PRACTICAL MECHANISM.

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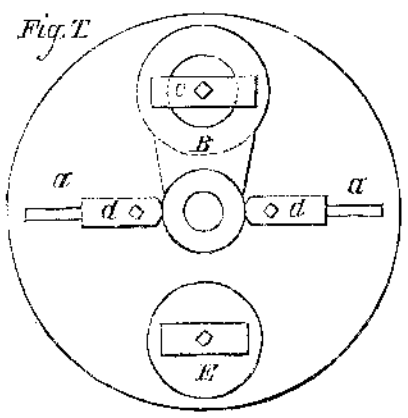
TURNING CRANKS.

A crank having a plain surface on its back should have such surface planed true. The large hole should be bored first, the crank being clamped with its planed surface to the chuck plate of the lathe, when the hole may be bored and the face of the hub trued up. To bore the hole for the crank pin, clamp the face of the hub of the crank, which has been trued up, against the p ate of the lathe (the crank pin end of the crank being as it were suspended); then bolt two plates to the chuck plate, one on each side of the crank at the end to be bored, and place them so that their ends just come in contact with the crank end, as shown in Fig. T, *a a* being

Fig. T.



the chuck plate, B the crank, C the clamp holding the turned face of the inside hub of the crank to the chuck plate, and *d d* the plates steadying the end of the crank to be bored, so that it shall not move its position on the face plate (or chuck plate) from the pressure of the cut, and E a weight bolted to the chuck to counterbalance the heavy end of the crank. It is obvious that, if the crank be a heavy one, two or more plates may be used in place of the plate or clamp, C. A crank chucked in this manner will be practically true providing the chuck plate be true, even if the cut taken off the back by the planer were not true, or even though there had been no cut taken off the back, and the crank had, in consequence, been sprung in the first chucking; because the face of the hub (or boss, as it is sometimes called) will, under any circumstances, be true with the hole, both having been turned at one chucking; and even if the crank were twisted in chucking, the face will follow the hole and remain practically true with it. This face, being in the second chucking bolted to the face plate of the lathe, will be held as true as is the face plate, and cannot spring from the pressure of chucking; neither can the crank pin end spring in the second chucking, because it does not receive any strain from either bolts or clamps. Furthermore, if the face plate is out of true across its face (that is, hollow or rounding), the last hole bored in the crank will, if chucked in this manner, be out of true to only the same degree as is the face plate.

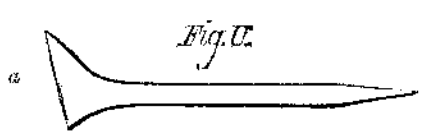
If, on the other hand, both holes of the crank are bored by clamping the planed face of the crank against the faceplate, merely turning the crank end for end to bore the last hole, the holes in the crank will be, when finished, out of true with each other to twice the amount that the faceplate of the lathe is out of true, or to twice the amount that the planed surface is itself out of true, from being sprung in chucking on the planer, from having its skin removed, or from other causes. If the face plate of a lathe is known to be hollow or round in the plane of its face, a piece of paper or other substance, of the thickness necessary to compensate for the defect, may be placed behind the crank and between it and the face plate, in the position requisite to effect such compensation.

Weights sufficient to counterbalance the overhanging end of the crank should be bolted to the face plate on the side opposite to such end, as shown at E, Fig. T.

BALL TURNING.

The best method of turning balls, such as are sometimes used for the valves of pumps, is as follows: The ball should be cast with two round stems on it, so that the stems can be placed between the centers of the lathe while the ball is roughed out, which may be done by a front tool for brass, cutting the ball down to within $\frac{1}{32}$ inch of the required diameter, and gaging it as nearly round as can be done by the eye and a pair of callipers. If, however, there are several balls to be turned, a gage may be made by filing out a segment of a circle (equal to, say, $\frac{1}{8}$ of its circumference) in a piece of sheet iron about $\frac{1}{32}$ of an inch thick. After the ball is roughed out, the stems must be cut off, care being taken not to cut them off too deep. The next operation is to chuck a block, of tin or of equal parts of tin and lead, and to bore a hole in it equal to about $\frac{9}{10}$ of the diameter of the ball, into which hole the ball may be lightly tapped with a piece of wood, so that the chuck will revolve the ball and hold it sufficiently firmly to admit of its being scraped by a hand scraper, shown in Fig. U, *a* being the cutting edge.

