

No. 682,180.

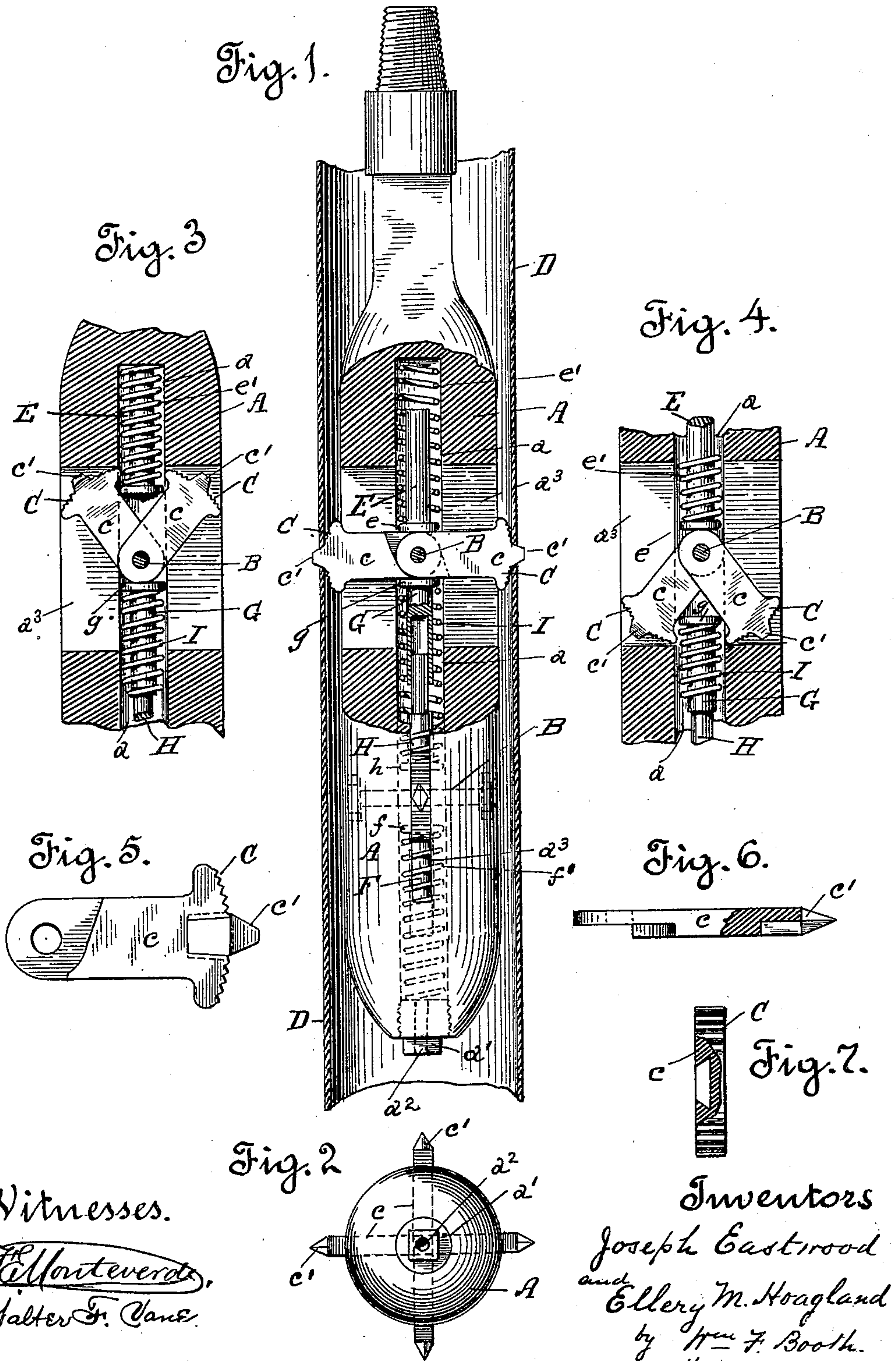
Patented Sept. 10, 1901.

