts	1,054	19,571
Maize, cwts	5,473,161	11,694,818
Bere or Bigg (a sort of Barley), cwts	2,039	7,675
Peas, cwts	811,620	1,024,722
Beans, cwts	1,822,972	2,037,137
Total exports	—	74,083,441

[155] In an appeal made in July, 1866, to the Trade Societies of England, by the shoemakers of Leicester, who had been thrown on the streets by a lock-out, it is stated: “Twenty years ago the Leicester shoe trade was revolutionised by the introduction of riveting in the place of stitching. At that time good wages could be earned. Great competition was shown between the different firms as to which could turn out the neatest article. Shortly afterwards, however a worse kind of competition sprang up, namely, that of underselling one another in the market. The injurious consequences soon manifested themselves in reductions of wages, and so sweepingly quick was the fall in the price of labour, that many firms now pay only one half of the original wages. And yet, though wages sink lower and lower, profits appear, with each alteration in the scale of wages, to increase.” Even bad times are utilised by the manufacturers, for making exceptional profits by excessive lowering of wages, i.e., by a direct robbery of the labourer’s means of subsistence. One example (it has reference to the crisis in the Coventry silk weaving): “From information I have received from manufacturers as well as workmen, there seems to be no doubt that wages have been reduced to a greater extent than either the competition of the foreign producers, or other circumstances have rendered necessary ... the majority of weavers are working at a reduction of 30 to 40 per cent. in their wages. A piece of ribbon for making which the weaver got 6s. or 7s. five years back, now only brings them 3s. 3d. or 3s. 6d.; other work is now priced at 2s. and 2s. 3d. which was formerly priced at 4s. and 4s. 3d. The reduction in wage seems to have been carried to a greater extent than is necessary for increasing demand. Indeed, the reduction in the cost of weaving, in the case of many descriptions of ribbons, has not been accompanied by any corresponding reduction in the selling price of the manufactured article.” (Mr. F. D. Longe’s Report. “Ch. Emp. Com., V. Rep., 1866,” p. 114, 1.)

[156] Conf “Reports of Insp. of Fact., 31st October, 1862,” p. 30.

[157] l.c., p. 19.

[158] “Rep. Insp. of Fact., 31st October, 1863,” pp. 41-45.

[159] l.c., pp. 41-42

[160] l.c., p. 57.

[161] l.c., pp. 50-51.

[162] l.c., pp. 62-63.

[163] “Rep. &c., 30th April, 1864,” p. 27.

[164] From a letter of Mr. Harris, Chief Constable of Bolton, in “Rep. of Insp. of Fact., 31st October, 1865,” pp. 61-62.

[165] In an appeal, dated 1863, of the factory operatives of Lancashire, &c., for the purpose of forming a society for organised emigration, we find the following: "That a large emigration of factory workers is now absolutely essential to raise them from their present prostrate condition, few will deny; but to show that a continuous stream of emigration is at all times demanded, and, without which it is impossible for than to maintain their position in ordinary times, we beg to call attention to the subjoined facts: — In 1814 the official value of cotton goods exported was £17,665,378, whilst the real marketable value was £20,070,824. In 1858 the official value of cotton goods exported, was £182,221,681; but the real or marketable value was only £43,001,322, being a ten-fold quantity sold for little more than double the former price. To produce results so disadvantageous to the country generally, and to the factory workers in particular, several causes have co-operated, which, had circumstances permitted, we should have brought more prominently under your notice; suffice it for the present to say that the most obvious one is the constant redundancy of labour, without which a trade so ruinous in its effects never could have been carried on, and which requires a constantly extending market to save it from annihilation. Our cotton mills may be brought to a stand by the periodical stagnations of trade, which, under present arrangements, are as inevitable as death itself; but the human mind is constantly at work, and although we believe we are under the mark in stating that six millions of persons have left these shores during the last 25 years, yet, from the natural increase of population, and the displacement of labour to cheapen production, a large percentage of the male adults in the most prosperous times find it impossible to obtain work in factories on any conditions whatever." ("Reports of Insp. of Fact., 30th April 1863," pp. 51-52.) We shall, in a later chapter, see how our friends, the manufacturers, endeavoured, during the catastrophe in the cotton trade, to prevent by every means, including State interference, the emigration of the operatives.

