May 11, 1943. J. C. CURTIS 2,318,593

SUPPORT

Filed March 23, 1940 2 Sheets-Sheet 1

Fig. 1.

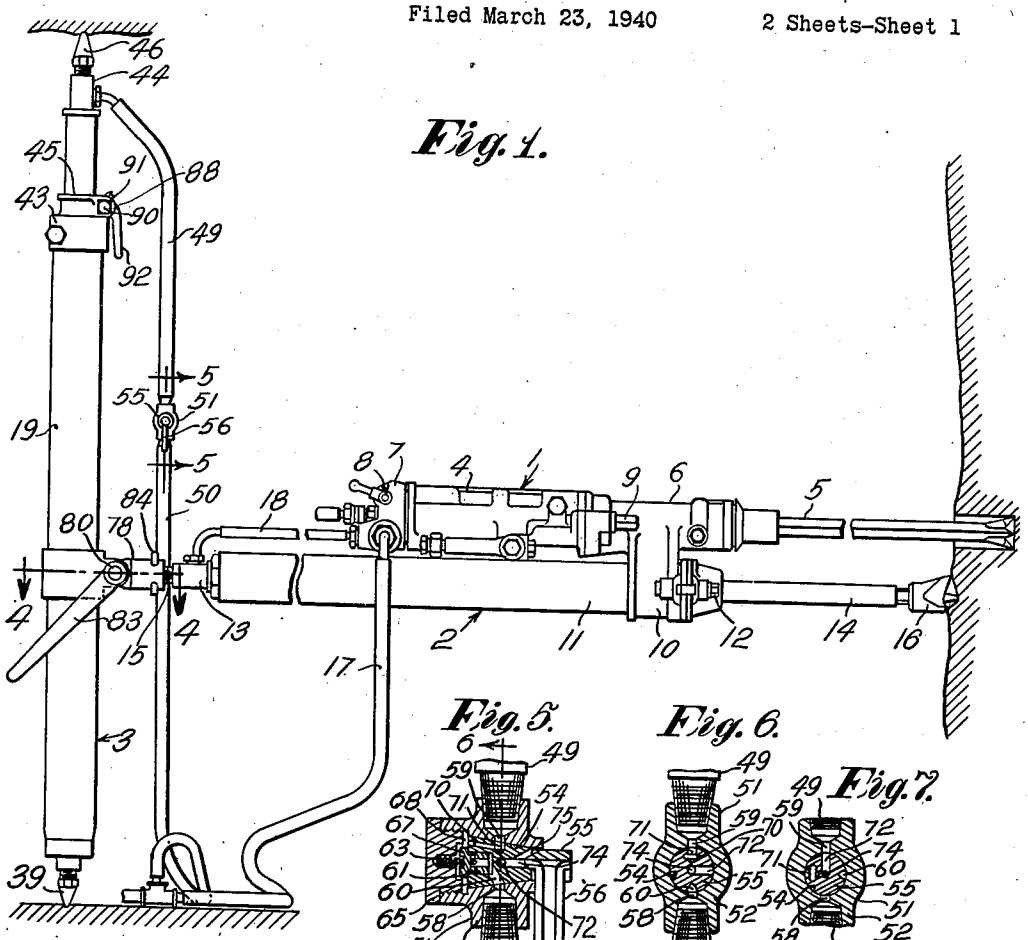


Fig. 5.

Fig. 6.

Fig. 7.

Fig. 4

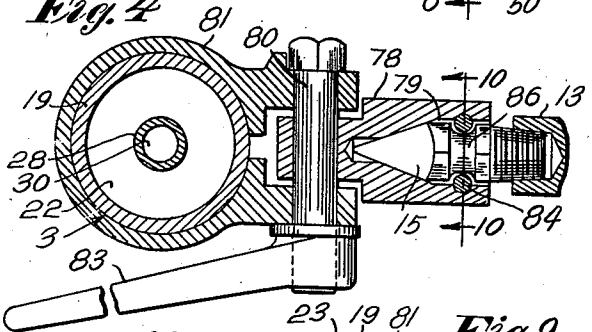


Fig. 8.

