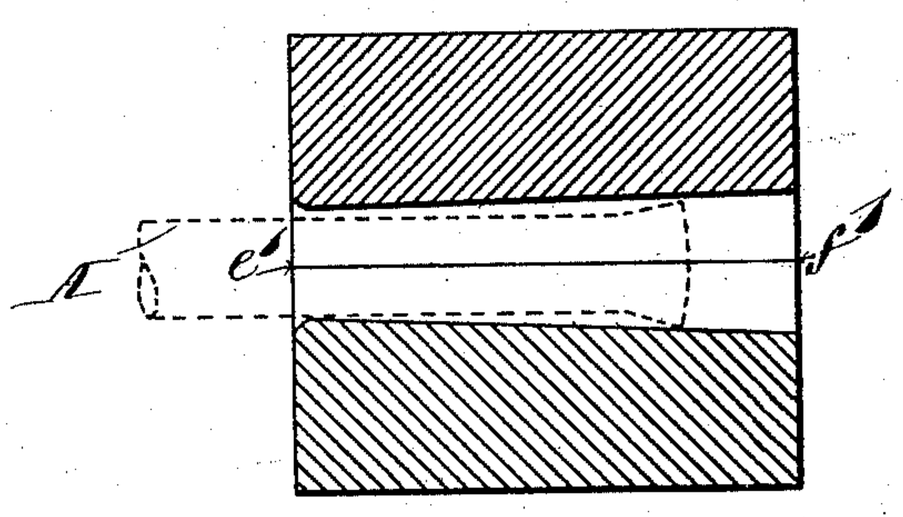
(No Model.) 4 Sheets—Sheet 1.

T. H. BRADBURY.

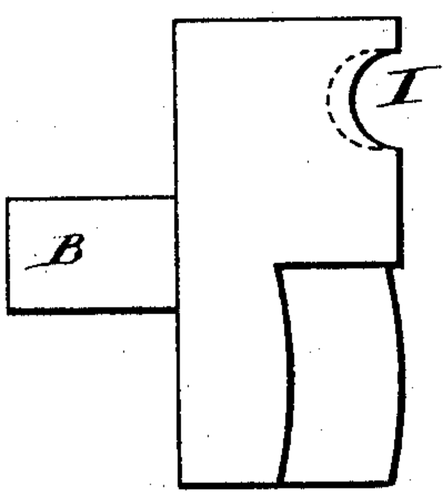
ROCK DRILL SHARPENER.

No. 603,887. Patented May 10, 1898.

