

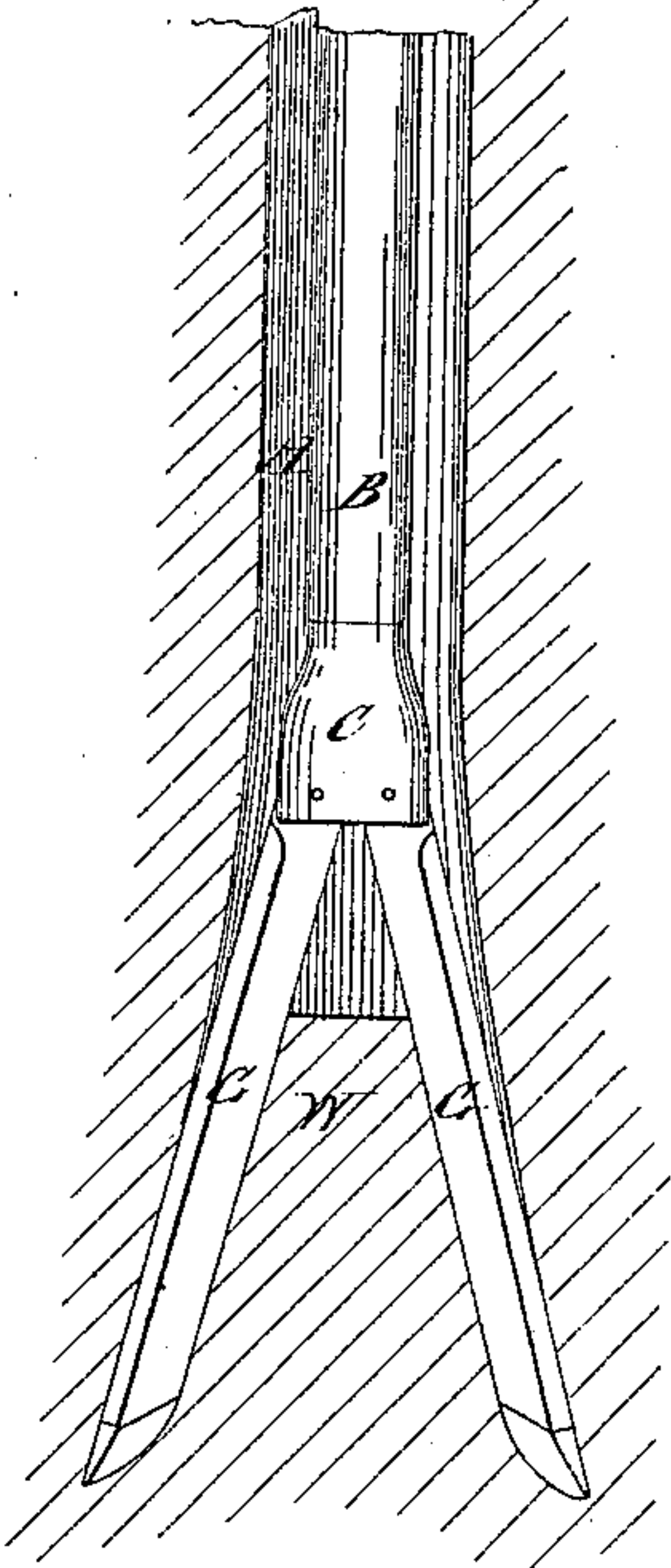
*A. Hamar,*

*Expanding Rock Drill.*

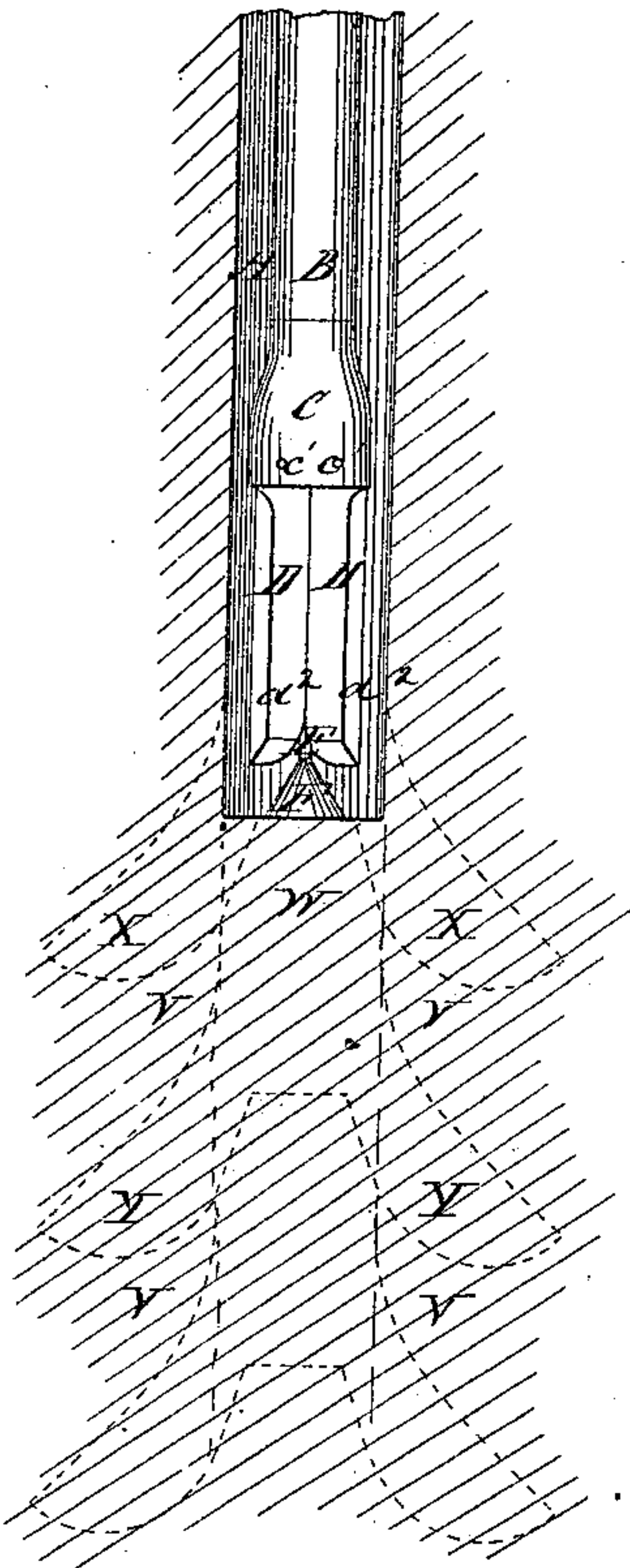
*No 54,144.*

*Patented Apr. 24, 1866.*

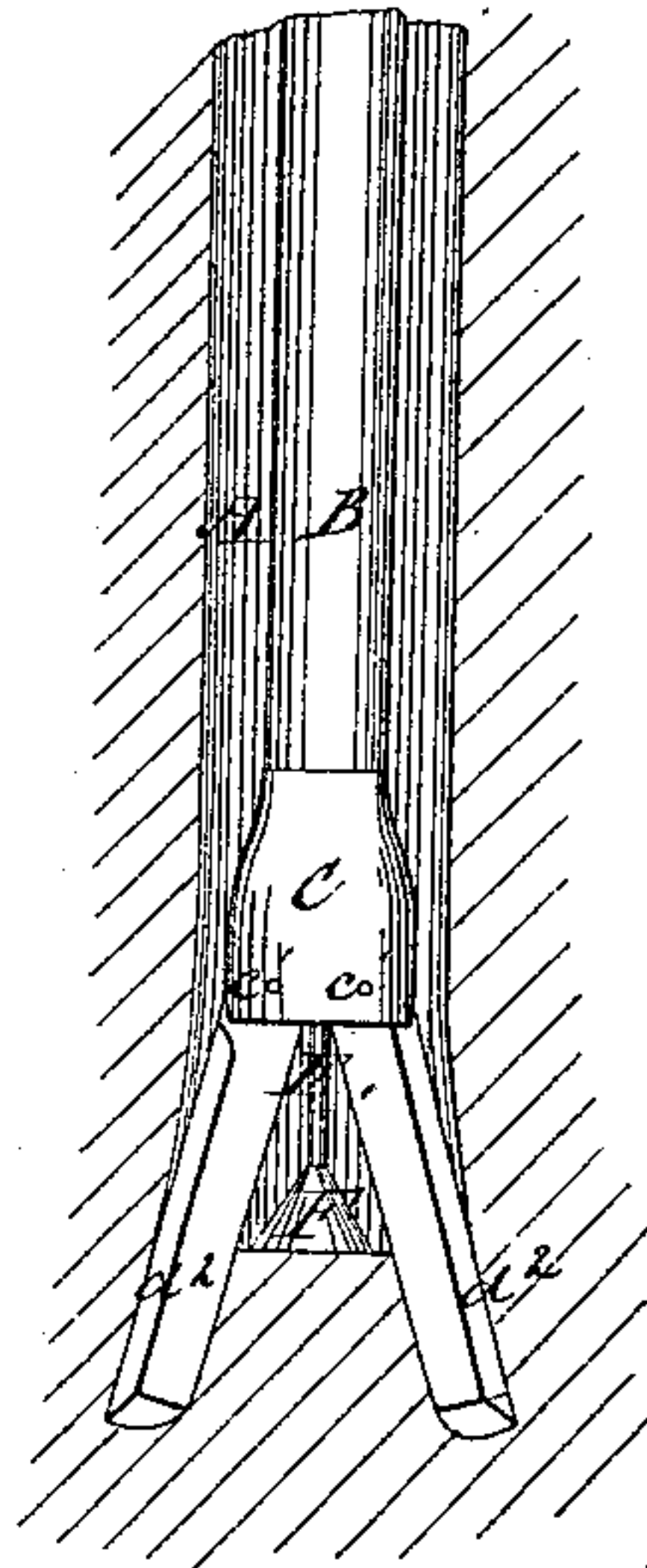
*Fig. 3*



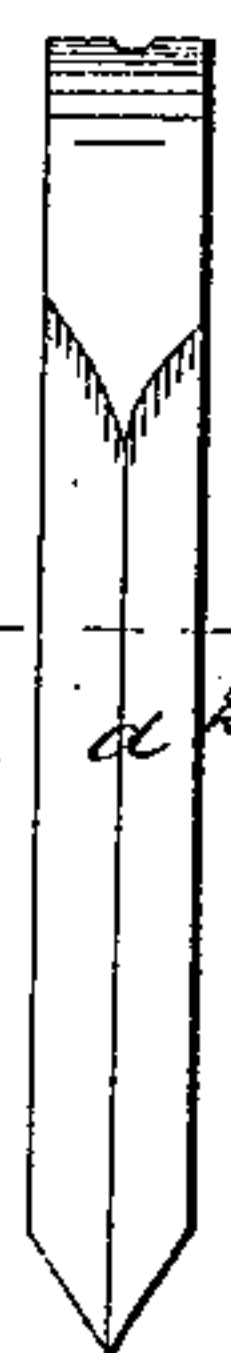
*Fig. 1*



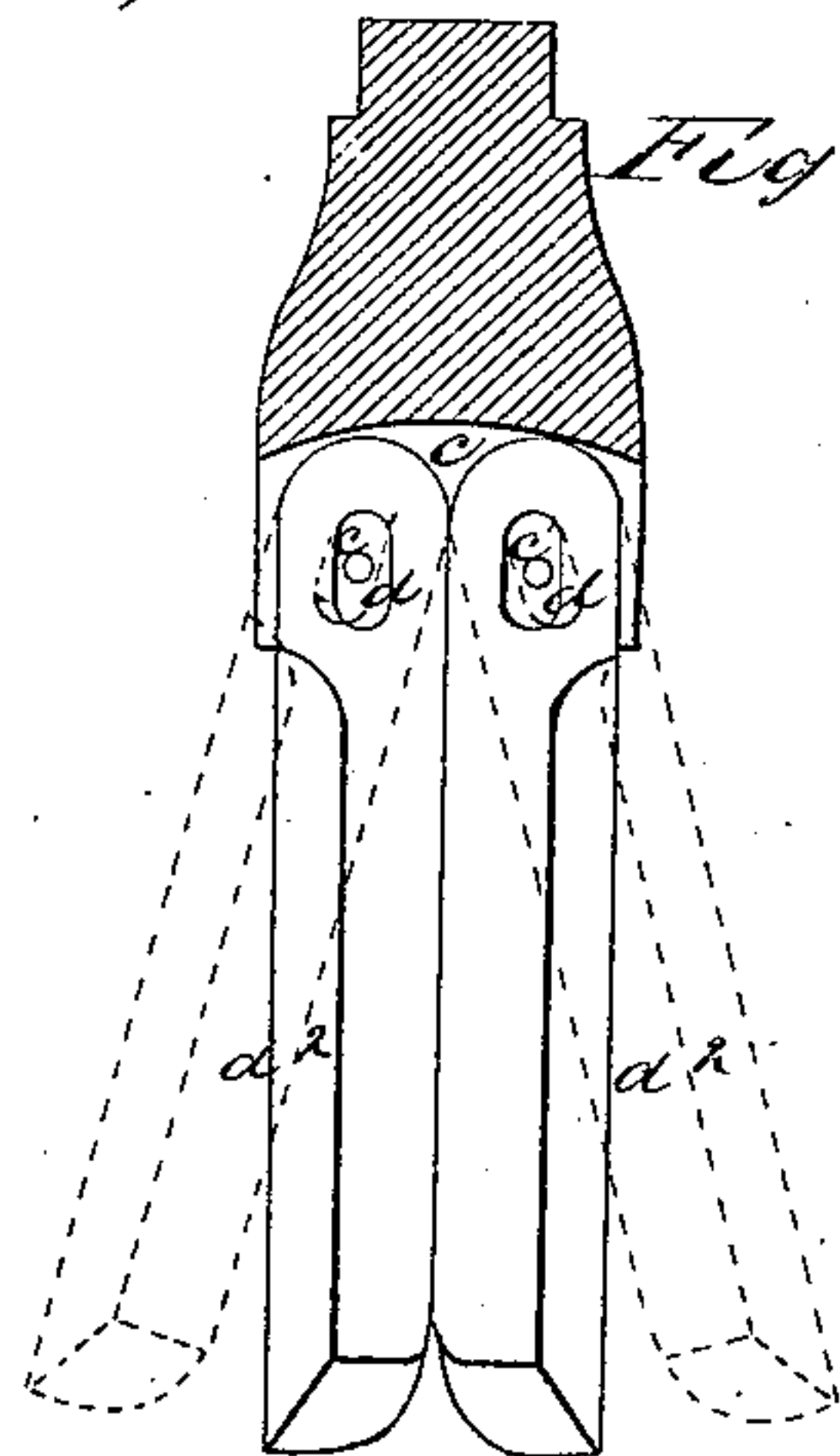
*Fig. 2*



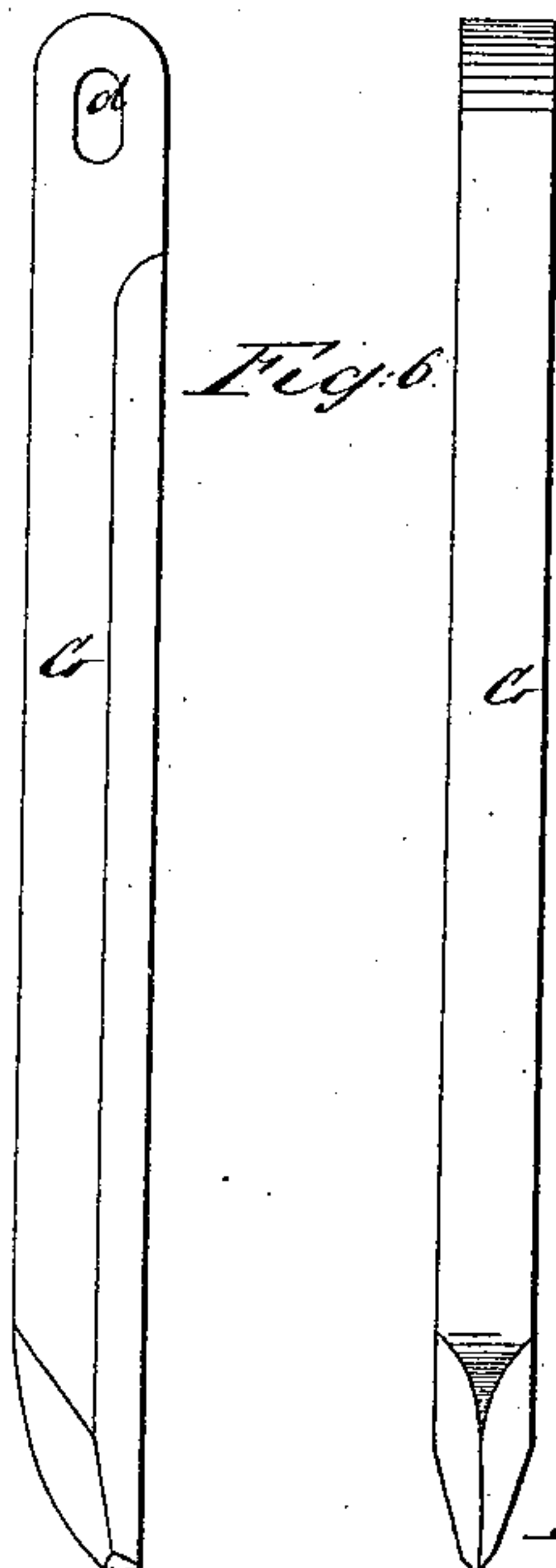
*Fig. 5*



*Fig. 4*



*Fig. 6*



*Witnesses*  
*John I. Peyton.*  
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# UNITED STATES PATENT OFFICE.

