PRACTICAL MECHANISM.

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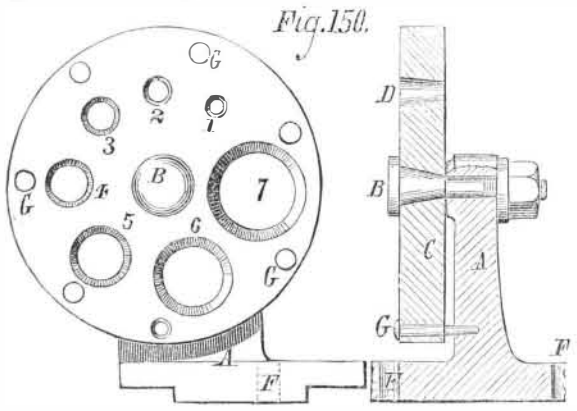
CONE PLATE FOR BORING IN THE LATHE.

For chucking shafts and other similar work in the lathe (to bore holes in the ends of the shafts, etc.), the cone plate shown in Fig. 150 is the best appliance known to ma-

Fig. 150.



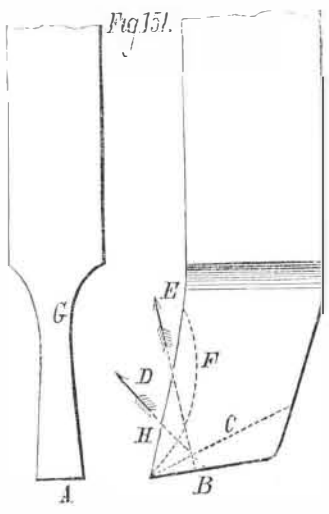
chinists. A is a standard, fitting in the shears of the lathe, at E, and holding the circular plate, C, by means of the bolt, B, which should be made to just clamp the plate, C, tightly when the nut is screwed tight. The plate contains a series of conical holes, 1, 2, 3, etc. (shown in section at D). The object of coning the pin, B, where it carries the plate, C, is that the latter shall be made to a good working fit and have no play. The operation is to place the shaft in the lathe, one end being provided with a driver, dog, or carrier, and placed on the running or line center of the lathe; and the other end, to be operated upon, being placed in such one of the conical holes of the plate, C, as is of suitable size, the distance of the standard, A, from the lathe center is to be adjusted so that the work will revolve in the coned hole with about as much friction as it would have were it placed between both the lathe centers. Thus the conical hole will take the place of the dead center of the lathe, leaving the end of the shaft free to be operated on. F F are holes to bolt the standard, A, to the lathe shears or bed; and G G, etc., are taper holes to receive the pin, G, shown in the sectional view. The object of these holes and pin is to adjust the conical holes so that they will stand dead true with the lathe centers; for if they stood otherwise, the holes would not be bored straight in the work. In Fig. 155, hole No. 7 is shown in position to operate, the pin, G, locking the plate, C, in that position. In setting the work, the nut on the pin, B, should be eased back just sufficiently to allow the plate, C, to revolve by hand; the work should then be put into position, and the pin, G, put into place; the standard, A, should then be adjusted to its distance from the live lathe center, and bolted to the lathe bed; and finally, the nut on the pin, B, should be screwed up tight, when the work will be held true, and the cone plate prevented from springing. Care must be taken to supply the conical holes, in which the work revolves, with a liberal quantity of oil, otherwise they will be apt to abrade.

SLOTTING MACHINE TOOLS.

Tools for use in slotting machines are divided into two classes, those used by themselves, for holes in which there is not sufficient room to admit a tool post or bar; and short tools, held in a tool post on the bar, and fastened by a set screw or screws thereon provided.

Referring to the first class, which should never be employed if it can be avoided, Fig. 151 is a tool for cutting out a key seat. The edge, A, is the cutting part, the thickness at G being reduced to make it clear the sides of the key seat. The face, B, receives the force necessary to bend the shaving, which, acting at a right angle to that face, tends (as will be observed) to force the tool deeper into the cut, at the angle shown by the dotted line and arrow, E. Now suppose B to be ground to the angle shown by the dotted line, C; the direction of the force required to bend the shaving would be in the direction of the dotted line and arrow, D; and a comparison of D and F shows that an equal degree of spring would have more effect in deepening the cut of the tool in the case of D than in that of E; and it is this consideration which determines the proper angle of the face, B. It being obvious that the more angle it has, the keener the cutting edge of the tool will be, and the greater the liability to force into the cut; and since the deeper the cut, the greater is the force required to bend the shavings, the tool continues to spring, digging into the work and either bending or breaking itself, or stopping the machine. Hence the face, B, should be made for slight tools, or for tools held far out from the tool post, at about the angle shown above.

