GETTING THE MOST OUT OF YOUR DRILL PRESS

Helpful hints by

Delta

Getting the Most Out of Your Drill Press

By
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HELPFUL HINTS FROM DELTA

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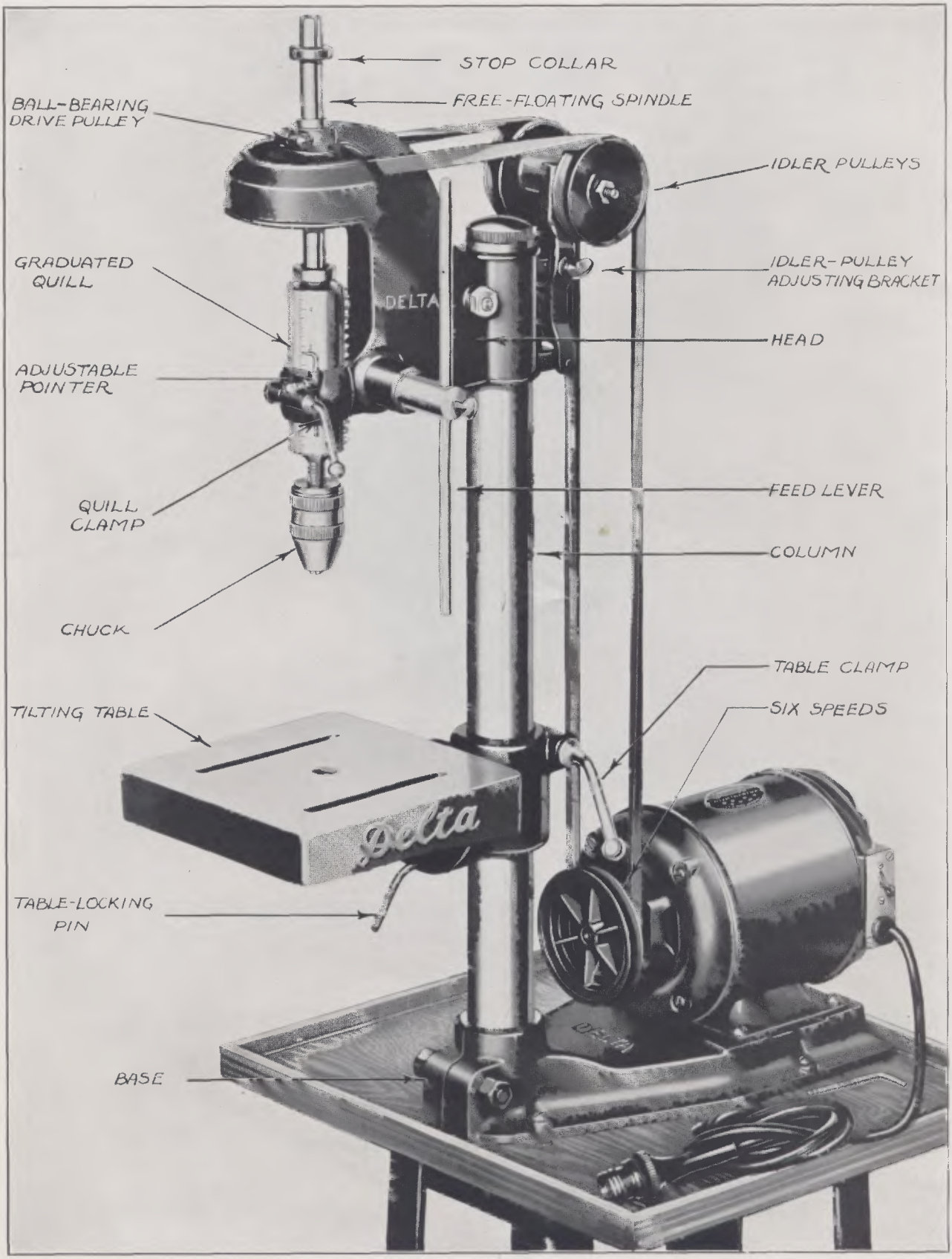
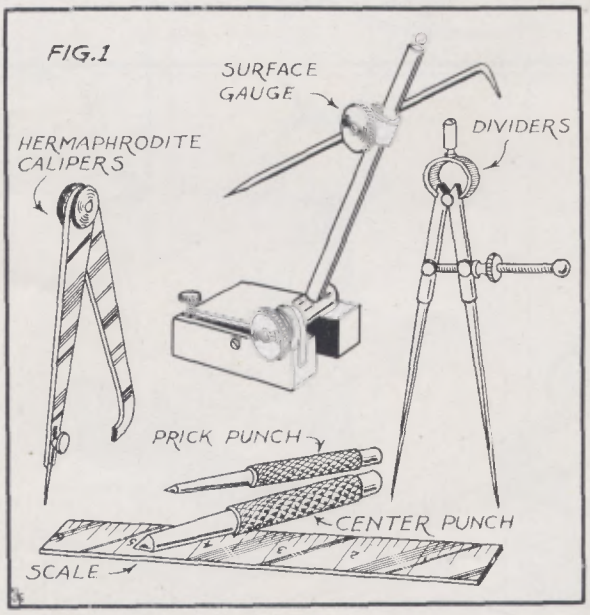


