Aug. 8, 1939. F. M. SLATER 2,168,541

ROCK DRILL

Filed July 26, 1938 2 Sheets-Sheet 1

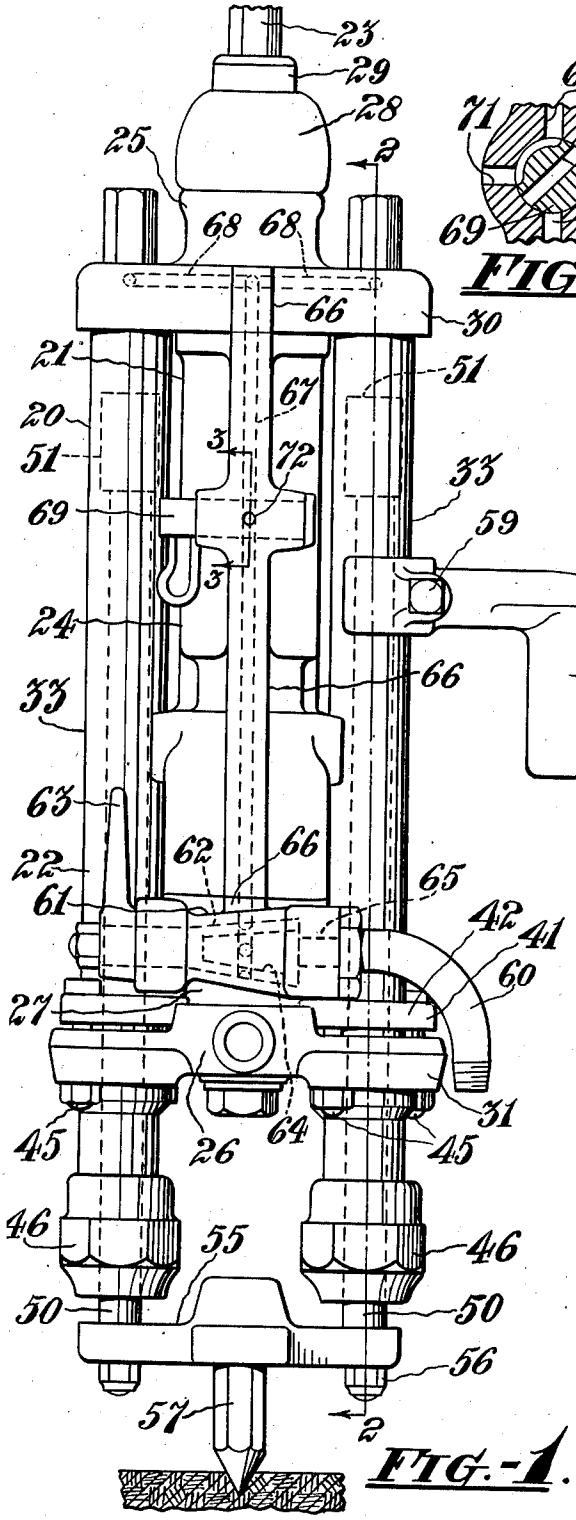


FIG.-1.

FIG.-3.

