(No Model.) 2 Sheets—Sheet 1.

A. J. COOPER.

MINING MACHINE.

No. 409,772. Patented Aug. 27, 1889.

Fig. 1.

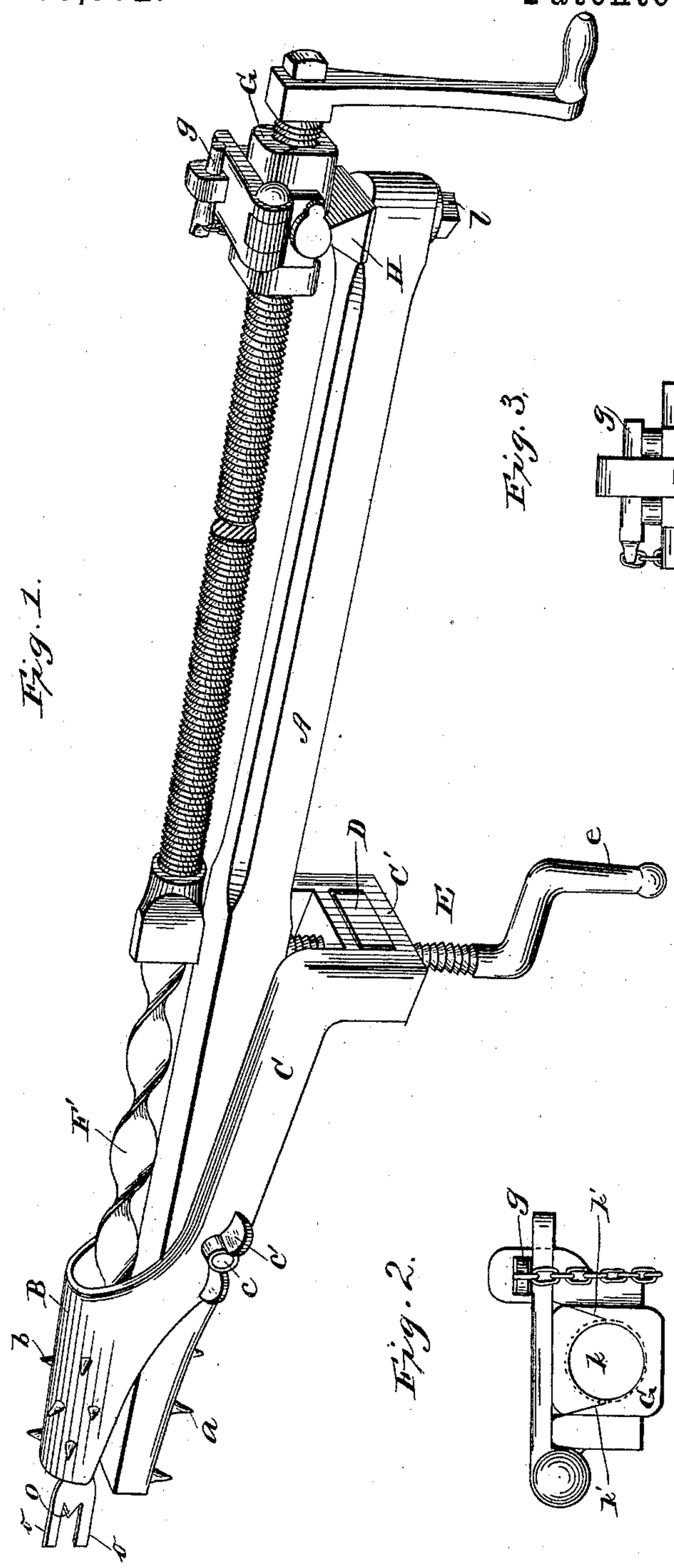


Fig. 3.

