ply boiling, or by the addition of certain foreign substances. Nut oil and poppy oil are far inferior in strength, tenacity, and drying qualities to linseed oil, and are used to adulterate the latter. The author noticed the dryers employed, and alluded to the properties and means of testing the purity of spirits of turpentine. He then dwelt at length upon the mixing and practical application of paint to new and old woodwork, the preservation of cast iron by means of Dr. Smith's pitch bath, and the cleansing, painting, and care of wrought iron structures. He stated that, when used under proper supervision, no better protection could be found for iron structures than oxide of iron paints. He concluded by observing that the real value of any paint depended entirely upon the quality of the oil, the quality and composition of the pigment, and the care bestowed on the manufacture; and that the superiority of most esteemed paints was due to these causes rather than to any unknown process or material employed in their preparation.

PRACTICAL MECHANISM.

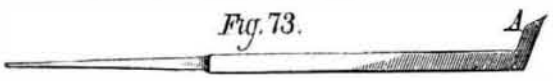
BY JOSHUA ROSE.

NUMBER XXIV.

HAND TURNING—FINISHING TOOLS.

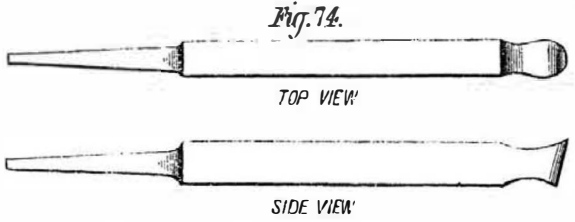
The tool shown in Fig. 73 is an excellent one for finishing wrought iron or steel; it must, however, always be used with water, and should be hardened right out at and near the cutting edge, A.

Fig. 73.



For cutting out a round corner, a round-nosed tool, such as shown in Fig. 74, is the most effective; it will either rough out or finish, and may be used with or without water, but it is always preferable to use water for finishing wrought iron and steel. A is the cutting edge, and B, the heel of the tool. This is a sample of a large class, applicable to steel and wrought iron, the metal behind the cutting edge being ground away so as to give to the latter the keenness or rake necessary to enable it to cut freely, and the metal behind the heel being ground away to enable it to grip the rest firmly.

Fig. 74.



CUTTING A THREAD.

Our next operation will be to cut a thread upon an iron bolt, supposing it to be roughed out according to the instructions already given. The tools necessary for this purpose are a graver or V tool, with which to start the thread, and a chaser, with which to cut the thread after it is once started. Fig. 75 presents a V tool, A being the cutting point, and B, the heel. To start the thread, the lathe should be run at a fast speed: and the heel of the tool being pressed firmly to the face of the lathe rest, the handle of the tool must be twisted from right to left at the same time as it is moved bodily from the left to the right, the movement being similar to that already described for the graver, save that it must be performed more rapidly. It is in fact the relative quickness with which these combined movements are performed which will determine the pitch of the thread. The appearance of the work after striking the thread will be as shown in Fig. 76, A being the work, and B, a fine groove cut upon it by the V tool; from which it will be observed that the judgment alone must be depended upon to gage the speed of the movement of the tool necessary to cut the fine groove, B, which must be the same width from one groove to the next as is the chaser from the point of one tooth to the point of the next.

Fig. 75.

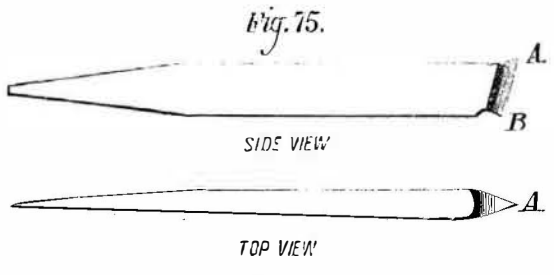


Fig. 76.

The reason for running the lathe at a comparatively fast speed is that the tool is then less likely to be checked in its movement by a seam or hard place in the metal of the bolt, and that, even if the metal is soft and uniform in its texture, it is easier to move the tool at a regular speed than it would be if the lathe ran comparatively slowly.

