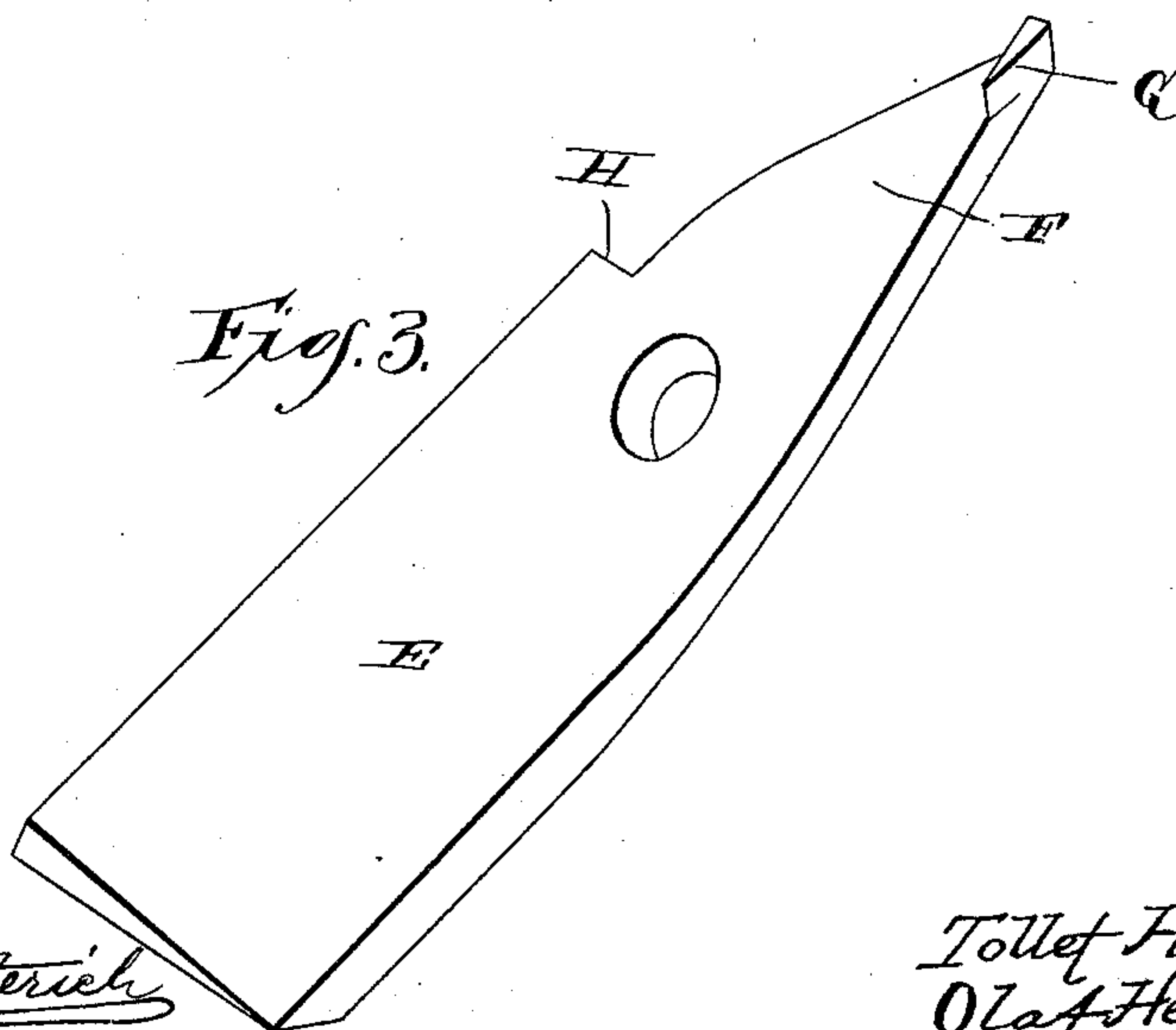