Getting the Most Out of Your Drill Press

CHAPTER I

LAYING OUT THE WORK

THE FIRST necessity, before a hole can be drilled on the drillpress, or with any form of drill, for that matter, is for some kind of a layout to show the location of the hole. It is true that in many instances this layout is of the roughest kind, and that only an approximate location is necessary for the hole. On any work but the roughest kind, however, the holes must usually be located with some regard to accuracy, and for this reason every drillpress user, whether he uses the machine in his business or for his pleasure, should know something of the methods used by the professional in laying out work for the drill press. Methods requiring extreme accuracy will not be considered here, since these usually involve the use of instruments and machines beyond the scope of this book, but only such methods as are used every day in every shop in the land.

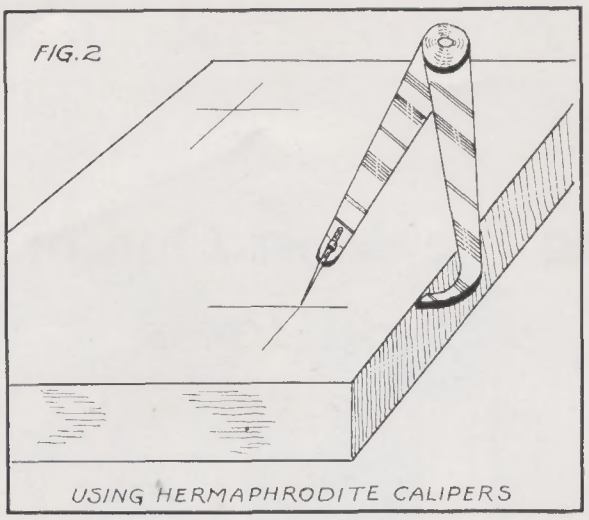


The few tools necessary for good results in laying out work for drilling on the drill press. With the aid of these tools quite accurate work can be done, although not what is known as "precision" work.

For quick, reasonably accurate layout work, a few tools are required. A hammer and a center punch are usually to be found in every shop. The center punch should be a fairly heavy one, with its point ground to the same angle as the point of a twist drill—118 degrees. In addition to the center punch, the drill-press user's equipment should include a small prick punch, smaller in diameter than the center punch, and with its point ground to a much sharper angle. One should have also a pair of hermaphrodite calipers, a pair of dividers, a steel scale at least 6 inches long, and better 12 inches, divided down to 64ths and a surface gauge. The latter tool may be dispensed with, especially if the user does not expect to do any fine layout work. If he has a combination square, an attachment may be obtained for this, as shown in Fig. 2, which will supply the lack of a surface

gauge to some extent.