[166] "Ch. Empt. Comm. III. Report, 1864," p. 108, n. 447.

[167] In the United States the restoration, in this way, of handicrafts based on machinery is frequent; and therefore, when the inevitable transition to the factory system shall take place, the ensuing concentration will, compared with Europe and even with England, stride on in seven-league boots.

[168] See "Rep. of Insp. of Fact., 31st Oct., 1865," p. 64.

[169] Mr. Gillott erected in Birmingham the first steel-pen factory on a large scale. It produced, so early as 1851, over 180,000,000 of pens yearly, and consumed 120 tons of steel. Birmingham has the monopoly of this industry in the United Kingdom, and at present produces thousands of millions of steel-pens. According to the Census of 1861, the number of persons employed was 1,428, of whom 1,268 females from 5 years of age upwards.

[170] "Ch. Empl. Comm. II. Rep. 1864," p. LXVIII., n. 415.

[171] And now forsooth children are employed at file-cutting in Sheffield.

[172] "Ch. Empl. Comm., V. Rep. 1866," p. 3, n. 24; p. 6, n. 55, 56; p. 7, n. 59, 60.

[173] l.c., pp. 114, 115, n. 6, 7. The commissioner justly remarks that though as a rule machines take the place of men, here literally young persons replace machines.

[174] See the Report on the rag trade, and numerous details in "Public Health, VIII. Rep." Lond. 1866, app., pp. 196, 208.

[175] "Ch. Empl. Comm. V. Rep., 1866," pp. xvi-xviii, n. 86-97, and pp. 130-133, n. 39-71. See also III. Rep., 1864, pp. 48, 56.

[176] "Public Health. Sixth Rep.," Lond. 1864, pp. 29, 31.

[177] l.c., p. 30. Dr. Simon remarks that the mortality among the London tailors and printers between the ages of 25 and 35 is in fact much greater, because the employers in London obtain from the country a great number of young people up to 30 years of age, as "apprentices" and "improvers," who come for the purpose of being perfected in their trade. These figure in the census as Londoners, they swell out

the number of heads on which the London death-rate is calculated, without adding proportionally to the number of deaths in that place. The greater part of them in fact return to the country, and especially in cases of severe illness. (l.c.)

[178] I allude here to hammered nails, as distinguished from nails cut out and made by machinery. See "Child. Empl. Comm., Third Rep.," pp. xi., xix., n. 125-130, p. 52, n. 11, p. 114, n. 487, p. 137, n. 674.

[179] "Ch. Empl. Comm., II. Rep.," p. xxii, n. 166.

[180] "Ch. Empl. Comm., II. Rep., 1864," pp. xix., xx., xxi.

[181] l.c., pp. xxi.. xxii.

[182] l.c., pp. xxix., xxx.

[183] l.c., pp. xi., xii.

[184] "Child. Empl. Comm., I. Rep. 1863," p. 185.

[185] In England millinery and dressmaking are for the most part carried on, on the premises of the employer, partly by workwomen who live there, partly by women who live off the premises.

[186] Mr. White, a commissioner, visited a military clothing manufactory that employed 1,000 to 1,200 persons, almost all females, and a shoe manufactory with 1,300 persons; of these nearly one half were children and young persons.

[187] An instance. The weekly report of deaths by the Registrar-General dated 26th Feb., 1864, contains 5 cases of death from starvation. On the same day *The Times* reports another case. Six victims of starvation in one week!

[188] "Child. Empl. Comm., Second Rep., 1864," p. lxvii., n. 406-9, p. 84, n. 124, p. lxxiii, n. 441, p. 68, n. 6, p. 84, n. 126, p. 78, n. 85, p. 76, n. 69, p. lxxii, n. 483.

[189] "The rental of premises required for workrooms seems the element which ultimately determines the point; and consequently it is in the metropolis, that the old system of giving work out to small employers and families has been longest retained, and earliest returned to." (l.c., p. 83, n. 123.) The concluding statement in this quotation refers exclusively to shoemaking.

[190] In glove-making and other industries where the condition of the work-people is hardly distinguishable from that of paupers, this does not occur.

[191] l.c., p. 83, n. 122.

[192] In the wholesale boot and shoe trade of Leicester alone, there were in 1864, 800 sewing-machines already in use.

