G. H. GILMAN.

DRILL BIT RETAINING DEVICE.

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1,126,628.

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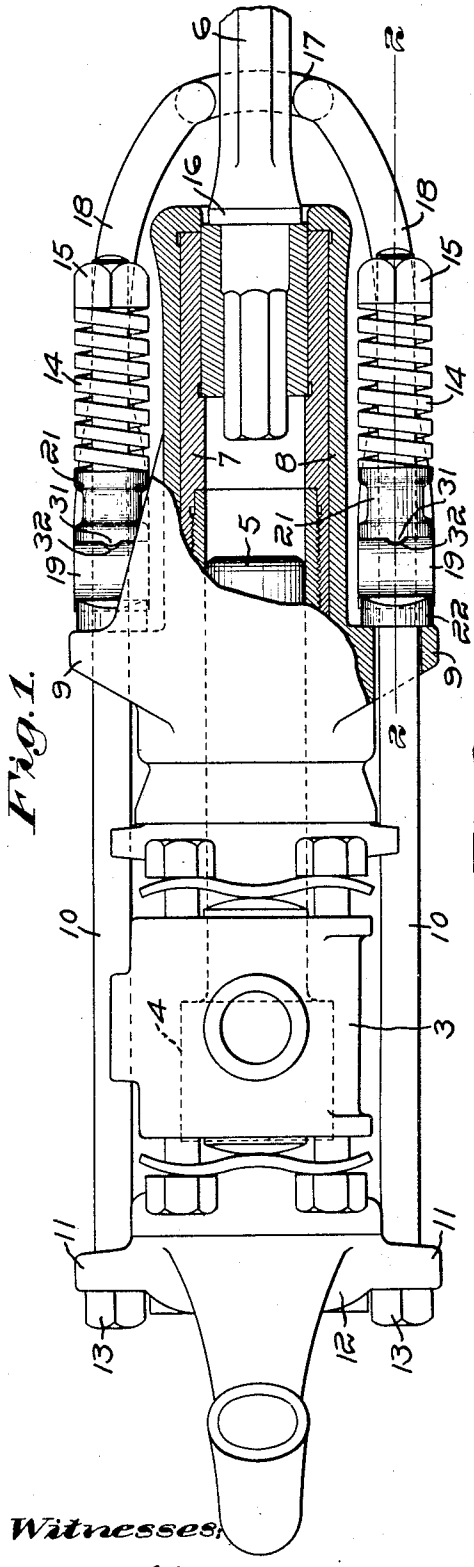


Fig. 1.