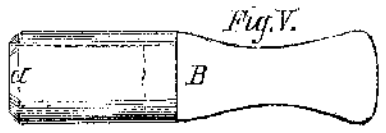
Fig. U.



The ball should be so placed in the chuck that the scraper marks will cross the turning marks already on the ball; and the scraper may then be applied, taking off just enough to take out the marks left by the tool when the ball was turned between the centers. The ball is then taken from the chuck by tapping the former lightly with a piece of wood, and is replaced in the chuck in such a position that the part of the ball which has just been scraped will now be inside the chuck, when the exposed half of the ball may be in turn trued up with the scraper; which being done, the ball is again removed from the chuck and replaced in such a position that the turning marks will be directly across the previous ones on that half of the ball, the scraper being then applied in the same manner as before. The ball being again removed from the chuck and replaced so that the part last scraped will be inside the chuck, the process of scraping is repeated, when the ball will have been made round except in so far that some of the scraper marks may be a little deeper than others. The positions in which the ball has been turned during the four chuckings may be clearly understood by making a comparison of the ball to the earth, the stems representing the north and south poles. The turning marks made while the ball was between the latter centers will be in the same relative position as the lines representing longitude. The first two turnings in the chuck will leave the turning marks in the same relative position, as the lines representing latitude, and the second two turnings in the chuck will again represent the lines denoting longitude. The operation of scraping may then be repeated, the ball being reversed indiscriminately in the chuck and scraped very lightly and as evenly as possible, after which the ball cutter may be applied.

A ball cutter is a hardened steel tube with its outside edge beveled off so as to cause the inside edge to form a

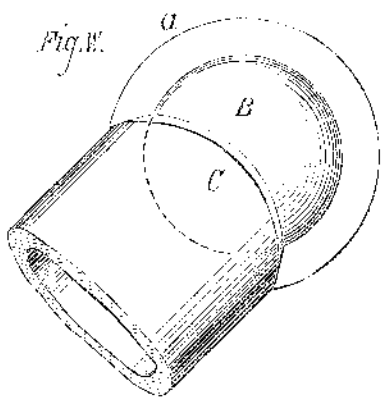
Fig. V.



cutting edge, as shown in Fig. V, *a* being the cutting edge and B the handle. It should be made as follows: A piece of cast steel tube about 4 inches long must be bored out, true and smooth, to a bore equal to about $\frac{3}{4}$ of the diameter of the ball it is intended to cut. The outside of the tube must then be trued up so that the metal will be of equal thickness all over, which will render the tube less likely to warp during the process of hardening. The end of the cutting end of the tube must be beveled as shown in the illustration when the tube must be taken from the lathe and hardened right out, care being taken to dip it endwise and evenly in the water, so that its contraction in cooling may be even, which will reduce to a minimum its liability to crack or warp.

The next operation is to grind it out true again, for the bore is almost certain to have warped a trifle in hardening. The grinding is performed by a lap in a manner to be described in remarks upon laps and lapping. The lapping being completed, the handle may be fitted to the tube and the cutting edge ground on a grindstone, taking care to only grind sufficient off the beveled edge to sharpen it, and revolving the cutter so that it will be ground evenly and smooth. The cutting edge should stand at a right angle to the bore, and may be gaged by applying a square to the outside and across the cutting edges of the cutter. The grinding completed, the oil stone may be applied, when the cutter will be ready for use, Fig. W showing the manner of its applica-

Fig. W.



tion, *a* being the chuck, B the ball, and C the cutter.

The cutter, when forced by hand against the revolving ball, trues it up exceedingly smooth and true; the ball being reversed, the operation is repeated in all directions in the chuck which may be; done without stopping the lathe, and then continued until the ball is true, which may be readily known, because the cutter will cut the high parts of the ball easily, taking off large shavings; but when the cutter edge bears equally at all parts on the ball, it will scarcely do more than polish it. When the ball is nearly finished, but a slight pressure must be placed upon the cutter, and the ball must be more frequently reversed in the chuck.

TURNING PISTONS AND RODS.

A piston should first be bored to receive the piston rod. The next operation is to rough out the body of the piston rod and to then fit it to the piston. The piston is then made fast to the rod, by the key, the nut, or by riveting, as the case may be and the piston and rod should then be turned between the centers. By this means, the piston is sure to be true with the rod, which would not be the case if the piston and rod were turned separately. In turning the piston follower, that is, the disk which bolts to the piston head to retain the rings in their places, slack back the dogs or jaws of the chuck after the roughing out is complete, taking the finishing cuts with the jaws clamped as lightly as possible upon the work; because when the jaws of a chuck are screwed upon the work with great force, they spring it out of its natural shape.

