June 25, 1940. H. J. SCHORLE 2,205,736

PERCUSSIVE TOOL

Filed April 22, 1939 2 Sheets-Sheet 1

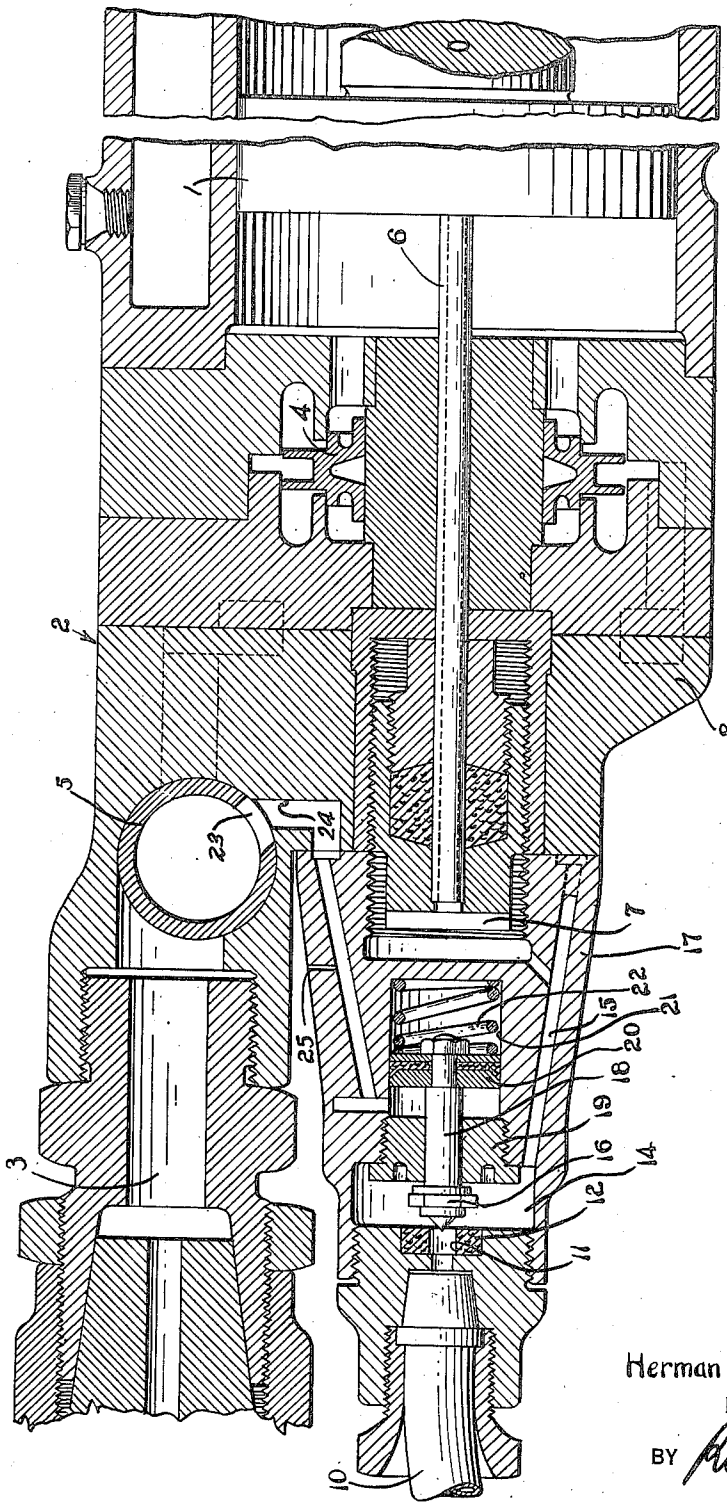


Fig. 1

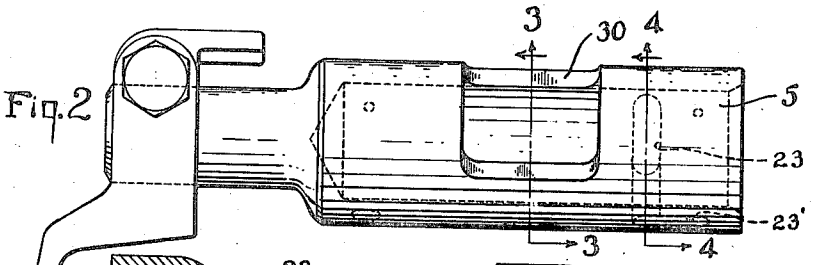
Herman J. Schorle
INVENTOR
BY
ATTORNEY

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Fig. 2



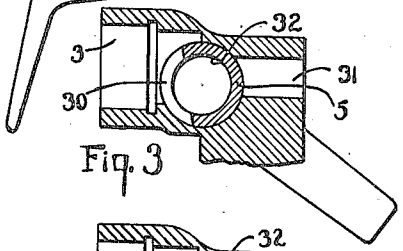


Fig. 3

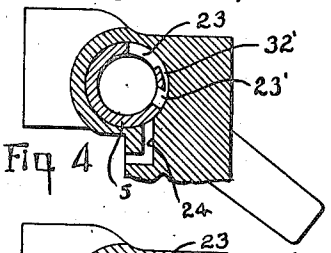


Fig. 4

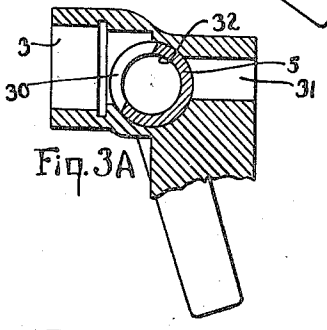


Fig. 3A

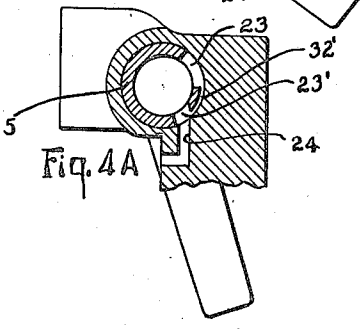


Fig. 4A

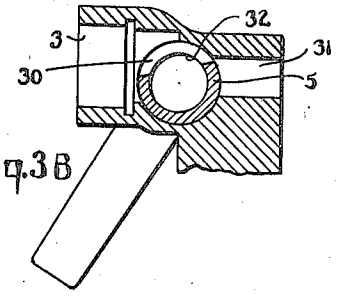


Fig. 3B

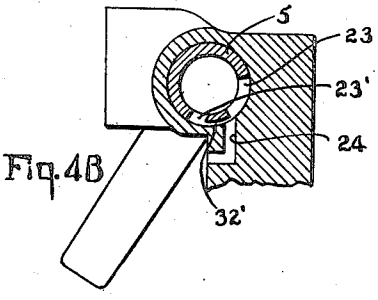


Fig. 4B

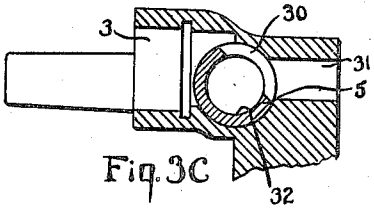


Fig. 3C

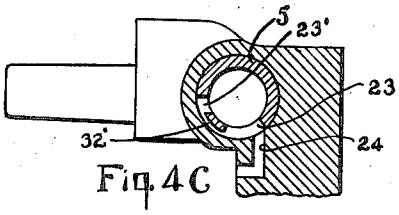


Fig. 4C

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PERCUSSIVE TOOL

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Application April 22, 1939, Serial No. 269,473

7 Claims. (Cl. 121—10)

This invention relates to percussive tools such as rock drills or the like and more particularly to hole cleansing means for cleansing the drill hole.

An object of the present invention is to provide, in a percussive tool in which water is fed to the drill hole through a suitable water tube and hole in the drill steel for cleansing the drill hole, means controlled by operation of throttle of the drill for controlling the flow of cleansing liquid to the drill hole.

More specifically, the present invention comprises a valve normally held closed by suitable means, which valve is opened by pressure of pressure fluid employed to operate the drill.

With these and other objects in view, as may appear from the accompanying specification, the invention consists of various features of construction and combination of parts, which will be first described in connection with the accompanying drawings showing a percussive tool embodying the present invention, and the features forming the invention will be specifically pointed out in the claims.

In the drawings:

Figure 1 is a longitudinal section through a part of a percussive tool embodying the present invention.

Figure 2 is a side elevation of the throttle valve employed in the percussive tool.

Figures 3, 3A, 3B and 3C are a series of section views taken on line 3—3 of Figure 2 and showing the throttle valve in various adjusted positions.

