G. H. GILMAN.

FEED CONTROLLING DEVICE.

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1,285,980.

Patented Nov. 26, 1918.

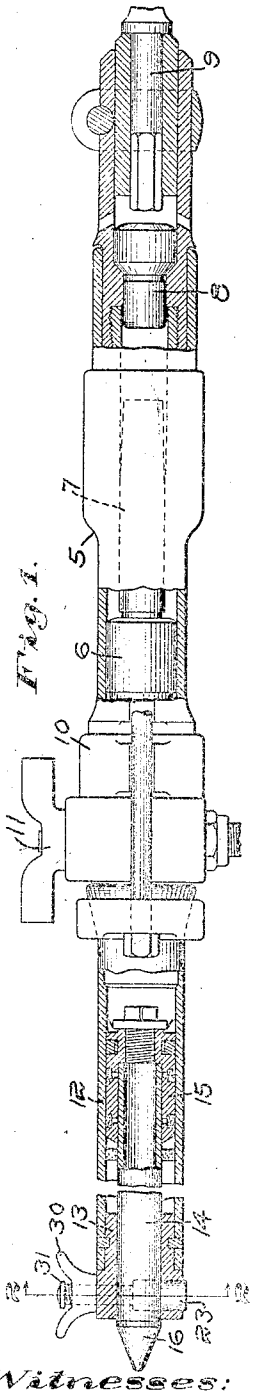


Fig. 1.

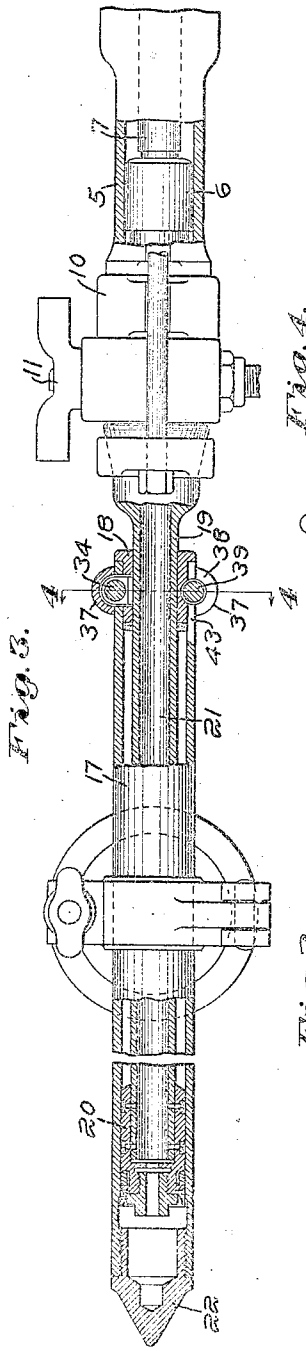


Fig. 3.

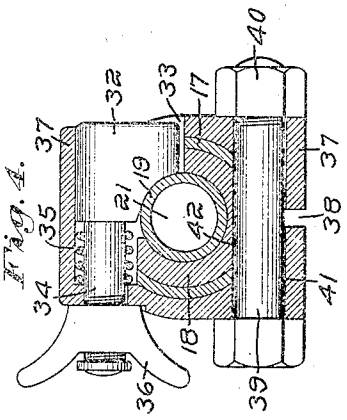


Fig. 4.

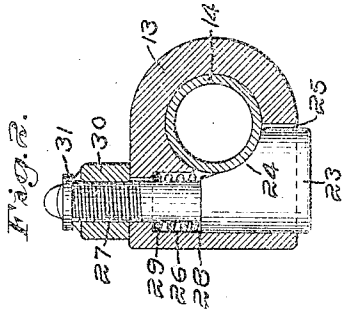


Fig. 2.

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UNITED STATES PATENT OFFICE.

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FEED-CONTROLLING DEVICE.

1,285,980. Specification of Letters Patent. Patented Nov. 26, 1918.

Application filed April 8, 1914. Serial No. 830,555.

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 Feed-Controlling 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 feed-controlling devices for tools, and more especially, though not exclusively, to means for controlling the action of the pressure fluid feed cylinder and piston of a pressure fluid impact tool, such for example as a stoping rock drill.

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

In the drawings:—

Figure 1 is a central, longitudinal sectional view, partly in elevation, of one form of stoping drill having a feed-controlling device embodying my invention;

Fig. 2 is a sectional view, on an enlarged scale, on line 2—2 of Fig. 1;

Fig. 3 is a central, longitudinal sectional view, partly in elevation, of another form of stoping drill having a feed-controlling device embodying my invention; and

Fig. 4 is a sectional view on an enlarged scale, on line 4—4 of Fig. 3.