PISTON RINGS.

The rings of metal from which piston rings are turned should have feet cast upon one end, which feet must be faced up true by taking a cut over them. The ring should then be chucked by bolting the faced feet against the chuck plate, so that the ring shall not be sprung in chucking, as it would be if it were held upon its inside or outside diameter by the jaws of a chuck. The inside and outside diameters of the ring may then be turned to their required dimensions, and the end face may be trued up, when the piston rings may be cut off as follows:

First introduce the parting tool, leaving the ring sufficiently wide to allow of a finishing cut after cutting the ring nearly off; introduce a side tool, shown in Fig. 22, and take a light finishing cut off the side of the ring, and then cut it off. The end face of the ring in the lathe may then be trued up by a finishing cut being taken over it, when the parting tool may be introduced and the process repeated for the next ring.

Piston rings are sometimes made thick on one side and thin on the other side of the diameter, the split of the ring being afterwards cut at its thinnest part, so that, when the ring is sprung into the cylinder (which is done to make the ring fit the cylinder tight and to cause it to expand as it wears, thus compensating for the wear), its spring will be equal all over and not mainly on the part of the diameter at right angles to the split, as it otherwise would be.

The process of turning such rings is to face the feet of the ring from which they are to be cut, and then turn up the outside diameter to its required size. Then move the ring on the face plate sufficiently to cause it to revolve eccentrically to the amount of the required difference between the thickest and thinnest parts of the ring, when the inside diameter should be trued out, and the rings cut off as before directed.

The object of turning the inside bore after and not before the outside diameter of the ring is turned, is that, during the process of cutting off the individual piston rings, the bore of the ring will be true, so that the parting tool will not come through the ring at one side sooner than at the other; for if this were the case, the parting tool, from its liability to spring and its broad cutting surface (parallel to the diameter of its cut), would be apt to spring in, rendering the cutting off process very difficult to perform; because if the piston ring is cut completely through on one side and not on the other, it will probably bend and spring from the pressure of the parting tool, and in most cases break off before being cut through at all parts by the tool.

The inside diameter (or bore) of piston rings is frequently left rough, that is to say, not turned out at all; but whenever this is the case, the splitting of the ring will in all probability cause one end of the ring (where it is split) to move laterally one way and the other end to move the opposite way, causing the vise hand a great deal of labor to file and scrape the sides of the ring true again. The cause of this spring is that there is a tension on the inside of the ring (where it has not been bored), tending to twist it, which tendency is overcome by the strength of the ring so long as it is solid; but when it is split, the tension releases itself by twisting the ring as stated.

Cider.

This is the month when fine clear cider may be made, but later in the year perhaps the best cider is made. To have good cider, says the Maryland *Farmer*, the apples ought to be sound, clean, and somewhat mellow, and there should be perfect cleanliness in all the operation of grinding, etc. The barrels ought to be clean and free from all taint or bad smell. Keep the barrels full, during fermentation, with cider of the same making kept for the purpose. As soon as it ceases to actively ferment, draw it off into other barrels and at the same time strain it through a blanket or muslin—common cotton—and when it ceases fermenting, add to it 4 lbs. of mustard seed or as some recommend, sulphite of lime; then bung down.

A small gimlet hole might be bored through the bung to let off for a few days any excess of gas, and then stopped up tight. To have it extra fine, it should be racked off the third time. Good cider always commands a high price, and it is admitted to be a wholesome and temperate beverage.

KEEPING APPLES.

A correspondent of the Boston *Cultivator* kept 1,200 barrels of apples, mostly Baldwins, in his cellar last winter, by daily expelling the stagnant air and replacing it with pure. He attributes the early decay of apples largely to a vegetable miasma in the air, which is communicated to it by vegetable evaporation under certain conditions. The effect of this miasma is first seen in minute specks on the apple.

AN unfortunate trouble exists between the proprietors of the Troy, N. Y., iron works and their puddlers, owing to a reduction in the wages of the latter. The puddlers have refused to accept the reduced wages. A dead lock consequently prevails. If the puddlers do not accede to this new scale of wages, the whole works threaten to shut down. This is not a pleasant prospect in view of the nearness of winter.

A SPECIMEN of the ore recently taken from the new silver mine at Wolcottville, Conn., contained from eight to ten ounces of silver to a tun, with a small percentage of gold. An effort is being made to form a joint stock company, for the purpose of developing the mine.