J. EASTWOOD & E. M. HOAGLAND.

WELL CASING PERFORATOR.

(Application filed Apr. 23, 1901.)

(No Model.)



UNITED STATES PATENT OFFICE.

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WELL-CASING PERFORATOR.

SPECIFICATION forming part of Letters Patent No. 682,180, dated September 10, 1901.

Application filed April 23, 1901. Serial No. 57,124. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH EASTWOOD, residing in the city and county of San Francisco, and ELLERY M. HOAGLAND, residing at East Oakland, Alameda county, State of California, citizens of the United States, have invented certain new and useful Improvements in Well-Casing Perforators; and we do hereby declare the following to be a full, clear, and exact description of the same.

Our invention relates to well-boring tools, and particularly to tools for perforating the casing.

Our invention consists in the novel construction, arrangement, and combinations of parts, which we shall hereinafter fully describe and claim.

The general object of our invention is to provide means for positively perforating the well-casing.

Particular objects and advantages will hereinafter appear in the description of parts and the mode of operation of the tool.

Referring to the accompanying drawings, Figure 1 is a side elevation of the perforator, partly broken away, showing it inside the casing with its punches perforating said casing. Fig. 2 is a bottom plan. Fig. 3 is a detail sectional elevation showing the position of parts while descending. Fig. 4 is a similar view showing the position of parts while ascending. Fig. 5 is a side elevation of one of the dog-arms with insertible punch. Fig. 6 is an edge view of same partly broken away. Fig. 7 is a front view of same partly broken away.

A is the stock of the tool, formed at its upper end for the usual connections. In the stock, from the lower extremity upwardly, is made a bore a , the lower end of which is closed by a screw-plug a' , with a vent-hole a^2 for the escape of sand from the bore. Diametrically through the stock is made a slot a^3 , or, as here shown, two such slots, one above and one below. These open clear through the stock and traverse the central bore a , and said slots are elongated in the direction of the length of the stock. When two slots are made, one is in a plane at right angles to the other.

Through the stock and crossing the slot a^3 at right angles is a pin or bolt B, which forms

a pivot for the arms c of a pair of segmental or cam dogs C, each fitted with a perforating point or punch c' . There is a pair of these arms in each slot, one pair being at right angles to the other. The arms of each pair are seated in its slot a^3 , the inner ends of said arms being rounded and halved upon one another, with the pivot-pin B passing through the overlapping ends, whereby a hinge or joint is formed, enabling each dog and arm to swing up and down in a plane parallel with the length of the stock and slot. The faces of the dogs C are best corrugated or toothed, as shown, to enable them to hold with greater certainty. The perforating points or punches c' project from the center of the dogs and may be formed integral therewith or independent and insertible, so that they may be removed when necessary, as for sharpening or when worn, and then replaced or others substituted. When made insertible, they are let into the dogs in a dovetailed groove, as shown, whereby they are (because of the planes of their operation) securely held and cannot work out. The arms of the dogs are of such length that when a pair extend oppositely in alinement or horizontally the greatest distance from the outermost part of the face of one dog to that of its fellow is just the diameter of the interior of the casing D; but the punches c' project beyond these faces, so that the distance between opposing punches when the arms are alined is greater than the interior diameter of the casing and is greater also than the exterior diameter of said casing to enable them to punch through. Each pair of arms is controlled by springs, the tendency of which is to return them to and hold them in alinement in horizontal position. The arrangement of springs may be of any suitable character. That here shown is as follows: In the stock-bore a is a rod E, having a head e , which bears down upon the overlapping hinged inner ends of the arms of the upper pair of dogs. A spring e' is fitted around this rod and bears with one end behind the rod-head e , and with its other end it bears against the head of the bore. A similar rod F has a head f , which bears up under the overlapping hinged ends of the arms of the lower pair of dogs, and a spring f' bears

