(No Model.)

A. J. COOPER.

DRILL HEAD.

No. 526,297. Patented Sept. 18, 1894.

Fig. 1.

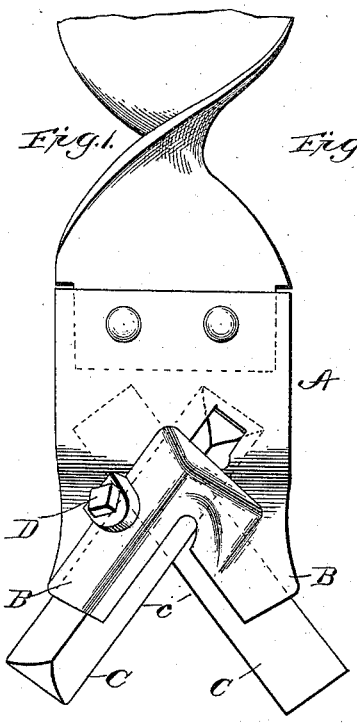


Fig. 2.

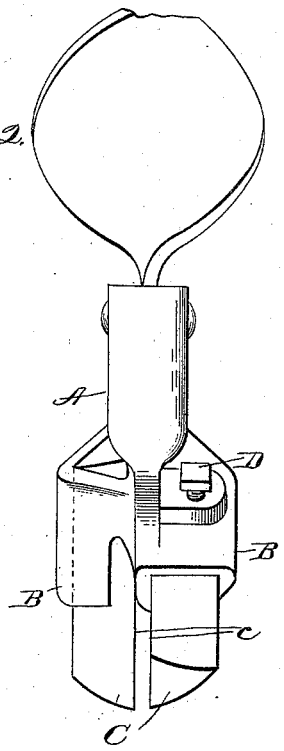


Fig. 3.

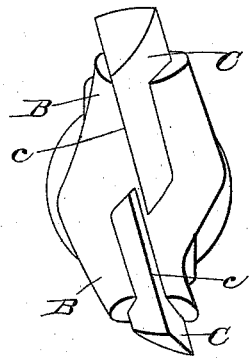


Fig. 4.

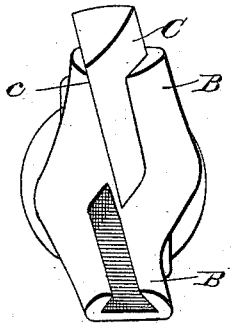


Fig. 5.

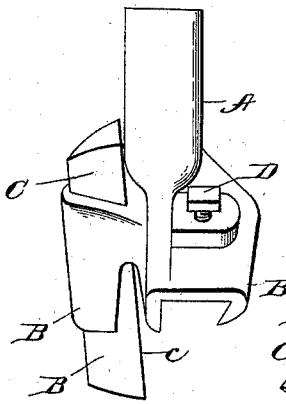
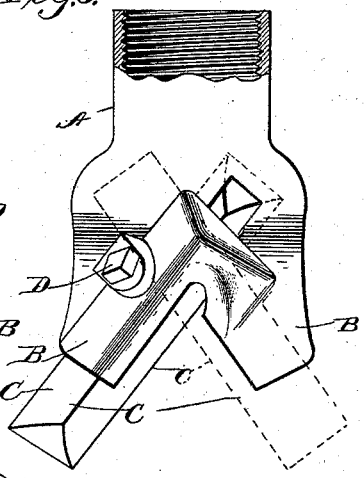
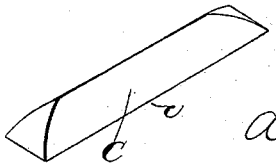


Fig. 6.





Witnesses:

J. M. Fowler

Alfred Stewart

Inventor:

Alfred J. Cooper

By Church & Church

his Attorneys.

UNITED STATES PATENT OFFICE.

ALFRED J. COOPER, OF DURYEA, PENNSYLVANIA.

DRILL-HEAD.

SPECIFICATION forming part of Letters Patent No. 526,297, dated September 18, 1894.

Application filed May 28, 1894. Serial No. 512,740. (No model.)

To all whom it may concern:

Be it known that I, ALFRED J. COOPER, of Duryea, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Drill-Heads; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates to improvements in drill heads, such as are designed particularly, though not exclusively for use in coal mining operations, the object of the invention being to provide a drill head, which may be placed upon a twisted shank of any suitable character, and having simple and powerful removable cutters, which will not only rapidly disintegrate the material, to form a hole, but be capable of adjustment to increase the diameter of the hole formed or compensate for wear upon the cutters or a reduction in their length by sharpening, &c.

The invention consists in certain novel details of construction and combinations and arrangements of parts all as will be now described and pointed out particularly in the appended claims.

Referring to the accompanying drawings: Figure 1 is an elevation looking at one side of a head constructed in accordance with my invention. Fig. 2 is an elevation taken at right angles to Fig. 1. Fig. 3 is an end view of the same. Fig. 4 is a similar view with one of the cutters removed. Fig. 5 is an elevation showing a construction employing elongated cutters, separated at the rear end to avoid the socket for the shank of the drill. Fig. 6 is an elevation showing one of the cutters removed and the socket adapted for the reception of a round ended, threaded, drill shank.

Like letters of reference in the several figures indicate the same parts.