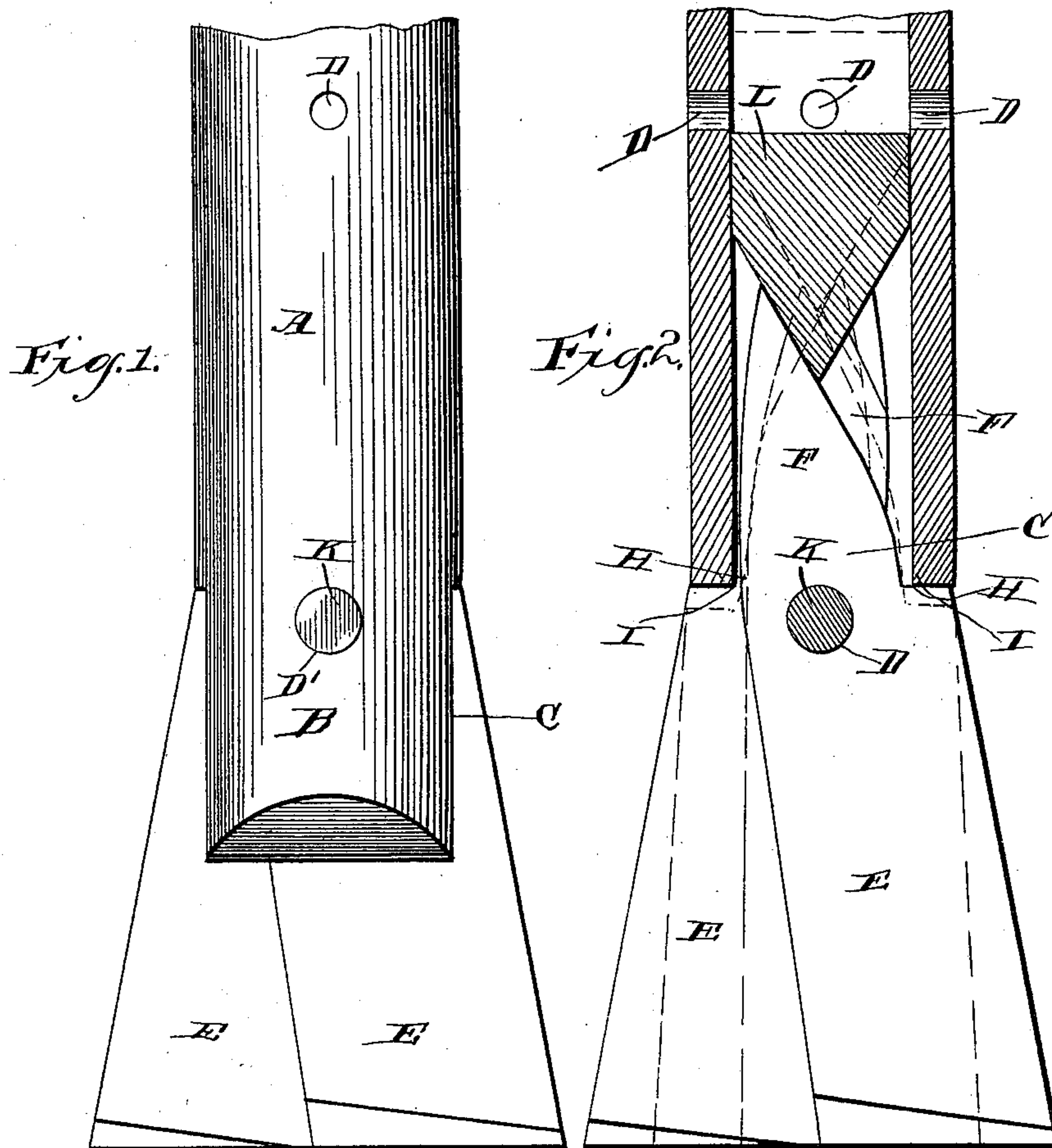