If the tool is moved irregularly or becomes checked in its forward movement, the thread will become "drunken," that is, it will not move forward at a uniform speed; and if the thread is drunken when it is started, the chaser will not only fail to rectify it, but, if the drunken part occurs in a part of the iron either harder or softer than the rest of the metal, the thread will become more drunken as the chaser proceeds. It is preferable, therefore, if the thread is not started truly, to try again, and, if there is not sufficient metal to permit of the starting groove first struck being turned out, to make another further along the bolt. It takes much time and patience to learn to strike the requisite pitch at the first trial; and it is therefore requisite for a beginner to leave the end of the work larger in diameter than the required finished size, as shown in Fig. 76, so as to have metal sufficient to turn out the first few starting grooves, should they not be true or of the correct pitch. If, however, a correct starting groove is struck at the first attempt, the chaser may be applied sufficiently to cut the thread down to and along the body of the bolt; then the projection may be turned down with the graver to the required size, and the chasing proceeded with.

After the thread is struck, and before the chaser is applied to it, the top face of the rest should be lightly filed to remove any burrs which may have been made by the heel of the V tool or graver; or such burrs, by checking the even movement of the chaser, will cause it to make the thread drunken. Where the length of the thread terminates, a hollow curved groove should be cut, its depth being even with the bottom of the thread; the object of this groove is to give the chaser clearance, and to enable you to cut the thread parallel from end to end and not to leave the last thread or two larger in diameter than the rest. Another object is to prevent the front tooth of the chaser from ripping in and breaking off, as it would be very apt to do in the absence of the groove.

TO MAKE A CHASER.

Chasers are cut from a hub, that is to say, a cutter formed by cutting a thread upon a piece of round steel, and then forming a cutting edge by cutting a series of grooves along the length of the hub. These grooves should be V-shaped, the cutting side of the groove having its face pointing towards the center of the hub, as shown in Fig. 78. Hubs should be tempered to a brown color. A chaser is made from a piece of flat steel whose width and thickness increases with the pitch of the thread; the following proportions will, however, be found correct:

Number of threads per inch	Number of teeth in the chaser	Thickness of the chaser
24 to 20	12 to 14	1-4 inch
18 " 14	10	5-16 "
12 " 8	9 to 6	5-16 "
6 " 4	7 " 6	3-8 "

The end face of the chaser should be filed level and at an angle with both the top face and the front edge of the steel, as shown in Fig. 77, the edge, A, being rounded off so that it shall not strike against any burr upon the face of the rest, and thus be retarded in its forward movement while being cut. The hub is then driven in the lathe between the centers, the chaser being held in a handle sufficiently long to enable the operator to hold it with one hand, and press the shoulder against the end so as to force the end of the chaser against the hub, which will of itself carry the chaser along the rest. The position in which the chaser should be held is shown in Fig. 78, A being the hub, and B, the chaser, from which it will be seen that the chaser is held upside down while it is being cut, the cutting face resting upon the lathe rest. After the chaser has passed once down the hub, special attention should be paid as to whether the front tooth will become a full one; if not, the marks cut by the hub should be filed out again, and a new trial essayed. It must be borne in mind that, the chaser being held upside down, the back tooth, while cutting the chaser, becomes the front one when the chaser is reversed and ready for use. The hub should be run at a comparatively slow speed, and kept freely supplied with oil, it being an expensive tool to make, and this method of using preserves it. In Fig. 79, A is a chaser whose front tooth is not a full one; B is a chaser with a full front tooth; and C is of the same form as A, when it is, as far as possible, corrected.

Fig. 77.

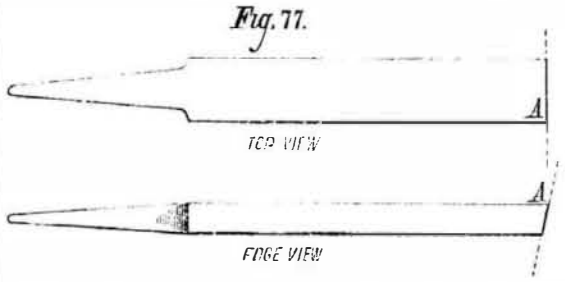


Fig. 78.

