PRACTICAL MECHANISM.

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NUMBER XXXVI.

LINING OR MARKING OUT.

We now enter upon an entirely new and distinctive partof the machinist's art, namely, the marking work out by lines upon its surface, indicating to what shape and size it requires to be cut. When a piece of work has to be exactly duplicated in large numbers, as in the case of a sewing machine the labor of marking out may be entirely dispensed with by the employment of special chucks and tools, adjusted to suit the requirements of the case; but in all other cases, especially upon large work, the marking-out must be performed, and should be executed with great exactitude, for a variation of the thickness of a line gives the thickness of two lines to file off, entailing upon large surfaces an enormous loss of time. Suppose, for example, a large pillow block to be marked out the thickness of a line too small, and the brasses to be marked out the thickness of a line too large: when both were cut to the lines, the labor of fitting them together would be unnecessarily increased by one third. Nor is this all the mischief, for the inaccuracy of workmanship that will mark off to the thickness of a line too large will sometimes mark off to the thickness of a line too small; and the consequence is that, after a few such experiences (and consequent spoiling of the work), the machine hands will leave the lines on each side of the work as a witness, thus giving the thickness of four lines to be filed off in fitting. Now it

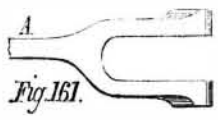

Fig. 161.

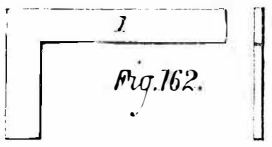

Fig. 162.

is perfectly true that, in most cases, it is practicable and customary to use gages or calipers as well as the lines; but there are numerous instances in which that cannot be done. Nor is it at all times desirable, because the lines, correctly marked, may be sufficiently correct for the purpose, as in the case of cutting down a surface requiring to be finished but not fitted to anything. Take, for another instance, the stem of a double eye, having an offset, as shown in Fig. 161, at A. In this case, the lines being accurately marked, the proper amount of offset and of thickness, at A, may be more easily obtained by working to the lines than by any gaging or measuring.

A marker-out, as the operative is termed, should not only be one capable of great exactitude in his measurements, but should also be an expert workman at the lathe, vise, planing machine, and drilling machine; because it is by his lines that the work is chucked, and hence he should know the very best method of chucking or holding the work in each of the machines. Furthermore, a line over and above those necessary to define the outline of the work is often necessary for use as an assistance and guide in chucking it. Upon the truth of this lining, in many cases, will the truth of the finished work depend, and even in those instances where the method of chucking will correct any inaccuracy in the marking-out, the usefulness of the latter is almost entirely destroyed, because the lines will become entirely removed on one side, and left fully in on the other side of the work. If, however, the marking-out is performed reasonably true, one of its main elements of usefulness consists in that it denotes if there is sufficient excess of metal upon the piece of work to permit of its being cleaned up all over. But if there is any one part of the work scant of metal, as is sometimes the case in forgings of unusual and irregular form, the marking-out requires to be very true, and may be made to just save a piece of work that otherwise would have been spoiled. By accommodating the marking to some spot or place in the work, which will only come up to the full size by throwing the whole of the rest of the lines towards the opposite side of the work, a costly piece of forging may be saved from the scrap heap. And again, in castings where the surface appears spongy, showing the presence of air holes beneath the surface, or in forgings where the surface may indicate that a weld is not perfect upon one side, the whole of the marking-out should be performed with a view to take off as much metal as possible on the faulty side. In other work there may be a part very difficult to turn or plane on account of the conformation of the job; in which case the marker-out, foreseeing such to be the case, will so place the lines as to give as little to come off that particular place as possible, disregarding the excessive heavy cut or amount of metal which it may be necessary to cut off other and more accessible parts of the work. There are many other considerations, which need not be here enumerated, all tending to show that a marker-out should be a master hand at the various branches of his business, and possess much judgment and experience

The tools necessary for marking-out operations are a true flat surface plate, having its edges squared true, which plate is usually of cast iron, and enough larger than the size of the work, both in length and breadth, to admit of the use all round the work, of the scribing block illustrated in Fig. D, in a previous issue (page 133, Vol. XXXI.), supposing the clinee or scriber there shown to be extended horizontally Th ordinary L and T squares, and a flat one of each kind, as shown in Fig. 162, are required. We have next the bevel square, shown in Fig. 163, A representing the stock, and B