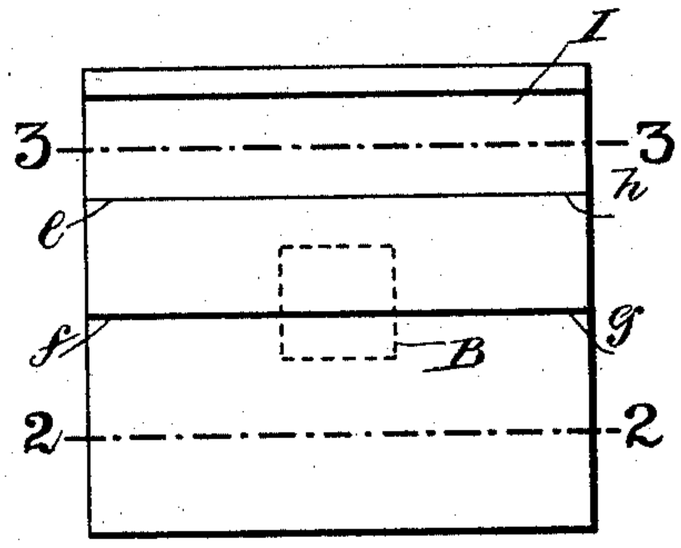
— Fig 3. —



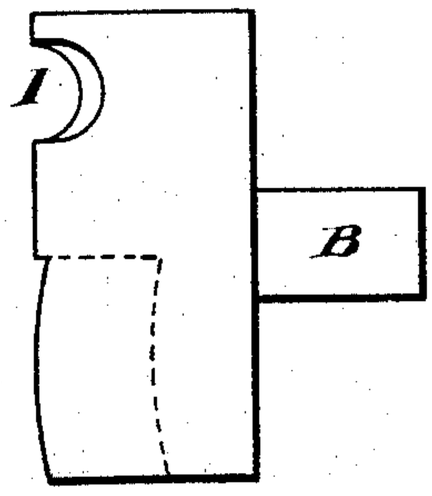
— Fig 5 —



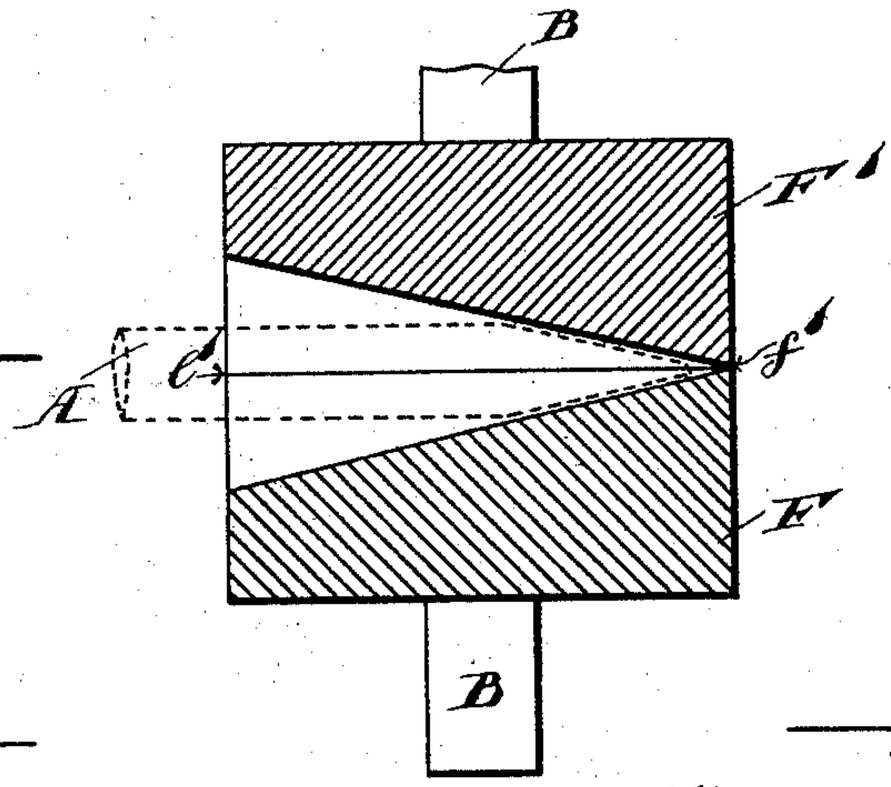
— Fig 1. —



— Fig 4. —



— Fig 2. —



Witnesses. —

John Barton.

Edmund C. Walker

— Inventor. —

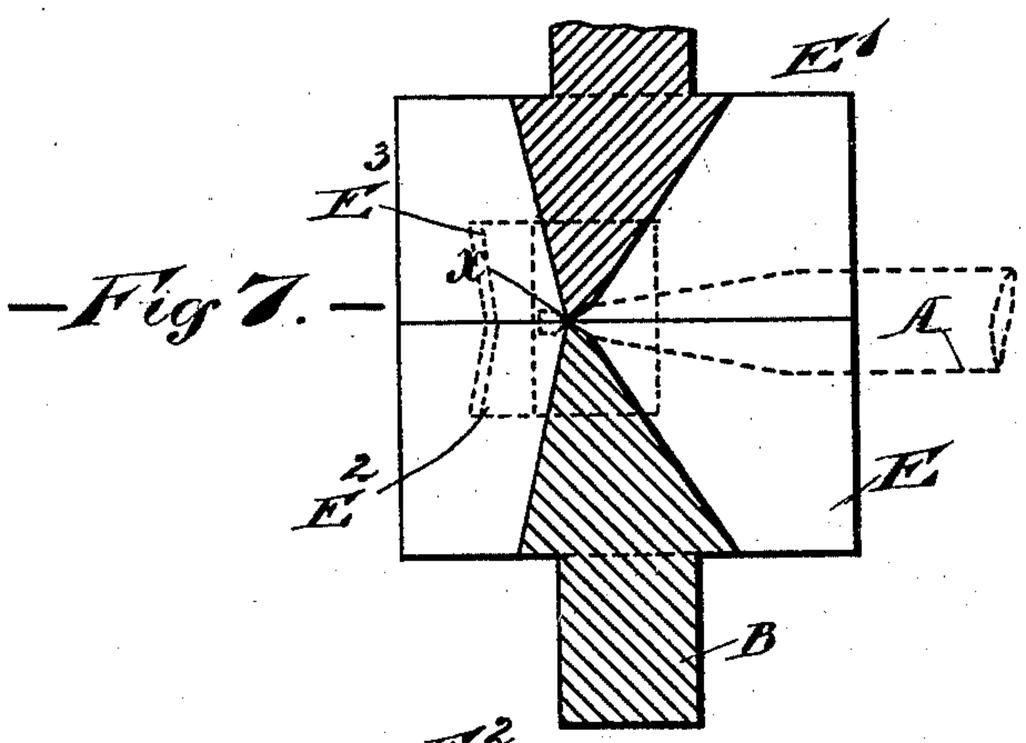
Thomas Henry Bradbury

(No Model.) 4 Sheets—Sheet 2.