Referring to the drawings, and to the embodiments of my invention which I have selected for illustration, I have there shown two examples of stoping drills, each comprising work performing means including a cylinder 5, having therein a piston 6, provided with a reduced extension or hammer bar 7, adapted to deliver a succession of blows upon a suitable impact-receiving member, herein in the form of a striking pin 8, the latter in turn acting upon the inner end of an appropriate drill-bit 9 in a familiar manner, to cause the drill by its percussive action to drill a hole in the rock. The cylinder 5 is provided with a rear cylinder head 10, which may be of any other appropriate construction but herein constitutes a mounting for a throttle valve 11 for controlling the admission of the pressure fluid to the tool.

As a means for advancing the impact motor, thereby to press the drill-bit against its work, the tool may be provided with any appropriate feeding means, as for example a pressure fluid feeding means comprising a feed piston and cylinder, one part being secured to the rear cylinder head and the other being arranged to engage a suitable abutment, as for example the floor or side wall of the tunnel or other space in the mine or quarry where the tool is being operated.

In the form shown in Fig. 1, the feeding means comprises a feed cylinder 12, secured to the cylinder head 10 and having at its rear end a cylinder head 13 through which passes a piston rod 14, the latter being secured to a feed piston 15 working in the feed cylinder. In this example, the piston rod 14 is provided with a spur 16, for engagement with the wall or floor of the mine.

In the form shown in Fig. 3, the feeding means comprises a feed cylinder 17 having a front cylinder head 18 through which passes a piston rod 19, the latter being secured at one end to the cylinder head 10 and at its other end to a feed piston 20 working in the feed cylinder 17. In this form, the piston rod and feed piston are provided with an axial passage 21 through which the pressure fluid passes to the rear end of the cylinder, where it may act upon the rear end of the feed piston. In this instance, the feed cylinder 17 is provided with a spur 22, for engagement with the wall or floor of the quarry. Both forms of stoping drills thus far described are of well-known construction, and require no further description. I will now describe the feed-controlling means whereby the feed may be regulated, or altogether stopped, at will.

In a great many cases, the rock which is encountered is comparatively soft, and does not require the full pressure of the feeding device to keep the drill up to its work. In many cases, also, soft and seamy spots in the rock are encountered, and when this is the case, there is a tendency of the drill to jump forward suddenly under the influence of its feeding device, thus causing the drill-bit to become jammed.

As a means for controlling the feed, and to provide for the manual regulation of the same, I have herein provided a frictional restraining device, which, in the form shown in Figs. 1 and 2, comprises a block 23 hav-

ing a lateral concavity 24 engaging the piston rod 14. This block is herein mounted in a recess 25 provided in the cylinder head 13, whereby the feed-controlling device is supported upon and carried by the feed cylinder. As herein shown, the feed-restraining device is normally inoperative,—that is to say, it is provided with means constantly tending to release the same, such means in the present instance comprising a spring 26, which, in the form shown, encircles a stem 27 projecting from the block 23. One end of this spring is seated against a shoulder 28 upon the block, while the other end is seated against the bottom of a recess 29, within which the spring is depressed. The spring when thus arranged tends to urge the block 23 out of engagement with the piston rod 14. As a means for applying the restraining device and regulating the control exercised thereby upon the feeding means, I have herein provided a nut 30 having screw-threaded engagement with the stem 27. I prefer to employ for this purpose a wing nut, in order that the same may be readily turned by the hand of the operator without the use of a wrench. By turning this nut in the proper direction, the block 23 may be caused to bear against the piston rod with a greater or less degree of pressure, whereby the restraint imposed upon the feeding means may be regulated to suit the requirements of the work. As a means for preventing the nut from becoming accidentally unscrewed from the threaded stem, the latter is herein provided with an enlargement or head 31.

Referring to the form shown in Figs. 3 and 4, this is the same in all essential particulars as that already described, and comprises a friction block 32, located in a recess 33, said block having a stem 34 encircled by a spring 35 tending to move the block out of engagement with the piston rod 19. The nut 36, threaded onto the stem, serves as a means for regulating the feed. This form, however, differs from that already described, in that the feed cylinder 17 is provided with an encircling collar 37, which is split at 38 and provided with a clamping bolt 39 having a nut 40. This clamping bolt passes through a transverse perforation 41 in the collar, and through a lateral recess 42 formed partly in the wall of the cylinder 17 and partly in the cylinder head 18, which latter extends into the cylinder. By this means, the collar 37 and cylinder head 18 are interlocked with the cylinder 17 against endwise movement. As a means for causing the collar to contract the cylinder about the cylinder head which it encircles, in order to bind the latter, the cylinder is herein provided with a longitudinal slot 43.