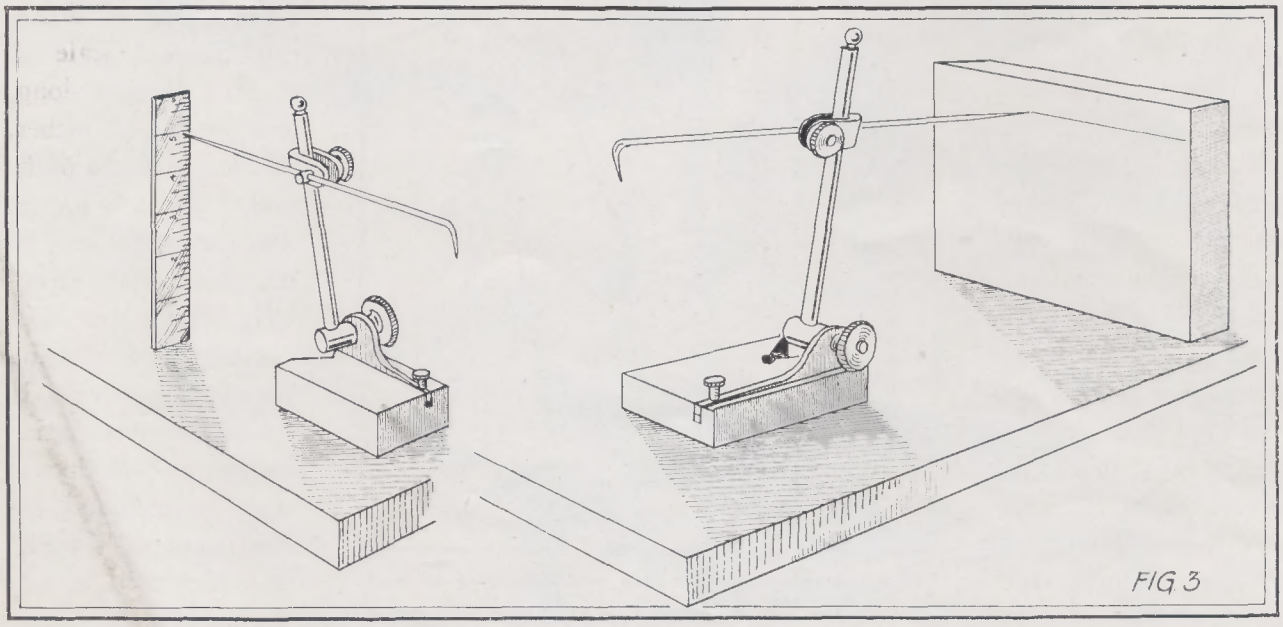
The hermaphrodite calipers are shown in Fig. 1. Only one leg of these calipers is bent, and the other leg carries an adjustable scribing point. The method of using the calipers is shown in Fig. 3. Suppose, for instance, a hole is to be drilled 1 inch from each edge of a piece of steel. The calipers are set by placing the end of the bent leg against the end of the scale, and opening or closing ½ the legs until the scriber point is exactly on the 1-inch graduation. The calipers are then transferred to the work and used as shown in the drawing. The bent leg is pressed against the edge of the work and the calipers drawn along, when the scriber will mark a line on the surface exactly 1 inch from the edge. The mark 1 inch from the other edge is made in the same manner, and a hole drilled at the intersection of the marks will be 1 inch from both edges. These marks could be made, of course, merely by the use of a scale and a scriber, but the use of the hermaphrodite calipers insures more accuracy. Besides, if a number of pieces are to be marked off in the same manner, the use of the caliper speeds up the work considerably, since the scale need be used but once, and all subsequent markings on the work will be exactly the same.



The use of the hermaphrodite calipers in marking off for the position of holes is shown in this illustration. These are used when the holes may be located from the edge of the work, and where a fairly accurate layout is desired.

This is a good place to interject some remarks about making the marks on the work show up so they can easily be seen. It is apparent to anyone who has ever tried it that a scriber mark on a piece of bright steel, for example, is not exactly a success in the way of being easy to see. A similar mark on cast iron is not much better. It is usually

A more accurate tool for the layout of holes is the surface gauge, shown in use in the illustration below. The drawing at the left shows how the gauge is set, and the one at the right how the line is marked on the work.



necessary to give the work a coating of some kind, then the scriber, cutting through the coating, leaves a mark that is easy to see.

In the case of rough cast iron, with the skin still on it, a good coating of white chalk, well rubbed on, will usually answer the purpose. Some layout men use whiting, mixed with water to the consistency of thin cream, and applied to the work with a brush. This covers better than the chalk, but the user must wait until it dries. On machined cast-iron surfaces some use blue chalk and some white, the blue being better because of the contrast between it and the scribed line.

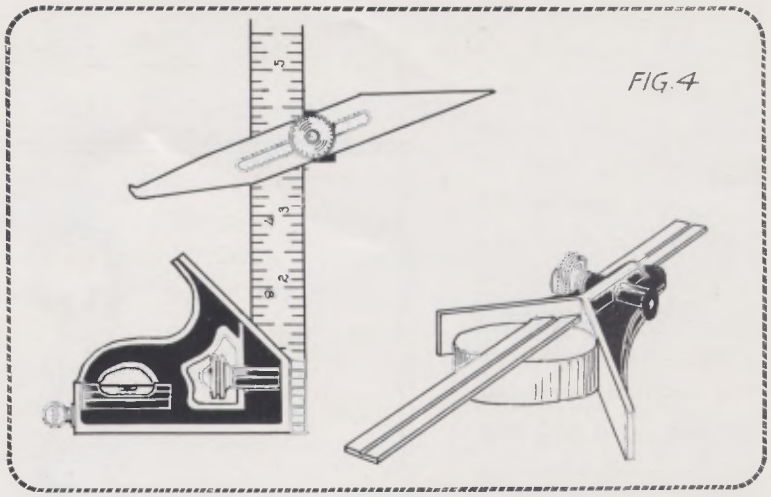


FIG. 4

The left-hand drawing shows an attachment for the combination square that may be used as a surface gauge. The drawing at the right shows the "center head" of the combination square and how it is used to mark the center of a disk for drilling.