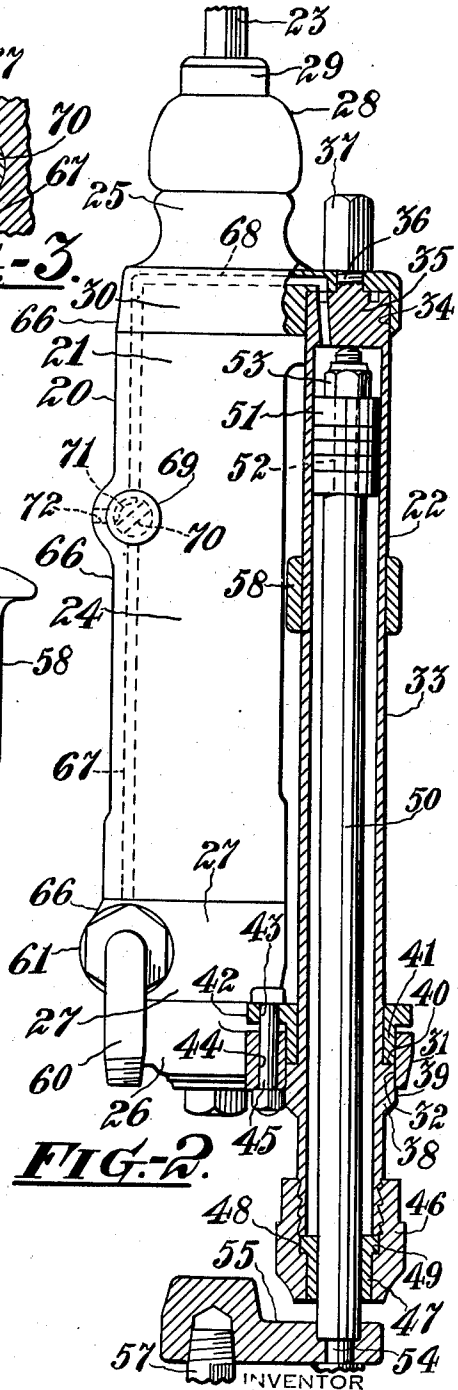


FIG.-2.

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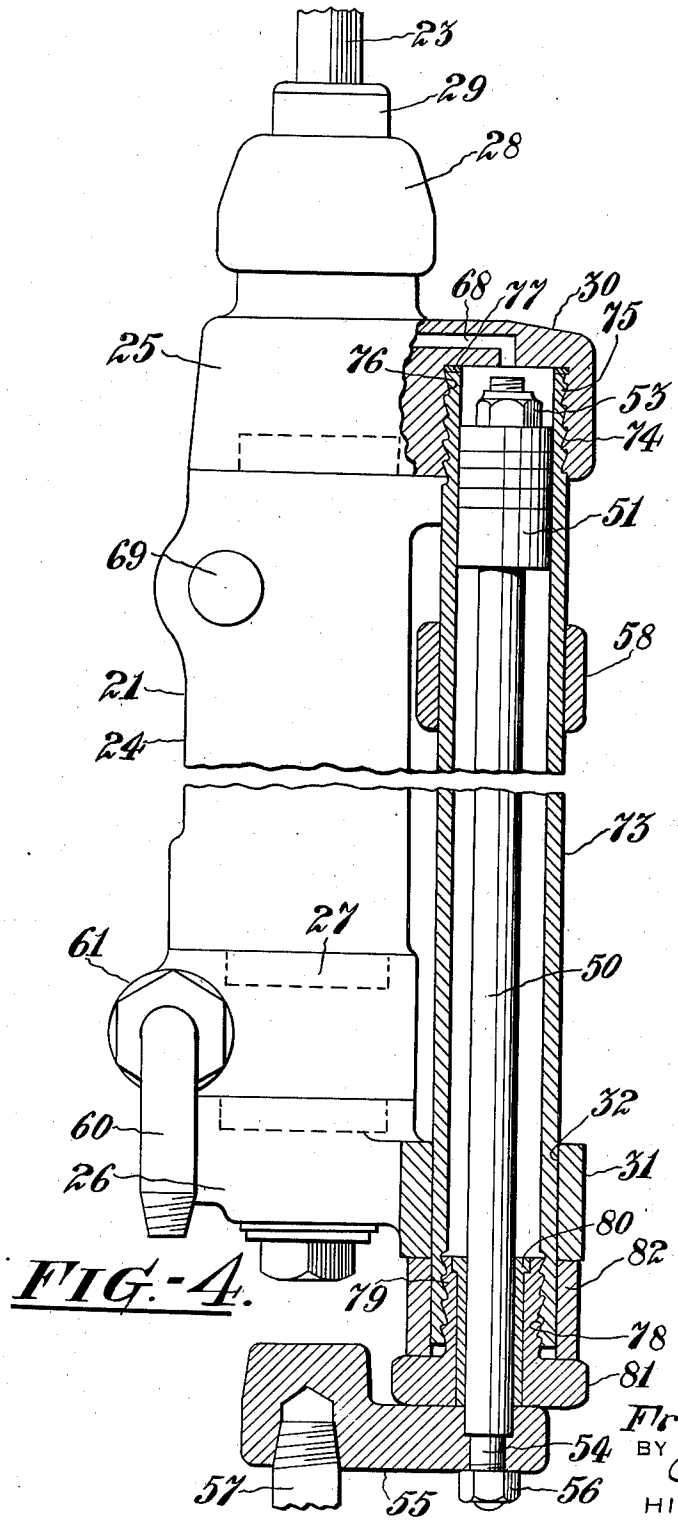