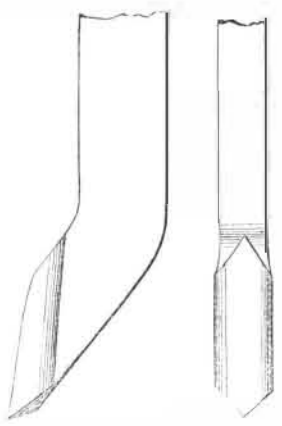
Fig. 151.



The face, H, should, in all cases, be made as shown above, and not hollowed at all in the direction shown by the dotted line, F, which would not only weaken the tool, but would cause the cutting edge to be badly supported by the metal behind it, and hence to break; and these considerations, as to the shape and angle of the faces, B and H, apply to all descriptions of slotting machine cutting tools, and are of more importance in the class of tools above shown than in tools used in any other kind of machine, because of the great distance they have, at times, to stand out from the holding screws or clamps.

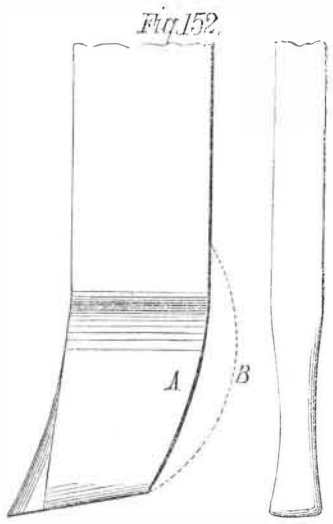
A roughing out tool, held in the tool post without the aid of a bar, should be made as shown in Fig. 151 *a*, concerning which nothing need be said save that it should be hardened right out, if the cutting edge stands close to the holding screws or clamps of the tool post, and tempered to a light straw, if held far out from the same, which will, in the latter case, prevent it from breaking in consequence of any deepening of the cut from the tool springing.

Fig. 151 *a*.



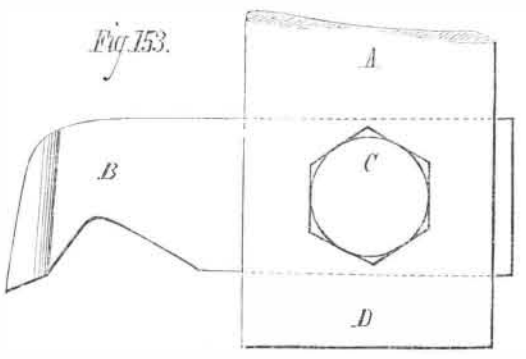
For cutting out a half-round groove, the tool shown in Fig. 152 should be employed. The outline, A, is made as denoted by the dotted line, B, in cases where, from the narrowness of the tool, it is very liable to spring from the pressure of the cut, as, say, when the thickness at C is less than three eighths inch, in which case the cutting edge should be lowered to a straw color; whereas, if thicker, the edge may be hardened right out. It is well here to note that it is advantageous that the tool should have a barely perceptible amount of spring, in the direction of D, in Fig. 151, because otherwise the edge of the tool will rub against the work during the back stroke, and thus become rapidly dulled.

Fig. 152.



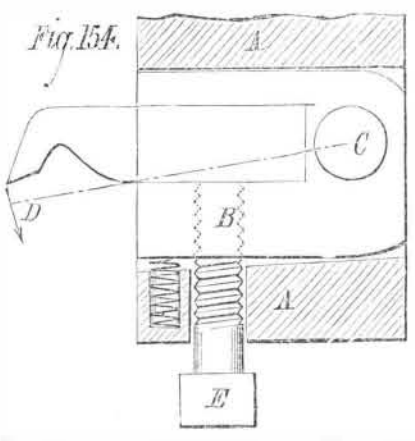
Whenever the nature of the work to be done will admit, a holding bar and short tool, such as shown in Fig. 153, should be employed. A represents the bar, which is fastened in the tool post, B the tool, and C a set screw to hold the tool, which set screw may be placed in the end, D, of the bar. By using such a bar, short tools, such as have been already described for use in the lathe or planer, may be em-

Fig. 153.



