

(No Model.)

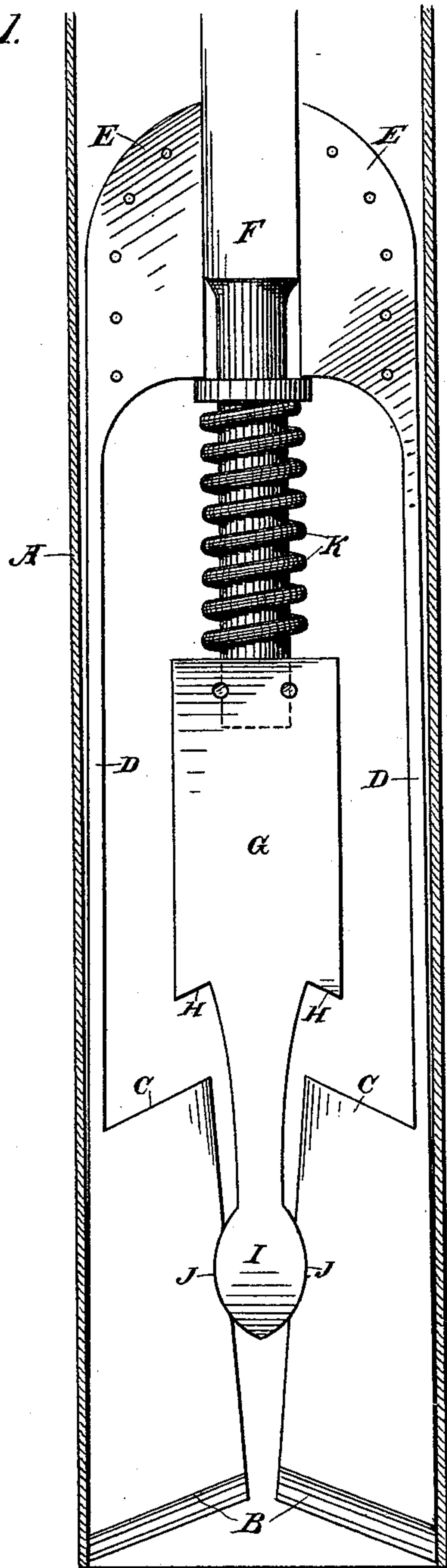
J. E. DAY.

WELL BORING OR DRILLING APPARATUS.

No. 403,877.

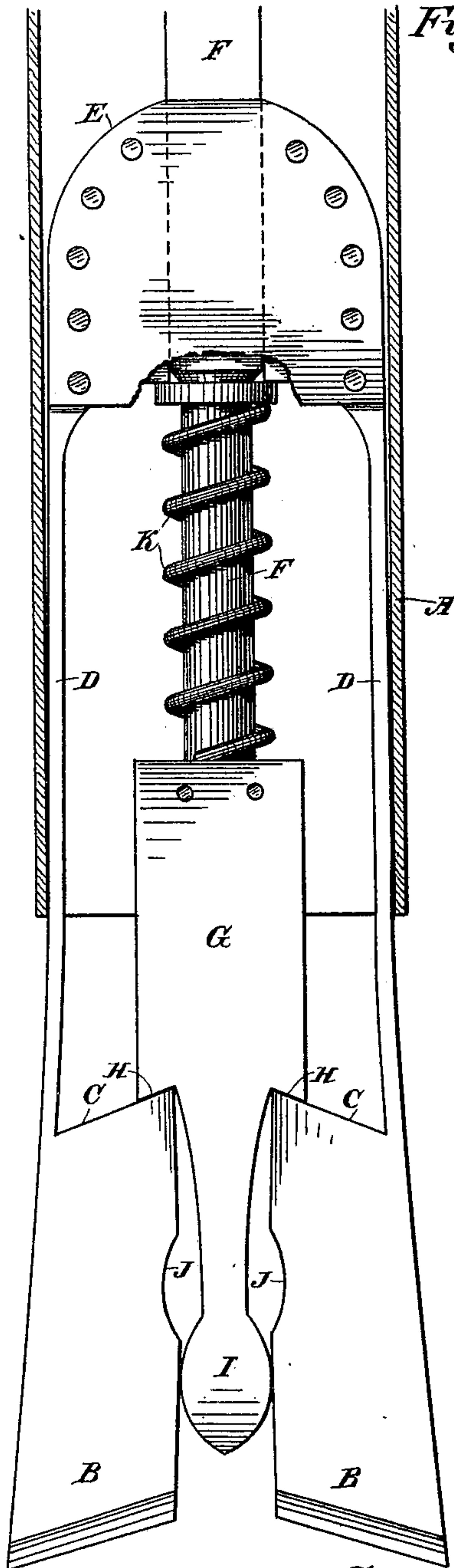
Patented May 21 1889.

Fig. 1.



Witnesses,
Geo. H. Strong
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Fig. 2.



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UNITED STATES PATENT OFFICE.

JEREMIAH E. DAY, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-HALF TO JOSEPH PRACY, OF SAME PLACE.

WELL BORING OR DRILLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 403,877, dated May 21, 1889.

Application filed February 11, 1889. Serial No. 299,497. (No model.)

