of ink requisite varies with the fineness of the strokes and of their distance apart. Owing to this we see in most letter-press poly­chromatic prints a deficiency of transparency, of half-tints, of depth of ground, and of general harmony. Even if it were possible to make chromo - typography as easy as chromo - lithography, there would still be the obstacle of its very much greater cost, owing to the expense of the engraving and of the casts from the key block. In chromo-lithography the designer can repeat the designs for the different stones by a process that costs almost nothing. Also in the process of multiplying the blocks the deviation in the register of the successive colours is practically unavoidable. In lithography the surface to be printed is nearly level ; hence the sheet is not shifted and twisted or stretched in places, as it is in typography, owing to the alternate closeness and absence of contact between the sheets and the raised and depressed surface of the block. Whatever success the letter-press method has attained of late is owing to the invention of electrotyping and process blocks, and to the improve­ment of machinery. For to print these pictures enormous strength and rigidity, and the most perfect arrangements for securing register, are absolutely essential.

*Recent Changes.*

We will now give a cursory glance at the changes that have been effected during the last twenty-five years in the processes and the products of the art of printing. That these have been of a most drastic kind may be gathered from a comparison of the appliances figured and described in the 8th or the previous edi­tions of the *Encyclopædia Britannica* with those referred to above. The hand-press has been almost completely superseded by the machine press. Cylindrical impression has displaced platen impres­sion, and the finest book-work and woodcut work are done on a cylinder press. In book-work, indeed, other significant changes have taken place. Whereas formerly it was deemed essential that the paper should be damped before printing, in order to get a delicate and perfect impression, some of the finest books and periodicals are now printed on dry paper, highly calendered, even the illustrated journals and some of the evening papers being so worked. Then, it was thought necessary for the safety of the type to interpose a thick soft blanket between it and the pressing surface, whether cylinder or platen ; now, it is found equally safe, and far more conducive to a good impression, to make the packing as thin and hard as possible. Then, fine woodcuts were “brought up” by the use of many “overlays” and “underlays” to correct inequalities in the surface of the blocks and emphasize some of the parts ; now, although the art of “making ready’’ has been brought to great perfection, the fewer and thinner the overlays employed the better. And it may not be irrelevant to point out that the printing of wood­cuts has improved in the same degree as the engraving of them.