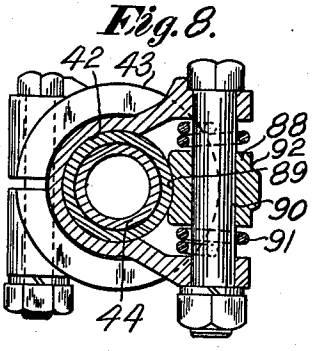


Fig. 10

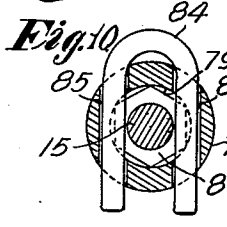
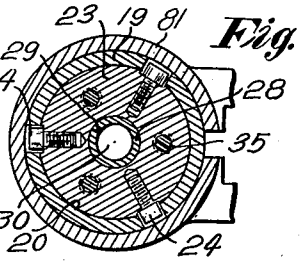


Fig. 9.



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SUPPORT

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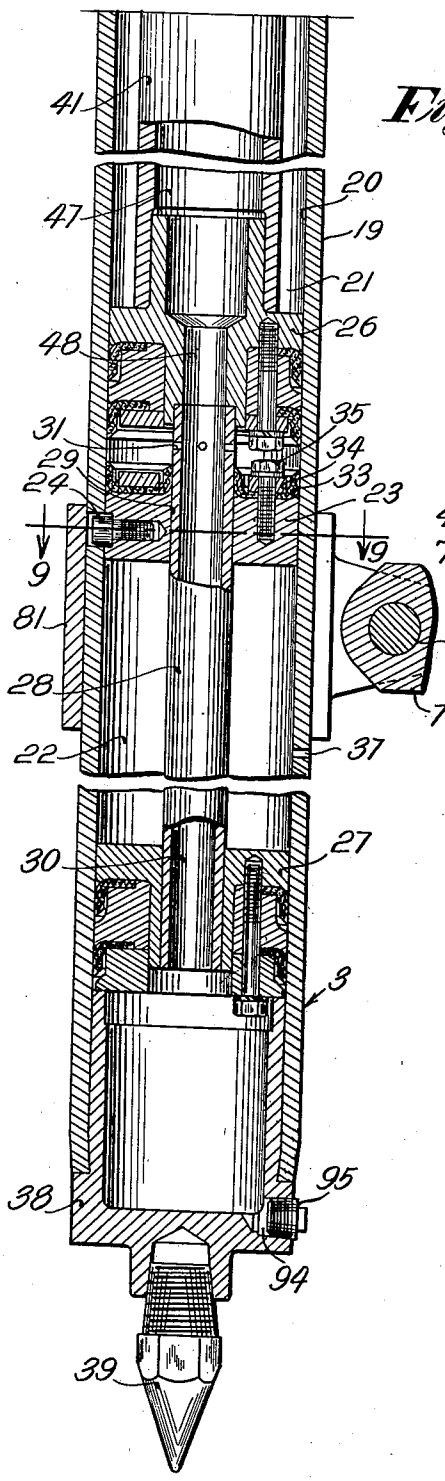


Fig. 2.