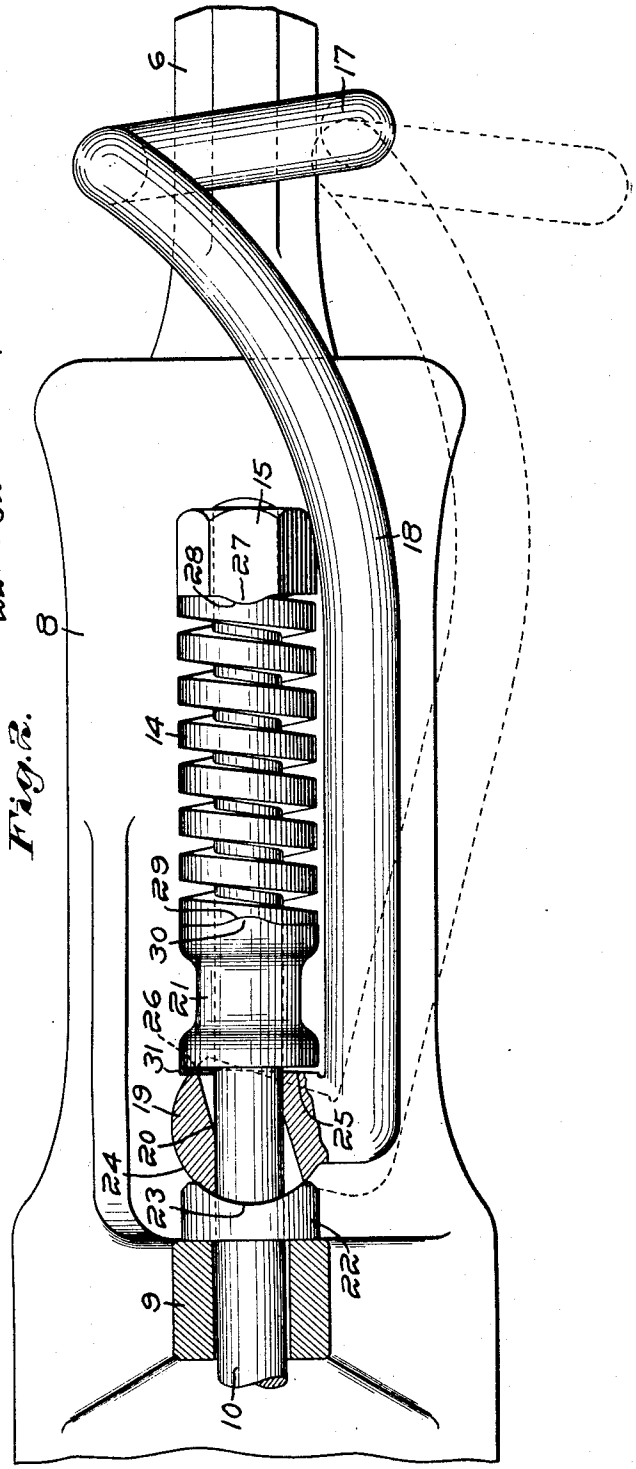


Fig. 2.

Witnesses:

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UNITED STATES PATENT OFFICE.

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DRILL-BIT-RETAINING DEVICE.

1,126,628. Specification of Letters Patent. Patented Jan. 26, 1915.

Application filed February 26, 1914. Serial No. 821,334.

To all whom it may concern:

Be it known that I, GEORGE H. GILMAN, a citizen of the United States, and a resident of Claremont, county of Sullivan, and State of New Hampshire, have invented an Improvement in Drill-Bit-Retaining Devices, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to drill-bit retaining devices for rock drills of the hammer type, and more especially, though not exclusively, to such devices as applied to pressure fluid tools of the piston hammer type, in which the drill bit is struck a hammer blow which tends to drive it out of the drill chuck, when the drill-bit is not against its work.

My invention will be best understood by reference to the following specification, when taken in connection with the accompanying drawings of one illustrative embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings: Figure 1 is a plan, partly in central longitudinal section, of a pressure fluid rock drill of the piston hammer type, embodying my invention; and Fig. 2 is an elevation, on an enlarged scale, of the forward end of the drill, a portion thereof being shown in section on line 2—2 of Fig. 1.

Referring to the drawings, and to the embodiment of my invention which I have selected for illustrative purposes, I have there shown a pressure fluid rock drill of the piston hammer type, comprising a cylinder 3, in which operates a piston 4 having a reduced forward extension 5 constituting a hammer which delivers a rapid succession of hammer blows upon the inner end of a drill-bit 6, the latter being loosely, though preferably non-rotatably held in a chuck 7.

The chuck is herein rotatably mounted in an elongated front cylinder head 8, preferably supported in a yielding manner on the forward end of the cylinder. To this end, the cylinder head is herein provided with laterally projecting lugs 9, 9, through which a pair of tie rods 10, 10 extend. The rear ends of these rods extend through lugs 11, 11, of a rear cylinder head 12, and are provided with heads 13, 13, abutting against said lugs, while the forward terminal portions of the rods are encircled by cushioning springs 14, 14, interposed between the lugs 9, 9, and nuts 15, 15, threaded onto the front ends of the rods. The arrangement of the described parts is such that the front and rear cylinder heads are yieldingly mounted on the cylinder in such a manner as to cushion the blow of the piston, should the latter strike against either cylinder head.

Thus far, the rock drill is of usual and well known construction. I will now pass on to the features constituting my present invention.

The drill-bit 6 is provided with an abutment 16, which engages the forward end of the drill chuck and limits the inward movement of the drill-bit as it rebounds after being struck by the piston hammer. This abutment also serves, in coöperation with a stop presently to be described, to arrest forward movement of the drill-bit when struck by the piston hammer. To this end, I have provided a stop member 17, herein in the form of a yoke partially encircling or embracing the drill-bit to form an abutment for limiting its forward movement. The yoke is herein provided with a pair of arms 18, 18, having enlarged terminals constituting pivotal portions 19, 19, whereby the yoke is pivoted to swing laterally from its normal position, as shown in full lines in Fig. 2, to the position shown in dotted lines therein, thereby to permit the drill-bit to be withdrawn from and replaced in the chuck.

The pivotal portions 19, 19 are interposed between the lugs 9, 9, and the springs 14, 14, whereby the stop member yieldingly resists the forward movement of the drill-bit when the latter is struck by the piston hammer, and the abutment 16 brings up against the yoke. Herein the pivotal portions 19, 19, are provided with perforations 20, 20, through which the tie rods 10, 10 extend. These perforations are widened from their central portions toward their ends, as clearly shown in Fig. 2, thus permitting a limited lateral swinging movement of the yoke.

The pivotal portions 19, 19, might, of course, directly engage the lugs 9, 9, and springs 14, 14, but I prefer to interpose sleeves 21, 21, between the pivotal portions

and the springs, and sleeves or washers 22, 22, between the pivotal portions and the lugs. The washers 22, 22, are herein provided with concavities 23, 23, to receive corresponding convexly formed or rounded surfaces 24, 24, of the pivotal portions 19, 19, thus forming pivotal bearings for the yoke.

