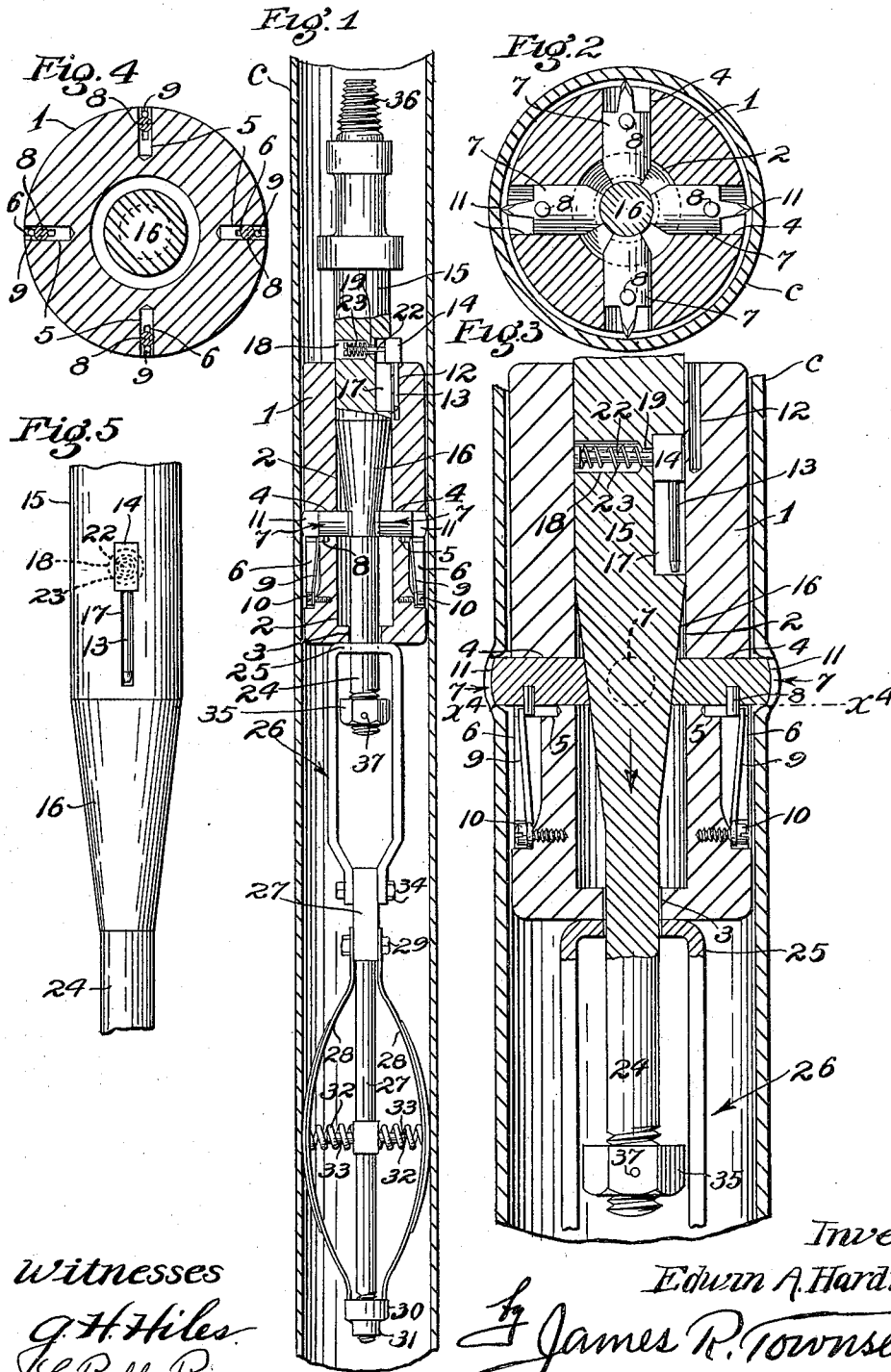


E. A. HARDISON.
CASING PERFORATOR.
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1,004,782.

Patented Oct. 3, 1911.



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UNITED STATES PATENT OFFICE.