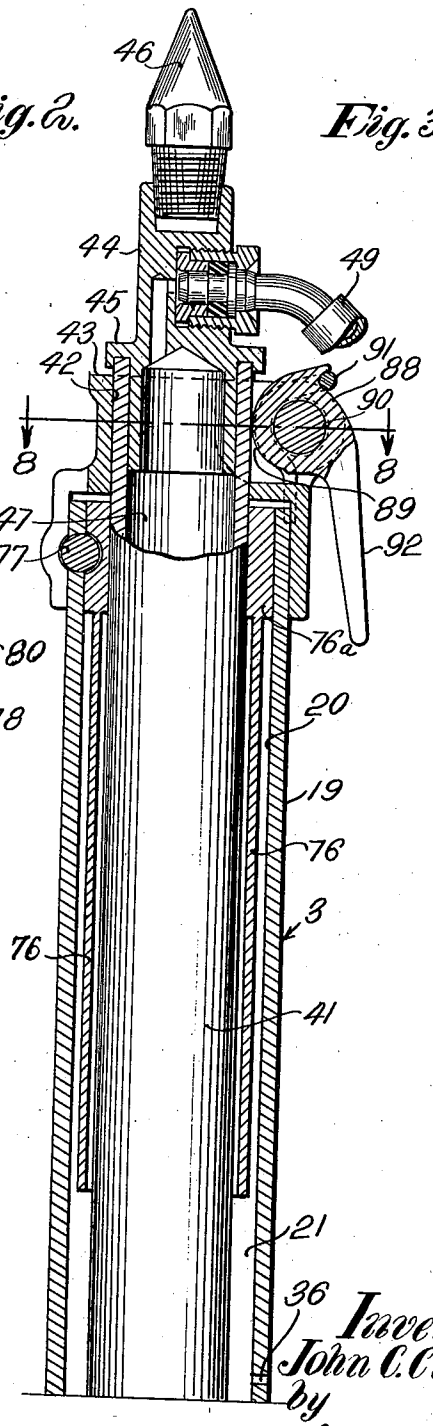


Fig. 3.

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UNITED STATES PATENT OFFICE

2,318,593

SUPPORT

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Application March 23, 1940, Serial No. 325,490

1 Claim. (Cl. 255—45)

This invention relates to adjustable supports, and more particularly to improved supporting and abutment providing means for rock drills of the stoper type.

An object of this invention is to provide an improved support and abutment providing device for a rock drill. Another object of this invention is to provide an improved extensible, fluid actuated device for rigidly holding one end of a stoper type drill relative to the work. Still another object of this invention is to provide an improved extensible column having adjustable means for supporting one end of a rock drill of the stoper type, and relative to which said rock drill may be adjusted to various angularly related positions. It is still another object of this invention to provide, in an improved extensible supporting and abutment providing member for a rock drill of the stoper type, improved means for effecting pressure fluid actuation of said member into engagement with extraneous abutments. Other objects and advantages of the invention will hereinafter more fully appear in the course of the following description.

In the accompanying drawings there is shown for purposes of illustration one form which the invention may assume in practice.

In these drawings:

Fig. 1 is a side elevational view of a rock drill supported at one end by an improved column constructed in accordance with an illustrative embodiment of the invention.

Fig. 2 is an enlarged vertical sectional view of the lower half of the supporting column shown in Fig. 1.

Fig. 3 is an enlarged vertical sectional view of the upper half of the supporting column shown in Fig. 1.

Fig. 4 is an enlarged cross sectional view of the supporting column and an end of the rock drill, taken substantially on the line 4—4 of Fig. 1.

Fig. 5 is an enlarged vertical sectional view, taken on the line 5—5 of Fig. 1, showing the control valve for the supply line leading to the supporting column.

Fig. 6 is a vertical sectional view taken on the plane of the line 6—6 of Fig. 5, showing the control valve in one position.

Fig. 7 is a view similar to Fig. 6, showing the valve in a different position.

Fig. 8 is a cross sectional view taken on the line 8—8 of Fig. 3 on a reduced scale.

Fig. 9 is a cross sectional view, taken on the plane of the line 9—9 of Fig. 2, on a reduced scale.

Fig. 10 is an enlarged sectional view, taken on line 10—10 of Fig. 4, showing means for locking one end of the drill to the supporting column.

Referring to the illustrative embodiment of the invention it will be noted that a drill steel actuating motor 1 is mounted on a supporting, guiding and feeding structure, generally designated 2, supported at its rear end by an improved extensible column, generally designated 3. The drill steel actuating motor is of the conventional reciprocating piston, hammer type comprising a motor cylinder 4 containing a usual reciprocatory hammer piston for delivering impact blows to the shank of a drill steel 5 suitably supported within a front chuck housing 6. The motor cylinder has a usual rear head block 7 containing a control valve mechanism, generally designated 8. The rear head block and front chuck housing are suitably secured to the motor cylinder in any conventional manner, as by usual side rods 9. Formed integrally with the front chuck housing 6 is a laterally located boss-like portion 10 having a bore for receiving the forward end of a feed cylinder 11 which forms part of the supporting, guiding and feeding structure 2 and which is described and claimed in an application Serial No. 304,792, filed November 16, 1939, now matured into Patent 2,296,818, dated Sept. 22, 1942. The boss-like portion 10 is rigidly secured to the feed cylinder 11 by bolts 12. Within the feed cylinder 11 are telescopically arranged piston rods 13 and 14 extending through the opposite ends of the feed cylinder and having at their outer extremities abutment engaging members 15 and 16. The member 16 may be caused to move forwardly relative to the feed cylinder into abutment engaging position upon manipulation of the control valve 8, by means of pressure fluid supplied through a conduit 18 from a supply line 17, and feeding of the feed cylinder may be effected as desired, all as more fully explained in said application Serial No. 304,792.