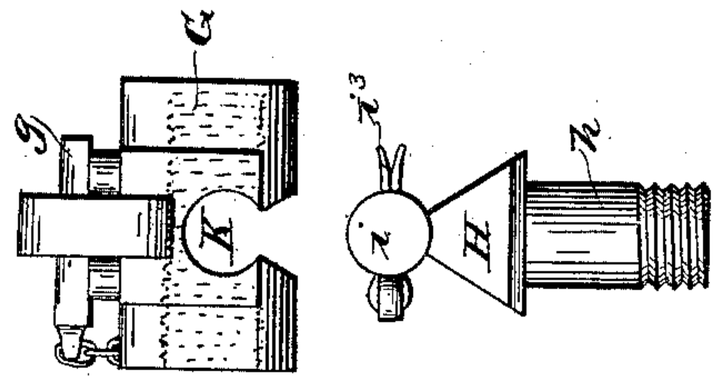
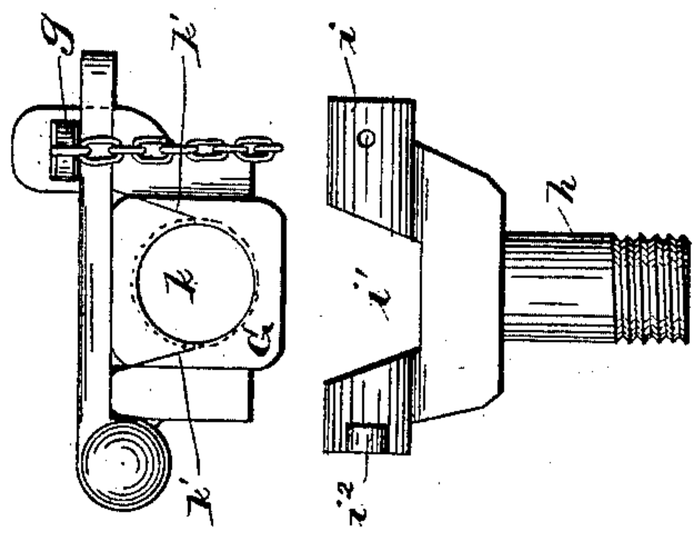


Fig. 2.



Witnesses,
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Thomas Durant

Inventor:
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by Church & Church
his Attorneys.

(No Model.)

2 Sheets—Sheet 2.

A. J. COOPER.

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Fig. 7.

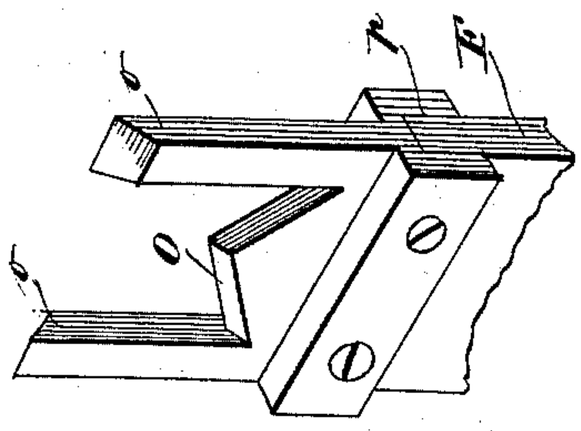


Fig. 6.

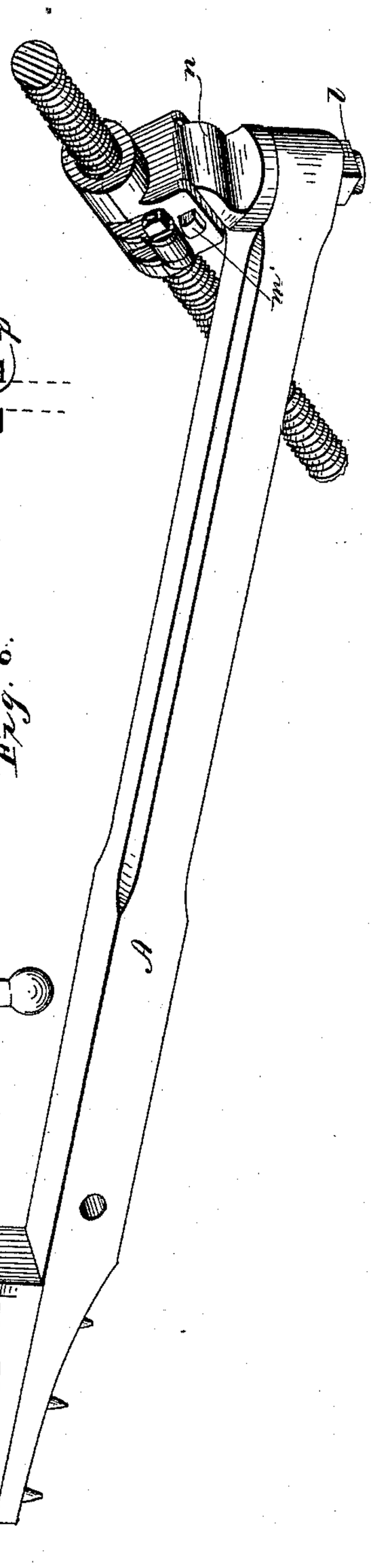


Fig. 5.

