April 2, 1940. J. I. HULSHIZER 2,195,488

CONTROLLING DEVICE

Filed July 28, 1938

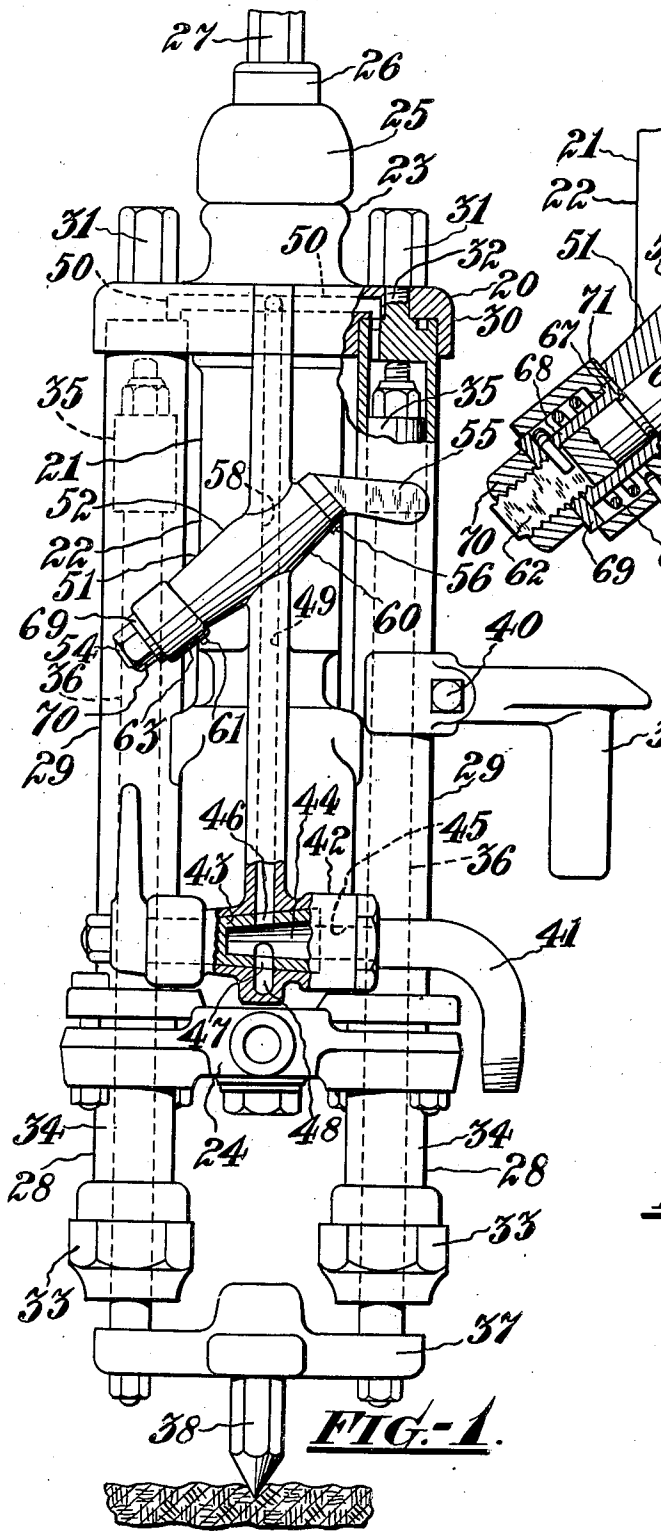


FIG.-1.

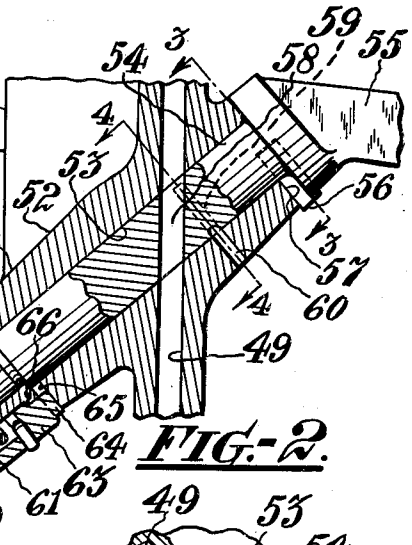


FIG.-2.

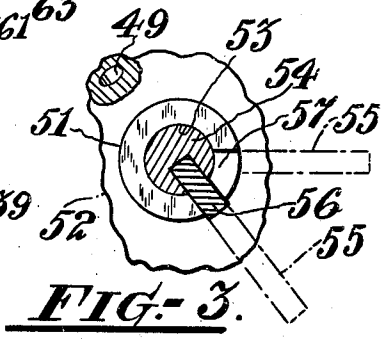


FIG.-3.