Now referring to the improved supporting column 3 shown in Figs. 2 and 3, it will be noted that a cylinder 19 has a bore 20 divided into upper and lower piston chambers 21 and 22 by a head 23 secured to the cylinder, as by bolts 24. Reciprocable in the upper and lower piston chambers are pistons 26 and 27 connected together by a piston rod 28 extending axially of the cylinder bore and passing through a bore 29 in the head 23. Formed in the piston rod 28 is a passage 30 extending longitudinally thereof and opening at its lower end into the piston chamber 22 below the piston 27. Passages 31 in the piston rod 28 connect the

passage 30 with the piston chamber 21 between the piston 26 and head 23. At the upper surface of the head 23 is a cup leather 33 pressed into fluid-tight sealing engagement with the walls of the cylinder bore and with the piston rod 26 by a ring member 34 secured to the head, as by bolts 35. The piston chambers 21 and 22 are connected to atmosphere through passages 36 and 37 which open into the cylinder bore at points overrun by the pistons 26 and 27 when they are moved to the uppermost ends of their respective chambers. The lower end of the piston chamber 22 is closed by a cylinder head 38 to which there is attached an abutment engaging point 39. Extending axially of the cylinder bore from the upper side of the piston 26 is a piston rod 41 which projects through an opening 42 in a top cylinder head 43 and has attached to its upper end a member 44 provided with a flange 45 overlying the outer end of the piston rod 41. Attached to the member 44 is an abutment engaging point 46. Formed within the piston rod 41, and extending axially thereof, is a passage 47 opening at its lower end into a passage 48 in the piston 26, and the passage 48 communicates with the passage 30 extending through the piston rod 28. Pressure fluid is supplied to or vented from the passage 47 through a flexible conduit 49 which is connected to the member 44 and which communicates with a supply line 50 or with atmosphere under the control of a throttle valve 51.

This throttle valve comprises, as shown in Fig. 5, a valve casing 52 having a bore 54 containing a valve 55 which may be manually rotated into various positions by a handle 56. The supply line 50 and the conduit 49 communicate with the valve bore 54 through passages 58 and 59 formed in the valve casing. A passage 60 in the valve opens at one end through the outer peripheral surface of the valve at a point in a vertical plane which includes passages 58 and 59, and opens at its other end into a bore 61 formed in one end of the valve 55. A spring 63, supported at one end by a plug 65 screwed into the end of the valve casing, continuously urges a valve 67 in a direction to close off the bore 61 from a space 68 between the plug 65 and valve 55. A passage 70 extending longitudinally through the valve, connects the space 68 with a passage 71 opening through the outer peripheral surface of the valve at a point diametrically opposite the outer end of passage 60. Formed in the valve 55 is a passage 72 opening into the valve bore at a point between, and in the same vertical plane with, the outer ends of passages 60 and 71. A passage 74 formed within the valve 55 and extending axially thereof connects passage 72 to a passage 75 which opens to atmosphere.

Within the forward end of the bore 20 is arranged, between the piston rod 41 and the wall of the bore 20, a sleeve 76 having at its upper end a portion 76a thickened both inwardly and outwardly so that it fills the space between the piston rod and the feed cylinder wall. This sleeve is held in position by the bolt 77, and serves to prevent the piston 26 from getting close to the top head of the feed cylinder, thereby reducing the danger of breakage.

