## PRACTICAL MECHANISM.

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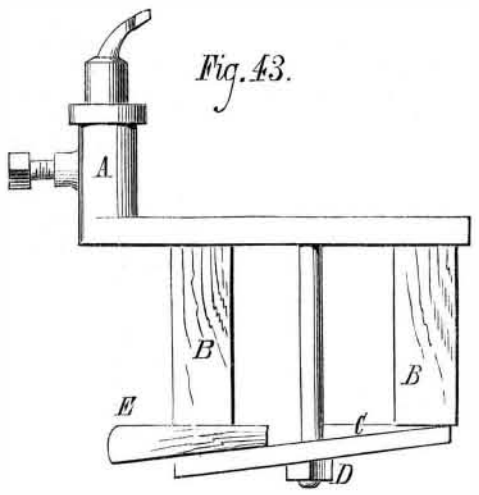
### PATTERN MAKING.

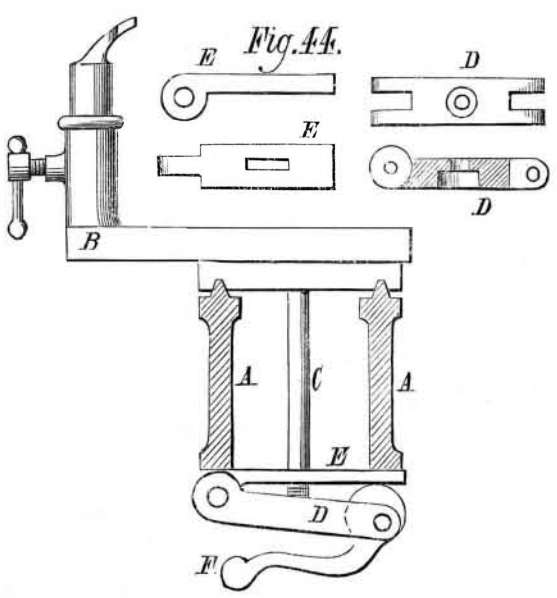
To give the required form to various patterns, recourse must frequently be had to that useful machine, the lathe. The lathe adapted for pattern work is strong and steady in the framework, to avoid the tremor resulting from the high speed at which it is driven. It should be of good and durable workmanship and should also be handy, that is to say, the parts requiring frequent adjustment should be provided with the readiest means for accomplishing that end; and especially is this the case with the hand rest and the manner of holding it to the lathe bed, as it is, in the progress of a piece of work, almost constantly changed in position. Fig. 43 shows the method, still followed by many wood turners, of holding the hand rest; it is a primitive arrangement, but the tightening and loosening of the wedge, E, is found to take less time than screwing up the nut. In Fig. 43, A

Fig. 43.




is the hand rest, B B the lathe shears, C the clamp, and D the nut upon the bolt, E, the head of which slides in a groove running along the foot of the hand rest. It will be observed that the nut, being beneath the lathe shears, is somewhat unhandy to get at, and the wrench may not perhaps at the moment be at hand; while, in any event, screwing up a nut with a wrench is a slow process. In some cases there is substituted, for the nut, a wheel with a tapped hole in its center; but it is still not perfect, because the workman, in slacking it off, gives the wheel a twist; and while his attention is absorbed in the intricacy of his work, the momentum of the rim of the wheel has kept it turning, so that it either unscrews itself altogether and falls off, or runs so far back that it requires handling twice to bring it home when refastening it. A much better method is now in many cases adopted; it is shown in Fig. 44, in which A A represents the lathe shears, B the hand rest, C the fastening bolt, D a piece hinged at each end and having through its center a hole to receive the fastening bolt, and a countersink or recess to receive the nut and prevent it unscrewing. E represents a hinged plate, and F a lever, having a cam at

Fig. 44.




its pivoted end. A slot for the fastening bolt to pass through is provided in the plate, E. In this arrangement, a very moderate amount of force applied to bring up the cam lever will cause the plate, D, to be pressed down, carrying with it the nut. This arrangement is simple, cheap, durable, and very handy, and may be applied on any existing lathe to the hand rest, slide rest, or tail stock. There are other simple and useful contrivances devised for the same purpose; but generally speaking, the lathe requires to be designed to accommodate them, and they are not superior in action to the system above described.