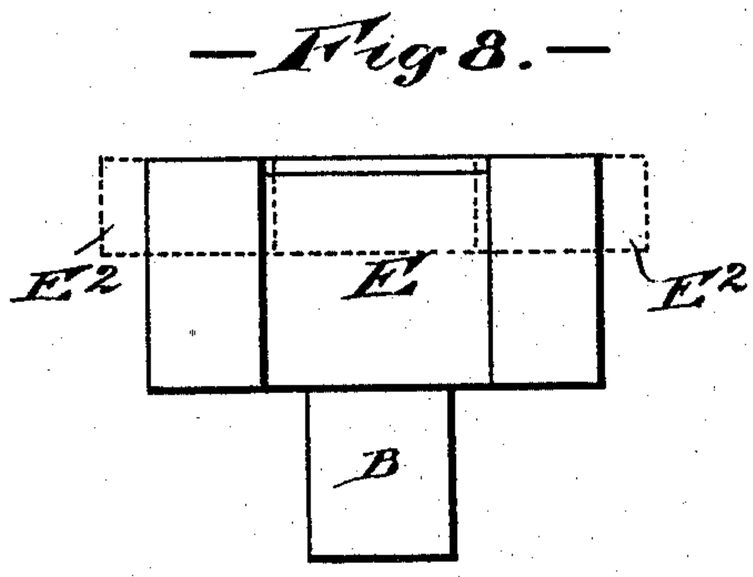
T. H. BRADBURY.

ROCK DRILL SHARPENER.

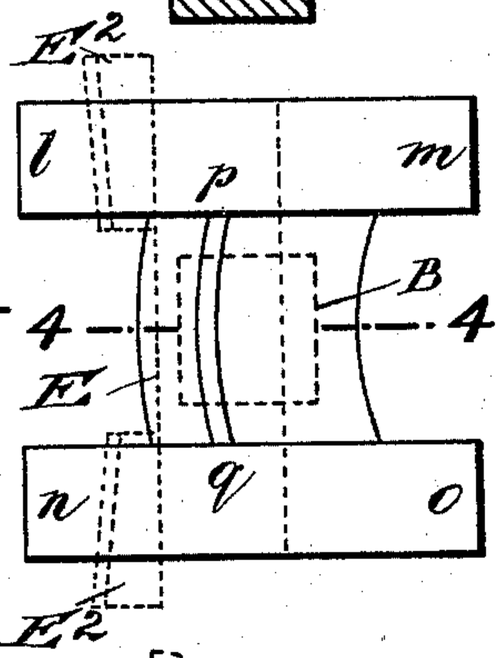
No. 603,887. Patented May 10, 1898.



