the ſum of the preſſures at A and E is unqueſtionably equal to the ſum of the weights, becauſe the weights are ſupported ſolely at A and E. Let the two weights be hung on at C the middle point ; the preſſure at E is ſtill the same. Therefore, in general, the preſſure excited at the point E, by two equal weights hanging at any points B and D, is the ſame as if they were hung on at the middle point between them : but the preſ­ſure excited at E is a juſt meaſure of the effort or ener­gy of the weights *b* and *d* to urge the lever round the point A. It is, at leaſt, a meaſure of the oppoſite force which muſt b applied at E to ſuſtain or balance this preſſure. A very faſtidious metaphysician may ſtill ſay, that the demonſtration is limited to a point E, whoſe diſtance from A is twice AC, or = AB + AD. But it extends to any other point, on the authority of a po­stulate which cannot be refuſed, viz. that in whatever proportion the preſſure at E is augmented or diminiſhed, the preſſure at this other point muſt augment or diminiſh in the same proportion. This being proved, the general theorem may be demonſtrated in all proportions of diſtance, in the manner of Archimedes, at once the moſt ſimple, perſpicuous, and elegant of all.

We cannot help obſerving, that all this difficulty (and it is a real one to the philoſopher who aims at ren­dering mechanics a demonſtrative ſcience) has ariſen from an improper ſearch after ſimplicity. Had Archi­medes taken a lever as it really exiſts in nature, and conſidered it as *material,* conſiſting of atoms united by coheſion ; and had he traced the intermediate preſſures by whole means the two external weights are put in oppoſition to each other, or rather to the ſupport given to the fulcrum; all difficulty would have vaniſhed. (See what is ſaid on this ſubject in the article *Strength of Timber,* &c. )

The quantity of goods which may be weighed by th is inſtrument depends on the weight of the counterpoiſe, and on the diſtance CD from the fulcrum at which the goods are ſuſpended. A double counter- poiſe hanging at the ſame diviſion will balance or indi­cate a double quantity of goods hanging at D ; and any counterpoise will balance and indicate a double quan­tity of goods, if the diſtance CD be reduced to one- half. Many ſteelyards have two or more points oſ suspenſion D, to which the ſcale may occaſionally be at­tached. Fig. 6. of Plate XCI. Vol. II. repreſents one of theſe. It is evident, that in this caſe the value or indication of the diviſions of the long arm will be diffe­rent, according to the point from which the ſcale is ſuſpended. The ſame diviſion which would indicate 20 pounds when CD is three inches, will indicate 30 pounds when it is two inches. As it would expoſe to chance of miſtakes, and be otherwiſe troubleſome to make this reduction, it is uſual to make as many divi­ded ſcales on the long arm as there are points of ſuſpenſion D on the ſhort arm ; and each ſcale having its own numbers, all trouble and all chance of miſtake is avoided.

But the range of this inſtrument is not altogether at the pleaſure of the maker. Beſides the inability of a slender beam to carry a great load, the diviſions of the ſcale anſwering to pounds or half-pounds become very minute when the diſtance CD is very ſhort ; and the balance becomes leſs delicate, that is, leſs ſenſibly affect­ed by ſmall differences of weight. This is becauſe in ſuch caſes the thickneſs which it is neceſſary to give the edges of the nails does then bear a senſible propor­tion to the diſtance CD between them; ſo that when the balance inclines to one side, that arm is ſenſibly ſhortened, and therefore the energy of the prepondera­ting weight is leſſened.

We have hitherto ſuppoſed the ſteelyard to be in equilibrio when not loaded. But this is not neceſſary, nor is it uſual in thoſe which are commonly made. The long arm commonly preponderates conſiderably. This makes no difference, except in the beginning of the ſcale. The preponderancy of the long arm is equivalent to ſome goods already in the ſcale, ſuppoſe four pounds. Therefore when there are really 10 pounds in the ſcale, the counterpoiſe will balance it when hang­ing at the diviſion 6. This diviſion is therefore rec­koned 10, and the rest of the diviſions are numbered ac­cordingly.

A scientific examination of the ſteelyard will con­vince us that it is inferior to the balance of equal arms in point of ſenſibility : But it is extremely compendi­ous and convenient ; and when accurately made and at­tentively uſed, it is abundantly exact for moſt commer­cial purpoſes. We have ſeen one at Leipzig which has been in use since the year 1718, which is very ſenſible to a difference of one pound, when loaded with nearly three tons on the ſhort arm ; and we ſaw a waggon loaded with more than two tons weighed by it in about six minutes.

The ſteelyard in common uſe in the different coun­tries of Europe is of a conſtruction ſtill ſimpler than what we have deſcribed. It consists of a batten of hard wood, having a heavy lump A (fig. 3.) at one end, and a ſwivel-hook B at the other. The goods to be weighed are ſuſpended on the hook, and the whole is carried in a loop of whip-cord C, in which it is ſlid backward and forward, till the goods are balanced by the weight of the other end. The weight of the goods is eſtimated by the place of the loop on a ſcale of divi­ſions in harmonic progression. They are marked (we preſume) by trial with known weights.

The chief uſe that is now made of the ſteelyard in theſe kingdoms is for the weighing of loaded waggons and carts. For this it is extremely convenient, and more than sufficiently exact for the purpoſe in view. We ſhall deſcribe one or two of the moſt remarkable ; and we ſhall begin with that at Leipzig already men­tioned.

This ſteelyard is repreſented in fig. 4. as run out, and juſt about to be hooked for lifting up the load. The ſteelyard itſelf is OPQ, and is about 12 feet long. The ſhort arm PQ has two points of ſuſpenſion *c* and b; ; and the ſtirrup which carries the chains for holding the load is made with a double hook, inſtead of a doubſe. eye, that it may be eaſily removed from the one pin to the other. For this purpoſe the two hooks are con­nected above by an haſp or ſtaple, which goes over the arm oſ the ſteelyard like an arch. This is repreſented in the little figure above the ſteelyard. The ſuſpenſion is shifted when the ſteelyard is run in under cover, by hooking to this ſtaple the running block of a ſmall tackle which hangs in the door through which the ſteelyard is run out and in. This operation is easy,