

(No Model.)

J. B. WALLACE.
CUTTING TOOL.

No. 295,466.

Patented Mar. 18, 1884.

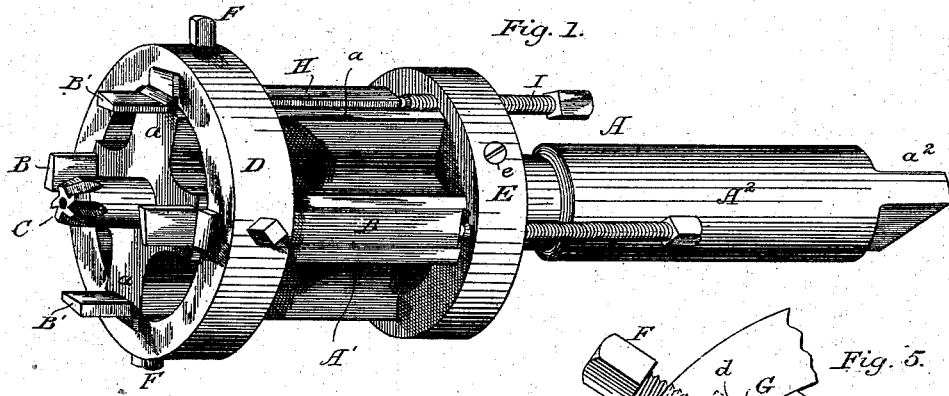


Fig. 1.

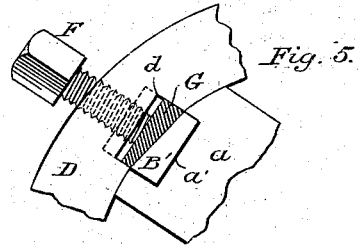


Fig. 5.

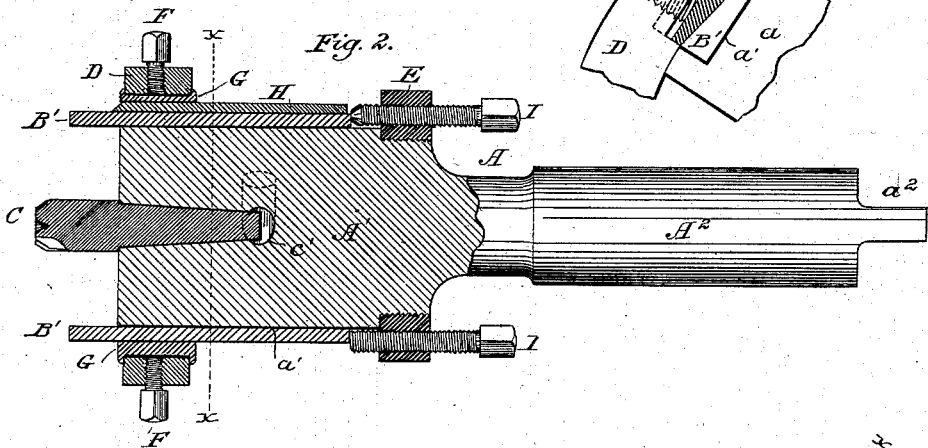


Fig. 2.

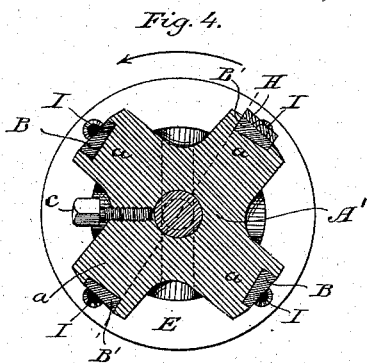


Fig. 4.

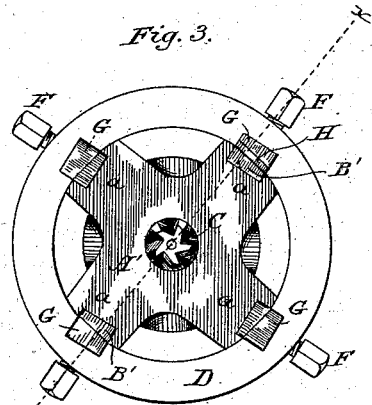


Fig. 3.

WITNESSES
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J. BENNETT WALLACE, OF CHICAGO, ILLINOIS.

CUTTING-TOOL.

SPECIFICATION forming part of Letters Patent No. 295,466, dated March 18, 1884.

Application filed December 18, 1882. (No model.)

To all whom it may concern:

Be it known that I, J. BENNETT WALLACE, of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Annular Cutting-Tools; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to tools for cutting large circular holes in metal plates by planing out an annular groove through the same—as, for example, in boiler head-plates for the reception of the tubes, &c.