behind the rod-head at one end and against the plug a' in the foot of the stock-bore a . In the bore a between the upper and the lower pair of arms are two rods G and H, each with a head g and h . The rod G is the upper one and its head bears up under the hinge of the upper arms, while the head of the lower rod H bears down on top of the hinge of the lower arms. The upper end of the rod H is reduced and telescopes into the lower end of the upper rod G, which relative arrangement permits any sand to drop out from the telescopic joint. A spring I surrounds both rods with an end bearing behind the head of each. It will readily be seen that by this arrangement the springs are suitably guided, and their effect is to return each pair of arms to and hold them in their extended horizontal alined position.

The reasons for these constructions will be understood from the description of the operation of the tool, which is as follows: It is of course understood that the reason for perforating the well-casing is to let the water, oil, or other liquid into the casing at the levels where such liquid is found in sinking the well. When the tool is inserted in the top of the casing, the distance between the punches of each pair of dogs when the latter are extended being greater than the interior diameter of the casing, these parts can enter the casing only by reason of the members of each pair being forced upwardly at an angle to each other, and in this position the tool can be readily slipped down into the casing. In this position the lower extremity of each cam-dog bears against the casing-wall, and thus saves the punches from frictional wear in lowering or removing the tool.

When the level is reached at which the casing is to be perforated, the tool is forcibly lifted. Thereupon the lower point of each dog, engaging the casing-wall, causes each to roll that portion of its segment-face which is below the punch against the casing, thereby drawing down the punch and forcing it into and through the casing, and when the extended or horizontal alined position is reached the punches are completely projected through the casing, thereby perforating it. Continued upward movement of the whole tool now rolls the upper faces of the dogs against the casing, which by turning the members of each pair to a downward angle with each other withdraws the punches, thereby giving relief to the tool. Thereupon the parts, being at the opposite angle, are dropped again and the reverse operation takes place, the weight of the tool, jars, and other connections causing a return of the parts to the first inclination, and in passing through the horizontal or alined position the punches once more perforate the casing. Thus the casing may be perforated on both the up and the down stroke without taking the tool from the casing to adjust it. By having the pairs at right angles four perfo-

rations can be made at each movement, thereby insuring a number of holes and variety of positions without depending upon any attempt to turn the tool, which even when poles, rods, or tubes are used is inaccurate and difficult and is impracticable when using a cable.

It will be seen that the object of the springs is to so control the dogs as to insure the normal holding of their faces to their initial contact with the casing by always tending to return them to their extended position, thereby overcoming the tendency of gravity or friction in the hinge to hold them away in one position or the other. It will also be seen that these dogs in pairs by filling the casing diameter furnish a gage which positively forces both punches of the pair to perforate the casing simultaneously. One cannot perforate unless the other does, for they must move together to their different positions.

With this tool there can be no slipping of the punch, as with the ordinary perforator, which when the punch is worn will not catch or take hold, but will slip or stagger along. In our device the dogs prevent such slipping, as they positively take hold in either direction. The joint between the arms of each pair of dogs is of a character best adapted to receive the pressure of the spring-actuated rod-heads and to relieve the pivot-bolt of strain.

The use of this tool, because of its positive and numerous perforations, dispenses with any necessity for using a splitter, which when it cuts through a coupling weakens the casing and tends to cause its collapse.

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

1. A well-casing perforator consisting of a stock, an arm pivoted in the stock and adapted to swing in the plane of the length of the stock from a position at right angles thereto to an angle on either side of said right-angle position, a dog on the outer end of the arm adapted to bear against the inner wall of the casing, and a punch projecting from said dog in the plane of the length of the arm.

2. A well-casing perforator consisting of a stock, an arm pivoted in the stock and adapted to swing in the plane of the length of the stock from a position at right angles thereto to an angle on either side of said right-angle position, a dog on the outer end of the arm adapted to bear against the inner wall of the casing, a punch projecting from said dog in the plane of the length of the arm, and a spring controlling the arm, to hold its dog to the casing-wall.

