June 7, 1932. J. G. GRAHAM 1,861,853

ROCK DRILL FEEDING DEVICE

Filed Aug. 14, 1930

Fig. 1.

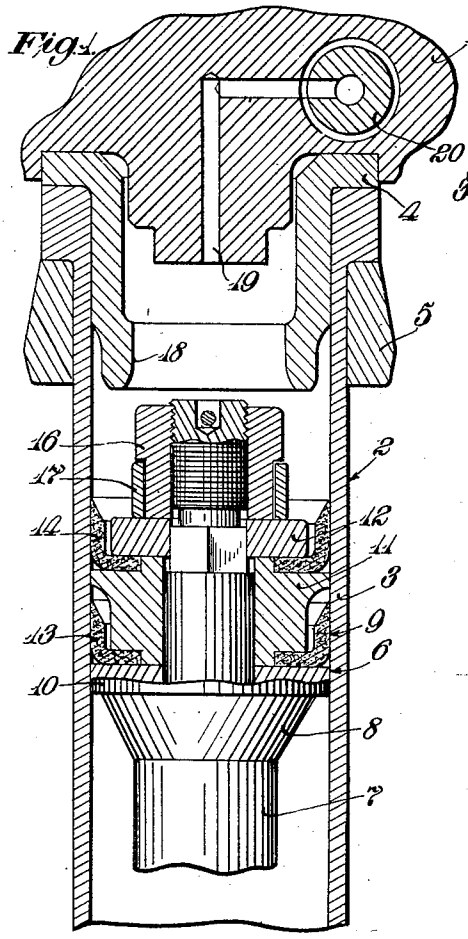


Fig. 2.

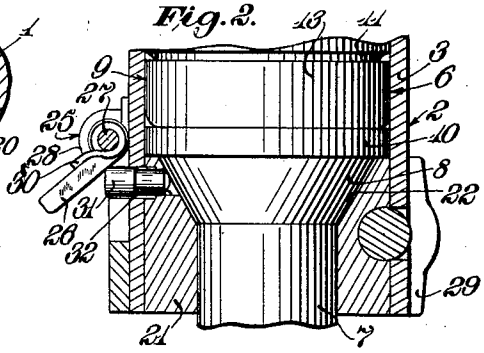
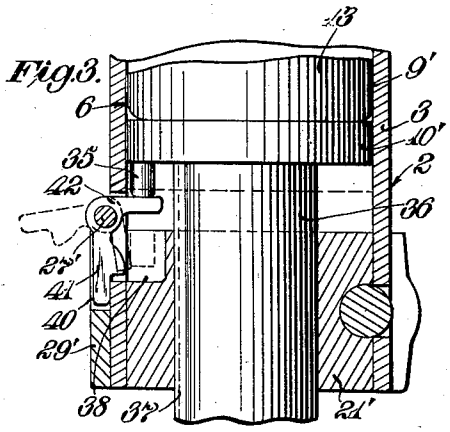


Fig. 3.



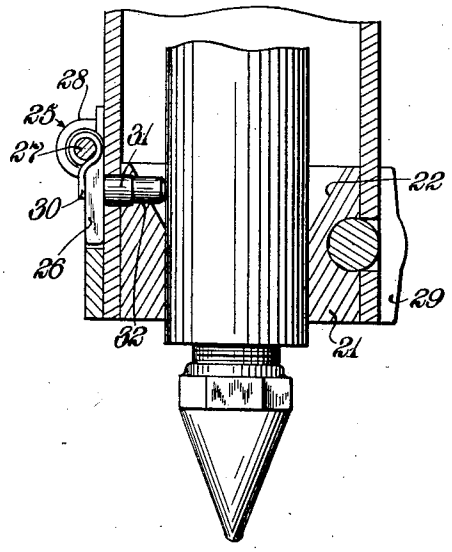
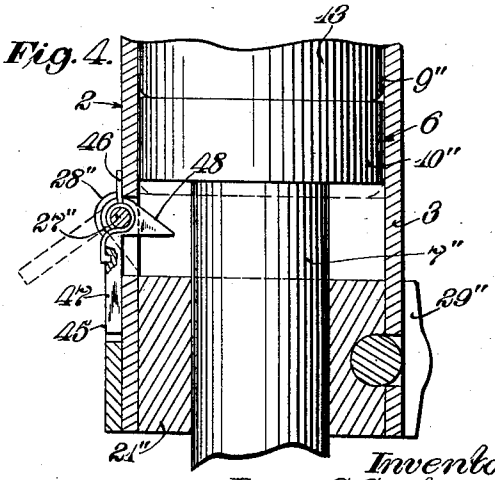


