(No Model.) 2 Sheets—Sheet 1.

C. SULLIVAN.

CUTTER HEAD.

No. 400,371 Patented Mar. 26, 1889.

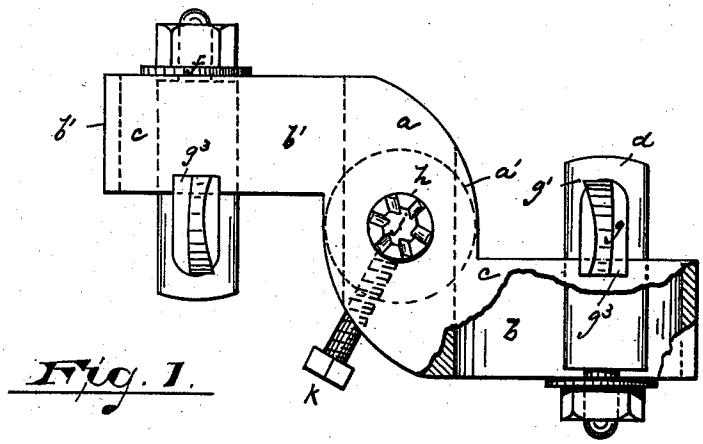


Fig. 1.

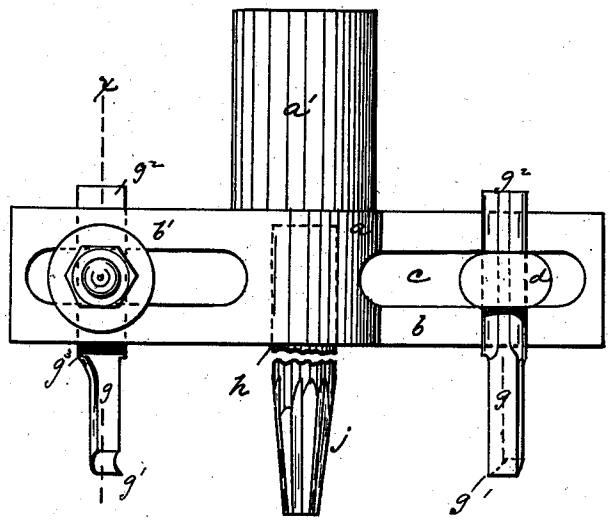


Fig. 2.

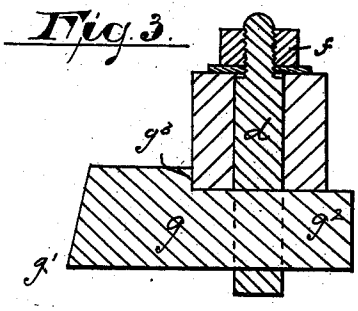


Fig. 3.

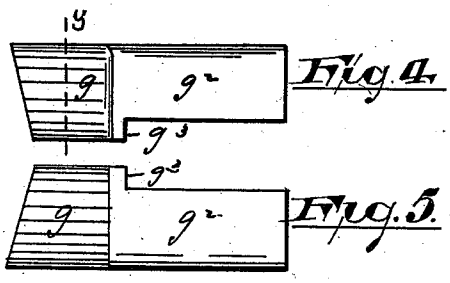


Fig. 4.

Fig. 5.



Fig. 6.

WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

C. SULLIVAN.

CUTTER HEAD.

No. 400,371. Patented Mar. 26, 1889.

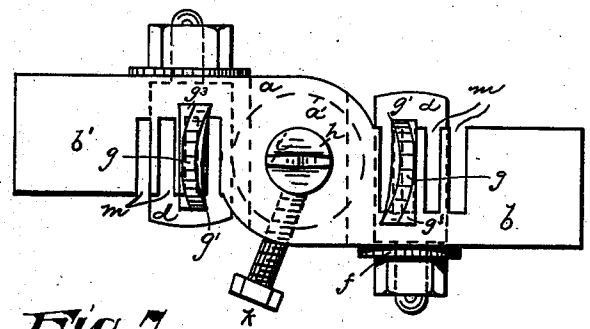


Fig. 7.

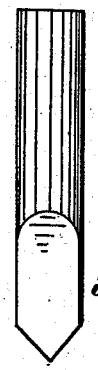


Fig. 9.