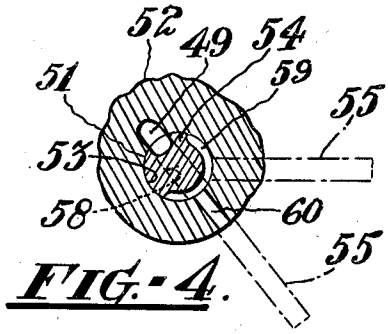


FIG.-4.

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CONTROLLING DEVICE

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Application July 28, 1938, Serial No. 221,748

1 Claim. (Cl. 251—110)

This invention relates to controlling devices, and more particularly to a controlling device applicable to the feeding mechanism of a fluid actuated rock drill of the stoper type.

One object of the invention is to assure large flow area through a rotary control valve of small diameter.

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

In the drawing accompanying this specification and in which similar reference numerals refer to similar parts,

Figure 1 is an elevation, partly in section, of a stoper type rock drill equipped with a controlling device constructed in accordance with the practice of the invention,

Figure 2 is an enlarged view, partly broken away, of the controlling device, and

Figures 3 and 4 are transverse views taken through Figure 2 on the lines 3—3 and 4—4, respectively.

Referring more particularly to the drawing, 20 designates a rock drilling mechanism, to which the invention is applied, and comprises a percussive element 21 indicated by the external casing parts consisting of the cylinder 22, the front head 23 and the back head 24. A hood 25 is arranged at the front end of the front head and a chuck 26 extends through the hood to accommodate a working implement 27 which the rock drill is intended to actuate.

The rock drill is provided with a suitable feeding device 28 shown, by way of example, as comprising a pair of cylinders 29 arranged on opposite sides of the cylinder 22. The cylinders 29 extend through the back head and with their front ends into a flange 30 on the front head 23 to which they are secured by nuts 31 threaded on extensions 32 carried by the cylinders. On the rearward ends of the cylinders 29 are heads 33 which may be threaded to the cylinders 29 to form closures therefor and act against spacers 34 seating against the back head 24 to clamp the back head to the end of the cylinder 22.

Within the cylinders 29 are pistons 35 having rods 36 that extend slidably through the heads 33 and are connected to a cross head 37 carrying a rock engaging pointer 38 upon which the drilling mechanism rests during drilling. The pointer, in effect, serves as a pivot for the drilling mechanism which may be conveniently rotated about its axis or held against rotational movement by a handle 39 clamped to one of the feeding cylinders 29 by a bolt 40.

The pressure fluid employed for actuating the drilling mechanism is conveyed thereto by a conduit 41 connected to a valve casing 42 on the cylinder 22. The casing 42 contains a throttle valve 43 having a chamber 44 into which pressure fluid flows from the conduit 41 through a passage 45 in the valve casing 42.

The throttle valve 43 controls the supply of pressure fluid to both the percussive and feeding elements. It is accordingly provided with a pair of ports 46 and 47 of which the former communicates the chamber 44 with a supply passage 48 leading to the distributing valve mechanism (not shown) of the rock drill, and the port 46 affords communication between the chamber 44 and a passage 49 in the cylinder 22 and the front head 23 and having branches 50 that open into the forward ends of the feeding cylinders 29.

The ports 46 and 47 may be brought simultaneously into registry with the adjacent passages to which they are intended to supply pressure fluid. Thus, when the throttle valve is rotated to a position to supply pressure fluid to the percussive element pressure fluid will be simultaneously supplied to the front ends of the feeding cylinders 29 for raising the percussive element toward the work. The ports 46 and 47 may, however, be so positioned that pressure fluid will first be introduced into the feeding cylinders to raise the drill before the percussive element is set in operation.

In drilling mechanisms equipped with a plurality of feeding cylinders, it is desirable that a single element be provided for controlling the pressure values in all the feeding cylinders. It is, moreover, essential that such element be located within convenient reach of the operator and that, when located on the surface of the drilling mechanism, it be of compact form in order to prevent high protuberances on the drilling mechanism that might strike against the rock surface and become damaged. Thus, when applied, say, to a drilling mechanism of the character described the controlling device, designated in general by 51, is interposed in the passage 49 and in close proximity to the handle 39 so that it may be conveniently manipulated without requiring the operator to reach around the drilling mechanism.