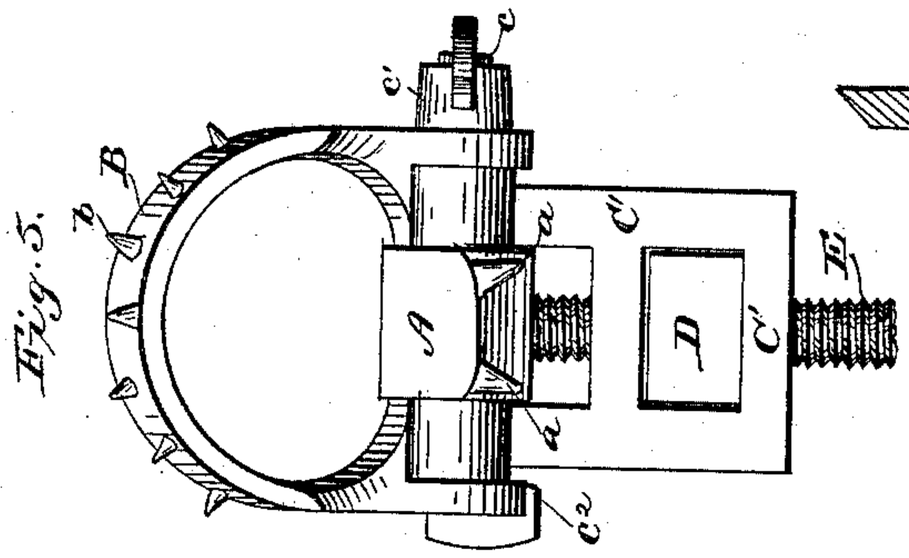


Fig. 8.

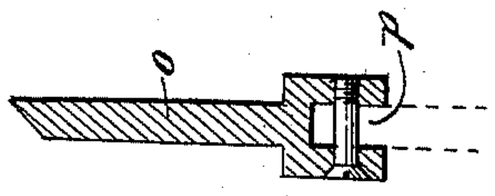
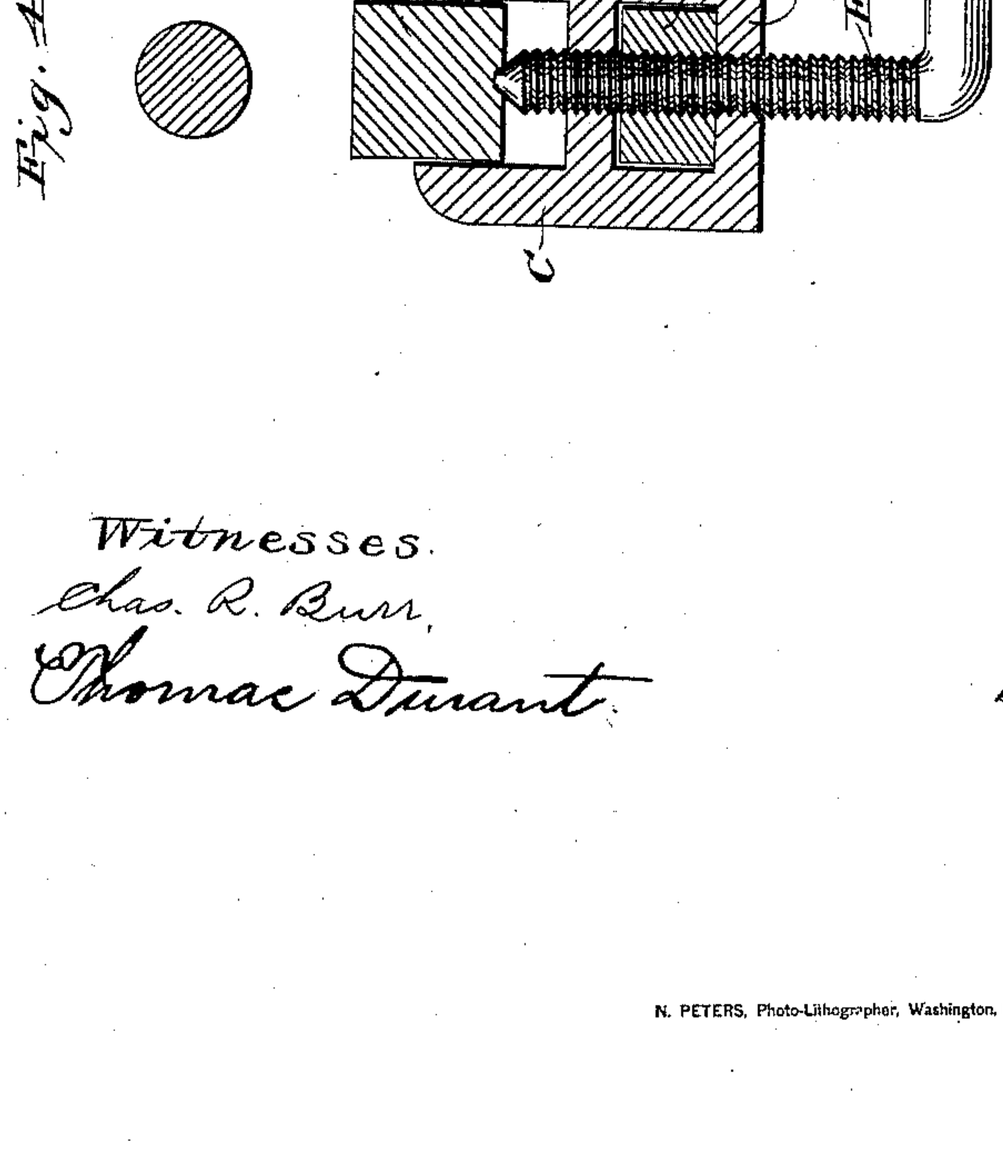