[193] l.c., p. 84, n. 124.

[194] Instances: The Army Clothing Depot at Pimlico, London, the Shirt factory of Tillie and Henderson at Londonderry, and the clothes factory of Messrs. Tait at Limerick which employs about 1,200 hands.

[195] "Tendency to Factory System" (l.c., p. lxvii). "The whole employment is at this time in a state of transition, and is undergoing the same Change as that effected in the lace trade, weaving, &c." (l.c., n. 405.) "A complete revolution" (l.c., p. xlvi., n. 318). At the date of the Child. Empl. Comm. of 1840 stocking making was still done by manual labour. Since 1846 various sorts of machines have been introduced, which are now driven by steam. The total number of persons of both sexes and of all ages from 3 years upwards, employed in stocking making in England, was in 1862 about 129,000. Of these only 4,063 were, according to the Parliamentary Return of the 11th February, 1862, working under the Factory Acts.

[196] Thus, e.g., in the earthenware trade, Messrs. Cochrane, of the Britain Pottery, Glasgow, report: "To keep up our quantity we have gone extensively into machines wrought by unskilled labour, and every

day convinces us that we can produce a greater quantity than by the old method." ("Rep. of Insp. of Fact., 31st Oct., 1865," p. 13.) "The effect of the Fact. Acts is to force on the further introduction of machinery" (l.c., pp. 13-14).

[197] Thus, after the extension of the Factory Act to the potteries, great increase of powerjiggers in place of hand-moved jiggers.

[198] "Report of lnsp. of Fact., 31st Oct., 1865," pp. 96 and 127.

[199] The introduction of this and other machinery into match-making caused in one department alone 230 young persons to be replaced by 32 boys and girls of 14 to 17 years of age. This saving in labour was carried still further in 1865, by the employment of steam power.

[200] "Ch. Empl. Comm., 11. Rep., 1864," p. ix., n. 50.

[201] "Rep. of Insp. of Fact., 31st Oct., 1865," p..22.

[202] "But it must be borne in mind that those improvements, though carried out fully in some establishments, are by no means general, and are not capable of being brought into use in many of the old manufactories without an expenditure of capital beyond the means of many of the present occupiers." "I cannot but rejoice," writes Sub-Insp. May, "that notwithstanding the temporary disorganisation which inevitably follows the introduction of such a measure (as the Factory Act Extension Act), and is, indeed, directly indicative of the evils which it was intended to remedy, &c." (Rep. of Insp. of Fact., 31st Oct., 1865.)

[203] With blast furnaces, for instance, "work towards the end of the week being generally much increased in duration in consequence of the habit of the men of idling on Monday and occasionally during a part or the whole of Tuesday also." ("Child. Empl. Comm., III. Rep.," p. vi.) "The little masters generally have very irregular hours. They lose two or three days, and then work all night to make it up.... They always employ their own children, if they have any." (l.c., p. vii.) "The want of regularity in coming to work, encouraged by the possibility and practice of making up for this by working longer hours." (l.c., p. xviii.) "In Birmingham ... an enormous amount of time is lost ... idling part of the time, slaving the rest." (l.c., p. xi.)

[204] "Child. Empl. Comm., IV., Rep.," p. xxxii., "The extension of the railway system is said to have contributed greatly to this custom of giving sudden orders, and the consequent hurry, neglect of meal-times, and late hours of the workpeople." (l.c., p. xxxi.)

[205] "Ch. Empl. Comm, IV. Rep.," pp. xxxv., n. 235, 237.

[206] "Ch. Empl. Comm. IV. Rep.," p. 127, n. 56.

[207] "With respect to the loss of trade by non-completion of shipping orders in time, I remember that this was the pet argument of the factory masters in 1832 and 1833. Nothing that can be advanced now on this subject, could have the force that it had then, before steam had halved all distances and established new regulations for transit. It quite failed at that time of proof when put to the test, and again it will certainly fail should it have to be tried." ("Reports of Insp. of Fact., 31 Oct., 1862," pp. 54, 55.)

[208] "Ch. Empl. Comm. IV. Rep.," p. xviii, n. 118.