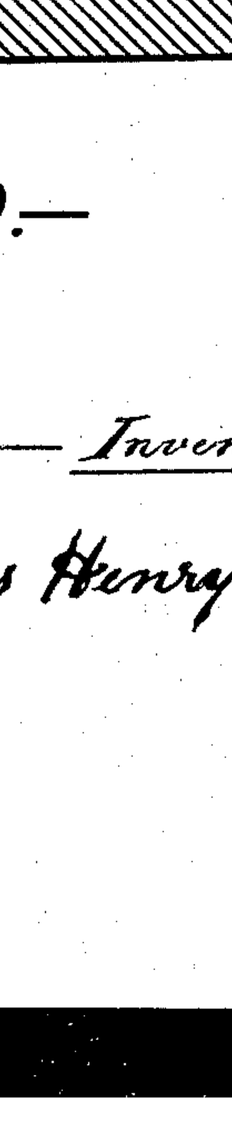
—Fig 7.—



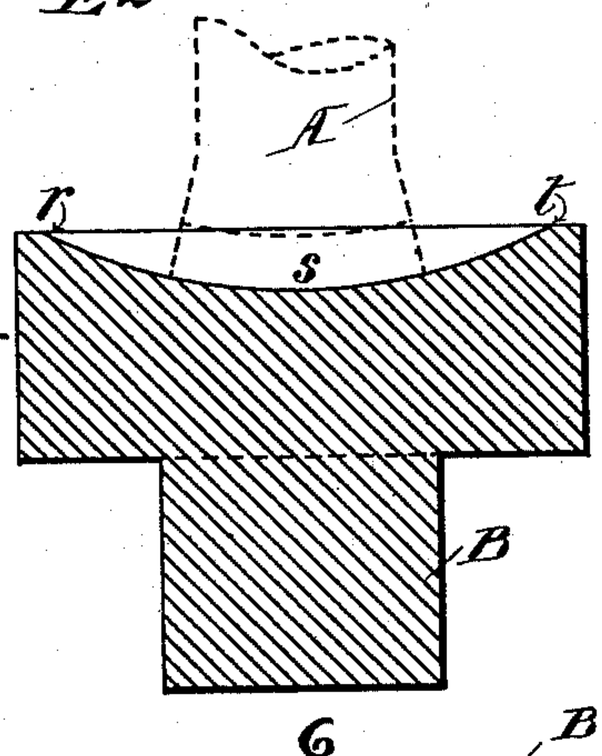
—Fig 8.—



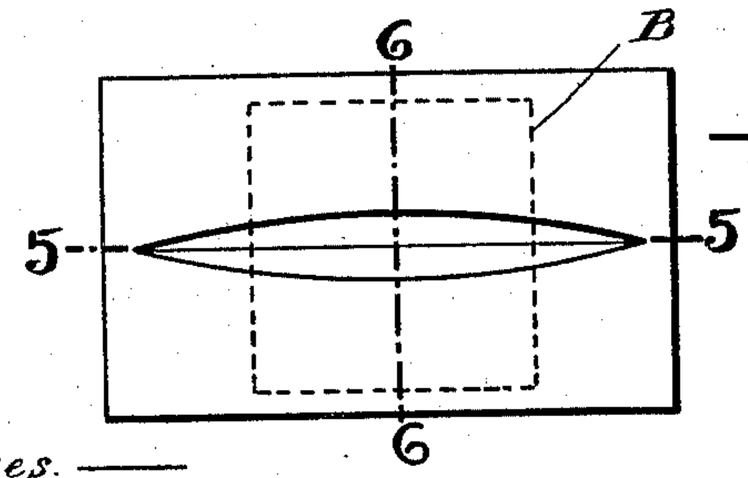
—Fig 6.—



—Fig 10.—



—Fig 11.—



—Fig 9.—

Witnesses.

John Dawson

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Inventor.

Thomas Henry Bradbury

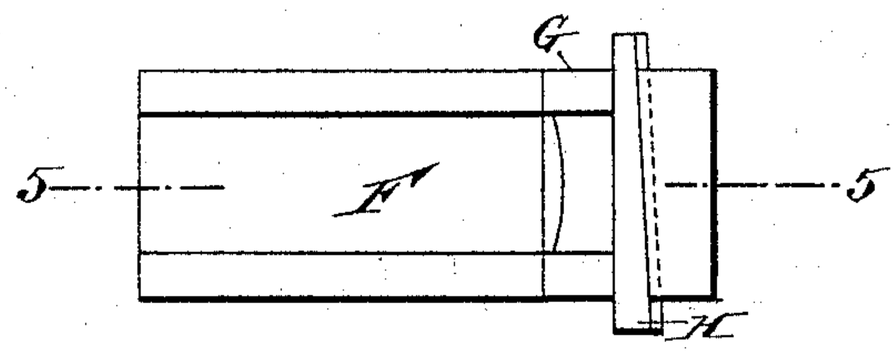
(No Model.) 4 Sheets—Sheet 3.

T. H. BRADBURY.

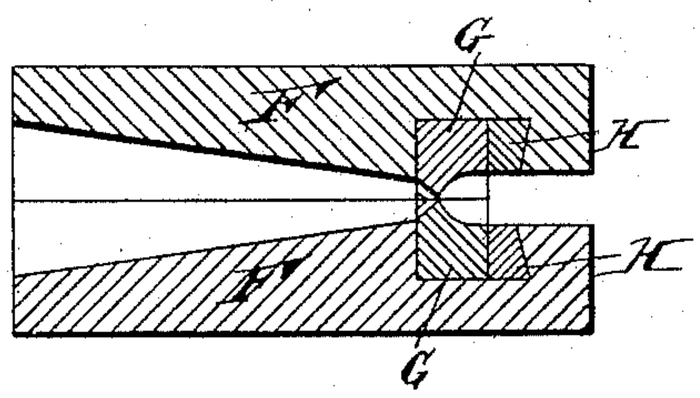
ROCK DRILL SHARPENER.