Fig. 4.



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UNITED STATES PATENT OFFICE

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ROCK DRILL FEEDING DEVICE

Application filed August 14, 1930. Serial No. 475,328.

This invention relates to rock drill feeding devices, and more particularly to feeding devices for stoping drills.

The feeding mechanism of stoping drills commonly comprises a feed cylinder and feed piston arranged in alinement with the drilling motor, either the piston or cylinder being secured rigidly to the rear end of the drilling motor, and the other of these elements having provision for engaging an abutment during feeding. In order that the drill runner may be advised when the limit of possible relative motion between the feed cylinder and piston elements is approaching, a "tell-tale" hole is commonly provided in the feed cylinder in such a position that it is uncovered by the head of the feed piston just before the extreme limit of feed is reached, and the blast of air which is then discharged from the interior of the feed cylinder through this hole brings to the attention of the operator the necessity for collapsing the feed and changing steels. The function of this "tell-tale" port is very important, but the port is a source of serious difficulty in connection with lubrication of the feeding mechanism, for the grease or other lubricant employed for the lubrication of the feed cylinder and piston is blown out through the "tell-tale" port when the latter is opened and accordingly there is both a waste of lubricant and, unless an excessive quantity of lubricant is used and a considerable amount of time employed in renewing the supply of lubricant, the feed piston will run dry and sticking will occur.

In a preferred form of the invention means is provided whereby relative movement of the feed cylinder and feed piston is availed of mechanically to effect actuation of a signalling device without the opening of any passage through which lubricant can be blown. Wedge, cam, and plunger devices are among the obvious possible operating means, and while the signal device is preferably carried upon the feed cylinder, it is possible to mount it upon the piston rod, for example, and to cause its operation when the rod is projecting for substantially its maximum distance from the cylinder. Such a device would have the advantage of being wholly housed when not in operation.

In the accompanying drawing, in which for purposes of illustration there are shown three forms which the invention may assume in practice,—

Fig. 1 is a central longitudinal section through an improved feeding mechanism for a stoping drill in which one form of my improved tell-tale or signalling device is incorporated.

Fig. 2 is a fragmentary sectional view showing the parts of the mechanism of Fig. 1 in different positions.

Figs. 3 and 4 are central longitudinal fragmentary sectional views showing two other modified constructions.

Now referring to the drawing, and considering first the embodiment of the invention illustrated in Figs. 1 and 2, the head block of a percussive drilling motor is shown at 1. To the rear of this head block is secured feeding mechanism generally designated 2 and including a feed cylinder 3, a sleeve member 4 which cooperates in a well known manner in retaining the feed normally in collapsed position, a clamping ring 5, which by means of suitable bolts or side rods (not shown) maintains the feed cylinder 3 and sleeve 4 in rigid relation to the head block 1, and a feed piston mechanism 6. The feed piston mechanism 6 comprises a piston rod 7 having a conically shaped portion 8 just below the feed piston proper, which is as a whole designated 9. The feed piston 9 includes a circular bottom plate 10, an intermediate plate member 11, a top plate 12, a pair of cup leathers 13 and 14, and clamping mechanism including a nut 16 which also serves to position a resilient spring 17 which cooperates with an annular shoulder 18 upon the sleeve member 4 in maintaining the feed collapsed. Feeding pressure is supplied to the feed cylinder through a passage 19 under the control of a throttle valve 20. The feed cylinder 3 has a lower head 21. This lower head is provided with a tapered recess 22 into which the conical portion 8 upon the piston rod 7 may

enter as the piston and cylinder approach their extreme position of extension.