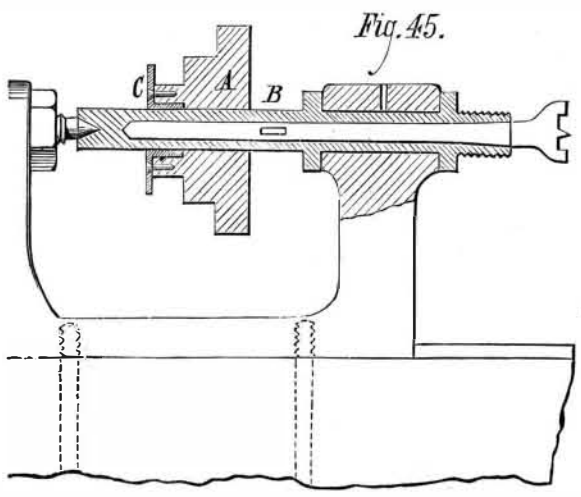
The running head of the lathe requires particular mention. The mandrel should always be of steel, turned true, hardened, and trued by an emery wheel after the hardening process. It should be well fitted to its bearing; for if it is not, an unpleasant jarring noise will be produced when the latter is set in motion.

Hard steel coned bearings are very desirable, and will work perfectly when properly made, lasting practically unimpaired for years. They are, however, expensive to make; and in view of the present active competition in producing cheaply, most mechanics, knowing the difficulty attending the proper fitting of this style of mandrel, feel more or less dubious as to the perfection of such lathes until they have been well tried. Next to a hard steel coned bearing, we should prefer a cylindrical one of hard brass: that is to say, a mixture of five parts copper, one part tin, and one quarter part zinc. The length of the journal should be three times its diameter; the brasses should be made in halves, and adjusted so that the faces of the brasses are butted when the cap screws are tightened home, and the journal is at a neat working fit in the bearings. It will then be a long time before the brasses will require letting together for adjustment. If, however, the joint faces of the brasses are left open, the cap screws are apt to slack back, there being no pressure on them to retain them in their places. It is an advantage to have the mandrel bored nearly through its length, say within one inch of the tail pin or screw, whose coned end forms the bearing for that end of the mandrel. The size of the hole referred to should be as large as is consistent with the strength of the mandrel. This arrangement is shown in Fig. 45. The usefulness of this bore or hole is that, when a number of small pieces require to be turned, a nipping chuck can be screwed on the mandrel, and a long piece of stuff can be pushed up the hole, and the projecting end to be operated upon nipped in the chuck; then, when a piece is finished, all we have to do is to advance our long piece of stuff and proceed again.

The method ordinarily employed is to drive a plug into the mandrel, and form the projecting end to the shape required. By this plan more stuff is lost than is used; and if the plug is not well fitted and driven, it loosens while being operated upon, to say nothing of the trouble of extracting the stub from the mandrel when the work is cut off. Another purpose served by the long bore is that it will form a guide for a boring bar.

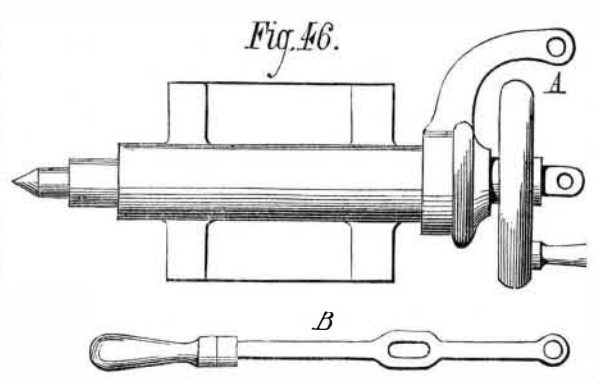
The cone pulleys should be as light as possible for a pow-

Fig. 45.




er lathe. Hard wood is very suitable for them, the manner of fastening to the mandrel being shown in Fig. 45. The cone pulley, A, is bored to fit the mandrel, B, tightly, and secured at the end to receive the light brass bush, C, which is keyed to the mandrel and screwed to the pulley. The reason for making the cone pulley of wood is that, if it were of iron, and consequently heavy, it would, from its weight, require time to get up to its full speed; and from its momentum, it would take some little time to stop in both cases, especially if the work were heavy. The tail stock should, in addition to the hand wheel, be provided with an arm; and a lever, to give rapid motion to the spindle when used for boring purposes, should be added, the arrangement being as illustrated in Fig. 46, in which A represents the arm or or fulcrum, and B the lever, which is applied after the hand wheel is removed. The end of the screw must be cut like a double eye. The long hole or slot in the middle of the line is to allow for the difference in the direction of the motion, since the lever moves from its end as a center, while the tail stock spindle moves in a straight line. The supporting frames of the lathe need not be very heavy, but should be well braced to the shears or bed, and screwed fast

