CONCERNING FLAT DRILLS.*

What a drill is for is to bore easily in metal, a clear smooth hole that shall be round and parallel, and of a definite and desired size. A good many drills produce work that is three-sided or oblong, tapered, ridgy, crooked, and out of size, and take much time and power. This is generally owing (except when in lead or copper) to the shape of the drill.

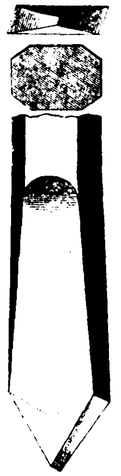
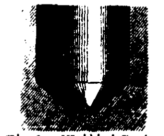




Fig. 3.—*Wabbled Centre.*

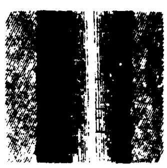


Fig. 1.—*Good.* *Fig.* 2.—*Bad.* *Fig.* 4.—*Ridged Hole.*

Taking an ordinary flat steel bar with thin pointed end, this end having slight bevel or clearance on back edge, we get a drill that will do tolerably straight smooth work, but drive somewhat hard, and bruise its chips and clog with them. It always bores the same sized hole, no matter how often the point is sharpened. Making the cutting edges square makes them cut equally from point to corner, all parts working at equal speed; slightly rounding the parallel edges of this drill-bit makes it run easier, because there will be less friction against the sides of the hole, and the chips escape more easily (See Fig. 1). If the bar were thicker at the butt than at the point, the chips would be impeded in progress. If the bar were of octagonal section (that is the edges beveled instead of rounded off) the borings would be bruised and broken. If the bar be wider at the point than at the butt, there will be some easement for the passage of the chips (unless it have a greater butt thickness, to increase the area of its section). But with a spreading point every grinding makes it cut a smaller hole (see fig. 2). If the point be thick it cuts unevenly; there is liability of the point wabbling and cutting around a cone centre in the bottom of the hole (see fig. 3); in this case it will cut a *ridgy*, untrue hole (fig. 4). It will consume a great deal of power, and be likely, if it has any fair rate of feed, to become hot and lose its temper.

If we take a slight groove immediately off the cutting face, so as to lessen its cutting angle, we make it more eager in cutting, but easier dulled; so that we find this form, or "lipped" drill (fig. 5), best only for long holes, in which case its heavy borings are less likely to clog than if finer. Raising the back part of the cutting edge too high is like grinding a cold chisel to the acute bevel of a wood-turner's chisel.

One form of drill, which is used so often as a cutter or for counter-boring, as to be often called a counter-bore, is the pin-drill (fig. 6); having a flat bar tapering in neither width nor thickness, and, at right angles to its length and sides, a slightly beveled cutting face, having projecting from its middle a guide pin, central with the drill axis, and for the guidance of which a small straight hole, with very little clearance, must have been first bored. If the first hole be crooked, the larger hole will follow its direction. If the guide-pin have too much play in the guide-hole, the drill will cut wabbling and out of round. If rightly made the pin-drill will curl out great chips with comparatively little power. The pin must of course be straight and true. If the end face of the pin be formed into a tiny milling tool (as in fig. 7), it is an advantage, as any slight defect of round or straightening in the guide hole is remedied by the milling action of the pin, and the guide-hole is cut true, ahead of the action of the drill-faces proper. The guide-pin may also be cut so as to form a rose bit, and the guide-hole in this case may be a trifle smaller than the pin. The pin-drill is a costly tool to make and keep in order. A development of this contrivance is used for boring flue-sheets; in this case, where the circle to be cut is much larger than that intended for the ordinary pin-drill, it would be a great waste of time and power to cut into borings, all the metal in the hole. Instead of cutting with the whole end