No. 603,887. Patented May 10, 1898.

— Fig. 6.A —



— Fig. 6.B —



Witnesses;
H. Graham
E. L. Todd

Inventor:
Thomas Henry Bradbury,
by Graham & Low,
attorneys.

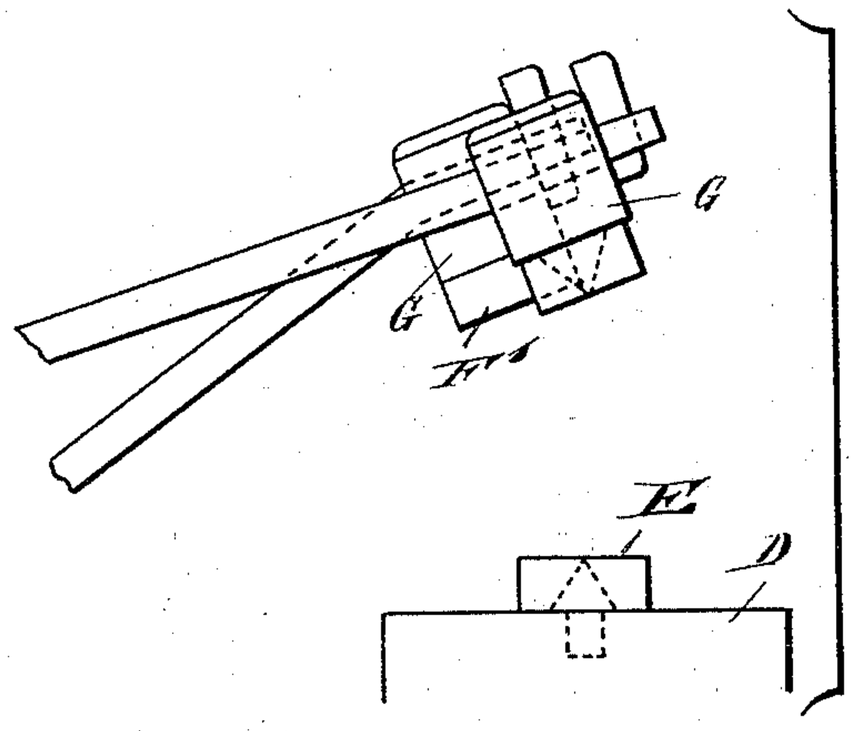
(No Model.) 4 Sheets—Sheet 4.

T. H. BRADBURY.

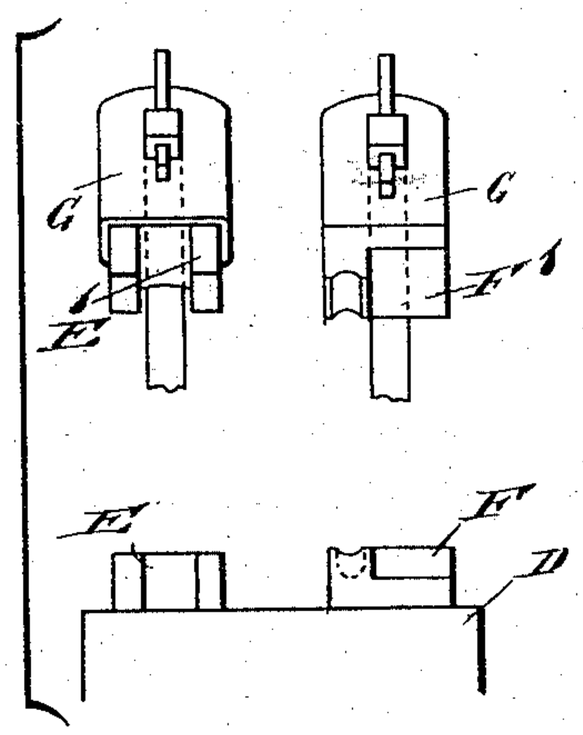
ROCK DRILL SHARPENER.

No. 603,887. Patented May 10, 1898.