A primary object of the invention is to provide a construction in this class of tools in which the cutters are removable for purposes of sharpening, adjustment, or renewal, and are of such form and are so held by the retaining devices that they will clear themselves when properly set in the tool-head and at work, whereby said cutters require to be ground only upon their ends in being sharpened.

It is a further object of my invention to provide retaining devices for the cutters, whereby said cutters may be conveniently set in the head in proper position for clearance.

Another object is to provide an adjustable cutter for detaching the burr raised on the face of the plate by the cutters which form the annular groove, and still another object of the invention is to provide a center-post constructed to operate as a reamer for a portion of its length and as a steady-post for the remainder.

To these and other ends that will further appear my invention consists in the several matters, hereinafter fully described, and set out in the accompanying claims.

In the drawings, Figure 1 is a perspective view of my improved tool complete. Fig. 2 is a central axial section through xx of Fig. 3. Fig. 3 is an end elevation. Fig. 4 is a transverse section taken at xx , Fig. 2. Fig. 5 is a fragmentary end view, showing the gib and wedge.

A is the body of the tool, consisting of the head A' and shank A².

B B are cutters secured in opposite sides of the tool-head parallel with its axis.

B' B' are blind cutters or guides, similarly set in the sides of the head intermediate to the working-cutters B, and in position to follow said cutters in the groove formed by the latter.

C is a central reamer and steadying-post set in the axis of the head.

D is a clamping-ring embracing the head A' at the working end of the tool, and E is a stationary ring embracing the head A' at its end adjacent to the shank A² for the support of adjusting-screws I.

In the present drawings but two working-cutters B, and two blind-cutters B' are shown. Provision may, however, be made in the construction of the tool for the employment of a greater number of both, if desired, or, if preferred, working-cutters may take the place of the blind-cutters. Intermediate to the cutters the head A' is cut away toward its axis in longitudinal grooves or recesses, as seen in the drawings, for the purpose of lightening the tool and letting oil down to the cutters when at work. This form of the head leaves the longitudinal flanges $a a$, the outer faces of which are in the surface of a cylinder, or, in other words, are parallel with the axis. In each of said outer faces of the flanges $a a$ is cut a longitudinal flat-bottomed groove, a' , for the reception of a cutter, B, or guide B', as the case may be, and of such depth as to admit substantially the entire body of the cutter or guide. The working-cutters, and, preferably, the blind cutters or guides, also, are made of uniform dimensions throughout their length, thinner on their rear than on their advanced edges, in order to give suitable clearance, and to allow of sharpening them by grinding them only on their ends. The grooves a' are made correspondingly inclined on their bottom surfaces, as indicated more plainly in Figs. 3 and 4, in order to hold the cutter thus beveled in proper position to clear the groove back of the advanced or cutting edge of said cutter. The advanced sides of these grooves a' are located in diametrical planes, as shown by the dotted line in Fig. 4, and the front and rear walls of the grooves a' are at right angles with

the bottom faces thereof. The cutters or guides are preferably shaped to correspond with the grooves in this respect.

The clamping-ring D closely embraces the flanges *a* at the working end of the tool-head, and opposite the grooves *a'* in the head, said clamping-ring is notched on its inner face, to form, with the grooves of the head, rectangular apertures or spaces, as shown in Fig. 5. In these spaces and over the cutters or guides are placed flanged gibs G, preferably made of unequal thickness, as shown, to compensate the similar inequality of the cutter or guide, and to bring the outer face of the gib parallel with the bottom of the groove in the head. Through the ring D set-screws F are threaded to bear squarely against the gibs. The construction and arrangement of the cutters and gibs, as above described, require that the set-screws F, in order to bear squarely on the gibs, as stated, shall stand inclined from the radii of the head, as seen in Fig. 3. The gibs of course serve their usual purpose of giving broad bearing and support on the cutters for the set-screws F.

The ring E at the top or inner end of the head A' forms a flange, and is for the purpose of supporting adjusting-screws I, by which to more accurately regulate the position of the cutters and guides as to the length of their projection beyond the head. For this purpose the flanges *a* of said head are cut away to bring the body of the ring centrally opposite the ends of the cutters and guides, and the adjusting-screws I are threaded through said ring, so as to be in line with the parts to be adjusted, and to bear against their ends in the manner shown in Figs. 1 and 2. Said ring E is secured firmly in place by any suitable means, but preferably so as to be removable, if desired, for repairs or other purpose. As here shown, the ring is screwed upon the head, and is held from displacement by a screw, *e*.