The springs 14, 14, might serve yieldingly to retain the yoke 17 in any one of a plurality of positions, but herein means are provided whereby the springs constantly tend to urge the stop member toward a position where it will arrest forward movement of the drill-bit, when the latter is struck by the piston hammer. To this end, the enlarged terminal portions of the yoke are provided with surfaces 25, 25, angularly disposed with relation to the ends of the sleeves 21, 21, and engaging the latter at points 26, 26, at one side of the pivotal axis of the stop member 17. By this means, the longitudinal thrust of the springs 14, 14, against the sleeves 21, 21, causes the latter to exert against the yoke 17 a force tending to hold the latter in its normal position, and to return the same to such position after having been removed therefrom.

The nuts 15, 15, may be otherwise prevented from accidentally unscrewing, but herein each is provided with one or more rounded projections 27, engaging a similarly formed indentation 28 in the adjacent end of the spring 14, while the latter is provided at its other end with a similar indentation 29, which receives a similar rounded projection 30 on the adjacent end of the sleeve 21. The latter, in turn, is provided with one or more rounded projections 31, engaging a similarly formed indentation 32 in the pivotal portion 19 of the yoke. By the coöperative action of these interengaging parts held in such interengagement by the thrust of the spring, the nut is held against rotation, yet is permitted to be unscrewed by the application of sufficient force in the proper manner by the aid of a wrench. The great vibration to which such a tool is subject when in operation tends to cause nuts to unscrew, but by the simple expedient just described, the nuts 15 are effectually prevented from unscrewing due to the vibration, yet may be instantly removed at will.

In operation, the springs 14 serve to cushion either cylinder head, should the piston strike the same; they also serve to cushion the stop member 17, should the abutment 16 strike the same owing to the drill-bit being removed from its work; and they serve, moreover, as a means for maintaining the stop member in position to arrest the forward movement of the drill-bit when struck by the piston hammer. By simply grasping the stop member adjacent its forward end, it may be swung laterally, so that it will clear the abutment of the drill-bit, and permit the latter to be withdrawn and replaced. When released, the stop member will snap back into place, and will retain the drill-bit, while allowing a limited longitudinal play of the same under the influence of the piston hammer.

While I have herein shown and described one specific embodiment of my invention for illustrative purposes, and have disclosed and discussed in detail the construction and arrangement incidental to one specific application thereof, it is to be understood that the invention is limited neither to the mere details or relative arrangement of parts, nor to its specific embodiment herein shown, but that extensive deviations from the illustrated form or embodiment of the invention may be made, without departing from the principles thereof.

Having thus described my invention, what I claim and desire by Letters Patent to procure is:—

1. In a hammer drill, the combination of a movable stop, a drill-bit having an abutment to engage said stop for limiting the forward movement of the drill-bit when it is not against its work, said stop being movable into and out of position to be engaged by said abutment, and means constantly tending to urge said stop toward a position where it will be engaged by said abutment.

2. In a hammer drill, the combination of a laterally swinging stop, a drill-bit having an abutment to engage said stop for limiting the forward movement of the drill-bit when it is not against its work, said stop being movable laterally into and out of position to be engaged by said abutment, and yielding means constantly tending to urge said stop toward a position where it will be engaged by said abutment.

3. In a hammer drill, the combination of a laterally swinging stop, a drill-bit having an abutment to engage said stop for limiting the forward movement of the drill-bit when it is not against its work, said stop being movable laterally into and out of position to be engaged by said abutment, and yielding means having a movement lengthwise of the drill constantly tending to urge said stop toward a position where it will be engaged by said abutment.

4. In a hammer drill, the combination of a pivoted laterally swinging stop member, a drill-bit having an abutment to engage said stop member for limiting the forward movement of the drill-bit when it is not against its work, said stop member being movable laterally into and out of position to be engaged by said abutment, a member engaging said stop member, said members having coöperating portions engaging each

other at a point at one side of the pivotal axis of said stop member, and yielding means coöperating with said member to cause them to coöperate to carry the stop member toward a position where it will be engaged by said abutment.

5. In a hammer drill, the combination of a pivoted laterally swinging stop member, a drill-bit having an abutment to engage said stop member for limiting the forward movement of the drill-bit when it is not against its work, said stop member being movable laterally into and out of position to be engaged by said abutment, another member engaging said stop member, said members having coöperating angularly disposed surfaces uniting at a point at one side of the pivotal axis of said stop member, and yielding means coöperating with said members to cause them to cooperate to carry the stop member toward a position where it will be engaged by said abutment.

6. The combination of a cylinder and a piston hammer working therein, a front cylinder head, a movable stop, a drill-bit having an abutment to engage said stop for limiting the forward movement of the drill-bit when it is not against its work, said stop being movable into and out of position to be engaged by said abutment, and means yieldingly to hold said cylinder head against forward movement and yieldingly to hold said stop.