[209] John Bellers remarked as far back as 1699: "The uncertainty of fashions does increase necessitous poor. It has two great mischiefs in it. 1st, The journeymen are miserable in winter for want of work, the mercers and master-weavers not daring to lay out their stocks to keep the journeymen employed before the spring comes, and they know what the fashion will then be; 2ndly, In the spring the journeymen are not sufficient, but the master-weavers must draw in many prentices, that they may supply the trade of the kingdom in a quarter or half a year, which robs the plough of hands, drains the

country of labourers, and in a great part stocks the city with beggars, and starves some in winter that are ashamed to beg." ("Essays about the Poor, Manufactures, &c.," p. 9.)

[210] "Ch. Empl. Comm. V. Rep.," p. 171, n. 34.

[211] The evidence of some Bradford export-houses is as follows: "Under these circumstances, it seems clear that no boys need be worked longer than from 8 a.m. to 7 or 7.30 p.m., in making up. It is merely a question of extra hands and extra outlay. If some masters were not so greedy, the boys would not work late; an extra machine costs only £16 or £18; much of such over-time as does occur is to be referred to an insufficiency of appliances, and a want of space." "Ch. Empl, Comm. V. Rep.," p. 171, n. 35, 36, 38.

[212] l.c. A London manufacturer, who in other respects looks upon the compulsory regulation of the hours of labour as a protection for the workpeople against the manufacturers, and for the manufacturers themselves against the wholesale trade, states: "The pressure in our business is caused by the shippers, who want, e.g., to send the goods by sailing vessel so as to reach their destination at a given season, and at the same time want to pocket the difference in freight between a sailing vessel and a steamship, or who select the earlier of two steamships in order to be in the foreign market before their competitors."

[213] "This could be obviated," says a manufacturer, "at the expense of an enlargement of the works under the pressure of a General Act of Parliament." l.c., p. x., n. 38.

[214] l.c., p. xv., n. 72. sqq.

[215] "Rep. Insp. Fact., 31st October, 1865," p. 127.

[216] It has been found out by experiment, that with each respiration of average intensity made by a healthy average individual, about 25 cubic inches of air are consumed, and that about 20 respirations are made in each minute. Hence the air inhaled in 24 hours by each individual is about 720,000 cubic inches, or 416 cubic feet. It is clear, however, that air which has been once breathed, can no longer serve for the same process until it has been purified in the great workshop of Nature. According to the experiments of Valentin and Brunner, it appears that a healthy man gives off about 1,300 cubic inches of carbonic acid per hour; this would give about 8 ounces of solid carbon thrown off from the lungs in 24 hours. "Every man should have at least 800 cubic feet." (Huxley.)

[217] According to the English Factory Act, parents cannot send their children under 14 years of age into Factories under the control of the Act, unless at the same time they allow them to receive elementary education. The manufacturer is responsible for compliance with the Act. "Factory education is compulsory, and it is a condition of labour." ("Rep. Insp. Fact., 31st Oct., 1865," p. 111.)

[218] On the very advantageous results of combining gymnastics (and drilling in the case of boys) with compulsory education for factory children and pauper scholars, see the speech of N. W. Senior at the seventh annual congress of "The National Association for the Promotion of Social Science," in "Report of Proceedings, &c.," Lond. 1863, pp. 63, 64, also the "Rep. Insp. Fact., 31st Oct., 1865," pp. 118, 119, 120, 126, sqq.

[219] "Rep. Insp. Fact., 31st Oct., 1865," p. 118. A silk manufacturer naively states to the Children's Employment Commissioners: "I am quite sure that the true secret of producing efficient workpeople is to be found in uniting education and labour from a period of childhood. Of course the occupation must not be too severe, nor irksome, or unhealthy. But of the advantage of the union I have no doubt. I wish my own children could have some work as well as play to give variety to their schooling." ("Ch. Empl. Comm. V. Rep.," p. 82, n. 36.)

[220] Senior, l.c., p. 66. How modern industry, when it has attained to a certain pitch, is capable, by the revolution it effects in the mode of production and in the social conditions of production, of also revolutionising people's minds, is strikingly shown by a comparison of Senior's speech in 1863, with

his philippic against the Factory Act of 1833; or by a comparison, of the views of the congress above referred to, with the fact that in certain country districts of England poor parents are forbidden, on pain of death by starvation, to educate their children. Thus, e.g., Mr. Snell reports it to be a common occurrence in Somersetshire that, when a poor person claims parish relief, he is compelled to take his children from school. Mr. Wollarton, the clergyman at Feltham, also tells of cases where all relief was denied to certain families "because they were sending their children to school!"