The rear end of the guiding and feeding structure is supported, as shown in Fig. 4, by a member 78 providing a socket 79 for receiving the abutment engaging member 15. The member 78 is pivotally connected to a pivot forming bolt 80 carried by a clamping device 81 on the cylinder 19 of the supporting column 3, and a handle 83 on the bolt 80 effects locking engagement of the clamping device with the cylinder in its various adjusted positions. The abutment engaging member 15 is locked into the socket 79, as shown in Fig. 10, by the legs of a U-shaped member 84, which project through openings 85 in the member 78 and engage in a groove 86 in the member 15. Means is provided for automatically preventing downward movement of the abutment engaging point 46 upon failure of the pressure fluid supply to the piston chambers 21 and 22, and this means comprises an automatic gripping device 88 having a cam-like gripping surface 89 and pivotally mounted at 90 on the upper cylinder head 43. A spring 91 is provided for constantly urging the gripping surface into gripping engagement with the piston rod 41. A handle 92 is provided to enable manual release of the gripping device from the piston rod. An opening 94 is provided in the lower cylinder head 38 through which pressure fluid may be supplied to the cylinder bore 20 from the conduit 49, if desired, or, through which condensed liquid may be drained from the cylinder bore when conduit 49 is connected to supply pressure fluid to the piston chambers through passage 47 in the piston rod 41. The opening 94 is closed by a plug 95 when pressure fluid is supplied through passage 49.

The mode of operation of this embodiment of the invention will be clearly apparent from the description given. The supporting column 3 is moved into a position adjacent the working face with its abutment engaging point 39 resting on the mine floor. The valve 55 is then rotated into the position shown in Fig. 5, to supply pressure fluid from the line 50 through passage 60 to the bore 61, where it acts on the valve 67 to force it open against the pressure of spring 63. Pressure fluid passes the open valve to the space 68 and through passages 70, 71 and conduit 49 to the passage 47 within the piston rod 41. The pressure fluid flows through passage 47, passage 48 in piston 26 and passage 30 in the piston rod 23 to the piston chamber 22 beneath piston 27, and through passages 31 into the piston chamber 21 beneath piston 26. The abutment engaging point 46 on the piston rod 41 is forced firmly into engagement with the roof of the mine by the action of the pressure fluid on the pistons 26 and 27. The clamping device 81 is then locked to the cylinder at the desired level and the abutment engaging point 15 of the supporting, guiding and feeding structure is placed in the socket 79 and locked in position by the member 84. This structure is held in the desired angular position relative to the column 3, and the control valve 8 is then opened to supply pressure fluid through conduit 18 to effect movement of the abutment engaging member 16 firmly into engagement with the working face.

After the drilling has been completed and it is desired to move to a new location, the control valve 8 is adjusted to vent pressure fluid from the supporting structure and release the abutment engaging member 16 from the working face, and the valve 55 may be turned to the position shown in Fig. 7 to vent pressure fluid from the piston chambers 21 and 22 through the conduit 49 and passages 72, 74 and 75 in the valve 55. The gripping device 88 is manually released and the abutment engaging point 46 moves from engagement with the roof by the weight of piston rods 28 and 41 and pistons 26 and 27. If the supply from line 50 fails after the abutment engaging points 35 and 46 have been forced into

engagement with extraneous abutments, the valve **67** serves to prevent the escape of pressure fluid from the piston chambers through the conduit **49**, and the cam surface of the gripping device **88** engages the piston rod **41**, until released by the handle **92**, to prevent the release of point **46** from the abutment. If it is desired to operate the drill in an inclined passage, the column **3** may be arranged in a horizontal position between the side walls of the mine passage in an obvious manner.

As a result of this invention it will be noted that an improved supporting and abutment providing column is provided for a stoper type rock drill. It will further be noted that this column may be extended in an improved manner to firmly engage extraneous abutments and is provided with means for preventing its release from the abutments in the event of any failure in the system. It will still further be evident that the supporting column may be arranged in any position and is provided with adjustable means for supporting the rock drill at any angular position relative to the column and for moving the drill support along the column.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claim.

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

In a supporting column, in combination, a cylinder having a plurality of piston chambers therein, pistons reciprocable in said piston chambers and connected against movement relative to each other, a piston rod attached to one of said pistons and terminating in an abutment engaging point extending beyond one end of said cylinder, an abutment engaging point on the other end of said cylinder, means for supplying pressure fluid to said piston chambers for effecting relative movement of said abutment engaging points firmly into engagement with extraneous abutments, said last mentioned means including passage means extending through said piston rod, and a fluid supply line connected to said piston rod and communicating with said passage means, and means controlled by said pistons for venting pressure fluid from each of said piston chambers on predetermined movement of said abutment engaging points relative to each other.

JOHN C. CURTIS.