TURNING TOOLS.

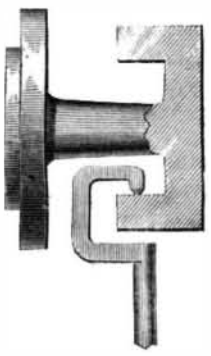
PART FIFTH.

Very many mechanics start the carriage with feed down the lathe shears, and, as the curve falls in on the rod, screw the tool in, thus gradually working out the curve. This may be a good plan where the curve is large, but as it changes its character near the neck of the rod, and becomes concave, instead of convex, the handle must move over a long space very quickly, and it requires good guessing to tell just how much or how little the tool will take. Sometimes it misses entirely or else takes a huge bite, and the latheman trembles lest the next thing his eyes behold will be the six-tun rod flying from its centers and crashing into the bed below, while the general wreck of face plates, cone pulleys, etc., carried down by his mismanagement, tell a piteous tale of want of system and good workmanship.

It is not seldom that similar cases occur. We once saw an impatient turner cutting a screw; when he came to throw the backing belt on to the pulley he slammed the shipping bar with such violence as to spread the counter-shaft hangers overhead apart, and the shaft, belting, pulleys, and all, came thundering down within an inch of his head.

The ingenious turner can readily contrive tools for special purposes, so that by them his work will be greatly expedited. It sometimes occurs that jobs have to be turned inside and out at one time or without removal from the face plate or mandrel; ordinary tools are then inapplicable. Such an instance is shown below, where the casting has to be turned off inside and out without removal. As the inside cannot be bored with a boring tool (it being next the face plate), a special tool must be used, and one is shown n Fig. 24, in connection with the casting

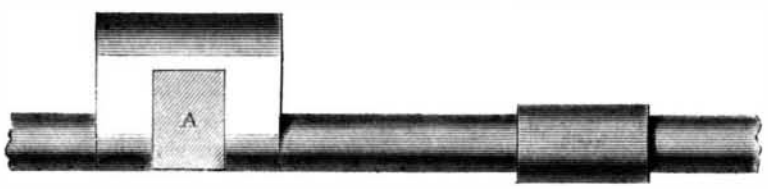
Fig. 24.



It must be borne in mind that we distinctly repudiate the use of such tools unless they are absolutely indispensable. The situation, however, is one that the turner has nothing to do with, and he must not be held responsible for want of good judgment on the part of the designer who contrived such an awkward piece of work. Such a tool as the one shown in Fig. 24, springs and buckles because it has no direct support or bearing from the shank, and cannot be used at all with a heavy cut.

In the manipulation of heavy crank shafts much care and good judgment is requisite. Crank shafts for inside connected locomotives and screw engines are made in one mass, and it is a costly piece of work to finish them. For large marine engines, crank shafts of many tuns in weight are sometimes built up or made in separate pieces and shrunk together. By this method they are not only as good as solid shafts, but better, for in the crank and pin the fibers of the

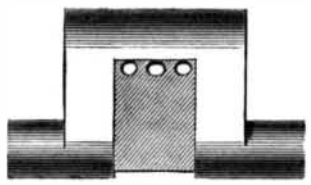
Fig. 25.



iron run in the direction of the greatest strain. The case is quite different in solid forged cranks. When properly shrunk together the parts are immovable by any ordinary power. The *Golden Gate*, of the Pacific Mail Steamship Company's line, has a composite center shaft of this kind, which weighs over twenty-five tuns.

To return to the solid crank shaft (Fig, 25). It is customary to cut the center piece, A, out at the slotting machine, but this is sometimes impracticable, owing to the size of it, or other causes. It is also drilled out, but these several operations involve more labor than when done in a lathe. The block is first cut out by drilling holes along the line of the crank pin, as in this diagram, and then running a square-

Fig. 26.



tool up to the holes. By this plan much handling of the shaft is prevented, for when the block almost drops out, the turner can detach it with a hammer and chisel and then go on and finish the pin up, without the trouble of taking out or putting it on the lathe so often. When the shaft is long it is a very troublesome piece of work to handle. There are strong cast-iron heads keyed on to the ends of the shaft,in which are centers to turn the pin on, balance weights must be put on the face plate of the lathe to compensate for the weight of the cranks. For want of these balances the work is very often spoiled. The crank being the heaviest has a tendency to fall forward immediately after passing over the top center. The back-lash of the back gear, which is always in, allows it considerable motion, so that a very little is enough to make it mount on the tool and break it off or else cut into the surface of the pin and destroy its truth. All the centers must be well screwed up, and the lathe centers, especially, have a fair bearing, or else they will work out of correctness and make the crank pins and journals oval instead of round.