[221] Wherever handicraft-machines, driven by men, compete directly or indirectly with more developed machines driven by mechanical power, a great change takes place with regard to the labourer who drives the machine. At first the steam-engine replaces this labourer, afterwards he must replace the steam-engine. Consequently the tension and the amount of tambour-power expended become monstrous, and especially so in the case of the children who are condemned to this torture. Thus Mr. Longe; one of the commissioners, found in Coventry and the neighbourhood boys of from 10 to 15 years employed in driving the ribbon-looms, not to mention younger children who had to drive smaller machines. "It is extraordinarily fatiguing work. The boy is a mere substitute for steam power." ("Ch. Empl. Comm. V, Rep. 1866;" p. 114, n. 6.) As to the fatal consequences of "this system of slavery," as the official report styles it, see l.c., p. 114 sqq.

[222] l.c., p. 3, n. 24.

[223] l.c., P. 7, n. 60.

[224] "In some parts of the Highlands of Scotland, not many years ago, every peasant, according to the Statistical Account, made his own shoes of leather tanned by himself. Many a shepherd and cottar too, with his wife and children, appeared at Church in clothes which had been touched by no hands but their own, since they were shorn from the sheep and sown in the flaxfield. In the preparation of these. it is added, scarcely a single article had been purchased, except the awl, needle, thimble, and a very few parts of the iron-work employed in the weaving. The dyes, toci, were chiefly extracted by the women from trees, shrubs and herbs." (Dugald Stewart's "Works," Hamilton's Ed., Vol. viii., pp. 327-328.)

[225] In the celebrated "Livre des métiers" of Etienne Boileau, we find it prescribed that a journeyman on being admitted among the masters had to swear "to love his brethren with brotherly love, to support them in their respective trades, not wilfully to betray the secrets of the trade, and besides, in the interests of all, not to recommend his own wares by calling the attention of the buyer to defects in the articles made by others."

[226] "The bourgeoisie cannot exist without continually revolutionising the instruments of production, and thereby the relations of production and all the social relations. Conservation, in an unaltered form, of the old modes of production was on the contrary the first condition of existence for all earlier industrial classes. Constant revolution in production, uninterrupted disturbance of all social conditions, everlasting uncertainty and agitation, distinguish the bourgeois epoch from all earlier ones. All fixed, fast-frozen relations, with their train of ancient and venerable prejudices and opinions, are swept away, all new formed ones become antiquated before they can ossify. All that is solid melts into air, all that is holy is profaned, and man is at last compelled to face with sober senses his real conditions of life, and his relations with his kind." (F. Engels und Karl Marx: "Manifest der Kommunistischen Partei." Lond. 1848, p. 5.)

[227] "You take my life
When you do take the means whereby I live."
Shakespeare.

[228] A French workman, on his return from San-Francisco, writes as follows: "I never could have believed, that I was capable of working at the various occupations I was employed on in California. I was firmly convinced that I was fit for nothing but letter-press printing.... Once in the midst of this

world of adventurers, who change their occupation as often as they do their shirt, egad, I did as the others. As mining did not turn out remunerative enough, I left it for the town, where in succession I became typographer, slater, plumber, &c. In consequence of thus finding out that I am fit to any sort of work, I feel less of a mollusk and more of a man." (A. Corbon, "De l'enseignement professionnel," 2ème ed., p. 50.)

[229] John Bellers, a very phenomenon in the history of Political Economy, saw most clearly at the end of the 17th century, the necessity for abolishing the present system of education and division of labour, which beget hypertrophy and atrophy at the two opposite extremities of society. Amongst other things he says this: "An idle learning being little better than the learning of idleness.... Bodily labour, it's a primitive institution of God.... Labour being as proper for the bodies' health as eating is for its living; for what pains a man saves by ease, he will find in disease.... Labour adds oil to the lamp of life, when thinking inflames it.... A childish silly employ" (a warning this, by presentiment, against the Basedows and their modern imitators) "leaves the children's minds silly," ("Proposals for Raising a Colledge of Industry of all Useful Trades and Husbandry." Lond., 1696, pp. 12, 14, 18.)