In constructing drill heads in accordance with this invention, a casting A is provided having at the rear end a socket for the reception of the end of the drill shank, which socket may be elongated for the reception of a flat drill shank as in Figs. 1 and 2, or round as in Fig. 6.

Where the shank is flat and a flat socket provided, rivets or other equivalent fastening means may be employed for attaching the head thereto, and where it is round, it may be screwed on in the ordinary manner.

Below the socket for the drill shank, the casting is provided with two sockets B, triangular in cross section, for the reception of cutters C which are similarly shaped in cross section.

In order that the cutters may have an extended bearing in the head to give greater range of adjustment and strength of structure, as well as to provide a means whereby the central portion or core of the hole being drilled may be broken or disintegrated, as will be presently explained, the sockets B are arranged with flat faces adjacent each other, but preferably slightly separated and crossing each other at a point below the socket for the shank. This construction causes the cutters to cross in proximity to each other to project diagonally outward and by being adjusted in their sockets, it is obvious that their outer ends will turn in a larger or smaller circle, as the case may be, and by such adjustment, the size of the hole bored may be regulated, and if a standard size is to be followed, the wear on the cutters incident to breakage or sharpening may be compensated for without difficulty. Furthermore, by so arranging the cutters, the whole of their rear portions may be incased by the solid metal of the head and by slightly separating their ends or the sockets, as illustraded in Fig. 6, they may be extended up past the lower portion of the shank socket.

The flat faces of the cutters, which as before stated are triangular in cross section are preferably arranged oppositely, that is to say, one faces in one direction, and the other in the other, the cutting edges being formed by the sharpened ends of such faces, which construction not only presents the most effective cutting ends, but it also presents a breaking edge along the inner sides of each of the cutters, as shown at *c*, and by cutting away the inner portions of the sockets up to the point of crossing of the cutters, such edges become effective in breaking or disintegrating the core or small conical projection at the center of the hole without requiring that such portion be comminuted as is necessarily done by

the cutting edges, it being found in practice that such portion of the removed material is broken up into relatively large portions which escape back of the socket projections and is conveyed out of the hole by the drill shank.

Any preferred arrangement of mechanism for securing the cutters in place may be provided, but in the form shown, and as I preferably make them, set screws D are passed through the solid back wall of the sockets and impinging upon the outer flat faces of the cutters, wedge them tightly between the opposite inclined faces of the socket and prevent all liability of their working loose while being used.

It will be observed from the drawings, that the sockets B are open at the rear end and should it become necessary, because of the binding of the cutters in the sockets they may be readily driven out from the rear end. At the same time I prefer to leave some metal at the rear end of the sockets to limit the rearward movement of the cutters should they by any accident become loosened while in use and tend to bind the drill in the hole.

With a cutter head, such as described herein, it is found that the coal is disintegrated very rapidly and the speed at which the hole is formed correspondingly increased. At the same time, it is found that the drill turns very lightly and may be employed in the hand drills now in common use throughout the coal mining districts.

The triangular cross sectional structure of the cutters is peculiarly advantageous, in that by means of it long and well braced cutters may be employed projecting diagonally and the rear ends of the cutters may cross each other without destroying the proper line of cut and without the employment of an undue amount of metal which would make a heavy awkward drill head and tend to, in a large measure obstruct the free rearward movement of the disintegrated material. Furthermore, by such diagonal arrangement, the disintegrated material is given a backward impulse and to this extent assistance is rendered in clearing the hole and preventing the accumulation of disintegrating material.

The cutters, it will be further and particularly noted, are straight reversible and may be sharpened by unskilled workmen or the miners themselves by simply grinding or otherwise reducing the ends to the proper bevel to produce a smooth cutting edge, as will be readily understood.

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

1. As an improved article of manufacture the herein described drill head having the diagonally arranged sockets therein crossing each other at the rear end, and the diagonally arranged substantially straight cutters, crossing in proximity to each other, secured in said sockets, with their inner edges exposed to approximately the point of crossing; substantially as described.

2. As an improved article of manufacture, the herein described drill head having the diagonally arranged sockets crossing each other at the inner ends, triangular in cross section and having their adjacent corners cut away, and triangular cutters secured in said sockets, with approximate corners projecting through the cut away portions of the socket up to approximately the point of intersection; substantially as described.

3. As an improved article of manufacture, the herein described drill head having a socket for the attachment of the shank, the cutter sockets triangular in cross section, crossing each other at the inner end and having flat faces arranged opposite to each other as described, and the triangular cutters, adjustably secured in said sockets; substantially as described.

4. The combination with the drill having the diagonally arranged sockets crossing each other with flat surfaces arranged opposite to each other, as described, of diagonally arranged cutters crossing each other near their inner ends and having breaking edges up to the point of crossing and flat faces entering said sockets with the cutting edges at the ends of said flat faces and means for adjustably securing said cutter in place; substantially as described.

5. The combination with the head having the diagonally arranged sockets triangular in cross section crossing at the inner ends and having their approximate corners cut away to the point of intersection, of cutters fitting in said sockets and set screws passing through the outer plane faces of the sockets and bearing against flat sides of the cutters whereby the cutters are caused to wedge between the two opposite inclined faces of the sockets; substantially as described.

ALFRED J. COOPER.

Witnesses:
ALEX. S. STEUART,
THOMAS DURANT.