Located at the lower end of the feed cylinder is improved signalling mechanism generally designated 25 and including a signal arm 26 journaled upon a pin 27, which is supported in a bracket 28 formed on a ring 29 surrounding the lower end of the feed cylinder. A spring 30 cooperates with the bottom of the feed cylinder and with the signalling element 26 to maintain the latter normally flat against the side of the feed cylinder. To cause this signal member 26 to project laterally from the feed cylinder and thereby bring to the attention of the drill runner the necessity for changing steels, a plunger 31, slidable in a shouldered bore 32, is arranged in position to be engaged by the conical shoulder 8 upon the feed piston rod 7. During the major portion of the relative travel between the feed cylinder and feed piston, the spring 30, acting upon the signal arm 26, maintains the latter and the pin 31 in the positions shown in Fig. 1 of the drawing When the feed piston is in the position shown in Fig. 2 it will be observed, however, that the conical portion 8 on the piston rod has forced the plunger 31 outwards in its bore and has caused the signal arm 26 to project outwardly to notify the drill runner that the feed is fully extended and the time for changing steels has come.

It will be obvious that the "tell-tale" port has been eliminated, that accordingly there is no chance for a blowing of the lubricant out through the wall of the cylinder with resultant impairment of the lubrication and loss of lubricant, and yet the operator will be duly notified by the projection of the signal arm 26 that the end of possible feeding movement is being approached and can accordingly collapse the feed at the proper time and make a change in steels.

The construction shown in Fig. 3 employs, instead of a wedge mechanism, a pin and lever construction in which the pin is reciprocable with the feed cylinder, and a lever having portions at right angles to each other is employed. In this construction the feed cylinder 3 contains a feed piston 9′ which has a bottom plate 10′ from which a downwardly projecting pin 35 projects. The piston has secured thereto a piston rod 36 which has a splined connection at 37 with the lower cylinder head 21′ whereby relative rotation between the feed cylinder and piston is prevented. A socket 38 is formed in the cylinder head 21′ to permit the pin 35 to enter it as limit of feed is approached. A ring 29′ supports a pivot pin 27′ on which a signal device 40 comprising, in the form illustrated, a lower heavier arm 41 and an upper lighter arm 42, is mounted. By appropriately weighting the lower arm 41, the use of a spring is unnecessary, but a spring similar to that shown in Fig. 1 can be used if desired, with an omission of the weighting of the lower arm.

The mode of operation of this device is so clear as to render detailed description unnecessary. It will be evident that as the end of the feeding movement is approached the pin 35 will engage the arm 42 and swing the arm 41 upwardly into a position in which it will project substantially at right angles from the feed cylinder, and the drill runner will thereby be notified that the limit of feed is approached.

A further modification which may be used is shown in Fig. 4. In the species of that figure the feed cylinder 3 has a lower head 21″ through which a piston rod 7″ extends. A piston 9″ is carried by the piston rod 7″ and includes a lower plate 10″. A ring 29″ carries in suitable ears 28″ a pivot pin 27″ and upon this pin a lever 45 is pivotally mounted. A spring 46 normally holds the lever 45 in the position shown in Fig. 4. This lever comprises a relatively long signal arm 47 and an approximately right-angled cam arm 48. The cam arm is engageable by the plate 10″ as the end of feeding movement approaches.

Obviously, as the end of the feeding movement draws near, the engagement between the plate 10″ and the cam arm 48 will cause clockwise movement of the signal member 45 and will cause the arm 47 to be projected to the dotted line position shown in Fig. 4. As a result the operator will be duly notified that the limit of feeding movement is being reached. Since the piston never reaches a position in which the opening through which the arm 48 projects is uncovered by the feed piston, there will, clearly, be no opportunity for the blowing of lubricant out of the feed cylinder as it occurs with the usual "tell-tale" hole.