[230] This sort of labour goes on mostly in small workshops, as we have seen in the lacemaking and straw-plaiting trades, and as could be shown more in detail from the metal trades of Sheffield, Birmingham, &c.

[231] "Ch. Empl. Comm., V. Rep.," p. xxv., n. 162, and II. Rep., p. xxxviii., n, 285, 289, p. xxv., xxvi., n. 191.

[232] "Factory labour may be as pure and as excellent as domestic labour, and perhaps more so." ("Rep. Insp. of Fact., 31st October, 1865," p. 129.)

[233] "Rep. Insp. of Fact., 31st October, 1865," pp. 27-32.

[234] Numerous instances will be found in "Rep. of Insp. of Fact."

[235] "Ch. Empl. Comm., V. Rep.," p. x., n. 35.

[236] "Ch. Empl. Comm., V. Rep.," p. ix., n. 28.

[237] l.c., p. xxv., n. 165-167. As to the advantages of large scale, compared with small scale, industries, see "Ch. Empl. Comm., III. Rep.," p. 13, n. 144, p. 25, n. 121, p. 26, n. 125, p. 27, n. 140, &c.

[238] The trades proposed to be brought under the Act were the following: Lace-making, stocking-weaving, straw-plaiting, the manufacture of wearing apparel with its numerous sub-divisions, artificial flower-making, shoemaking, hat-making, glove-making, tailoring, all metal works, from blast furnaces down to needleworks, &c., paper-mills, glassworks, tobacco factories, India-rubber works, braid-making (for weaving), hand-carpetmaking, umbrella and parasol making, the manufacture of spindles and spools, letterpress printing, book-binding, manufacture of stationery (including paper bags, cards, coloured paper, &c.), rope-making, manufacture of jet ornaments, brick-making, silk manufacture by hand, Coventry weaving, salt works, tallow chandlers, cement works, sugar refineries, biscuit-making, various industries connected with timber, and other mixed trades.

[239] l.c., p. xxv., n. 169.

[240] Here (from "The Tory Cabinet..... to "Nassau W. Senior") the English text has been altered in conformity with the 4th German edition. — Ed.

[241] The Factory Acts Extension Act was passed on August 12, 1867. It regulates all foundries, smithies, and metal manufactories, including machine shops; furthermore glass-works, paper mills, gutta-percha and India-rubber works, tobacco manufactories, letter-press printing and book-binding works, and, lastly, all workshops in which more than 50 persons are employed. The Hours of Labour Regulation Act, passed on August 17, 1867, regulates the smaller workshops and the so-called domestic industries. I shall revert to these Acts and to the new Mining Act of 1872 in Volume II.

[242] Senior, "Social Science Congress," pp. 55-58.

[243] The "personnel" of this staff consisted of 2 inspectors, 2 assistant inspectors and 41 sub-inspectors. Eight additional sub-inspectors were appointed in 1871. The total cost of administering the Acts in England, Scotland, and Ireland amounted for the year 1871-72 to no more than £25,347, inclusive of the law expenses incurred by prosecutions of offending masters.

[244] Robert Owen, the father of Co-operative Factories and Stores, but who, as before remarked, in no way shared the illusions of his followers with regard to the bearing of these isolated elements of transformation, not only practically made the factory system the sole foundation of his experiments, but also declared that system to be theoretically the starting-point of the social revolution. Herr Vissering, Professor of Political Economy in the University of Leyden, appears to have a suspicion of this when, in his "Handboek van Practische Staatshuishoudkunde, 1860-62," which reproduces all the platitudes of vulgar economy, he strongly supports handicrafts against the factory system.

[*Added in the 4th German edition* — The "hopelessly bewildering tangle of contradictory enactments" (S. 314) (present volume, p. 284) which English legislation called into life by means of the mutually conflicting Factory Acts, the Factory Acts Extension Act and the Workshops' Act, finally became intolerable, and thus all legislative enactments on this subject were codified in the Factory and Workshop Act of 1878. Of course no detailed critique of this English industrial code now in effect can be presented here. The following remarks will have to suffice. The Act comprises:

1) **Textile Mills**. Here everything remains about as it was: children more than 10 years of age may work 5½ hours a day; or 6 hours and Saturday off; young persons and women, 10 hours on 5 days, and at most 6½ on Saturday.