ALEXANDER HAMAR, OF NEW YORK, N. Y.

## IMPROVED MODE OF BORING ARTESIAN WELLS.

Specification forming part of Letters Patent No. 54,144, dated April 24, 1866.

*To all whom it may concern:*

Be it known that I, ALEXANDER HAMAR, of the city, county, and State of New York, have invented a new and useful Improvement in Tools for Boring Artesian Wells, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which make part of this specification, and in which—

Figure 1 represents a section of a well containing my improved boring-tool. Fig. 2 represents a similar view of the same, showing the drill enlarging the bore. Fig. 3 represents a similar view, showing my secondary drills. Fig. 4 is a section through the drill-stock, showing the mode of hinging the expanding cutters. Fig. 5 shows the details of the primary cutters, and Fig. 6 side and edge views of the secondary cutters.

It is the object of my invention to bore a hole of a diameter greater than that of the drill or cutters; and to this end the improvement herein claimed consists, first, in hinging a pair of drills or cutters to the drill-stock in such manner as to permit their cutting-edges freely to diverge from each other, and so forming such cutting-edges that the concussion of the downward stroke will cause them to diverge, and thus to enlarge the diameter of the bore, while on the upward stroke their own gravity will cause them to approach each other and resume their position in line with the drill-stock; second, in combining, in a boring-tool, a perforated drill-stock having two hinged and grooved expanding cutters with a guide-rod passing through the drill-stock, and provided at bottom with a conical expanding block; third, in constructing the expanding cutters so as to allow them free play on their pivots, and so curving their upper ends and the cavity of the drill-stock in which they play that the impact of the drill will cause the cutters so to bear against each other and against the cavity of the drill-stock as while expanding the cutters to relieve the pivots from the strain of the concussion and throw it upon the drill-stock and cutters.