Figures 4, 4A, 4B and 4C are a series of sectional views taken on line 4—4 of Figure 2 and corresponding to the positions of the throttle valve shown in Figures 3 to 3C respectively.

Referring more particularly to the drawings, the pressure fluid supply for operating the hammer piston 1 of the percussive tool or rock drill 2 is delivered to the tool from a suitable supply source (not shown) through the supply port 3. The delivery of the pressure air or fluid to the actuating or distributing valve 4 of the rock drill is primarily controlled by the throttle 5 as is usual in percussive tools of this type.

In the use of rock drills, hole blowing or cleansing means is frequently employed, in some instances pressure air is employed for blowing the drillings from the hole and in other cases water is employed for cleansing the drill hole. The present invention relates to that type of drill employing water, although it is equally applicable for use with drills employing pressure air.

The cleansing fluid passes through a tube 6 which opens out into a chamber 7 in the head 8 of the drill. As is usual, in the construction of percussive tools of this type the tube 6 delivers the cleansing fluid to the longitudinally extending axial hole in the drill steel (not shown) and the cleansing fluid passes through the drill steel out into the hole.

The cleansing fluid is delivered to the rock drill from a suitable supply source through the connection 10. The connection or supply passage opens through a suitable passage 11 in a valve seat 12 into the chamber 14, which has communication through a suitable passage 15 with the chamber 7.

A valve member 16 is carried by the extension 17 on the head 8 and is movable through the chamber 14 for controlling communication between the supply passage 10 and the chamber 14. The valve member 16 has a stem 18 thereon which extends through a closure plug 19 and has a piston or abutment surface forming element 20 mounted thereon. The piston or abutment surface forming element 20 is mounted for reciprocatory movement in the cylindrical chamber 21. A spring 22 engages the member 20 and is tensioned to hold the valve element 16 on its seat to cut off the flow of cleansing fluid through the various chambers 14 and 7 and passage 15 to the tube 6.

Pressure fluid which is employed for operating the hammer piston 1 is also employed for acting on the member 20 to move the valve 16 off of its seat and the delivery of such pressure fluid against the member 20 is controlled by the throttle 5.

The throttle 5 has a port 23 formed therein which at certain points during the rotation of the throttle opens into a passage 24 which in turn opens into the cylindrical chamber 21 on the side of the piston or member 20 oppositely to the side engaged by the spring 22 so that when the port 23 communicates with the passage 24, air under pressure will be delivered to the cylindrical chamber 21 and move the piston 20 against the tension of the spring 22 to move the valve 16 off its seat. The movement of the valve 16 off its seat will permit the cleansing fluid to flow through the chambers 14 and 7, passage 15, tube 6, etc., to the drill hole.

Figures 3 to 3C inclusive and Figures 4 to 4C inclusive of the drawings show the relative positions of the throttle ports for supplying pressure fluid to the distributing valve 4 for operating the hammer piston 1 and to the piston 20 for operating the valve 16.

In Figures 3 and 4 the throttle valve 5 is shown closed and the passage of pressure fluid therethrough is cut off.

As the throttle 5 is rotated (to the right in Figures 3 to 4C inclusive) the first section 23' is brought into communication with the passage 24, while the port 30 in the throttle valve is still out of communication with the passage 31 which delivers pressure fluid to the distributing valve 4, at which time pressure fluid will enter the bore

32 of the throttle and pass through the section 23' of the port 23, thence to the chamber 24, and acting on the piston 20 will open the valve 16 to permit cleansing fluid to flow through the tube 6, etc. (see Figures 3A and 4A).

As the throttle valve 5 is farther opened, providing restricted flow of pressure fluid to the distributor valve 4, the restriction 32' comes into registration with the passage 24 (see Figures 3B and 4B) providing a reduced opening of the valve 16 and consequently a reduced flow of cleansing fluid to and through the tube 6. The restriction 32' permits proportioned flow of cleansing fluid to the flow of operating pressure fluid to the distributing valve 4.

As the throttle valve 5 is continued in its movement to full open position the unrestricted part of port 23 moves into communication with the passage 24 (see Figures 3C and 4C) and the valve 16 is opened full, permitting maximum supply of cleansing fluid to the tube 6, etc.

Thus it will be seen that upon starting of operation of the percussive tool, a short flow of cleansing fluid will be delivered through the tool immediately before any hammer action takes place and as the operating fluid is fed to the distributing valve 4 for controlling the speed of operation of the tool, the flow of cleansing fluid is proportionately controlled.