2) **Non-Textile Factories**. Here the regulations are brought closer than before to those of No. 1, but there are still several exceptions which favour the capitalists and which in certain cases may be expanded by special permission of the Home Secretary.

3) **Workshops**, defined approximately as in the former Act; as for the children, young workers and women employed there, the workshops are about on a par with the non-textile factories, but again conditions are easier in details.

4) **Workshops** in which no children or young workers are employed, but only persons of both sexes above the age of 18; this category enjoy still easier conditions.

5) **Domestic Workshops**, where only members of the family are employed, in the family dwelling: still more elastic regulations and simultaneously the restriction that the inspector may, without special permission of the ministry or a court, enter only rooms not used also for dwelling purposes; and lastly unrestricted freedom for straw-plaiting and lace and glove-making by members of the family. With all its defects this Act, together with the Swiss Federal Factory Law of March 23, 1877, is still by far the best piece of legislation in this field. A comparison of it with the said Swiss federal law is of particular interest because it clearly demonstrates the merits and demerits of the two legislative methods — the English, "historical" method, which intervenes when occasion requires, and the continental method, which is built up on the traditions of the French Revolution and generalises more. Unfortunately, due to insufficient inspection personnel, the English code is still largely a dead letter with regard to its application to workshops. — *F. E.*]

[245] "You divide the people into two hostile camps of clownish boors and emasculated dwarfs. Good heavens! a nation divided into agricultural and commercial interests, calling itself sane; nay, styling itself enlightened and civilised, not only in spite of, but in consequence of this monstrous and unnatural division." (David Urquhart, l.c., p. 119.) This passage shows, at one and the same time, the strength and the weakness of that kind of criticism which knows how to judge and condemn the present, but not how to comprehend it.

[246] See Liebig: "Die Chemie in ihrer Anwendung auf Agricultur und Physiologie," 7. Auflage, 1862, and especially the "Einleitung in die Naturgesetze des Feldbaus," in the 1st Volume. To have developed from the point of view of natural science, the negative, i.e., destructive side of modern agriculture, is one of Liebig's immortal merits. His summary, too, of the history of agriculture, although not free from gross errors, contains flashes of light. It is, however, to be regretted that he ventures on such haphazard assertions as the following: "By greater pulverising and more frequent ploughing, the circulation of air in the interior of porous soil is aided, and the surface exposed to the action of the atmosphere is increased and renewed; but it is easily seen that the increased yield of the land cannot be proportional to the labour spent on that land, but increases in a much smaller proportion. This law," adds Liebig, "was first enunciated by John Stuart Mill in his 'Principles of Pol. Econ.,' Vol. 1, p. 17, as follows: 'That the produce of land increases, *caeteris paribus*, in a diminishing ratio to the increase of the labourers employed' (Mill here introduces in an erroneous form the law enunciated by Ricardo's school, for since the 'decrease of the labourers employed,' kept even pace in England with the advance of agriculture, the law discovered in, and applied to, England, could have no application to that country, at all events), 'is the universal law of agricultural industry.' This is very remarkable, since Mill was ignorant of the reason for this law." (Liebig, l.c., Bd. I., p. 143 and Note.) Apart from Liebig's wrong interpretation of the word "labour," by which word he understands something quite different from what Political Economy does, it is, in any case, "very remarkable" that he should make Mr. John Stuart Mill the first propounder of a theory which was first published by James Anderson in A. Smith's days, and was repeated in various works down to the beginning of the 19th century; a theory which Malthus, that master in plagiarism (the whole of his population theory is a shameless plagiarism), appropriated to himself in 1815; which West developed at the same time as, and independently of, Anderson; which in the year 1817 was connected by Ricardo with the general theory of value, then made the round of the world as Ricardo's theory, and in 1820 was vulgarised by James Mill, the father of John Stuart Mill; and which, finally, was reproduced by John Stuart Mill and others, as a dogma already quite commonplace, and known to every schoolboy. It cannot be denied that John Stuart Mill owes his, at all events, "remarkable" authority almost entirely to such *quid-pro-quos*.