Chalk and whiting are used by many when laying out lines on steel, but a better system is to have a strong solution of copper sulphate handy in a bottle with a swab in it. This solution will be made up by any drug store. A rub or two with the swab over the surface of the work produces in a few minutes a deposit of copper on the steel. The bright lines drawn by the scriber show up splendidly on this.

Chalk or whiting may be used on wrought iron and on steel shapes, for here the surface is black and rough like cast iron. A 20 per cent solution of silver nitrate, applied to copper or brass, produces a deposit through which scribed lines show clearly.

The surface gauge is a tool that should be in the hands of everyone who expects to do any amount of drilling with reasonable accuracy. It consists of a base carrying a rod that may be set at any angle. This rod or post carries a scriber that may also be moved to any angle, moved up and down the post, or, with the rod removed, used in the base. The manner of using the gauge is indicated in Fig. 4, which shows only one of its many uses. If a hole is to be drilled, say, 5 inches from one edge of the block shown in Fig. 4, the scale is stood on its end on a flat block of cast iron, or on the drill-press table, and the scriber of the gauge carefully moved until it is exactly on the 5-inch mark, then locked. This is assisted by the fine adjustment of the gauge, actuated by the small screw at the rear of

Below is shown how the prick punch is used to mark the intersection of the lines used to establish the location of the hole.

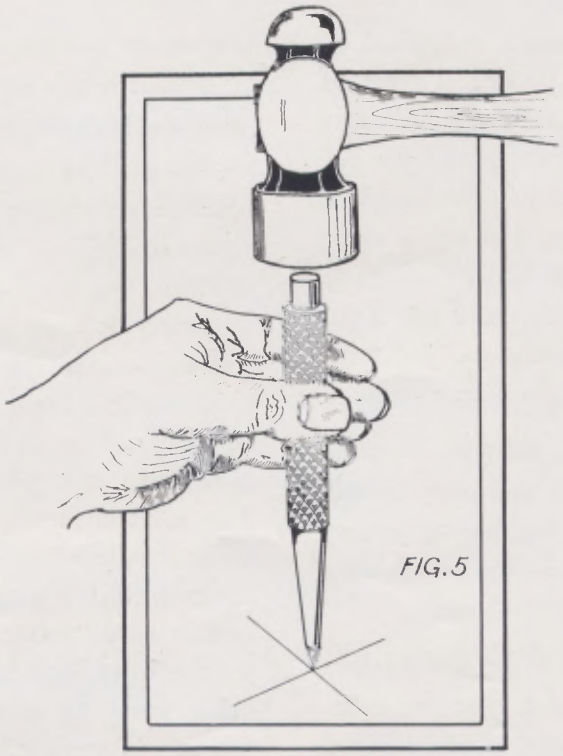
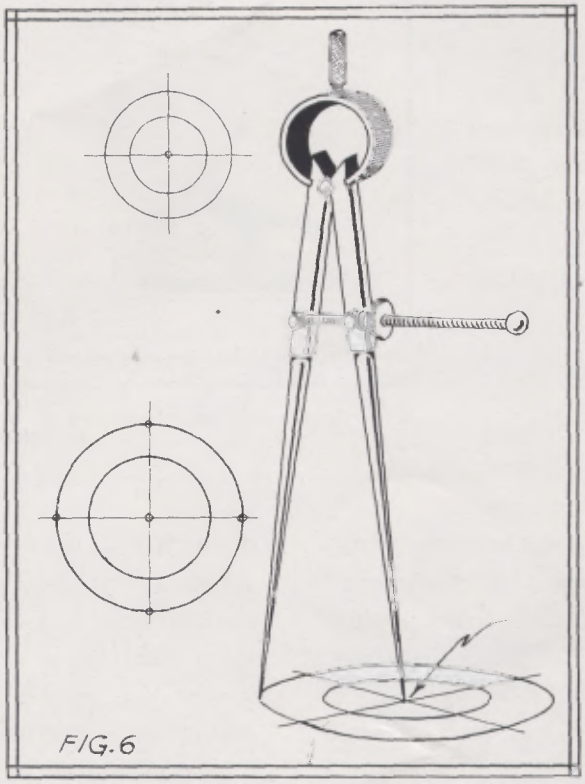