In the accompanying drawings, which exemplify one mode of carrying out the objects of my invention, A represents the bore of the well. To the drill B a stock, C, is connected in any suitable manner. The cutters D are pivoted in a slot, *e*, in the stock by means of

slots *d*, which are large enough to permit them to play loosely on their pins or pivots *e*'.

By reference to Fig. 4 of the drawings it will be seen that the top of the slot *e* is arched, forming, as it were, the arc of a circle of large diameter, while the upper ends of the cutters are curved, so as to form arcs of circles of small diameter. A groove, *d'*, is likewise formed on the inner side of each cutter. (See Fig. 5.) Sharp cutting-edges *d*<sup>2</sup> are formed on the outer edges of the cutter and at the bottom; but the inner bottom edges are rounded, as shown in the drawings, to aid the glancing stroke.

The drill and stock are perforated axially to receive a guide-rod, E, having on its lower end a conical plug, F, which I prefer to form of steel or other hard metal.

The operation is as follows: We will suppose, for instance, an oil-well to have been bored to the proper distance, in any of the well-known ways, and that it is desired to form an enlarged chamber at the bottom of the well to expose a greater area of the vein, or to form a reservoir for pumping. Now, in order to form this chamber I let my improved boring-tool down into the well, as shown in Fig. 1, and commence drilling, by alternately lifting and dropping the drill in the usual way. The cone-plug F, however, remains on the bottom of the well, while the drill slides freely on the guide-rod. The guide-rod E and cone F are more for the purpose of keeping the drill accurately in the center of the hole than for expanding the drill, for if the cone were on one side the cutters and drill, in their descent, would graze against the side of the well to which they were nearest, and thus shove the cone toward the center. The rounded edges of the cutters cause them to glance outward, so that, after a few strokes, they assume the position shown in Fig. 2, where, it will be seen, they do not touch the cone F.

When the drill strikes, the sockets *d* permit the cutters to slide on their pivots until they strike each other and the arch of the slot *e*, when they roll upon each other, as the curve of the arch tends to force them inward, and thus to expand the cutters. This rolling contact materially diminishes the friction which would be caused by the simple sliding contact of the two surfaces. Fig. 4 shows this mode of operation, and from it it will be seen that the ex-



pansion is entirely independent of the guide-cone F.

When the cutting has progressed as far as shown in Fig. 2, I remove the cutters D and guide-cone and insert longer ones, G, Fig. 3, which travel in the paths previously cut, and continue to cut diverging bores until the required depth is obtained.

To form an enlarged chamber I first drill two diverging holes, *x*, Fig. 1, leaving a cone, W, in the center, as shown in Fig. 3. Through this cone I drill, in the ordinary way, a short distance, and then bore two more diverging holes, Y, Fig. 1. This process may be repeated as often as required. The result is to leave a series of diverging holes separated by ledges or shelves U. These may be broken away by the use of a torpedo. The débris caused by its explosion will fall to the bottom and leave the chamber clear.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the drill-stock, of the hinged expanding cutters, when constructed, arranged, and operated substantially as described.

2. The combination of the guide-rod and cone with the drill-stock and expanding cutters, substantially as and for the purpose described.

3. Expanding cutters having free play on their bearings to relieve their pivots from all strain of the concussion, and so formed as to be expanded by the contact of the drill-head.

In testimony whereof I have hereunto subscribed my name.

ALEXANDER HAMAR.

Witnesses:

EDM. F. BROWN,  
J. I. PEYTON.