When the square-nosed tool is run in it must have a narrow steel shore under it, so fitted, in a slight depression on the lower side of the tool, that it can not fall out when the tool springs, as it does after every cut; very many turners make the tool with a deep belly, so that it is strongest in the direction of the cut.

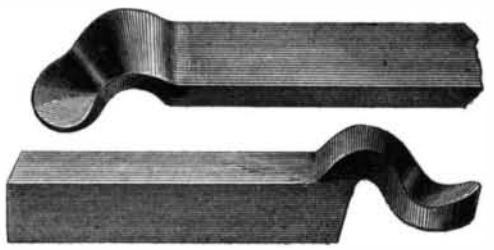
As the tool advances the shore advances with it, and the bottom of it rests in a shallow groove at the foot of the tool post. The tool should not have a lip on it, nor much rake, and the shaft must run slow and steadily. The feed must also be regular and even, and with these precautions, there is little or no danger of jumping it into the work.

Another very difficult tool to manage is the common straight cutting-off tool. There is no reason why this should be so, but it is a fact and will be universally acknowledged by machinists. The trouble arises from a want of care in making the tool. It merely requires to be straight from its cutting edge and sides down, not glanced or rounded off.

It is almost impossible to indicate in an engraving the slight amount of end roundness which will spoil the action of the cutting-off tool. If the corners of the sides are rounded over, even slightly, the tool is in danger of catching and breaking off, while, if the front or cutting edge be also an indirect line, it is liable to be drawn down instead of taking a direct hold on the work.

On page 35 of this volume, and in connection with this subject, we gave an illustration of a straight finishing spring tool, and specified some of the uses cutters of this class were applicable to. They come in play in putting the final touches on the crank pin, for here the tool has to be extended a long distance from the support, and a common solid tool is in danger of springing and forcing the edge in. The spring partition must be made light enough to yield when a heavy strain comes on the edge, and yet sufficiently strong to carry a moderate feed without causing the surface to be irregular. The round corners are apt to be full of chatters when the solid or stiff tool is used, but with this tool the fillets will be, when used in connection with water, of the most beautiful character that it is possible to imagine. In these figures,

Fig. 27.



27, an illustration of a round-nosed filleting tool is given, which works well and gives good satisfaction when properly used.

Production of the Sexes.

What are the causes of the production of the sexes? This question, which has occupied the earnest attention of physiologists, has been thoroughly studied by Mr. Thury, according to whom the product is always of the male sex when the fertilization of the ova occurs at complete maturity, and is always female when it takes place at a less advanced period.

There is a very simple way of solving this problem. It is to select for experiment species that come to maturity in succession, and, that during a single impregnation, fertilize the whole series of ova which detach themselves from the ovary during a period of eight, ten, twelve, fifteen, or even eighteen days. We know, indeed, that, in the case of the hen, a single coupling suffices for the fertilization of five, six, or even seven eggs which she is about to lay and which are arranged in her ovary in the order of their maturation. Now, in such a case, if the theory is exact, the first egg laid ought always to produce males and the others females without any possibility of the inversion of this order.

This is very near what has been observed by Messrs. Coste and Gerbe:

A hen, separated from the cock at the time of her first laying this year, gave five fertile eggs in the space of eight days.

The egg laid on March 15th produced a male; that on March 17th a male; that on the 18th a female; that on the 20th a male; that on the 22d a female.

A characteristic fact in this experiment is the production of a male after a female, which ought not to have taken place according to the theory. But is it only a simple exception? Or is it necessary to consider the fact a radical objection? We may learn by and by on this point, from the researches in which Mr. Gerbe is now engaged.

On the occasion of the preceding note, Flourens recalled an experiment which he made, thirty years ago.

"Aristotle had observed that the pigeon ordinarily lays two eggs, and that of these two eggs one commonly produces a male and the other a female. He wished to know which was the egg that gave the male, and which the one that produced the female. He found that the first egg always gave the male, and the second the female. I have repeated this experiment as many as eleven times in succession, and eleven times in succession the first egggave the male and the second egg the female. I have seen again that which Aristotle saw."—*Silliman's Journal.*

The Phrenological Journal.

This able publication continues to be the only periodical now printed, either in this or any other country, whose pages are wholly devoted to the consideration and study of physiology, phrenology,physiognomy, and all the latest ologys. These, at first blush, seem to be dry subjects. But a perusal of a single number of the *Phrenological Journal* will show that the theme of the Mind, and its various physiological indications are among the most comprehensive and deeply interesting things to which attention can be given. No person can be said to be well informed, much less, educated, who is unacquainted with the principles of mental philosophy as revealed from the stand point of modern Phrenology. S. R. Wells, Editor. Monthly, illustrated $1·50 a year. 389 Broadway.