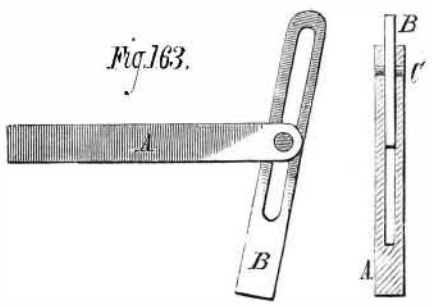

Fig. 163.

the blade, the latter being provided with a slot so that it may be extended to any required distance (within its scope) on either side of the stock. C is the rivet, which is made sufficiently tight to permit of the movement by hand of the blade, and yet it must hold firmly enough to be used without moving in the stock. Instead of the rivet, C, however, a thumbscrew and nut may be employed, in which case, after the blade is set to the required angle, it may be locked in the stock by the thumbscrew. For the angles of nuts and other hexagonal work, we have the hexagon gage shown in Fig. 164. The edges, A B, form a hexagon gage, and edges, C D, form a square, while the edge, E, serves as a straight edge.

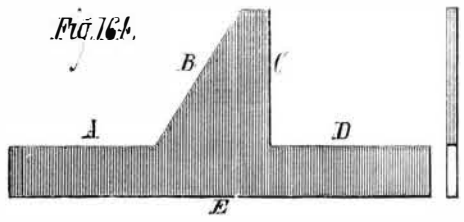

Fig. 164.

All these tools should be made of cast steel, the blades being made of straight saw blade, so that they will not be apt to permanently set from an ordinary accidental blow; while on the other hand, if it becomes, as it does at times, necessary to bend the blade over to the work, it will resume its straightness and not remain bent. To cut saw blade without causing it to split, as it is apt to do, especially in cutting out narrow square blades, it should be cut by gradually centerpunching it on both sides till it is completely perforated, when a flat chisel may be employed to nick between the centerpunch perforations, the whole operation being performed lightly and repeated until the plate is completely severed.

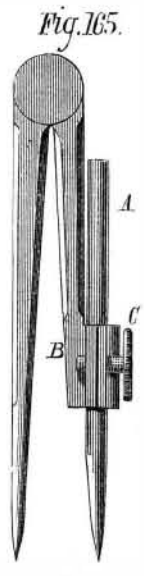

Fig. 165.

We next require a pair of long and a pair of short legged compasses, the latter of which should have an adjustable leg, as shown in Fig. 165. A is the adjustable leg, which passes through the split clamp, B, and is locked therein by tightening the screw, C, the object being to always use that leg as the marking one and the other as the pivot, and to lower it as it wears from grinding, thus keeping the compasses of their original length, and for the further purpose of lengthening out the adjustable leg when one of the faces of the work stands much below the level of the other, as we shall find, in some of our examples, will be the case. For long distances, to which compasses would be inapplicable from their excessive size and weight, trammels, shown in Fig. 166, are employed. A A A represents a bar of square steel; or for very long trammels, wood may be used. B represents a head fastened tightly to one end, and through B passes the leg or pointer, C, which is thus adjustable as to its projecting distance, as B can be fastened in any position by the thumbscrew, D. The head, E, is made to a good

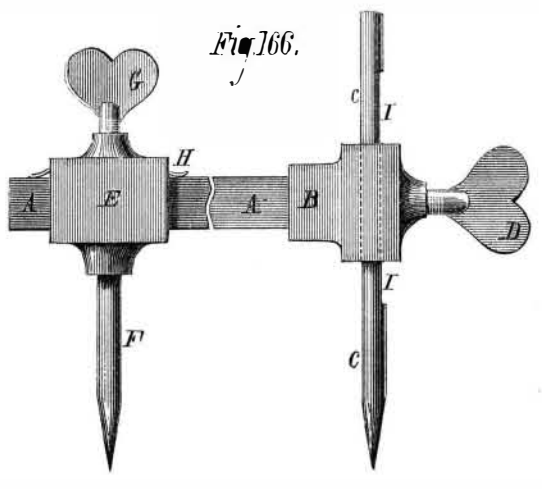

Fig. 166.