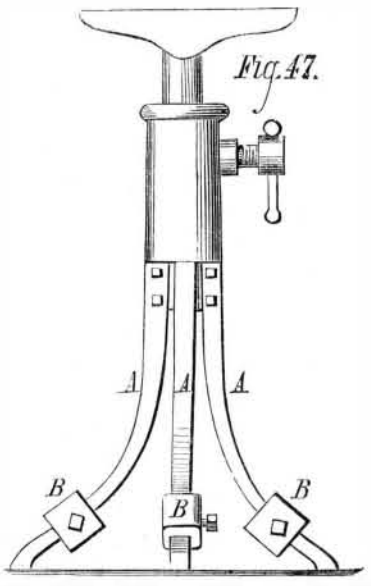
Fig. 46.




to the floor. It is not an uncommon thing, when an unusually large job is being done in the lathe, to brace or shore the lathe by means of braces placed between the lathe shears and the floor, wall, and ceiling. Of this arrangement it is sufficient to say that it is merely a makeshift, and is only resorted to when the floor is springy. In cases where it is necessary to use one lathe for both large and small work, the countershaft overhead should be so placed that the belt will run quarter-cross when the lathe head is placed across the ewo, in which position there will be full swing for large brdk from floor to ceiling.

It remains now to provide, for large work, a means of supporting the hand rest. The handiest is the portable tripod rest shown in Fig. 47. The legs, A A A, are curved so as to get the rest close up to a large chuck. Heavy weights, in the form of a U, as shown at B B B, may be clamped, by means of the set screw, to the legs, to give additional steadiness if required; but if good spread be given to the legs, so that they may form an angle of about 60° to the floor (taken

Fig. 47.




from the point of the foot to where the leg joins the hub), the weights may be dispensed with; and at the same time more space will be occupied, so that it may not be possible at all times, on account of surrounding objects, to get such a broadly spread rest into the position required; hence a narrower spread, in conjunction with the weights, is, under such condition, the most desirable.

We come now to the various chucking contrivances employed by the pattern maker. In Fig. 48, A represents a fork center, the taper part of which fits into the lathe mandrel in place of a center, the extreme end, B, being a flat projection, providing that there is a recess in the mandrel to receive it, as there should be. But if the lathe mandrel is bored up a great distance, then the extra length which may be given to the conical part of the fork will cause adhesion sufficient

Fig. 48.

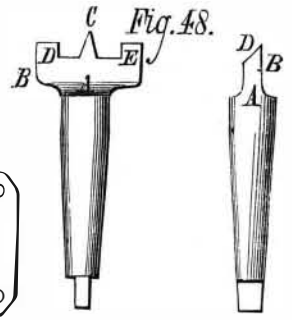
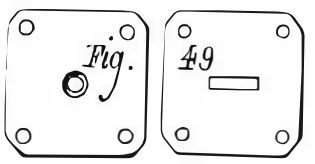
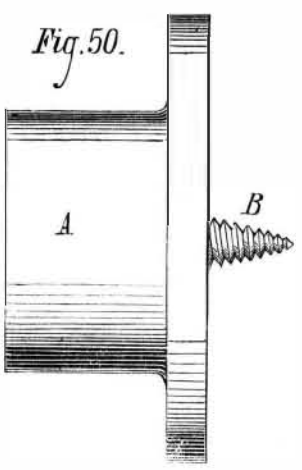



Fig. 49.



to drive the work. The broad part is wedge-shaped on the edge view, the center point, C, being turned conical, similar to a common center. The center, C, acts to keep the work true, and as a guide in taking the work in and out of the lathe, while the prongs, D and E, drive it. This tool, however, is only to be depended upon for small work; for larger work, center plates are used. They are made of metal and screwed firmly to the work. Of these centerplates, one has a slot in it, so that it may be used in conjunction with the fork; while another has a conical hole in the center, which hole is made to fit the back center of the lathe. They may be made of hard wood, screwed to a small iron face plate; such plates are made useful for a variety of purposes. A pair of such center plates are shown in Fig. 49, A being that to receive the back center, and B that for the fork center. Another driving chuck for small work is shown in Fig. 50

Fig. 50.




the part, A, having an internal screw to fit the driving screw on the lathe spindle, and the point, B, being a coarse screw intended to screw into the work: which latter should have a small hole bored up it to prevent (especially in the case of hard woods) the pressure of the screw from splitting the work.

THE following imitation shellac varnish is used by many furniture manufacturers: Gum sandarac 1½ lbs.: pale rosin 1½ lbs.; benzine 2 gallons. Dissolve by a gentle heat.