A small bleeder port 25 opens into the passage 24 and to atmosphere to permit pressure fluid to bleed from the chamber 24 and allow the spring 22 to move the valve 16 on its seat quickly when the throttle 5 is returned to position shown on Figures 3 and 4.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown but that they may be widely modified within the invention defined by the claims.

What is claimed is:

1. In a percussive tool, the combination with a pressure fluid controlling throttle, a distributor valve for controlling operation of the tool and a passage for conducting cleansing fluid to a drill hole made by the tool, of pressure fluid actuated means for controlling flow of cleansing fluid through said passage, and means on said throttle for controlling operation of said means whereby the flow of cleansing fluid will be proportionate to the flow of pressure fluid to said distributing valve.

2. In a percussive tool, the combination with a pressure fluid controlling throttle, a distributor valve for controlling operation of the tool and a passage for conducting cleansing fluid to a drill hole made by the tool, of pressure fluid actuated means for controlling flow of cleansing fluid through said passage, and means on said throttle for controlling operation of said means whereby the flow of cleansing fluid will be proportionate to the flow of pressure fluid to said distributing valve, said throttle further provided with means whereby said pressure fluid actuated means will be operated to permit delivery of cleansing fluid through said passage immediately prior to delivery of pressure fluid to said distributing valve.

3. In a percussive tool, the combination with a pressure fluid controlling throttle, a distributor valve for controlling operation of the tool, and a passage for conducting cleansing fluid to a drill hole made by the tool, of a valve for controlling flow of cleaning fluid through said passage, a piston connected to said valve and acted on by pressure fluid for opening the valve, a spring acting on said piston to close the valve, and means on said throttle for controlling delivery of pressure fluid against said piston whereby the flow of cleansing fluid will be proportionate to the flow of pressure fluid to said distributing valve.

4. In a percussive tool, the combination with a pressure fluid controlling throttle, a distributor valve for controlling operation of the tool, and a passage for conducting cleansing fluid to a drill hole made by the tool, of a valve for controlling flow of cleaning fluid through said passage, a piston connected to said valve and acted on by pressure fluid for opening the valve, a spring acting on said piston to close the valve, and means on said throttle for controlling delivery of pressure fluid against said piston whereby the flow of cleansing fluid will be proportionate to the flow of pressure fluid to said distributing valve, said throttle further provided with means whereby said valve will be operated to permit delivery of cleansing fluid through said passage immediately prior to the delivery of pressure fluid to said distributing valve.

5. In a percussive tool, in combination with a pressure fluid controlling throttle, a distributor valve for controlling operation of the tool and a passage for conducting cleansing fluid to a drill hole made by the tool, of a valve for controlling flow of cleansing fluid through said passage, a piston connected to said valve and acted on by pressure fluid for opening the valve, a spring acting on said piston to close the valve, said throttle provided with ports and passages for delivering pressure fluid to said distributor valve and piston and arranged whereby said piston will be operated to permit delivery of cleansing fluid through said passage immediately prior to delivery of pressure fluid to said distributing valve and whereby the flow of pressure fluid to said piston will be proportionate to the flow of pressure fluid to the distributing valve.

6. In a percussive tool, the combination with a pressure fluid controlling throttle, a distributor valve for controlling operation of the tool, and a passage for conducting cleansing fluid to a drill hole made by the tool, of pressure fluid actuated means for controlling flow of cleansing fluid through said passage, said throttle provided with ports and passages for delivering pressure fluid to said distributor valve and pressure fluid actuated means, and arranged whereby the flow of pressure fluid to said fluid actuated means will be proportionate to the flow of pressure fluid to said distributing valve.

7. In a percussive tool, the combination with a pressure fluid controlling throttle, a distributor valve for controlling operation of the tool, and a passage for conducting cleansing fluid to a drill hole made by the tool, of pressure fluid actuated means for controlling flow of cleansing fluid through said passage, said throttle provided with ports and passages for delivering pressure fluid to said distributor valve and pressure actuated means, arranged whereby the flow of pressure fluid to said fluid actuated means will be proportionate to the flow of pressure fluid to said distributing valve, said ports further arranged whereby said pressure fluid actuated means will be operated to permit delivery of cleansing fluid through said passage immediately prior to the delivery of pressure fluid to said distributing valve.

HERMAN J. SCHORLE.