Fig. 4.



Witnesses.
Chas. R. Burr.
Thomas Durant.

Inventor
Alfred J. Cooper
by Church & Church
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UNITED STATES PATENT OFFICE.

ALFRED J. COOPER, OF DURYEA, PENNSYLVANIA.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 409,772, dated August 27, 1889.

Application filed November 24, 1888. Serial No. 291,732. (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 Mining-Machines; 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 figures and letters of reference marked thereon.

This invention relates to an improved mining-machine in which the bit or drill is turned by hand, and which are usually employed in soft rock or other substances or in mining coal, the object being to provide a drill mechanism of simple construction and of great power and utility, not easily destroyed, and the wearing parts of which can be easily replaced by the operator himself at very slight cost.

To these ends the invention consists in certain details of construction and combinations and arrangements of parts, to be hereinafter described, and pointed out particularly in the claims at the end of this specification.

Machines of this class have heretofore been provided with teeth and smooth jaws or toothed extensions, with wedges which enter an aperture or opening formed in the rock or other substance to hold the drill-frame steady and in proper position while the drill is being operated. In machines having the jaws mentioned the jaws are either pivoted together similar to a pair of scissors, with a screw-thread for forcing the outer ends apart, or else have been pivoted together or mounted on spring-arms and a screw employed to draw the outer ends together or force the jaws apart. It has also been proposed to hinge the jaws together along one side and force them apart by a wedge driven between the edges of the opposite sides. In all these constructions, however, great difficulty is experienced in tightening the jaws in the aperture where the bit works through the jaws and at the same time maintaining the bit in proper alignment, or else the jaws are not adapted to have the bit work through them at all, in which case another difficulty arises from the increased leverage exerted on the supporting-bar, tending to throw the same out of its true position without any means of compensating for such deflection or of preventing it in the first instance.

A further object of my invention is to overcome the objections pointed out, and to provide a nut for the screw-threaded bit-stock, which lies close to the supporting-bar, and to so construct the jaws as to permit them to be adjusted to compensate for the deflection caused by the bit or drill.

In the accompanying drawings, Figure 1 is a perspective view of a drilling mechanism constructed in accordance with my invention. Figs. 2 and 3 are front and side elevations, respectively, of the nut for the bit-shank. Fig. 4 is a sectional view of the cross-piece and nut. Fig. 5 is an end view of the jaws. Fig. 6 is a view of the supporting-bar with the upper jaw removed, wedges being employed for retaining the bar in the aperture. Fig. 7 is a view of the cutting end of the bit or drill. Fig. 8 is a sectional view of the cutting end of the bit removed.

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

The bar A constituting the supporting-frame is preferably straight for the sake of cheapness and strength, and is provided at the end which enters the coal with points or holding-projections *a*, the area of the bar at this point being only slightly if at all increased.