7. The combination of a cylinder and a piston hammer working therein, a front cylinder head, a movable stop, a drill-bit having an abutment to engage said stop for limiting the forward movement of the drill-bit when it is not against its work, said stop being movable into and out of position to be engaged by said abutment, and means yieldingly to hold said cylinder head against forward movement and yieldingly to hold said stop in position to arrest forward movement of the drill-bit when struck by the piston hammer.

8. The combination of a cylinder and a piston hammer working therein, a front cylinder head, a movable stop, a drill-bit having an abutment to engage said stop for limiting the forward movement of the drill-bit when it is not against its work, said stop being movable into and out of position to be engaged by said abutment, and means yieldingly to hold said cylinder head against forward movement and yieldingly to hold said stop against forward movement when struck by the piston hammer.

9. The combination of a cylinder and a piston hammer working therein, a front cylinder head, a movable stop, a drill-bit having an abutment to engage said stop for limiting the forward movement of the drill-bit when it is not against its work, said stop being movable into and out of position to be engaged by such abutment, and means yieldingly to hold said cylinder head against forward movement and yieldingly to hold said stop in position to arrest forward movement of the drill-bit as well as against forward movement when struck by the piston hammer.

10. The combination of a cylinder and piston hammer working therein, a front cylinder head having lateral shoulders, a pair of tie rods, cushioning springs encircling said rods, respectively, a stop member comprising a yoke provided with a pair of arms having pivotal portions interposed between said shoulders and springs, respectively, and a drill-bit having an abutment to engage said stop member for limiting the forward movement of the drill-bit when it is not against its work.

11. The combination of a cylinder and piston hammer working therein, a front cylinder head having lateral shoulders, a pair of tie rods, cushioning springs encircling said rods, respectively, a stop member comprising a yoke provided with a pair of arms having pivotal portions provided with perforations through which said rods respectively extend, said pivotal portions being interposed between said shoulders and springs, respectively, and a drill-bit having an abutment to engage said stop member for limiting the forward movement of the drill-bit when it is not against its work.

12. The combination of a cylinder and piston hammer working therein, a front cylinder head having lateral shoulders, a pair of tie rods, cushioning springs encircling said rods, respectively, a stop member comprising a yoke provided with a pair of arms having pivotal portions provided with perforations through which said rods respectively extend, said pivotal portions being interposed between said shoulders and springs, respectively, said pivotal portions being provided with convex surfaces engaging concave surfaces between said pivotal portions and said shoulders, and a drill-bit having an abutment to engage said stop member for limiting the forward movement of the drill-bit when it is not against its work.

13. The combination of a cylinder and piston hammer working therein, a front cylinder head having lateral shoulders, a pair of tie rods, cushioning springs encircling said rods, respectively, a stop member comprising a yoke provided with a pair of arms having pivotal portions provided with perforations through which said rods respectively extend, said pivotal portions being interposed between said shoulders and springs, respectively, nuts threaded onto said rods, respectively, at the front ends of said springs, respectively, said nuts, springs

and pivotal portions having coöperating means to prevent said nuts from accidentally unscrewing from said rods, and a drill-bit having an abutment to engage said stop member for limiting the forward movement of the drill-bit when it is not against its work.

14. The combination of a cylinder and piston hammer working therein, a front cylinder head having lateral shoulders, a pair of tie rods, cushioning springs encircling said rods, respectively, a stop member comprising a yoke provided with a pair of arms having pivotal portions provided with perforations through which said rods respectively extend, said pivotal portions being interposed between said shoulders and said springs, respectively, nuts threaded onto said rods, respectively, at the front ends of said springs, respectively, sleeves encircling said rods and interposed between said springs, respectively, and said pivotal portions, said sleeves interengaging with said pivotal portions and springs, respectively, and said springs interengaging with said nuts, respectively, to prevent said nuts from accidentally unscrewing from said rods, and a drill-bit having an abutment to engage said stop member for limiting the forward movement of the drill-bit when it is not against its work.

15. The combination of a cylinder and piston hammer working therein, a front cylinder head having lateral shoulders, a pair of tie rods, cushioning springs encircling said rods, respectively, a stop member comprising a yoke provided with a pair of arms having pivotal portions provided with perforations through which said rods respectively extend, said pivotal portions being interposed between said shoulders and springs, respectively, sleeves encircling said rods, respectively, and interposed between said springs, respectively, and said pivotal portions, the latter having beveled surfaces engaging the ends of said sleeves whereby said springs urge said stop member toward a drill-bit arresting position, and a drill-bit having an abutment to engage said stop member for arresting forward movement of said drill-bit when struck by said hammer.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GEORGE H. GILMAN.

Witnesses:

CHAS. J. JONES,

WILBER RICE.