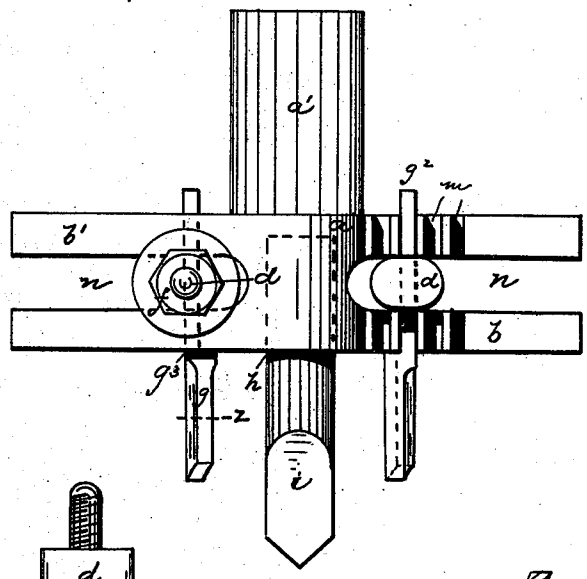


Fig. 8.

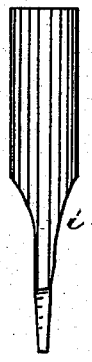


Fig. 10



Fig. 11.



Fig. 12.

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UNITED STATES PATENT OFFICE.

CORNELIUS SULLIVAN, OF NEWARK, NEW JERSEY.

CUTTER-HEAD.

SPECIFICATION forming part of Letters Patent No. 400,371, dated March 26, 1889.

Application filed August 6, 1888. Serial No. 282,062. (No model.)

To all whom it may concern:

Be it known that I, CORNELIUS SULLIVAN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Cutter-Heads; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The object of this invention is to provide an improved cutter-head and adjustable tube and boiler-sheet cutting-tool for metal work, which will permit the tool to be adjusted to the size of a hole required to be cut, and to be replaced when broken or worn out at much less cost than heretofore.

The invention consists in a peculiarly-formed cutter-head adapted to carry two cutters as well as a center drill or reamer, which serves also as a centering-tool, and in certain combinations of parts thereof, substantially as will be hereinafter set forth, and finally embodied in the clauses of the claim.

Referring to the accompanying drawings, in which like letters of reference indicate corresponding parts in each of the several figures, Figure 1 is a front view of an improved cutter-head with centering and double cutting tools embodying my improvement, with a portion broken away. Fig. 2 is a top view of the same. Fig. 3 is a section through line *x*, Fig. 2. Figs. 4 and 5 are detail views of the cutter. Fig. 6 is a section through line *y*, Fig. 4. Fig. 7 is a front view of a cutter-head where the cutting-tools are fixed in position in slots. Fig. 8 is a top view of the same. Figs. 9 and 10 are detail views of a centering-tool. Fig. 11 is a view of a cutter-stock; and Fig. 12 is a section on line *z*, Fig. 8.

In said drawings, *a* represents a cutter-head, with extending shank *a'* made integral therewith, and having arms *b b'* extending in a line, so as to bring the center of the shanks in a diametrical line with the center of the hub, and thus bring the cutting-points of the cutter a little in advance. *c c*, Figs. 1 and 2, are elongated slots in said arms, in which are secured cutter-stocks *d d*.

e e are slots near one end of said stocks, in which are secured the cutters, and the outer ends, where they extend beyond the cutter-head, are made smaller and threaded, so as to receive washers and threaded nuts *f f*, for securing said stocks to the cutter-head arms.

g g are cutters with cutting-points *g'*, as seen in Fig. 3, and the portion in the rear of the cutter-point is curved in the segments of a circle, according to the size of the hole to be cut, and whose center is the center of the cutter-head, the outer curve of the cutter being of greater circle than the inner curve of the cutter, so that the same cutter can be used for holes varying in size from the diameter of the inner circle of the cutter to that of the outer circle of the cutter. These cutters are provided with shanks g^2 g^2, which fit closely into the slots in the cutter-stocks, and have shoulders g^3 g^3 formed on the back and resting against the cutter-head, as seen in Figs. 1 and 7, or extending along the side, so as to keep the cutter steady and hold it firmly in an upright position. In the front and in the center of the cutter-head is a socket, *h*, in which is fitted the shank of a drill, *i*, as shown in Figs. 7 and 8, or the shank of a reamer, *j*, as shown in Figs. 1 and 2, and these center tools are held firmly in said sockets by set-screws *k k*.

In the form shown in Figs. 7 and 8 transverse recesses *m m* are cut in the outer arms at any desired distance apart, and slots *n n* are formed open at one end, as seen in Figs. 7 and 8. The cutter-stock is constructed similar to the one above described, the shank of the cutter being made to fit snugly in the recess *m* of the cutter-head, and the cutter-stock, with the cutter, is held firmly in place by washer and nut, as before described.

By the use of my improved cutter-head and arms in the form shown in Figs. 1, 2, and 3 the cutting-tool can be adjusted so as to cut a hole of any desired size by simply setting the tools on each of the arms at a distance from the center of the cutter-head equal to half the diameter of the hole to be cut.

In the form shown in Figs. 7 and 8 the recesses are cut at any desired distance from

the center of the head, and each recess can be marked, so that a hole in any one of the sizes can be cut by securing the tool in the designated recess.