To all whom it may concern:

Be it known that I, JEREMIAH E. DAY, of the city and county of San Francisco, State of California, have invented an Improvement in
5 Well Boring or Drilling Apparatus; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in well-drilling apparatus, and especially to that
10 class of apparatus which is employed for drilling in rock or hard material where jars and drills are employed; and it consists in the constructions and combinations of devices, which I shall hereinafter fully describe and claim.

15 Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a vertical section taken through the well tube or casing, showing the drills and connected mechanism within the
20 casing in position to be lowered to the bottom of the well. Fig. 2 is a view showing the drill below the bottom of the well-casing and expanded ready for work.

A is the well-casing.

25 B B are the drills or cutting-tools, which have their cutting-edges beveled outward, as shown. The shanks of these tools are made of considerable thickness for a short distance above the cutting-points, and at C is formed
30 an offset or shoulder from which the remainder of the shank extends upwardly in the form of a comparatively thin plate, D, which is sufficiently elastic to allow the lower parts or cutters to open and close as much as may
35 be necessary for the work. The upper ends are again thickened or enlarged, as shown at E. The rods from the surface come down inside the casing at F. They pass between the two sides of the drill-shanks, and, extending
40 downwardly between the elastic portions D, the lower end of the rod F is fitted into the upper end of the block G, and is held in place by boring holes through the block, which go one half into each side of the rod F, and plac-
45 ing bolts or rivets therein.

At the bottom of the block G, and on each side to correspond with the shoulders C, are formed similar shoulders, H, the shoulders C and H being beveled, so that when the should-
50 ders H rest upon the shoulders C the tendency of the bevel is to keep the drill-shanks from

spreading apart by the concussion of the blow upon the shoulders. Below the shoulders H a spear-point, I, is formed, and the thickened extensions between the drill-points B and the
55 shoulders C are grooved or chambered out, as shown at J, sufficient to receive the spear-head I and inclose it between the sides of the concavities J.

That portion of the rod F which passes be-
60 tween the upper ends, E, of the drill-shanks is made square. Below this point it is made somewhat smaller and cylindrical until it enters the block G. Around this cylindrical portion is placed a stout spiral spring, K, and
65 above this spring is a loose sliding washer, L, against which the upper end of the spring acts. This washer is of such diameter as to lie between the thin elastic portions D of the drill-shanks, and will not pass up between the
70 upper thickened ends, E.

The lower end of the spring K presses against the top of the block G, and the tendency of the spring is to force the cutters up until the shoulders H are in contact with the
75 shoulders C of the drill-shanks.

When the spear-head I lies within the depressions J of the drill-shanks, the points of the drills are drawn toward each other by the elasticity of their shanks D; but when the
80 drill-shanks are forced up so that the spear-head lies between the drill-shanks below the concavities J it will spread the drill-points B apart, so that they will be of greater diameter than the exterior of the tube or casing A, and
85 this only takes place after the drills have been lowered to the bottom of the well and below the bottom of the casing, as shown in Fig. 2.

The operation will then be as follows: The spear-head I is drawn up until it lies within
90 the concavities J of the drill-shanks, the springs K being compressed by this action, and the shanks of the drills are contracted or drawn in sufficiently to pass easily down the well tube or casing A. As soon as the lower
95 ends of the drills have passed out of the casing and rest upon the rock or bottom to be drilled, the weight of the rod above and the action of the spring K force the block G and the spear-head I downward until the latter
100 has passed out of the concavities J and between the lower portions of the drill-shanks.

The drills are thus spread apart, so as to be of greater diameter than the exterior of the casing. The drill-rods are then lifted up and allowed to fall, the weight acting upon the 5 drill-points and cutting away the bottom in the usual way, giving a diameter large enough to allow the casing to pass down freely. The shoulders H engage with the shoulders C, which are very near to the points of the drills, 10 so that only the very thick metal intervenes between the points of the drills and the shoulders. It will be seen that the blows applied through the shoulders at this point act more directly upon the points of the drills than if 15 they were applied at the upper ends, E, and by this construction the jar and strain is taken off from the thin elastic portions D of the drill-shanks.

When it is necessary to remove the drills 20 from the well, by drawing up the rods the weight of the drill-shanks is sufficient to compress the spring K until the spear-head I is again brought into the concavities J, when the shanks will close up sufficiently to allow 25 the drills to be drawn up through the well tube or casing again.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The drill-rod having the undercut bev- 30 eled shoulders at the lower end and the spear-head extending below these shoulders, as shown, in combination with the independent drill-shanks lying upon each side of the drill-rod and spear-head, the shanks of the drills 35 being provided with shoulders corresponding with and engaging those of the rod when the latter is lowered, and having concavities or depressions within which the spear-head is inclosed when the rod is raised, substantially 40 as described.

2. The drill-rod with undercut shoulders and spear-head, as shown, the drills inclosing said rod, having concavities within which the 45 spear-head may lie, and shoulders which engage the shoulders upon the rod, in combination with a spring and a sliding collar or plate between which and a fixed collar upon the rod the spring is compressed, substantially as 50 described.

In witness whereof I have hereunto set my hand.

JEREMIAH E. DAY.

Witnesses:

S. H. NOURSE,

H. C. LEE.