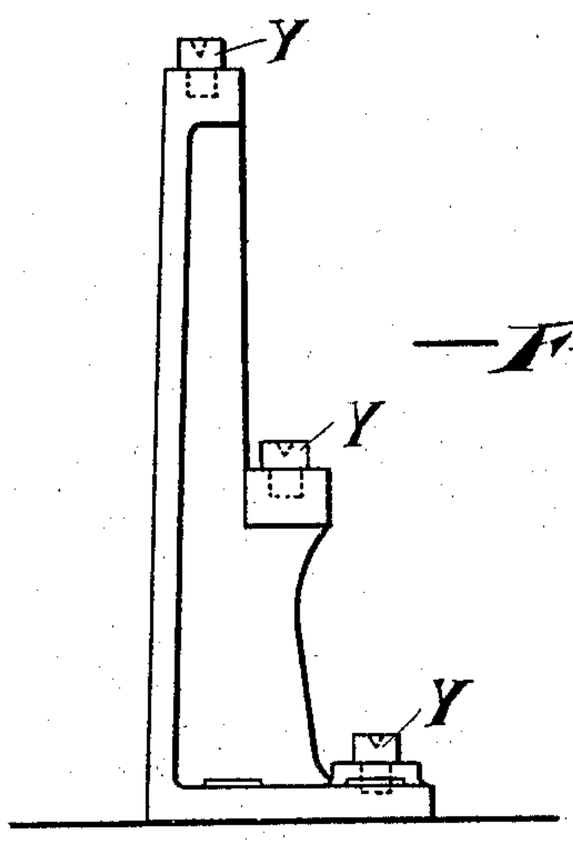
—Fig 12.—



—Fig 13.—



—Fig 14.—



—Fig 15.—

Witnesses.—

John D. Larson

Chas. C. Walker

—Inventor.—

Thomas Henry Bradbury

UNITED STATES PATENT OFFICE.

THOMAS HENRY BRADBURY, OF JOHANNESBURG, SOUTH AFRICAN REPUBLIC, ASSIGNOR TO THE BRADBURY'S WORLD PATENT DRILL SHARPENER COMPANY, LIMITED, OF LONDON, ENGLAND.

ROCK-DRILL SHARPENER.

SPECIFICATION forming part of Letters Patent No. 603,887, dated May 10, 1898.

Application filed December 16, 1895. Serial No. 572,338. (No model.) Patented in South African Republic March 1, 1894, No. 612.

To all whom it may concern:

Be it known that I, THOMAS HENRY BRADBURY, a subject of the Queen of Great Britain, residing at Johannesburg, in the district of Heidelberg, in the South African Republic, have invented a certain Improvement in Rock-Drill Sharpeners, (for which I have obtained Letters Patent in the South African Republic, No. 612, dated March 1, 1894,) of which the following is a specification.

In making and sharpening rock-drills by hand, as a blacksmith does with a hand-hammer, a large number of blows or strokes have to be given, and the time occupied is correspondingly extended.

The object of my invention is to replace hand labor by machinery, which secures the result required in shorter time, while the quality of the work done is certainly equal, if not superior, to that produced by hand labor.

The drills to which my invention more especially refers are those used by miners for drilling holes in rock or stone and of the shape known as "chisel-bits," and I attain my object by using dies of special and appropriate shapes, so that the hot and plastic metal is reduced, squeezed, or compressed to the required shape without necessity for superior and trained skill in workmanship. If, further, the specially-designed dies are driven with sufficient force onto the plastic metal, I secure the exact shaping with very few blows, and thus attain the end by combining accuracy of shape with economy of time.

The above-mentioned dies may be used in any suitable machine adapted to bring them in contact with the drill-rod with a heavy blow. For example, the machine known in the iron-workers' trade as an "oliver" is very suitable for the purpose, or a steam-hammer may be employed where such is available. As the machines in which the dies may be used are of ordinary well-known construction and do not form part of my invention, I have not deemed it necessary to describe them in detail or to illustrate them by drawings, except as to the particular parts of an oliver, for example, to which the dies are immediately connected.

In the drawings, Figures 1, 2, 3, 4, and 5 show what I call the "shaper" and "gager" dies, Fig. 1 being a plan of the lower or anvil die; Fig. 2, a section of both top and bottom dies, taken on line 2 2 of Fig. 1; Fig. 3, a section of both top and bottom dies, taken on line 3 3 of Fig. 1; and Figs. 4 and 5, end elevations of the bottom die, being projections of Fig. 1. Figs. 6, 7, and 8 show what I call the "cutter-dies," Fig. 6 being a plan of the lower or anvil die; Fig. 7, a section of both top and bottom dies, taken on line 4 4 of Fig. 6; and Fig. 8, an elevation of the die shown in Fig. 6. Figs. 6^A and 6^B show shaper and cutter dies combined in one pair of twin blocks. Figs. 9, 10, and 11 show what I call the "finishing-dies," Fig. 9 being a plan, and Figs. 10 and 11 sections on lines 5 5 and 6 6, respectively, of Fig. 9. Fig. 12 is a side elevation, and Fig. 13 a front elevation, showing two hammers G G′ and the anvil D of an oliver, with the shaper and gager dies F F′ fixed in relation to one of the hammers and the cutter-dies E E′ fixed in relation to the other of the hammers G. Figs. 14 and 15 are respectively an elevation and a plan of a stand or bracket adapted to receive and hold the finishing-dies.