FIG.-4.

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UNITED STATES PATENT OFFICE

2,168,541

ROCK DRILL

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Application July 26, 1938, Serial No. 221,322

10 Claims. (Cl. 121—9)

This invention relates to fluid actuated rock drills, and more particularly to rock drills of the type commonly known as stopers and used for drilling holes in the roof of a drift.

One object of the invention is to simplify the construction of rock drilling mechanisms embodying pneumatic feeding mechanism for advancing the drill toward the work.

Another object is to construct a compact and rugged rock drill and feeding mechanism peculiarly adapted for use in spaces providing low head room.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawings accompanying this specification and in which similar reference numerals refer to similar parts:

Figure 1 is an outside view in elevation, of a rock drill constructed in accordance with the practice of the invention,

Figure 2 is a side elevation, partly in section, of the rock drill shown in Figure 1,

Figure 3 is a transverse view taken through Figure 1 on the line 3—3, and

Figure 4 is a view similar to Figure 2 showing a modified form of the invention.

Referring more particularly to the drawings, and at first to the form of the invention illustrated in Figures 1 to 3 inclusive, 20 designates a drilling mechanism comprising a percussive element 21 and a feeding element 22 attached to the percussive element for advancing it in accordance with the degree of penetration of the working implement 23 into the work.

Of the percussive element only the outer casing parts are shown. These comprise a cylinder 24, front and back heads 25 and 26, respectively, and a head block 27 interposed between the cylinder 24 and the back head 26. The casing parts may be suitably interlocked with each other in a well known manner to prevent relative lateral movement between them and at the front end of the front head 25 is a hood 28 from which projects the end of a chuck 29 that accommodates the working implement 23.

In accordance with the practice of the invention, the front head 25 and the back head 26 are provided, respectively, with lugs or flanges 30 and 31 which extend on opposite sides of the heads. Within the portions of the flange 31 lying on opposite sides of the back head 26 are bores 32 to receive feeding cylinders 33 having their forward ends arranged in recesses 34 in the flange 30.

The ends of the cylinders 33 that seat in the recesses 34 are provided with integral heads 35 having threaded stems 36 extending through the flange 30 to receive nuts 37 whereby the cylinders may be firmly secured to the front head. On the portions of the cylinders 33 lying within the bores 32 are enlargements 38, the peripheral surfaces 39 of which have a slide fit in the bores 32.

The enlargements 38, moreover, have shoulders 40 that abut sleeves 41 carried by the back head 26 to provide adjustable seats for the shoulders. The sleeves 41 also extend slidably into the bores 32 and each sleeve is provided with lugs 42 having apertures 43 registering with apertures 44 in the flanges 31 to receive bolts 45 whereby the sleeve 41 is drawn against the shoulder 40.

Thus, by means of the above described arrangement the feeding cylinders 33 serve to clamp the casing parts of the percussive element firmly together and the sleeves are adjustable to compensate for any slight variations in the distance between the front ends of the feeding cylinders and the shoulders 40.