Perhaps, however, the most remarkable change is that made in newspaper printing. The highest achievement mentioned in the article “Printing” in the 8th edition of this work was the six- cylinder Hoe machine. The makers of that apparatus subsequently contrived machines of eight and ten cylinders. But they have now been wholly superseded by the rotary presses on the Walter principle. The hand feeding-in of single sheets is entirely done away with, and all newspapers of considerable circulation are printed from long reels of paper, uncut, as originally made at the paper-mill. The maxi­mum number of copies which a machine of this class would print with ten feeding attendants and four taking away attendants would be 8000 an hour. For folding the 8000 printed copies five folding machines and at least two attendants would be required to keep pace with the printing machines. Thus nineteen men were required to print and fold 8000 copies per hour with the best machines as late as 1870. With a rotary machine doing the same or a larger quantity of work only two men are required. The cost for print­ing and folding 1000 copies by the Hoe machine was estimated at 1s. 4d., while with the rotary it is only about 2d. Hence the saving of wages to a newspaper issuing 200,000 copies a day on 313 working days would be nearly £3700 in a year. This, in connexion with im­provements in paper, or rather the discovery of cheaper materials, bringing the price of “news ” down to about 2d. per lb—one quarter of its price a very few years ago—accounts for much of the enter­prise of modern journalism. For some time after the abolition of the paper duty there was a loss on the circulation of a large-sized penny journal ; now there is a considerable gain. Lately rotary presses for small jobbing work have been constructed; and before long the rotary principle will probably be rendered available for illustrated periodicals and fine book-work, printed from webs or reels of paper instead of single sheets. Great improvements have also been made in type-founding, and the Roman and Italic founts now used by English printers are equal to those of any country in the world. It is sometimes said that English *éditions de luxe* are not equal to those of the French, and that this is owing to the inferiority of the founders. This is, however, not quite true : some of the best French books are printed from English types or from types cut in the English manner. It is also the fashion to compare modern printed books with those of the Elzevirs and Baskerville. Yet as a matter of fact their best faces have been reproduced with perfect success by modern founders. From a mechanical point of view the impression given by the best machine presses to-day is undoubtedly superior to that of the hand-presses of the 17th and 18th centuries. If modern books suffer in any respect on comparison with those of former times, which are so highly prized by bibliophiles, it is owing to their want of general artistic *ensemble,* and not to any deficiency in mechanical execution. The artistic taste of English printers has, however, been greatly raised during the last few years, and a very interesting movement is going on which must produce important results in the future. In 1880 Mr Andrew W. Tuer of London organized the Printers’ Specimen Exchange, a scheme intended to promote the technical education of the working printer. Each contributor to the exchange furnishes periodically a certain fixed number of typographical specimens, all alike, which are collated into sets, and again distributed to the members, each of whom gets a volume, consisting of one copy of the work of each of his fellow-contributors. By this plan they become acquainted with the progress made by their brethren, and good taste and good work are fostered and mutually encouraged. The eighth quarto volume, issued in 1887, contains nearly 400 fine specimens of typography by as many different hands. It forms also the best criterion of the character of the jobbing work done at the present day, not only in England but abroad, for the scheme is of an international character. The results of the revival in artistic printing during the last decade are especially noticeable in jobbing work. Much of this improvement is due to the superior material with which the printer is furnished, and especially to the great variety of ornamental types which have been introduced. The specimen books of the principal type-founders are splendid volumes, containing several thousand different faces. The best work of German printers is noteworthy for its studied neatness and attractiveness, tasteful and harmonious arrangement of colour and tint, a characteristic and conscientious attention to details of finish, exact register, and beauty of impression. American work excels in originality of design, brilliancy of colour, and perfect finish. English printers are closely following the best points of each of these schools of typography. There is a distinct leaning at present to the German style, but with little slavish imitation. The dis­tinctness of English typography is maintained, while the beautiful German combination borders, produced with such profusion of late, are judiciously utilized, often in conjunction with American type. In the arrangement of colours English printers prefer the quiet harmonious tints of the Germans to the bold striking contrasts of the Americans.

The vast extent of the operations of the printing fraternity at the present day is in remarkable contrast to those of the 15th century, when the making of books was an art like the sculpture of statues or the designing of buildings. Now, printing is a manu­facture in which large capital and the greatest division of labour are essential. The old printers were almost entirely independent of other craftsmen. From the casting of the type to the mixing of the ink they did nearly everything for themselves. Gradually the different departments of the art were constituted separate and re­cognized trades. The type-founder was probably the first to secede from the concern ; then printers delegated to others the making of presses ; afterwards the ink and the rollers found separate and distinct manufacturers ; and there arose a class of persons who, though belonging to other trades, made printing appliances a specialty, such as printers’ smiths, printers’ joiners, and printers’ engineers. Subdivision again has taken place in regard to the operations which chiefly appertain to printing. The same man was formerly able to set up and print off the types, to fold the sheets perhaps, and even to make them up into books. The opera­tive printer has now become either a pressman or a compositor. If he is of the first denomination, he may be classed according as he works at press or machine. If he is a machinist, he may super­intend or be a “ minder, ” or he may be a layer-on or a taker-off of the sheets. If he is a minder, he may understand only book machines or only news machines ; he may know all about platens and little about cylinders ; or of cylinders he may know only one kind. En­tirely novel machines create a new class of artisans. There are men perfectly competent to manage a Walter press who are ignorant how to work two-colour or fine book-work machines. In the compositor’s department division of labour is carried out to a still minuter degree. An old-fashioned printer would set up indifferently a placard, a title-page, or a book. At the present day we have jobbing hands, book hands, and news hands, the word “hand” suggesting the factory-like nature of the business. There are jobbing hands who confine themselves to posters, and know little about general work even in this department. Book hands comprise those who set up the titles and those who set up the body of the work. Of these latter again, while one man composes, another, the “maker-up,” arranges the pages. Even the art of fitting up the furniture or “dressing the chase” is given to the “ quoin - drawer overseer.” News hands include advertisement hands and general hands. Some men work by day, others altogether by night ; some do general