B designates the movable jaw having projections or holding-points *b* thereon for engaging the sides of the aperture opposite to the projections on the bar A. This jaw is convex on the outside and hollow on the inside, as shown, rearward extensions or arms C being formed on each side and connected at the ends by cross-piece C′, said cross-piece having an opening or socket in the same for the reception of the loose nut D, for a purpose to be presently explained. The movable jaw is pivoted to the bar A by a bolt *c*, passing entirely through the same and having the thumb-nut *c′* on one end to permit of the ready removal of the bolt. The head of the bolt is provided with a point or projection c^2, which engages the jaw to prevent the rotation of the bolt. The arms C it will be noted pass diagonally across the bar A, the cross-piece C′ thus being on the opposite side from

the jaws, and when said cross-piece is forced away from the bar the end of the bar and the jaw will be separated.

For the purpose of forcing the cross-piece and arms away from the bar, as indicated, I provide an adjusting-screw E, which passes through the cross-piece and removable nut D and bears against the bar, an operating-handle *e* being provided, as shown. The cross-piece as well as the nut is preferably screw-threaded, and should the threads become worn or destroyed a new nut may be readily substituted. The bit or drill F′ ordinarily works through the movable jaw, thus securing the benefit of the aperture already made in the coal for the insertion of the jaw and bar, and the screw-threaded shank of the bit is carried by the threaded nut G, preferably formed in halves hinged together with a pin *g* for retaining them closed, as is ordinarily done, whereby the shank and bit may be moved up to the face of the coal at the point to begin drilling and may be quickly withdrawn after the hole is finished.

As ordinarily constructed, the nut for holding the shank of the bit stands some distance above the level of the bar, and in order that the bit may work between the jaws the bar has to be bent, and when the bar is not so bent the leverage exerted by the nut tends to hoist and force the bar out of position, destroying its grip in the coal.

In my preferred construction shown in Figs. 2 and 3 the nut is brought down close to the bar in the following manner: The swivel-piece H, which permits of lateral swing of the shank and bit, is provided with a shank *h*, fitting within an annular opening in the end of the bar. At the top the swivel-piece is formed into a pintle or pintles *i*, with a portion cut away in the center at *i′*, as shown in Fig. 2, one end of the pintle *i* having the projection or lug i^2 thereon and the opposite end an opening or aperture therein for the reception of the key or cotter i^3. The nut, besides being formed with the screw-threaded aperture K for the reception of the shank of the bit, is formed with a circular bearing *k* at right angles thereto, the lower portion of the bearing being open. The nut is slipped onto the pintle of the swivel from one end, the lug i^2 abutting against the side of the nut, preventing it from passing entirely through, and the contracted lower portion of the bearing K preventing its removal upward, at the same time permitting a limited swinging motion of the nut in a vertical plane, the portion of the nut between the bearing *k* being cut away at *k′* to permit of a greater movement in this direction and at the same time afford the necessary strength. The pin or cotter i^3 before mentioned is inserted in the end of the pintle to prevent the nut slipping off. It will now be seen that when the nut is in position on the swivel the screw-threaded shank passes almost directly between the bearing-points on the pintle of the swivel-piece, which piece may be very short, as shown, permitting the shank to lie close to the bar. The swivel-piece is held in position in the end of the bar by nut *l*. By this construction of the nut and swivel-piece they may be easily formed of castings and require no special tools or forge-work in the fitting, the miners being able to secure the parts ready-made and apply them themselves.

In Fig. 6 the bar is shown with the movable jaw removed, as may become necessary, the ordinary mode of fastening with wedges driven in above the bar being employed, and the swivel-piece and nut are in this instance modified somewhat, the nut having a recess therein with depending sides and the swivel-piece a pintle *n*, which fits into the recess, the parts being connected by a bolt or bolts *m′* passing through the depending sides into the pintle.

The preferred form of cutter or cutting end for the bit consists of two or more relatively long teeth *o o*, substantially the same size from top to bottom and with the cutting-jaws relatively wider than the rear edges, to afford clearance room and also to permit of their being sharpened until the points are entirely worn away. Between the teeth—preferably at the center—is a breaker or tooth O, designed to break the portion of the coal passing back of the center and not acted on by the cutters *o o*, thus doing away with the necessity of cutting or grinding over the whole area of the bottom of the hole and also preventing a large portion of the coal from being ground up too fine for practical use, the central tooth chipping and splitting it into relatively large pieces, which are immediately caught by the twisted portion of the bit and conveyed out of the hole. This cutting-point is preferably made separate from the twisted portion of the bit and of a single piece of cast-steel or drop forging, and for the purpose of properly securing it in position on the twisted portion a recess *p* is cast in the base, into which the ends of the twisted portion are fitted, the two being secured together by screws countersunk into one side of the socket and engaging screw-threads in the opposite side, thus leaving no projections to interfere with the passage of the coal. When the cutting point is removable the twisted portion of the bit may be cheaply made of iron, the point only being of steel, which may be removed and new ones substituted at very slight cost.