The hammer-heads G G′ of the oliver may conveniently weigh about thirty-five pounds each, and the blow of the upper die, fixed in the hammer-head, is delivered on the steel drill-rod, resting in the lower die, fixed on the anvil D, by working the treadle-levers of the oliver in the usual way.

The shaper, gager, and cutter dies may be made as one pair of blocks, upper and lower, or each twin die may be made in separate pairs of blocks, in which last case each twin may be fitted to a separate hammer-head and anvil; but Figs. 1 to 5 show a convenient way of cutting the shaper and gager dies out of two blocks of steel, one for the anvil-dies and the other for the hammer-dies, while the cutter-dies are made of two other blocks of steel to be worked with an independent hammer and anvil, which I find more convenient in practice.

The finishing-die shown in Figs. 9 to 11 is a single die on which the drill is finished. This die is single—that is to say, does not consist

of twin parts—and is not used in an oliver, steam-hammer, or other like machine for giving blows; but the drill is jumped onto it, as will be hereinafter explained.

Fig. 1 represents the anvil part of the shaper and gager dies in plan; Fig. 4, a back elevation, and Fig. 5 a front elevation or the elevation facing the operator. The hammer part of the dies is not shown in Figs. 1, 4, and 5. Fig. 2 is a section of the shaping-die through line 2 2, showing both hammer and anvil parts. Fig. 3 is a section of the gaging-die through line 3 3, also showing both hammer and anvil parts.

It will be noted that the sections Figs. 2 and 3 represent the dies in close contact, as they would be at the end of the blow of the hammer on the anvil.

e f g h in Fig. 1 is a flat or bearing surface on the anvil-die, which receives or seats a corresponding flat on the hammer-die, which serves the purpose of preventing the hammer and anvil dies from crushing one another on the edges or weak parts and arrests the blow of the hammer when the top and bottom dies come into contact. The plane of these flats is represented in the sections Figs. 2 and 3 by the line *e' f'*.

Fig. 6 is a plan of the anvil part of the cutter-die, of which Fig. 8 is an elevation.

Fig. 7 represents a section of the anvil and hammer parts of the cutter-dies in contact and bearing on the flats *l m n o*, *x* being the point which represents in section the cutting edge shown at *p q* in the plan. The curve *p q* is identical with the curve or camber which it is desired to give to the edge of the drill, while the short bevels of the cutter correspond and coincide with the short bevels of the drills.

Instead of the cutting edges of the cutter-die being made in one with the parts E and E', respectively, they may be made separate and removable and be fitted into recesses in the parts E and E', as shown by dotted lines in Figs. 6, 7, and 8, being secured in such recesses by dovetailed keys E^2 E^3 or by other suitable means.

Fig. 6^A is a plan of the anvil part of a shaper-die having a cutter-die combined therewith, and Fig. 6^B a section on line 5 5 of Fig. 6^A of same, together with the corresponding hammer-die. In this arrangement F are shaper-dies somewhat similar to those shown in Figs. 1, 2, 4, and 5, but having fitted at their ends a pair of cutter-dies G, which are let into recesses in the blocks of the dies F and are held in place by dovetail keys H. This arrangement may be used for shaping and cutting the points of new drills; but it is more especially suitable for mending or sharpening blunt drills, in which case the red-hot blunt point is laid with its front end on the cutting edge of the cutter G in the anvil-die and a single blow with the hammer die suffices to swage or shape the tapered part of the drill by the shaper-dies F and at the same time to cut the short bevels at the point thereof by means of the cutters G.

Fig. 9 represents the finishing-die in plan. This is a single die which is not used in the oliver, steam-hammer, or other like machine for giving blows, but is set up firmly in a position handy to the operator. In practice it is convenient to have three of these dies set up at different heights from the ground, so that the operator may use one or the other, according to the length of the drill which he is finishing.

Figs. 14 and 15 show a convenient stand or bracket for setting up the finishing-dies Y at different heights from the ground.