(No Model.)

T. & O. HERBERG.  
SELF EXPANDING DRILL BLADE.

No. 384,625.

Patented June 19, 1888.



Witnesses.  
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# UNITED STATES PATENT OFFICE.

TOLLEF HERBERG AND OLAF HERBERG, OF HENDRUM, MINNESOTA.

## SELF-EXPANDING DRILL-BLADE.

SPECIFICATION forming part of Letters Patent No. 384,625, dated June 19, 1888.

Application filed August 20, 1887. Serial No. 247,465. (No model.)

*To all whom it may concern:*

Be it known that we, TOLLEF HERBERG and OLAF HERBERG, citizens of the United States, residing at Hendrum, in the county of Norman and State of Minnesota, have invented a new and useful Improvement in Self-Expanding Drill-Blades, of which the following is a specification.

Our invention relates to an improvement in self-expanding drill-blades; and it consists in the peculiar construction and combination of devices, that will be more fully set forth hereinafter, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal elevation of a drill-rod provided with expanding blades embodying our improvements. Fig. 2 is a vertical central sectional view of the drill-rod, showing the blades in elevation. Fig. 3 is a detached perspective view of one of the drill-blades.

A represents a drill-rod, which forms a hollow cylinder and is open at its upper and lower ends. The said rod extends downward in the well which is being drilled. The lower end of the drill-rod is bifurcated to form a pair of depending ears, B, in which are made aligned openings C. At a suitable distance from the lower end of the drill-rod the same is provided with a series of discharge-openings, D.

E represents a pair of drill-blades, the lower edges of which are arranged at a slight angle, and are beveled on their outer sides. From the upper ends of the drill-blades, at the inner corners thereof, project arms F, the upper ends of which are provided with outwardly-extending lugs G.

H represents shoulders, which are formed on the outer edges of the drill-blades, and are adapted to engage the shoulders I, formed at the lower end of the drill-rod between the ears B. The drill-blades are placed together, so that their lugs G extend in opposite directions, and are inserted between the ears at the lower end of the drill-rod, so that the arms F extend upward in the drill-rod, and a pivotal bolt or pin, K, is then inserted in the opening D, and in aligned openings with which the drill-blades are provided at a suitable distance from their upper ends, and thus the

drill-blades are pivoted in the lower end of the drill-rod, and are adapted to be expanded to the position shown in solid lines in Fig. 1, so that the opening made by the drill-blades will have a diameter greater than that of the drill-rod. When the drill-blades are thus expanded therein, shoulders H bear under the shoulders I at the lower end of the drill-rod and take off the strain from the pivotal bolt or pin.

L represents a vertically-movable plunger, which is arranged in the lower end of the drill-rod and has its lower end shaped like a cone, and thereby adapted to enter the space between the lugs G of the drill-blades.

The operation of our invention is as follows: While the drill is in operation at the bottom of the well, water is forced down through the drill-rod by a suitable pump in the usual manner. The force of the water acting on the plunger causes the latter to descend in the drill-rod, force the arms at the upper ends of the drill-blades apart, and thereby expand the drill-blades at their lower cutting ends, as shown at Fig. 1. When the drill-blades are in this position, the plunger is sufficiently lowered to clear the openings D, and the water forced downward by the pump through the drill-rod escapes freely through the said openings. If by any reason the drill-blades should become contracted, the plunger will necessarily move upward in the drill-rod, so as to close the openings D, and thereby prevent the escape of water, and consequently cause the pump to cease to operate, and thereby notify the operatives that the drill is not in operation.

Having thus described our invention, we claim—

1. The combination of the drill-rod having the ears B at its lower end, the drill-blades arranged in the lower end of the drill-rod and pivoted between the ears B, said drill-blades having the upwardly-extending arms F, and being provided with the shoulders H, adapted to come in contact with the shoulders at the lower end of the drill-rod, and the vertically-movable plunger L in the lower end of the drill-rod, and adapted to expand the drill-blades by forcing their arms F apart between the ears and relieve the pivotal bolt or pin of strain, substantially as described.



2. The combination of the drill-rod having the discharge-openings D, the drill-blades pivoted in the lower end of the drill-rod, adapted to be expanded, said drill-blades having the upwardly-extending arms F, and the vertically-movable plunger arranged in the drill-rod and adapted to be forced downward therein by the pressure of the water in the drill-rod, so as to expand the drill-blades by forcing their arms apart, substantially as described.

3. The combination of the drill-rod having the discharge-openings D and the ears B at its lower end, the drill-blades pivoted between the said ears B and having the upwardly-ex-

tending arms F, entering the lower end of the drill-rod and provided with the oppositely-extending lugs G, and the vertically-movable plunger arranged in the drill-rod, and having the conical end adapted to force the drill-blades apart by entering in the space between the lugs, substantially as described.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in presence of two witnesses.

TOLLEF HERBERG.

OLAF HERBERG.

Witnesses:

SWAN S. MOEN,

OLE O. KJELBERG.