Referring now particularly to Fig. 5, it will be seen that the movable jaw is of relatively large area where it bears on the coal and is provided with a number of holding-points, while the area of the portion of the bar which bears on the coal is quite small. Thus, when the screw is tightened up and the jaw and bar forced apart the tendency will be to drive the bar farther into the coal than the jaw, this resulting in a slight depression of the end of the bar in the coal and the consequent elevation of the end on which the bit is

mounted, the result being that any sag occasioned by the working of the bit above the level of the bar and the consequent binding of the bit may be readily overcome. By the employment of the removable nut D it will be seen that when the threads are cut or worn away by the heavy pressure brought to bear on them in order to hold the drill-frame in position, it is not necessary to throw away the entire jaw, but a new nut may be substituted at very slight cost.

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

1. In a mining-machine, the combination, with the supporting bar or frame and the jaw pivoted thereto having the opening through the same on one side of the bar or frame, and the adjusting-screw on the opposite side of the bar or frame for moving the pivoted jaw away from the bar or frame, of the nut mounted on the bar in line with the opening through the pivoted jaw, and the bit mounted in said nut and working through the opening in the jaw, substantially as described.

2. In a mining-machine, the combination, with the supporting frame or bar, of the hollow jaw pivoted thereto having the two rearwardly-extending arms passing diagonally across the frame or bar—one on each side—the cross-piece uniting the arms, and the adjusting-screw passing through the cross-piece and engaging the bar, whereby the jaw and bar may be separated, substantially as described.

3. In a mining-machine, the combination, with the supporting frame or bar, of the jaw pivoted thereto having the rearwardly-extending arms, the removable nut held by the arms, and the adjusting-screw passing through the nut and engaging the bar to separate the jaw and bar, substantially as described.

4. In a mining-machine, the combination, with the supporting frame or bar, the hollow jaw pivoted thereto having the rearwardly-extending arms and the cross-piece uniting their ends, of the socket in the cross-piece and the removable nut therein, the adjusting-screw passing through the nut and engaging the bar, and the bit to adjust the hollow jaw mounted on the bar in line with the opening through the jaw and adapted to operate between the jaw and bar, substantially as described.

5. In a mining-machine, the combination, with the frame or bar having the end for engaging the coal and the nut carrying the bit on the opposite end, of the jaw pivoted to said bar having the end for engaging the coal of larger area than that of the bar, and means for separating the ends of the bar and jaw, whereby the bar will be forced into the coal and its outer end elevated to bring the bit into line with the hole being bored, substantially as described.

6. In a mining-machine, the combination, with the frame or bar having the ends for engaging the coal and the hollow jaw pivoted thereto having the end for engaging the coal of relatively larger area than that of the bar, of the rearwardly-extending arms having the connecting-piece with the adjusting-screw passing through the same and the bit mounted on the bar and in line with the opening through the jaw, whereby it is adapted to work between the bar and jaw, substantially as described.

7. The combination, with the frame or bar and bit having the screw-shank, of the nut for said shank having the open bearing in the bottom and the swivel-piece mounted on the bar and having the pintle fitting within the open recess in the nut, substantially as described.

8. The combination, with the frame or bar and bit having the screw-threaded shank, of the nut for said shank having the open bearing therein with the contracted bottom and the swivel-piece mounted on the frame or bar and having the round pintle engaging the bearing in the nut, substantially as and for the purpose specified.

9. The combination, with the frame or bar, the bit having the screw-threaded shank and the nut therefor having the open bearing therein, of the swivel-piece mounted on the bar and having the round pintle with the central portion cut away for the passage of the screw-shank, substantially as described.

10. The combination, with the frame or bar, the bit having the screw-threaded shank and the nut therefor having the open bearing with the contracted lower portion, of the swivel-piece pivotally mounted on the frame or bar and having the round pintle engaging the open recess, the lug at one end, the cut-away portion at the center, and the pin at the other end, substantially as and for the purpose specified.

11. An improved cutter for rotary mining-drills, having the twisted shank with the forwardly-extending circumferential cutting-teeth having the cutting-surfaces of substantially the same width from top to bottom and the tooth between and below the plane of the cutting-edges for breaking the central core left by the circumferential cutting-teeth, substantially as described.

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ALEX. S. STEUART.