EDWIN A. HARDISON, OF BAKERSFIELD, CALIFORNIA.

CASING-PERFORATOR.

1,004,782.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWIN A. HARDISON, a citizen of the United States, residing at Bakersfield, in the county of Kern and State of California, have invented a new and useful Casing-Perforator, of which the following is a specification.

This invention relates to a tool for perforating well-casings.

10 The object of the invention is to provide a tool of this kind by which the operation of perforating a casing may be accomplished with great accuracy, certainty, ease and rapidity.

15 Other objects are simplicity, cheapness, and strength of parts.

The accompanying drawings illustrate the invention.

20 Figure 1 is an elevation of a casing perforator constructed in accordance with this invention and lowered inside a well-casing, a fragment of which is shown. The body and a portion of the mandrel are shown in vertical mid-section and the cutters are retracted. Fig. 2 is an enlarged inverted plan section of the body at the horizontal plane of the axes of the cutters. The cutters are shown intact. The well-casing is also shown in cross section. Fig. 3 is an elevation of a portion of the mandrel and body mainly in vertical mid-section and in the scale of Fig. 2. The cutters are shown partly extended through the casing a fragment of which is shown. Fig. 4 is a plan section on the scale of Figs. 2 and 3 on a horizontal plane indicated by α^4 , Fig. 3, just below the cutters. The casing is omitted from this view. Fig. 5 is an elevation of a fragment of the mandrel viewed from the right of Fig. 3.

40 The tool body 1 is provided with a longitudinal mandrel-way formed by an axial bore 2 terminating at the lower end in a reduced guide orifice 3, and is provided with oppositely arranged lateral, horizontal, radial cutter ways 4 which communicate with the mandrel-way and with radial recesses 5 and slots 6 in the body.

The cutters 7 are provided with pins 8 that play in the recesses and slots to hold 50 the cutters from turning and also to receive the ends of springs 9 which are fastened by cap screws 10 in the slots 6 and operate to normally retract the cutters.

The cutter bodies and the ways therefor 55 are preferably cylindrical and the cutter blades 11 are preferably arranged vertically and are above the level of the pins 8 which are set in holes bored in the under sides of the cutter bodies.

60 In the top of the tool body 1 a latch seat 12 is provided to receive a latch pin 13 which is provided with an enlarged head 14 and is normally carried in the mandrel 15 which has a taper portion 16 to contact 65 with the cutters to force them out against the pressure of the springs 9 to cut the casing c when the mandrel is moved downward relative to the body.

The mandrel is provided with a slot-like 70 latch chamber 17, and spring chamber 18 and with a way 19 between the spring chamber 18 and the latch chamber 17 to accommodate the latch stem 22 which may be a bolt screwed into the body of the latch 75 and provided with a head between which and the end wall of the latch chamber is seated the latch spring 23 to normally retract the latch into the latch chamber.

80 The mandrel stem 24 extends down through the guide orifice 3 at the lower end of the body 1 and through the top loop 25 of the frictional body support 26 which comprises a bar 27 provided with semi-elliptic friction springs 28 that are oppositely 85 mounted on the bar and secured at the upper ends by the bolt 29 passing through the bar and the upper ends of the springs and are connected at their lower ends with a collar 30 in slidable relation with the bar and 90 adjustable thereon by means of a nut 31 screwed onto the lower end of the bar; there being tension springs 32 mounted on pins 33 at the center of the friction springs which are also held bowed out by the ad- 95 justment of the collar on the bar. The loop

25 is hinged to the top of the bar by a bolt 34 and is slidable on the mandrel stem 24 on which it is held by the nut 35.

The mandrel is provided at its upper end 5 with the usual pin 36 to engage the box, not shown, of an ordinary sub.