The controlling device comprises a valve casing 52 which may be an integral part of the cylinder 22. The valve casing 52 is arranged diagonally on the cylinder and has a cylindrical bore 53 that bisects the passage 49, that is to say, the portions of the passage 49 lying for-

wardly and rearwardly of the bore 53 open into opposite sides of the bore, although in different transverse planes.

Within the bore 53 is a cylindrical rotary valve 54 having a lever 55, whereby the valve may be manipulated, seating against an end of the valve casing 52, and the valve carries a pin 56 that lies in a slot 57 in the end of the valve casing 52 and seats against the ends of the slot 57 to limit the degree in which the valve may be rotated in the bore 53.

Extending through the valve 54 is a passage 58 to afford communication between the branches of the passage 49 and said passage 58 arranged angularly with respect to the valve. By arranging the passages 49 and 58 in the manner described the ends of the passage 58 will also lie in different transverse planes. Thus, when the valve 54 lies in the closed position to cut off the flow of pressure fluid through the passage 49 the ends of the passage 58 will be sealed by portions of the bore 53 lying in different transverse planes and will, therefore, be adequately sealed even though the diameter of the passage 58 is large as compared with the diameter of the valve 54.

In the periphery of the valve 54 is a partly annular groove 59 which lies in the same transverse plane as the entrance end of the portion of the passage 49 lying forwardly of the bore 53 and affords communication between said portion of the passage 49 and an exhaust port 60 in the casing 52.

Preferably, means are provided to normally maintain the valve in a position in which the passage 58 will be in registry with the passage 49 and to return the valve to this position when released in the closed position. To this end a coil spring 61 is disposed about the valve stem 62 and anchored thereto at one end. The other end of the spring 61 is anchored to a casing 63 having a lug 64 that seats into a depression 65 on the end of the valve casing 52 to prevent relative rotary movement between the casings.

The casing 63 encircles the spring 61 and has an internal shoulder 66 that seats upon a flange 67 of a spacer 68 disposed about the stem 62. The outer end of the spacer 68 serves as a seat for a washer 69 which in turn forms a seat for a nut 70 threaded on the outer end of the valve stem 62. The inner end of the spacer 68 abuts a shoulder 71 at the juncture of the valve 54 and the stem 62. The shoulder 71 is so positioned that it lies immediately exteriorly of the casing 52 in order that a slight clearance may exist between the spacer and the end of the valve casing. The spacer 68 and the washer 69 thus serve to prevent the application of a binding pressure on the valve 54, and the spacer and the lever 55 will cooperate with the ends of the valve casing 52 to prevent endwise movement of the valve 54.

In practice the present invention has been found to be highly desirable for use in controlling passages of sizable flow area and in which the space available for the control member or valve is limited. By so arranging the passage 58 in the valve that its ends lie in different transverse planes a comparatively large passage 58 may be provided and when the valve is rotated to the closed position sufficient surface will lie between the ends of the passage 58 and the passages in the casing to preclude the unauthorized flow of pressure fluid to the element intended to be controlled, in the present instance the cylinders 29.

In the operation of the device, and as has been previously stated, the valve 54 will normally occupy a position in which the passage 58 is in registry with the passage 49 so that when the throttle valve 43 is moved to position to establish registry of the port 46 with the passage 49 pressure fluid will at once be admitted into the feeding cylinder 29 without requiring the additional manipulation of the valve 54. The percussive element will then immediately be actuated toward the work, and in the event that it be desired to decrease the pressure value in the cylinders 29 the valve 54 is rotated to move the passage 58 out of registry with the passage 49 and to bring the groove 59 into registry with the portion of the passage 49 lying forwardly of the valve 54. A portion of the pressure fluid will then pass from the cylinders 29 through the passage 49 to the groove 59 and the port 60 to the atmosphere. After the need of low pressure in the cylinders 29 has passed the lever 55 is released and the spring 61 will then rotate the valve 54 to position to establish full communication between the pressure fluid supply and the feeding cylinders.

I claim:

A controlling device, comprising a casing having a cylindrical bore and coaxially aligned passages opening into the opposite sides of the bore and at different points along the length of the bore, a cylindrical rotary valve in the bore having a passage to establish communication between the first said passages, an exhaust port in the casing leading from the bore, a channel in the valve to afford communication between one of the first said passages and the exhaust port, means on the valve cooperating with the casing to prevent endwise movement of the valve in one direction, a shoulder on the valve lying exteriorly of the casing, a spacer on the valve seating against the shoulder and cooperating with the casing to prevent endwise movement of the valve in an opposite direction, means for clamping the spacer against the shoulder, and a spring attached to the casing and the valve for returning said valve to and holding it in a limiting position.

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