In the operation of either form of the invention, the full effect of the feeding means may be utilized by turning the regulating nut to allow the spring to disengage the frictional restraining device. If, however, the character of the rock should be so soft as to require a less degree of pressure, the action of the feeding device may be regulated to a nicety by simply turning the regulating nut to the proper extent. If, during the operation of the drill, the drill-bit should strike a soft spot and tend to jump forward suddenly, the restraining device imposes such a restraint thereon as to prevent the drill-bit from becoming wedged or jammed.

While I have herein shown and described two specific forms or embodiments of my invention for illustrative purposes, and have disclosed and discussed in detail the construction and arrangement incidental to two specific applications 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 embodiments herein shown, but that extensive deviations from the illustrated forms or embodiments of the invention may be made, without departing from the principles thereof.

Having thus described two illustrative embodiments of my invention, what I claim and desire by Letters Patent to secure is:

1. The combination with an impact tool and pressure fluid feeding means therefor comprising a feed piston and cylinder; one of said elements together with said impact tool forming a unitary structure; of feed regulating means supported by said cylinder and engageable with said piston.

2. The combination with an impact tool and pressure fluid feeding means therefor comprising a feed piston and cylinder having a cylinder head, one of said elements together with said impact tool forming a unitary structure; of frictional feed regulating means supported by said cylinder head.

3. The combination with an impact tool and pressure fluid feeding means therefor comprising a feed piston having a piston rod and a cylinder having a cylinder head; one of said elements together with said impact tool forming a unitary structure; of feed regulating means comprising a frictional restraining device mounted on said cylinder head and acting on said feed-piston rod.

4. The combination with an impact tool and pressure fluid feeding means therefor comprising a feed piston member and a feed cylinder member, one of said members together with said impact tool constituting a unitary structure; of feed regulating means supported by the other of said members and engaging the first member.

5. The combination with an impact tool and pressure fluid feeding means therefor including a feed piston, a rod therefor, and a cylinder, said cylinder having a chamber therein; of a member disposed in said

chamber and movable into frictional engagement with said piston rod, and means for adjusting the position of said member relative to said piston rod.

6. The combination with an impact tool and pressure fluid feeding means therefor including a feed piston, a rod therefor, a cylinder and a cylinder head, said cylinder head having a chamber therein; of a member disposed in said chamber and movable into frictional engagement with said piston rod, resilient means normally tending to hold said member in inoperative position, and means for controlling said resilient means.

7. The combination with an impact tool and pressure actuated feeding means therefor including a feed piston, a rod therefor, and a cylinder; of a member carried by said cylinder and having a concave surface engageable with said piston rod, means independent of said member normally tending to render said member ineffective and adjusting means for varying the pressure of said member on said piston.

8. The combination with an impact tool and pressure fluid feeding means therefor including a feed piston, a rod therefor, and a cylinder having a transverse recess therein; of a member reciprocable in said recess and having a concave portion engageable with said piston rod, resilient means surrounding said member at a point adjacent said concave portion normally resisting longitudinal movement thereof, and supplemental means for adjusting said member longitudinally.

9. The combination with an impact tool and pressure fluid feeding means therefor including a feed piston, a rod therefor, and a cylinder having an opening therein; of a split collar carried on said cylinder, means for clamping said collar to said cylinder, and means carried by said collar and reciprocable in the opening in said cylinder into engagement with said piston rod.

10. The combination with an impact tool and pressure fluid feeding means therefor including a feed piston, a rod therefor, a cylinder having an opening therein, a cylinder head on said cylinder; of a split collar surrounding said cylinder and head, means carried by said collar reciprocable in said cylinder opening into engagement with said piston rod, means for clamping said collar to said cylinder, and means for locking said cylinder head and collar against longitudinal movement relative to said cylinder.

11. The combination with a hammer operated impact tool having pressure fluid means for holding the same against the work including a feed piston and cylinder; of adjustable frictional means carried by said cylinder and engageable with said piston for controlling the feeding mechanism, and supplemental means coöperating therewith and normally tending to render said last mentioned means ineffective for rendering gradual the release of said frictional means from said piston.

12. The combination with an impact tool and pressure fluid feeding means therefor including a feed piston and a feed cylinder, one of said members together with said impact tool forming a unitary structure, a piston rod, a collar disposed adjacent one end of said cylinder and attached thereto, a member carried within said collar and frictionally engageable with said piston rod, manually controlled means for adjusting said member into engagement with said piston rod and out of engagement therewith, and coöperating resilient means for insuring a gradual disengagement of said frictional member from said piston rod as said manually controlled means is released.

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

GEORGE H. GILMAN

Witnesses:
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