3. A well-casing perforator consisting of a stock, a pair of oppositely-extending arms connected with the stock by a pivot, adapting them to swing in the plane of the length of the stock, from a position in alinement, to a position at an angle with each other on

either side of said alinement, each of said arms having, on its outer end, a dog adapted when the arms are in alinement to bear against opposite sides of the inner wall of the casing, and a punch carried by and projecting outwardly from each of said dogs.

4. A well-casing perforator consisting of a stock, a pair of oppositely-extending arms connected with the stock by a pivot adapting them to swing in the plane of the length of the stock, from a position in alinement, to a position at an angle with each other on either side of said alinement, each of said arms having, on its outer end, a dog adapted when the arms are in alinement to bear against opposite sides of the inner wall of the casing, a spring controlling said arms to hold their dogs to said casing-wall, and a punch carried by and projecting outwardly from each of said dogs.

5. A well-casing perforator consisting of a stock having a longitudinal bore, and a cross-slot traversing said bore, an arm fitted in said cross-slot and projecting radially from the stock, said arm being pivoted at its inner end in the stock and adapted to swing in the plane of the length of the stock from a position at right angles thereto to an angle on either side of said right-angle position, a dog on the outer end of the arm adapted to bear against the inner wall of the casing, a punch projecting from said dog in the plane of the length of the arm, and a spring controlling the arm, to hold its dog to the casing-wall.

6. A well-casing perforator consisting of a stock having a longitudinal bore and a diametrical slot traversing said bore and opening out on opposite sides of the stock, a pair of arms fitted in said cross-slot and projecting radially therefrom in opposite directions, said arms being pivoted at their inner ends in the stock and adapted to swing in the plane of the length of the stock from a position in alinement, to a position at an angle with each other on either side of said aligned position, a dog carried by the outer end of each arm and adapted when the arms are in alinement to bear against opposite sides of the inner wall of the casing, springs seated in the bore of the stock and bearing on each side of the hinge or pivot joints of the arms and tending to return the arms from an angle on either side, to a position in alinement, whereby the dogs are held to their bearing against the

casing-wall, and a punch carried by and projecting outwardly from each dog.

7. In a well-casing perforator and in combination with the stock having the longitudinal bore and diametrical slot, the pair of radial oppositely-extending arms, each having at its outer end a dog with a punch, the inner ends of said arms being overlapped, a cross-pin through said ends pivoting them in the stock, guide-rods in the stock-bore, each having a head, the head of one rod bearing against the pivoted ends of said arms on one side, and the head of the other rod bearing against said ends on the other side, and a spring around each rod bearing behind its head and holding it against said arm ends.

8. In a well-casing perforator and in combination with the stock having the longitudinal bore and a plurality of diametrical slots, a pair of radial oppositely-extending arms, fitted in each slot and each arm having at its outer end a dog with a punch, the inner ends of the arms of each pair being overlapped and pivoted in the stock by a cross-pin, rods in the stock-bore bearing against the pivoted ends of each pair of arms on their relatively remote sides, telescoping rods in the stock-bore bearing against the pivoted ends of each pair of arms on their relatively adjacent sides, and springs on the rods tending to hold them against the arms, to hold each pair normally in radial alinement.

9. A well-casing perforator consisting of a stock, a plurality of pairs of oppositely-extending arms pivoted in the stock, one pair being in a plane at an angle to that of another pair, the members of each pair of said arms being adapted to swing in the plane of the length of the stock from a position in alinement with each other to a position at an angle with each other on either side of said alinement, a dog on the other end of each arm adapted to bear against the inner wall of the casing, a punch projecting from each dog in the plane of the length of the arm, and a spring controlling the arms, to hold their dogs to the casing-wall.

In witness whereof we have hereunto set our hands.

JOSEPH EASTWOOD.
ELLERY M. HOAGLAND.

Witnesses:

WALTER F. VANE,
D. B. RICHARDS.