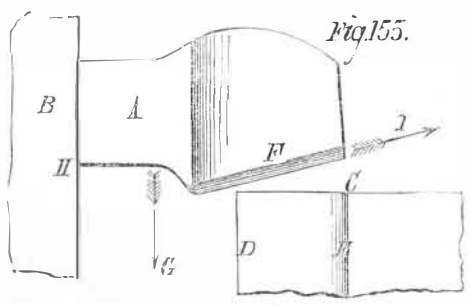
ployed, their shortness rendering their grinding and forging much easier of accomplishment. Many of these holding bars have small pivoted boxes, similar to that shown in Fig. 154, provided to receive the tool. A is a sectional view of

Fig. 154.



the bar, B is the box, pivoted at C, D is the tool, and E the set screw for holding the same. It will be observed that the set screw, E, screws into the pivoted box, and not into the end of the bar, and that the hole, provided in the end of the bar to admit the set screw, is large enough to permit the set screw to have plenty of play or movement. The object of this and similarly designed devices is to allow the tool to move, in the direction of D, off the pivot, C, and thus to prevent the tool edge from rubbing against the sides of its cut during the up stroke of the bar, the spiral spring shown being made sufficiently strong to support the box, B, in the position shown, but not sufficiently strong to resist much force exerted upon the tool and in the direction of D. For small or even medium sized work, these devices are very efficient; but for large, heavy, outside work, the bars themselves are too slight, and it is usual to employ a similar device (on a large scale) provided in the tool end of the slide itself. Under these conditions, the slotting machine will perform as heavy duty as either the lathe or planing machine. The writer has in his possession a cutting taken off the outside of a crank at the Morgan Iron Works, which cutting measures 2⅝ inches and is a full ⅛ of an inch in thickness, the tool employed being a knife tool, ground as shown in Fig. 155. B

Fig. 155.



represents the tool end of the slide of the slotting machine, A the knife tool, C the work, and from D to E the depth of the cut.

The face of the tool is ground off at an angle, in the direction of I, so that the point of the tool shall not break off when it strikes the work, and so that the strain upon the tool and working parts of the machine shall not come upon them too suddenly, and cause them to break, as would be the case were the cutting edge of the tool to strike the cut along its whole length simultaneously. As shown in the engraving, the tool would strike the work at F on the edge only, which would for an instant of time exert only enough resistance to bring all the working parts of the machine to a bearing; and as the tool descended, the strain would gradually increase until the point of the tool reached the work. When the tool is near the end of the stroke, and therefore leaves the cut, it will do so at F first, thus leaving the cut gradually, and greatly modifying the jump due to the recoil of the working parts of the machine when relieved of the heavy strain necessary to drive such a deep and thick cut. The enormous strain placed upon the tool would inevitably break it were it left very hard; it is therefore tempered to a purple.

No other tool can well be used for taking such heavy cuts, because grinding off the face, F, of any other tool would not leave the tool edge sufficiently keen to sever the metal without an excessive amount of driving power, and further because the breadth of the face, F, which sustains the force necessary to bend the cutting, is narrower in the knife tool than in any other, and therefore bends the cutting less, experiencing a corresponding decrease of strain. Cuts of such great depth and thickness cannot be well taken in slotting machines whose slides are operated by a connecting rod or link, because the excessive strain would be apt to force the connecting rod along the slot provided to alter the stroke of the machine; the sliding head is therefore provided with a strong rack on each side, operated by pinions, with suitable reversing gearing attached for varying the stroke.

When operating the feed of a slotting machine by hand, the work should be fed to the cut while the tool is reversing its motion at the top of the stroke, and not while the tool is cutting or at the bottom of the stroke, because, in either of the latter cases, the tool edge would grind against the sides of the cut during the up stroke, which would soon impair the cutting qualifications of the tool.

Tool-holding bars of sizes below about 1½ inches in thickness should be made of steel so as to be strong enough to resist the tendency to spring. For sizes above that, they may be made of wrought iron.

Buffalo Bones.

It is stated that many of the settlers in Kansas, in the valley of the Arkansas, have done a profitable business by gathering up buffalo bones. The prairies for forty miles each way from the railroad have been gleaned over till not a relic of the chase can be found. Heads and ribs are worth $5 a tun; these are shipped to Philadelphia and ground up into fertilizers. Shins and shoulder blades are worth $10 a tun, these go to the sugar refineries. The horns are worth $30; the tips are sawn off here and sent to the factories of umbrellas, fans, pipes, etc.; the remainder is used by the chemists. Bits of hide found hanging to the heads are taken off and sent to the glue factories. Every fragment of these animals is made to serve a purpose.

Electrical Exhibition in Paris.

In the Champs Elysées, in July, 1876, will be held an exhibition of the applications of electricity to industrial and domestic purposes. Information will be given on application at the offices of the exhibition, 86 rue de la Victoire, Paris. A special exhibition of the improvements in railway appliances has been proposed to be opened in Paris next year.

A Snake within a Snake.

While some workmen were laboring in a meadow near Saugus, Mass., recently, they discovered a black snake about five feet long. A closer examination revealed the fact that the tail of another snake was protruding from its mouth, and this was found to be a water adder, which measured nearly four feet.

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