FIG. 5

the base. The work, previously coated, is now stood on the block, or on the drill table, and the scriber is drawn along by the hands grasping the base of the gauge, making the mark on the work exactly 5 inches above the table. A moment's thought will show that this method is more accurate than the use of the hermaphrodite caliper, because variations may be made in the mark made by the caliper point, depending on the way in which the bent point is held against the edge of the work. If the scriber and post of the surface gauge are properly locked, however, no variation is possible. The plate on which the gauge is used is machined flat and true, and is known as a surface plate. A piece of slate from a discarded switchboard, a piece of ground and polished marble or a piece of plate glass all make excellent surface plates for the bench in place of the rather expensive cast-iron ones used in the machine shop. For small work, the machined surface of your drill-press table will serve excellently, or the table of the circular saw, provided it is machined flat and true, and is not merely a piece of sheet iron or steel.



The dividers, and how they are used to scribe circles at the location of the hole, with the prick-punch mark as center. These circles aid in starting the drill true, or in "drawing" it if it runs off.

It will be apparent that the example given of the use of the surface gauge is a very simple one, and that the gauge is capable of a very wide range of layout work, in the hands of a careful and experienced user.

If a number of holes are to be drilled in a line, say along the center of a piece of cold-rolled steel, and all are the same distance apart, a line can be scribed down the center of the piece with the hermaphrodite calipers, the location of the end hole marked with the scale and scriber, and then the location of the other holes can be stepped off with the dividers. Prick punch the location of the first hole lightly, set one point of the dividers in the prick, mark the location of the second hole with the other point, then prick punch this second location and repeat. Usually a series like this does not demand much accuracy; when it does, however, use a magnifying glass to set the dividers on the scale, and use the glass also when prick punching every location mark. This is a wise precaution to observe whenever any holes are to be drilled requiring accuracy in location. As we shall see later on, there are a number of things in the drilling operation itself that can cause inaccuracy. Accuracy in the final job depends upon accuracy in each step, and, in accurate drilling, one must start with accurate measuring, accurate transferring of the measurements, and accurate punching. The magnifying glass need not be a large or expensive one, and it can be mounted on a cheap, flexible lamp stand so as to leave both hands free for scriber, dividers, hammer and punch, as the case may be. Don't think it "fussy" to use such aids to accuracy as the magnifying glass. If you want a hole in a certain place you don't want it 1/64 inch or maybe 1/32 inch away from there, and it isn't being fussy to insure that it will be exactly where you want it.

Once the cross lines indicating the location of any hole are marked, prick punch the intersection of the lines, exactly where they cross, then set the dividers to the radius of the hole to be drilled, set one point in the punch mark, and scribe a circle representing the diameter of the hole to be drilled. Inside this scribe another circle about half the diameter. Prick punch lightly the intersections of the circle with the layout lines, as shown in the lower sketch B, Fig. 5. Then deepen the center punch mark with the center punch, taking care to hold the punch vertical so as not to shift the mark sidewise, and you are ready to drill the hole.

The reason for marking the circles is this: The center-punching of the prick-punch mark, in spite of your precautions, may have been "out"; the drill may start to run off as it enters the center punch; something may always happen to throw the drill off. If there were no mark on the work but the center punch you would not know if the hole were being drilled true or not. Just as soon as the drill makes a spot inside the smaller circle, however, it can be seen whether the conical depression made by the drill is concentric with the circle or not. If not, the driller has an opportunity of "drawing" the hole in a way to be described later, and thus correcting the fault. If the first drawing does not correct the fault, the drill mark will still show its eccentricity as it approaches the outer circle, affording another check. Some drillers mark but one circle on the work—the diameter of the hole—but two is better, since the smaller one enables the driller to check on the drill almost immediately it enters the work, instead of waiting until it approaches the circle of the outer diameter, when it might be too late to draw it enough.

The prick-punch marks are not essential, but they serve to make the circle markings more permanent if an interval must elapse between marking and drilling. In the regular shop, they serve also as a check on the layout work, since, although the circle showing the diameter of the hole naturally disappears when the hole has been drilled, half of the prick punch marks remain, as a witness to the accuracy of the drilling—or its inaccuracy.