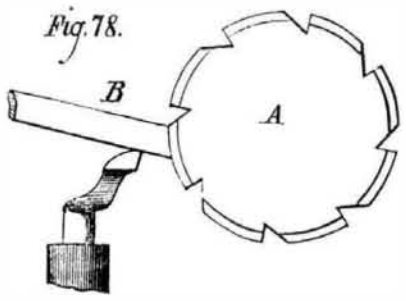
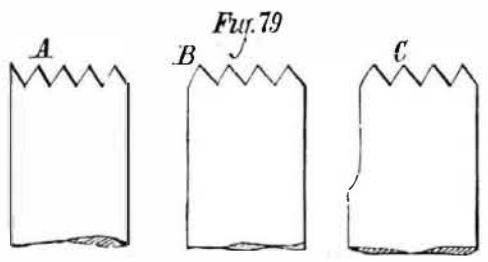
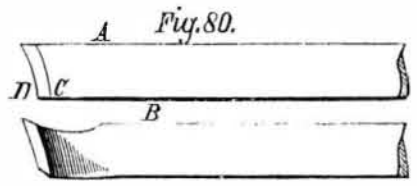


Fig. 79



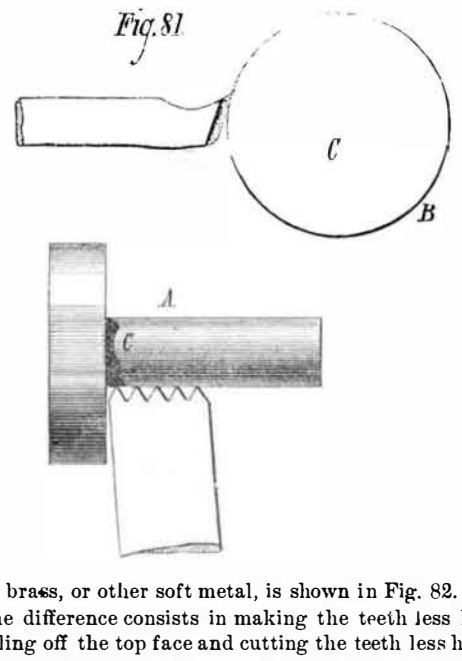
The cutting operation of the hub upon the chaser is continued until the thread upon the latter is cut full, when it is taken to the vise and filed as shown in Fig. 80, A being the chaser as it leaves the hub, and B, as it appears after having the edge, C, and corner, D, rounded off.

Fig. 80.



The angles of the end face of the chaser to the top and edge faces of the body of the steel, and the uses thereof, are made apparent in Fig. 81, in which A is a top, and B, a side view of a chaser when in operation, C being, in each case, the work. From this it will be observed that the angle in the direction of the thickness gives rake to the teeth, while the angle in the direction of the breadth serves to keep the front side of the chaser from coming into contact with the head, shoulder, or other projection of the work. In the absence of a hub, a chaser may be made by cutting a slot in a blank nut, fastening the end of the chaser in the slot, and tapping the hole. The difference in shape between a chaser for use on wrought iron, as shown in Fig. 81, and steel, and one for use on cast iron, brass, or other soft metal, is shown in Fig. 82.

Fig. 81



The difference consists in making the teeth less keen, by beveling off the top face and cutting the teeth less hollow in their length. The latter object is obtained by moving the handle, in which the chaser is fixed, up and down while the hub is cutting it.

The lathe rest should be so adjusted that the chaser teeth cut above the horizontal center of the work. The teeth of the chaser should fit the thread on the bolt along all their length when the body of the chaser is horizontal, and then the least raising of the handle end of the chaser will present the teeth to the work in position to cut, while the teeth behind the cutting edge will fit the thread, being cut sufficiently close to form a guide to steady the chaser. This method of using will not only keep the thread true, but will preserve the cutting edge of the chaser. If a chaser has top rake, as shown in Fig. 81, and the handle end is held too high and so that the back of the teeth are clear of the thread, it will cut a thread deeper than are its own teeth; if, on the other hand, the top face is beveled off, as shown in Fig. 82, and the handle is held too high, it will cut a thread shallower than are the chaser teeth.

Fig. 82.

The proper temper for the teeth is a deep brown, or, for unusually hard metal, a straw color. For chasing wrought iron, the lathe may be run so that the teeth will perform about 40 feet, for steel about 30 feet, for cast iron 50 feet, and for brass about 80 feet, of cutting per minute.

France and the Centennial Exposition.

We printed last week an extract from *The Engineer's* recent editorial on the Philadelphia Centennial, in which the general disinclination of English manufacturers of agricultural and other machinery was especially mentioned, and ascribed to the high duty which is charged in this country on the entry of such products. The same objection is now being urged in France to the contributions of French manufacturers. M. Herman La Chapelle, one of the largest engine builders of Paris, publishes a long letter in the *Moniteur Industriel Belge*, in which he strongly condemns the prohibitory nature of American duties, and points out that, with the exception of wines, silks, and works of art, of which France has almost a monopoly, it is useless to exhibit the principal industrial products of that country.

SIGNATURES made with a lead pencil are good in law