By constructing the arms in the manner described they are re-enforced on the rear of the cutting-tool, and are thus made stronger and able to bear a greater strain. The cutter-blank is made to conform to the arc of the circle of the hole to be cut, and the shoulder formed on the back edge, as described, renders it impossible for the cutter to work up while the hole is being cut.

The center drill-tool is employed when the cutter-head is to be used in a drill-press driven by steam-power or any other way than by hand, and, in fact, combines at one operation a drill and a centering-tool, drilling the center hole and acting as a center guide for the cutting-tool.

In adjusting the drill in the cutter-head it should project far enough from the plane of the cutter-head so as to drill a hole in the place to be cut before the cutting-tool begins to work, so as to serve the purpose of a centering-tool while the cutting-tools are performing their work.

The reaming center tool or milling-tool is employed when the cutter-head is to be used with a ratchet-lever by hand, and when thus used serves the same double purpose as the drill, as before shown; but with the hand-machine I prefer to drill the center hole first by a drill and then substitute the milling-tool for the drill, as when used in this way the operation is as follows: The area of the cutting-edge on the milled center tool being less than that of the two cutters on the arms, the milled center tool does not cut as fast as the two cutters, and thus exerts a continual and even pressure on the piece to be cut out, thereby relieving the cutters on the arms from unequal strain, and, moreover, preventing the point of the cutter from catching or digging, which generally breaks the point of the cutter. When power is to be employed, the drill center tool is secured in the center of the cutter-head by the set-screw. The shank of the cutter-head, which can be made of any shape desired, is fitted and secured in the ordinary way to the spindle or socket of the drill-press. The cutters are then adjusted on the arms to the diameter of the hole to be cut and firmly secured by the washer and nut, as before described. The piece is then cut out at one operation, the drill serving at the same time as a cutting-tool.

In cutter-heads as ordinarily constructed the tool can be only used in one circle, and numerous cutter-heads are required when holes of so many different sizes are to be cut, and when the cutters in these heads break, the ends of the heads generally break off with them, causing large expense and loss of time. With my improved cutter-head the cutters are easily adjusted to any desired position, and when broken can quickly be replaced with very little loss of time and at a small expense.

Having thus described my invention, what I claim as new is—

1. The improved cutter-head herein described, consisting of a hub, *a*, a shank made integral therewith, a drill or reamer adapted to fit in a socket in the center of said hub as a center guide, arms extending from said hub, as described, longitudinal slots in said arms, cutter-stocks adjustable in said slots, and means for securing them to said arms, slots in said cutter-stocks adapted to receive the shanks of the cutters, and cutters formed as described and provided with shanks adapted to fit in the slots in the cutter-stocks, substantially in the manner as and for the purpose set forth.

2. The improved cutter-head herein described, consisting of a hub, a shank made integral therewith, a drill or reamer adapted to fit in a socket in the center of said head as a center guide, arms extending from said hub, as described, longitudinal slots in said arms, cutter-stocks adapted to fit into said slots, and means for securing them to said arms, slots in said cutter-stocks adapted to receive the shanks of the cutters, formed as described, and provided with shanks adapted to fit in the slots in the cutter-stocks, and transverse recesses in said arms adapted to receive and hold the shanks of said cutters, substantially in the manner and as and for the purpose set forth.

3. The improved cutter-head having arms extending from the hub, as described, so as to bring the cutters on a diametrical line with the hub, and provided with slots parallel to the edges of said arms, cutter-stocks secured in said slots, and curved cutters secured in cutter-stocks, substantially as and for the purpose set forth.

4. In a cutter-head provided with extending slotted or recessed arms, a cutting-tool curved in the form of a segment of a circle, as described, and provided with a shank, and means for securing said cutting-tool to said arm, substantially as described, and for the purposes set forth.

5. In a cutter-head provided with a central socket and extending slotted or recessed arms, a drill or reamer secured in said central socket as a center guide, and cutting-tools curved in the form of a segment of a circle, as described, and provided with shanks, and means for securing said cutting-tools to said arms, substantially as described, and for the purposes set forth.

6. In a cutter-head provided with extending slotted or recessed arms, a cutting-tool curved in the form of a segment of a circle of the size of the hole to be cut and provided with shanks, and shoulders formed on said shanks, and means for securing said cutting-tool to said arms, substantially as described, and for the purposes set forth.

7. The combination, with a cutter-head pro-

vided with a central socket and extending slotted or recessed arms, of a drill or reamer and center guide, curved cutting-tools, said cutting-tools being provided with shoulder-shanks, and means for securing said drill or reamer and cutting-tools to said cutter-head, substantially in the manner and as and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 2d day of August, 1888.

CORNELIUS SULLIVAN.

Witnesses:
CHARLES H. PELL,
E. L. SHERMAN.