As a preferred form of construction the rearmost ends of the feeding cylinders 33 are threaded externally to accommodate heads 46, and in the heads 46 are bushings 47 each having a flange 48 at its inner end that is clamped between the rearmost end of the feeding cylinder 33 and a shoulder 49 in the head 46. The bushings 47 serve as removable bearing surfaces for rods 50 attached to pistons 51 reciprocable in the cylinders 33. The rods 50 have reduced stems 52 that extend through the pistons 51 and nuts 53 threaded on the stems 52 clamp the rods to the pistons.

The opposite or lower ends of the rods are likewise provided with reduced stems 54 that extend through a crosshead 55 to which the rods are secured by nuts 56, and intermediate the rods 50 and on the lower surface of the crosshead 55 is a pointer 57 to seat upon the rock for supporting the drilling mechanism. The pointer 57, in effect, serves as a pivot for the drilling mechanism and the rock drill may be oscillated by the operator about an axis extending through the pointer 57 and the working implement 23 by a handle 58 secured to one of the feeding cylinders 33 by a bolt 59.

The handle 58 may thus serve as an instrumentality for rotating the drill steel in the work or to hold the drilling mechanism stationary in the event that the percussive element is provided with mechanism for effecting automatic rotation of the working implement.

The pressure fluid supplied for both the feeding and percussive elements is conveyed to the

drilling mechanism by a single conduit 60 connected to a valve casing 61 which is bored to receive a throttle valve 62 having a lever 63 whereby said throttle valve may be rotated. The casing 61 is shown located on the head block 27 and the throttle valve 62 is bored to provide a chamber 64 which is in constant communication with the conduit 60 through a passage 65 in the casing 61.

The throttle valve 62 may be ported, in a well known manner, to admit pressure fluid to the percussive element wherein it may be distributed by suitable valve mechanism (not shown) to the cylinder 24. On the head block 27, the cylinder 24 and the front head 25 are ribs 66 having a passage 67 which leads from the throttle valve 62 to branch passages 68 extending through the front head 25 and the heads 35 and opening into the front end of the feeding cylinders 33.

Any suitable control valve, designated in the present instance by 69, may be interposed in the passage 67 to cut off the flow of pressure fluid to the feeding cylinders and, if required, to communicate the feeding cylinders with the atmosphere to lower the pressure in the feeding cylinders. The control valve 69, shown for the purpose of illustration, is accordingly provided with a port 70 that communicates the several portions of the passage 67 with each other to admit pressure fluid into the feeding cylinders, and in the periphery of the valve 69 is a partly annular groove 71 to afford communication between the portion of the passage 67 lying forwardly of the valve 69 and an atmospheric port 72 in the rib 66 for bleeding pressure fluid from the feeding cylinders.

In the operation of the device, and assuming the valve 69 to occupy a position in which the port 70 is in registry with the several portions of the passage 67, the throttle valve 62 is moved to a position to supply pressure fluid to the feeding and percussive elements. The pressure fluid admitted into the feeding cylinders 33 will then move the percussive element towards the work and will continue to advance the percussive element in that direction to maintain it within favorable actuating position of the working implement 23.

Whenever the pressure in the feeding cylinders 33 is found to be excessive for immediate needs or if it be desired to discontinue feeding movement the valve 69 may be rotated to bring the groove 71 into registry with the forward portion of the passage 67 and the port 72 and a portion or all of the pressure fluid may be exhausted from the feeding cylinders 33 to retard the forward movement of the percussive element or to discontinue feeding movement altogether.

In practice, the present invention has been found to be highly desirable in drilling mechanism of the character described. By employing the feeding cylinders 33 as rods for securing the casing members of the percussive element together the construction of the percussive element may be greatly simplified and its weight may also be materially reduced, thus making it possible to construct a light weight drilling mechanism which may be conveniently handled by one attendant. This arrangement of the feeding cylinders, moreover, makes possible a very considerable reduction in the length of the drilling mechanism so that it may be conveniently used in narrow spaces in which drilling has hitherto been accomplished only through the use of hand-supported and guided rock drills.