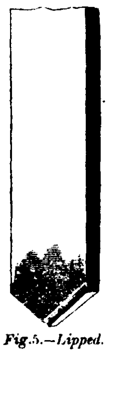


Fig. 5.—*Lipped.*

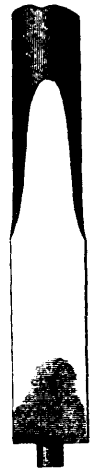


Fig. 6.—*Pin Drill.*

Fig. 7.—*Milling Pin Drill.*

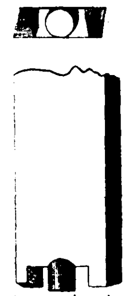


Fig. 8.—*Flue Sheet Cutter.*

face of the drill around the guide-pin, the cutting faces are cut out in a wide ring around the guide-pin; leaving only a cutting ring at the extreme periphery of the end-face (see fig. 8). This tool thus cuts away a ring and leaves a hollow core between this ring and the guide-hole. It is even more expensive to make and maintain, than the ordinary pin-drill; the spaces between pin and cutters being hard to cut out in a lathe. If however, (see fig. 9), a cutter is made from a round steel bar, having drilled in its axis a hole the size of the guide-pin, and having its flat end cut into radiating teeth so as to form a milling tool, the central non-cutting spaces may be readily removed with it. It may also be used for making and repairing ordinary pin-drills. Another flat drill, not nearly so good as t e pin-drill, is the tit-drill or centre-drill (fig. 10); having instead of a cylindrical guide-pi , working in a previously drilled hole, a triangular center-tit, intended to do cutting work. This tit, which requires to be carefully filed up in the vise, is very bothersome in tempering, on account of the small quantity of metal therein; rendering it apt to be either too hard and brittle, or too soft and dull.

The principal beauty of the best flat metal drills is that they have similar cutting edges on both sides, giving even and equal pressure on both sides of the hole, and not wasting any power in side-strains.

If there is any one particular nuisance in a machine shop it is square-tapered drill shanks (fig. 11), no two the same length, thickness, or bevel. A square tapered shank is likely to be untrue; its square-tapered socket more so. Hence this kind of a shank is liable to cause wabbling and untrue work. A round-tapered shank is more

Fig. 9.—*Rose Cutter for Pin Drill.*

Fig. 10.—*Tit Drill*

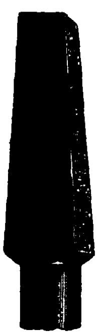


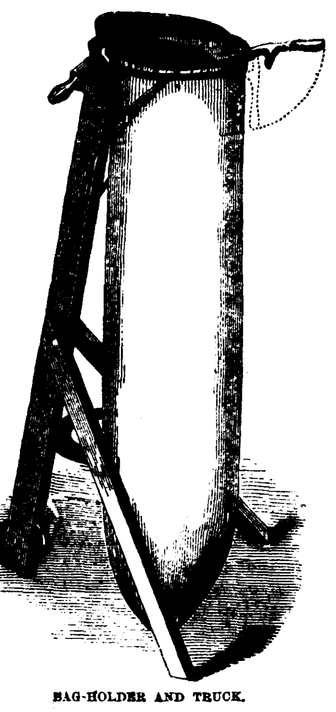
Fig. 11.—*Square Tapered Shank.*

Fig. 12.—*Round Parallel Shank.*

expensive than the square-taper; is hard to draw out and apt to be injured in drawing. In common with the square-taper shank, it cannot be extended in case a drill is a trifle to short too reach or bottom its work. A straight round shank (fig. 12) is apt to be true; so is its socket; it is less likely to jam and to be injured in drawing; it can be "set out" by slipping a block in the socket. It is, too, easier to have standard sized shanks and sockets; the saving in the time bill alone on this score, is important. G.

A Combined Bag-Holder and Truck.

Being recently at a railroad depot, where a good deal of grain is received, we were much interested in a man filling some bags with wheat from a car, and trundling them away to a store-house. He used a bag-holder, which served also as a truck, upon which the filled bag could be wheeled away. We quickly sketched the bag-holder in our note-book, as a good thing to make known to our readers, not knowing then the name of the maker of it; but on our way home discovered in a catalogue of the Higganum Manufacturing Company, of Higganum, Conn., an illustration of the same holder and truck. We give our illustration here, which shows for itself the character of the bag-holder, and the method of using it. For use in grist-mills, and barns or granaries, this handy contrivance would be found to save considerable labor and time, as when the bag is filled, it may be wheeled away by taking hold of the handles at the top, and



BAG-HOLDER AND TRUCK.

making a one-wheeled truck of the machine; the bag rests between the projecting legs.

Experiments with the Turkish Bath.—Some interesting observations were related at the last meeting of the British Medical Association, by William James Fleming, M. B. (Glasgow). These experiments were performed by the author upon himself, and consisted of observations on the effect of the Turkish bath at temperatures of from 130° Fah. to 170° Fah., upon the weight, temperature, pulse, respiration and secretions. The results showed that the immersion of the body in hot, dry air, produced loss of weight to an extent considerably greater than normal, amounting, on the average, to the rate of about 40 ounces an hour. This was accompanied by an increase in the temperature of the body and a rise in the pulse rate, with at first a fall and then a rise in the rapidity of respiration. The amount of solids secreted by the kidneys was increased and coincidently the amount of urea. The sweat contained a quantity of solid matter in solution and among other things a considerable amount of urea. The most important effect of the bath was the stimulation of the emunctory action of the skin. By this means the tissues could, as it were, be washed by passing water through them from within out. The increased temperature and pulse rate pointed to the necessity of caution in the use of the bath when the circulatory system was diseased.