The center-post C is set removably in the axis of the head A', is secured by the set-screw *c*, Fig. 4, and is detached in the customary way by a lever or wedge thrust behind it through the hole *c'*. Said center-post is constructed as a reamer for a short distance from its outer end, and is otherwise accurately cylindrical. The purpose of this construction is that said center-post may enlarge and fit itself perfectly to a central aperture previously drilled in the plate, to admit the reduced end of the reamer, and thereby serve more reliably as a support for the tool while the marginal cutters B are at work. To this end the cutters will usually be set at a proper length to begin work only after the reamer and center-post has entered the metal far enough to have lateral bearing by its cylindrical part. The guides B' severally follow the cutters B in the annular groove made by the latter, and are slightly rounded off on their edges, so as to approximate the walls of said groove, and so

as not to cut said walls and enlarge the aperture being made. The object of the guides B' is more particularly to steady the tool in its withdrawal from the plate after the completion of its work, and when the center-post ceases to be of service, because the central disk of metal in which it works is detached from the plate.

For the purpose of cutting away the burr raised by the cutters B, a secondary cutter, H, is provided, (seen in Figs. 1 and 2,) having a beveled or inclined end essentially like a reamer. This cutter is clamped in place along with and outside one of the cutters or guides, as shown, and is of course set to take into the metal of the plate when the cutters have completed or are about to complete their work.

In order that the shank A² may be fitted to the socket of any drill-press, said shank, in the tool as made for the trade, will be of the largest size likely to be required, and will be duly centered and be provided with a driving-flat, *a*². The center-post or reamer is also centered, as seen in Figs. 1, 2, and 3, so that the tool may be put into a lathe and its shank reduced to fit the drill-socket.

The operation and manner of using the tool are obvious from the foregoing description. The cutters are preferably set with reference to the depth of cut to be made, and the burr-cutter is set with reference to the thickness of the plate to be cut. A hole of size to admit the reduced end of the reamer, but of less diameter than the cylindrical part of said reamer, is first drilled in the plate to be cut, and the tool, properly secured in the drill-stock, is then brought into action. The reamer first enlarges the hole previously drilled in the plate, and makes itself a close bearing therein, so as to firmly steady the tool, after which the cutters B take into the metal. The guides B' are set to enter the annular groove made by the cutters B, and by their bearing against the wall of the groove steady the tool in its withdrawal, and prevent the cutters from marring the hole or from being broken as they are being withdrawn therefrom. When the cutters detach or are about to detach the central disk from the plate, the beveled cutter H removes the burr lifted on the adjacent face of the plate by the cutters B. As the cutters and guides wear and are ground away, the screws F are loosened, and the screws I are run inwardly to accurately adjust the position of said cutters and guides. Said adjusting-screws I may co-operate with the set-screws F in holding the cutters firmly in place.

It is evident that in the tool described all the working parts are removable or changeable at pleasure, and that said parts may be adjusted longitudinally relative to each other with respect to the thickness of the plate to be drilled, or to any other condition that may call for adjustment.

Of course, it will be practicable to make the

grooves *a'* of uniform depth and the body of the cutters rectangular; but in this case it will be necessary to grind the sides of the cutters near their working ends from time to time, to give the required clearance. This is an operation difficult to be performed by the user of the tool, wherefore the cutters are preferably made tapering from their front to their rear edges throughout their length, to give such required clearance, and so as to require no grinding, except upon their ends, for any purpose. The inclination of the bottom wall of the groove *a'* is such as to hold the cutter in proper position to clear, and the user of the tool will therefore have no care, either in sharpening or setting the cutter for accurate work. The coincident relation of the notches *d* with the grooves *a'* permits the gibs to follow the cutters into the said grooves, or to allow the cutters to be raised into said notches by inserting "lines" beneath them, or by increasing their thickness. By this means a limited variation in the diameter of the cut may be made.

25 I claim as my invention—

1. In a tool for the purpose set forth, the combination, with the head provided with longitudinal grooves *a'*, deeper at their front than at their rear margins, of the rearwardly-beveled cutters B, and means for securing them adjustably in said grooves, substantially as described.

2. In combination with the head provided with grooves *a'*, and with the cutters fitted to lie in said grooves, a ring, D, embracing said head and provided with notches *d* opposite the cutters, gibs fitted to said notches, and set-screws F, threaded through the ring in position to bear on the gibs, substantially as described.

3. In a tool for the purpose set forth, the combination, with the head having longitudinal grooves *a'* for the cutters, of the ring or flange E, secured to the head, and the adjusting-screws I, threaded through said ring, substantially as described.

4. In a tool for the purpose set forth, the combination, with the cutters, of a longitudinally-movable burr-cutter, and means for securing it adjustably in place, substantially as described.

5. In a tool for the purpose set forth, the combination, with the head, of the center-post constructed as a reamer for a portion of its length, and a longitudinally-adjustable cutter or cutters, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

J. BENNETT WALLACE.

Witnesses:

M. E. DAYTON,
JESSE COX, Jr.