Figs. 10 and 11 show sections of the finishing-die taken through the lines 5 5 and 6 6, respectively. The hollow of this die is identical in shape with the edge and short bevel of the drill intended to be made—that is to say, the curvilinear bottom of the hollow indicated by *r s t* in Fig. 11 is struck with the same radius as *p q* in Fig. 6, while the V-shaped section of Fig. 10 has the same angle as the short bevels meeting at *x* in Fig. 7. The hollow, however, is longer than the breadth of the drill, so that the corners of the drills shall not touch the die laterally when the drill is inserted in this hollow. Figs. 10 and 11, showing sections of the die and elevations of the drill A, will indicate this clearly.

The drawings show the shanks or squares B, by means of which the dies are set or keyed in the hammer-heads G G' and in the anvil D of the blow-delivering machine or in the stand, bracket, or anvil for the finishing-die, as the case may be. Figs. 1 to 8 are drawn to a scale of half full size, Figs. 9, 10, and 11 full size, and Figs. 12 to 15 to a much smaller scale.

The dies are made of steel and properly tempered to the same degree of hardness as is usual for iron cutting or drilling tools—that is, pale blue or straw color.

It has not been lost sight of that the material to be operated on is a steel bar or rod and the object to be attained is to shape the end of this bar or rod into that of a rock-drill, whether the rod may have been previously used as a drill or not.

The end of the rod A is heated in a smith's fire or any appropriate furnace in the same way as a blacksmith or workman would do to the proper degree of heat adapted for forging steel. The operator then seizing the rod in his hand transfers the hot end thereof to the anvil-die F of the shaper, (see Figs. 2, 12, and 13,) and bringing the hammer-die F' down flattens that end of the metal into a wedge with one blow of the hammer if the latter is sufficiently heavy or falls with sufficient energy. Fig. 2 shows the rod A, in this process the operator being supposed to be at the left hand and facing the open side of the two inclined planes of the shaping-die, from which side he has introduced the rod A to the die. He then removes this wedged end

of the rod or bar A to the anvil part E of the cutting-die, (see Figs. 6, 12, and 13,) and placing the end of the wedge flatwise on the cutting edge *x* he brings the corresponding die E′ down onto it and clips off the blunt or rough end of the wedge, as shown in Fig. 7. The same blow forms the short bevels of the drill, as well as its curved cutting edge. This operation of forming the short bevels of the drill by means of cutters is an important feature of my invention, as by its means the point of the drill is made as dense and as hard by the one cutting operation as it has heretofore been made by numerous blows of a hammer administered to it in the ordinary process of sharpening by hand. The two operations above described have, however, tended toward spreading the hot metal, so that the gage of the drill will be wider than the diameter of the rod, and the drill will also be found at this stage to have been left with a bur on its edge. The operator therefore as soon as the hammer cutter-die E′ rises removes the drill to the gaging-die, Fig. 3, and placing the drill A with its edge vertical in the groove of the anvil part of that die he brings the hammer part of the die onto it, as shown in that figure. It will be noticed here that when the upper and lower dies of the gager are in contact, as shown in Fig. 3, the diameter of the opening in the dies facing or toward the hand of the operator is equal, or nearly so, to that of the drill; but the grooves I of the dies deepen in section toward the other face of the dies, while their sides remain parallel in plan. The consequence is that the operator can gage his drill to any sizes between the depth of the grooves next to his hand and the depth of the grooves at the opposite end by simply holding the drill at any intermediate position between the ends of the grooves. Having shaped, cut, and gaged the drill, the operator removes the bur from the edge and finishes the drill by standing it, cutting edge downward, in the finishing-die, as shown in Fig. 11, and with a hand-hammer deals one or more blows on the top end of the drill. The short bevel of the drill fits closely in the hollow of the finishing-die, while the cutting edge lies in the angle at the bottom of the hollow, as at *y* in Fig. 10. The effect of the blow on the end of the drill is to force the bur back into the hot metal, while the edge and short bevels are smoothed, made more compact, and finished. The drill is now complete, and being allowed to cool to the proper tempering color is plunged into water or other cooling liquid in the usual manner, and when cold is ready for use.

I claim—

In a drill-sharpening apparatus the combination with cutting and shaping dies, of the gaging-dies comprising the upper and lower dies having the grooves I formed with parallel sides and tapering with respect to each other on their upper and lower surfaces, for the purpose of centering and gaging the sharpened drill.

In witness whereof I have hereunto set my hand in presence of two witnesses.

THOMAS HENRY BRADBURY.

Witnesses:

THOMAS NEWMAN MARKS,

CHARLES BENJAMIN WILEY.