In each form of the invention shown herein the function of indicating to the drill runner that the end of feeding movement is being approached is duly accomplished. In each form, however, this is done mechanically and without opening of any connection between the pressure filled interior of the feed cylinder and the atmosphere. Each form of the mechanism is simple, inexpensive, durable and positive in operation, and each performs the function of signalling without the detriment to lubrication and loss of lubricant common with the signalling system for stoper feeds heretofore in use.

While there are in this application specifically described three forms which this invention may assume in practice, it will be understood that these forms of the same are shown for purposes of illustration and that the invention may be modified and embodied in various other forms without de-

parting from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a feeding mechanism, relatively movable feeding elements and a signal device mechanically actuated upon a predetermined relative movement of said feeding elements for warning the operator that the limit of feed is approached.

2. In a feeding mechanism, a feed cylinder, a relatively movable feed piston, and means engageable by the feed piston and carried by the feed cylinder for indicating the approach of the limit of possible feed.

3. In combination, a feed cylinder, a feed piston therein having a piston rod, and means carried by the feed cylinder and by said piston rod cooperating visually to indicate the approach of the limit of feed.

4. In combination, a feed cylinder, a feed piston, means supported by said feed cylinder and swingable about an axis extending transversely of the latter for indicating the approach of the feeding limit, and means actuated during the final stages of relative movement between the feed cylinder and piston for moving said indicating device.

5. In a feeding mechanism, a feed cylinder, a relatively movable feed piston, a signalling device supported on the feed cylinder, and means for actuating said signalling device near the end of feeding movement including a wedge moving with the feed piston and means actuated thereby for operating said signalling device.

6. In a feeding mechanism, a feed cylinder, a relatively movable feed piston, a signalling device supported on the feed cylinder, and means for actuating said signalling device near the end of feeding movement including a plunger carried by the feed piston and means actuated thereby for operating said signalling device.

7. In a feeding mechanism, a feed cylinder, a relatively movable feed piston, a signalling device supported on the feed cylinder and having an operating cam, and means for actuating said signalling device near the end of feeding movement including a cam engaging surface carried by the feed piston for operating said signalling device.

8. In a feeding mechanism, a feed cylinder, a relatively movable feed piston, a signalling device carried by said feed cylinder adjacent the lower end thereof including a pivoted lever having portions arranged at right angles to each other, and means including an abutment surface fixed relative to the feed piston for engaging one of said portions for causing the other to project to signalling position.

9. In a feeding mechanism, a feed cylinder, a relatively movable feed piston, and means carried by said feed cylinder and actuated adjacent the end of relative movement between the cylinder and piston for wholly mechanically indicating the end of feeding capacity.

10. In a feeding mechanism, a feed cylinder, a feed piston, and means rendered operative adjacent the limit of extension of the feeding mechanism for mechanically indicating the relative position of the parts.

11. In a feeding mechanism, relatively movable feeding elements, and a signal device including a signal element adapted to move automatically into a position of observation upon a predetermined relative movement of said feeding elements to warn the operator that the limit of feed is approached.

12. In a feeding mechanism, relatively movable feed cylinder and piston elements, and a signal device for indicating the approach of the limit of feeding movement including a signal element carried by one of said first mentioned elements and arranged to be projected therefrom upon approach of the limit of feeding.

13. In a feeding mechanism, relatively movable feed cylinder and piston elements, and means for indicating the approach of the limit of feeding movement including a signal element carried by and arranged to be projected from the feed cylinder element and means for so projecting it carried by the piston element.

14. In a feeding mechanism, relatively movable feeding elements, and means for signalling the limit of feed including a member carried by one of said feeding elements and movable relative to said element to effect signalling, and means carried by the other element and arranged to cooperate with said member to move the same to effect signalling adjacent the limit of feed.

In testimony whereof I affix my signature.

JAMES G. GRAHAM.