sliding fit upon the bottom and two side faces of A A A; but at the top, there is sufficient space to admit the spring, H H, which passes through E, as denoted by the dotted line. F is the leg screwed into E, which is locked in position by the thumbscrew, G. The head, E, is thus adjustable along the whole length of the bar or rod, A A A. The object of the spring, H H, is as follows: If the head, E, were made to fit the bar, A A A, closely on all four sides, the burrs raised upon the top side of the rod, A A A, by the end of the thumbscrew, G, would be likely to impede its easy motion. Then again, when the sliding head, E, had worn a trifle loose upon the bar, A A A, and was loosened for adjustment, it would be liable to hang on one side, and only right itself when the screw, G, brought it to a proper bearing upon the under side of the bar, A A A; and thus tightening the head, F, would alter the adjustment of the point. The spring, H H, however, always keeps the lower face of the square hole through E bearing evenly against the corresponding face of the bar, so that tightening the screw, G, does not affect the adjustment, and furthermore the end of the set screw, bearing against the spring instead of against the top of the rod, prevents the latter from getting burred. The flat face, I I, on the leg, C, is placed there to prevent the thumbscrew, D, from raising burrs, which would prevent C from sliding through B. The points of all compasses or trammels should be tempered to a straw color, as should also the points or ends of the set screws or thumbscrews

FORK SCRIBERS.

For marking small circles, there is no tool equal to a fork scriber, such as shown in Fig. 167, which represents a piece

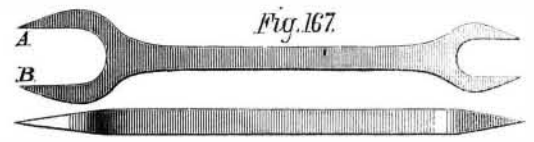

Fig. 167.

of steel wire flattened out at the ends and filed to the points, A B, the distance between them being the radius of the circle they are intended to scribe or mark. These tools may be used to advantage to mark circles ¾ of an inch and less in diameter, the sizes varying by sixteenths of an inch, and the points being hardened to a brown or straw color.

A Pocket Gymnasium.

The profits from patents on small inventions are practically illustrated by the recent introduction of an elastic tube, about 2 feet long (not unlike a small india rubber garden hose), fitted with a plug of wood at either end, and a cord running loosely through the tube, fastened at each end by a knot to the plug, to prevent injury from the flying ends of the tube in case of breakage. The object of this invention is to furnish a portable exercising device, which is inexpensive, and is designed as a substitute for the more complex and costly health lift apparatus. A patent was secured through this office for the invention last June, and we are informed that the demand for the device has become so great that the manufacturer finds it difficult to meet it, thus confirming what we have repeatedly stated, that there is always a ready sale for small patented inventions. The article referred to is advertised in another column; and for persons of sedentary habits, or ladies and children needing physical exercise, we would recommend a trial of the new pocket gymnasium.

Makaroff's Mats.

As a substitute for sails in stopping leaks in ships, Lieutenant Makaroff, a young officer serving in the Russian navy, designed a mat of peculiar construction. The Makaroff mat has for its basis a closely worked structure of rope about ⅝ inch in diameter, made of the finest hemp, while the mat-like surface closely resembles that common to all mats of the kind used for street doors. The texture of the mat is wonderfully close; and as the whole is treated with a waterproof composition, it may be regarded as practically impermeable to water. The hairy side of the mat is that applied to the ship's side, and it is stated—and we see no reason to doubt the statement—that these mats may be dragged over jagged edged holes in iron plates without sustaining any injury.

Pneumatic Pontoons.

Knapp's open-bottom pneumatic jacks or pontoons are attached by chains passing under the wreck, and the chaining is ingeniously effected by means of a small tube passed under the wreck, through which a float and line attached to the cable is drawn. Compressed air is then admitted to the pontoons, which instantly give the lifting power. The advantages of this system consist in easy management and the possibility of being used in exposed situations; and it appears to be extensively patronized.

French Patents.

In 1874 there were taken out in France 5,746 patents: 4,202 for fifteen years, 54 for ten years, 32 for five years, 283 foreign patents, and 1,175 extensions of former patents. The objects for which patents were taken out were in the following order for number: Chemical industry, including foods and drinks, machinery, textile industry, agriculture, domestic appliances. The average number of patents per annum in the ten years before the Franco-Prussian war was 5,800.

Donkey Street Cars.

A little girl, daughter of an American officer now in the service of the Khédive, Egypt, writes home that they use passenger donkeys in the city of Cairo, instead of street cars. The donkeys are not much larger than good sized dogs. If you wish to ride, you straddle a passing donkey; the Arab driver follows and, when you get off, collects your fare, then looks out for another passenger. Advantages: No crowding; plenty of air.

IT is proposed in France, by the telegraphic administration, to encourage the introduction of private wires, and to offer such inducements that no great factory and no rich man's house in the country will be without its wire.

CAVENDISH showed that nitrogen and oxygen in air formed a mixture only, but that the passage of electric sparks produced their chemical combination—nitric acid being the result.