In practice when it is desired to use the tool, the friction support 26 will be inserted into the casing and the body 1 will be let 10 down onto the top of the support loop 25 and the latch will be drawn out from the mandrel and allowed to enter its seat 12 within the body. The string of tools thus arranged will be lowered in the casing 15 until the body has come to the level at which it is desired that the lowest perforation shall be made. Then the tools are operated to draw the mandrel up until the latch is withdrawn from its seat; whereupon the 20 latch spring retracts the latch into the mandrel. Then the mandrel is lowered while the body is supported by the loop 25 and thereupon the tapered walls of the mandrel operate to force the cutters out in opposite di- 25 rections thus making a horizontal row or ring of perforations in the casing. Then the mandrel will be drawn up in the casing and the nut 35 at the lower end thereof will engage the loop, thereby lifting the body 1 30 and the friction support until the cutter is brought to the level at which it is desired to make the next row of perforations. Thereupon the mandrel is lowered again and a row of perforations is cut as before; and so 35 on until the casing is perforated as desired.

In case any portion of the casing is difficult to perforate, the mandrel may be raised and lowered to strike the cutters with a blow; and jars, not shown, may be employed 40 if desired, to increase the blow delivered to the cutters so that the cutters may in any instance be driven through the casing as required.

The nut 35 at the lower end of the mandrel 45 may be held in place by a cotter pin 37 extending through the nut and through the lower end of the mandrel thus to prevent accidental displacement.

In the drawings four cutters are shown 50 but it is understood that a fewer or greater number of cutters may be employed without departing from the main features of the invention.

I claim:—

55 1. A well-casing perforator comprising a body provided with oppositely arranged lateral ways, cutters horizontally slidable in said ways, resilient means to retract the cutters, a taper mandrel inside the body and in 60 slidable relation thereto and to said cutters for the purpose of forcing the cutters out, a latch releasable by retraction of the mandrel and adapted to support the mandrel in the body, means slidable in the casing and

movable in longitudinal relation to the man- 65 drel and the body to support the body in the casing and means on the mandrel to support the body-supporting means.

2. In a well-casing perforator, the combination with a hollow body provided with a 70 lateral way, of a cutter slidable transversely in said way, resilient means to retract the cutter, a taper mandrel in the body to force the cutter out, there being a seat in the top of the body, a latch in the mandrel adapted 75 to be extended from the mandrel to engage the seat, means to retract the latch, means slidable in the casing to support the body in the casing and means whereby the mandrel supports the supporting means of the body. 80

3. In a casing perforator the combination of a body provided with an axial bore and also provided in its top with a latch seat, cutters in the body, a mandrel in the bore to 85 operate the cutters, said mandrel being provided with a latch chamber, a latch pin in the chamber adapted to enter the latch seat and provided with an enlarged head, a bolt in the latch head, and a spring in the mandrel to retract the bolt to draw the latch into 90 the mandrel.

4. In a casing perforator the combination of a bar; semi-elliptic springs fastened at one end to the bar; a collar in slidable relation with the bar and fastened to the other 95 end of the springs; means to adjust the collar on the bar; a loop fastened to the top of the bar; a body above the loop provided with a longitudinal way; a mandrel in said way extending below the body and through 100 the top of the loop; means to secure the mandrel against withdrawal from the loop and to allow play of the loop along the mandrel; cutters in the body; said cutters and mandrel being in relative arrangement so 105 that downward movement of the mandrel relative to the body will operate the cutters, and means to operate the mandrel in the body.

5. In a casing perforator the combination 110 of a bar; semi-elliptic springs fastened at one end to the bar; a collar in slidable relation with the bar and fastened to the other end of the springs; means to adjust the collar on the bar; a loop fastened to the top 115 of the bar; a body above the loop provided with a longitudinal way; a mandrel in said way extending below the body and through the top of the loop; means to secure the mandrel against withdrawal from the loop 120 and to allow play of the loop along the mandrel; cutters in the body, said cutters and mandrel being in relative arrangement so that downward movement of the mandrel relative to the body will operate the cutters; 125 means to operate the mandrel in the body, and means to temporarily hold the mandrel from moving to operate the cutters.

6. In a casing perforator the combination with the body and cutters, of a mandrel to operate the cutters, a bar carried by the mandrel, semi-elliptic springs on the bar to engage the casing and support the body, and spiral springs between the bar and the middle of the semi-elliptic springs.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 2d day of December 1910.

EDWIN A. HARDISON.

In presence of—

JAMES R. TOWNSEND,
L. BELLE RICE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