In the form of the invention illustrated in Figure 4 the feeding cylinders 73 of which only one is shown also serve to clamp the casing parts of the percussive element 21 together. In the present instance, however, the feeding cylinder is provided with external threads 74 on its front end to engage the threads 75 of a recess 76 in the flange 30. A gasket 77 is preferably interposed between the end of the cylinder 73 and the bottom of the recess 76 to seal the recess.

The opposite end of the feeding cylinder 73 is provided with internal threads 78 to accommodate a head 79 having a bushing 80 which serves as a wearing surface for the rod 50. The head 79 has a lateral flange 81 which abuts the end of a spacer 82 disposed about the cylinder 73 and seating against the flange 31 of the back head.

In assembling this form of the invention the casing parts of the percussive element are first placed in their correct relative positions. The feeding cylinders are then extended through the flanges 31 and threaded into the recesses 76. Thereafter, the spacers 82 are placed on the lower projecting ends of the feeding cylinders and the heads 79 are next threaded into the feeding cylinders to clamp the spacers 82 tightly between the flanges 31 and 81 and to press the casing parts of the percussive element firmly together.

I claim:

1. A rock drill, comprising a percussive element having a plurality of casing parts, a feeding device for the percussive element comprising a plurality of telescopically arranged members and one of said members serving to secure the casing parts together.

2. A rock drill, comprising a percussive element having a plurality of casing parts, and a feeding device for the percussive element serving to secure the casing parts together.

3. A rock drill, comprising a percussive element having a cylinder and front and back heads, and a feeding device for the percussive element acting against the front and back heads to clamp said heads to the cylinder.

4. A rock drill, comprising a percussive element having a cylinder and front and back heads, a feeding device for the percussive element comprising piston and cylinder members and said cylinder member being connected to the front and back heads for clamping said heads to the cylinder of the percussive element.

5. A rock drill, comprising a percussive element having a cylinder and front and back heads, a plurality of feeding cylinders for the percussive element attached to the front and back heads for securing said heads to the cylinder of the percussive element, a crosshead, pistons in the feeding cylinders having rods attached to the crosshead, and a pointer for the crosshead.

6. A rock drill, comprising a percussive element having a cylinder and front and back heads, a pair of feeding cylinders threadedly connected to the front head and acting against the back head for securing said heads to the first said cylinder, pistons in the feeding cylinders having rods, a crosshead connecting the rods, and a pointer for the crosshead.

7. A rock drill, comprising a percussive element having a cylinder and front and back heads, a pair of feeding cylinders extending through the back head and secured to the front head, abut-

ments on the feeding cylinders, acting against the back head for clamping the cylinder between the heads, a crosshead, pistons in the feeding cylinders attached to the crosshead, and a rock-engaging pointer for the crosshead.

8. A rock drill, comprising a percussive element having a cylinder and front and back heads, a pressure actuated feeding device for the percussive element connected to the front head, a passage in the cylinder and the front head for conveying pressure fluid to and from the feeding device, and a valve to control the passage.

9. A rock drill, comprising a percussive element having a cylinder and front and back heads, a pair of feeding cylinders threadedly connected to the front head, spacers on the feeding cylinders seating against the back head, heads threadedly connected to the feeding cylinders and acting against the back head to clamp the first said cylinder between the front and back heads, a crosshead, pistons in the feeding cylinders having rods connected to the cross-head, and a pointer for the crosshead.

10. A rock drill, comprising a percussive element having a cylinder and front and back heads, a pair of feeding cylinders connected to the front head, shoulders on the feeding cylinders, adjustable seats on the back head for the shoulders, a crosshead, pistons in the feeding cylinders having rods connected to the crosshead, and a pointer for the crosshead.

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