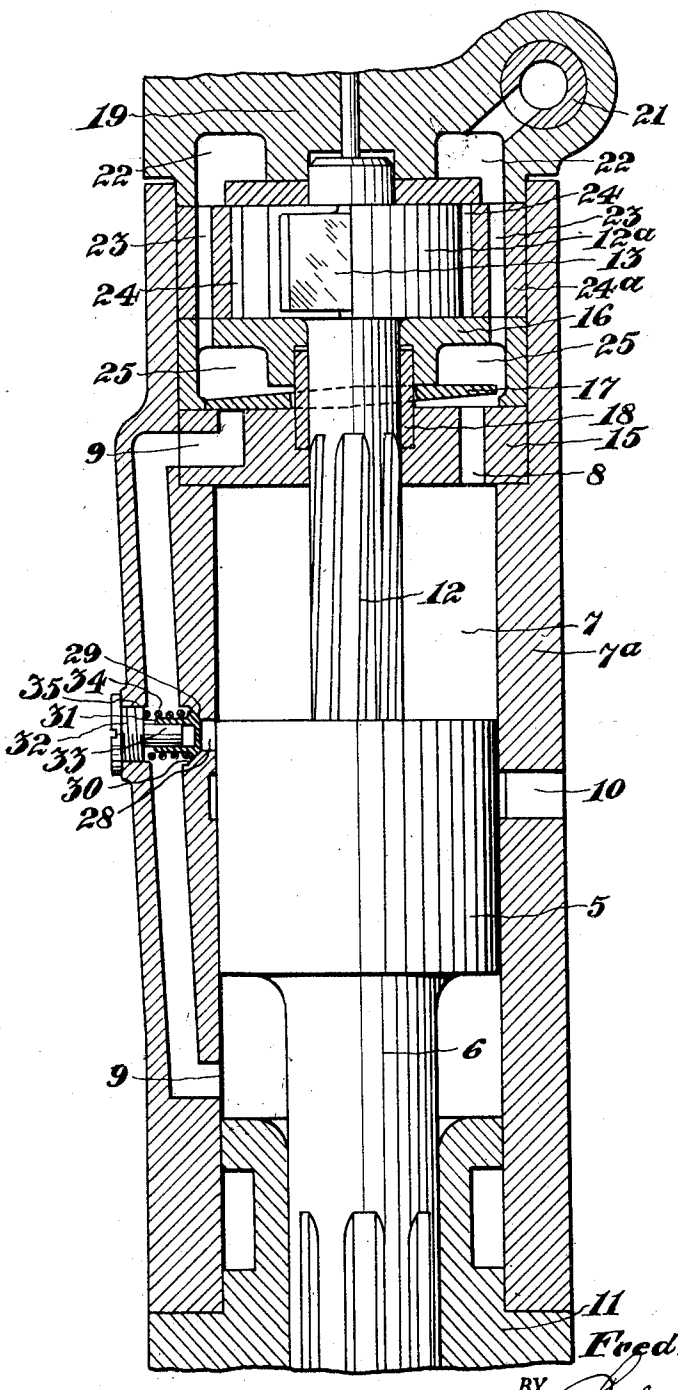
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PERCUSSIVE TOOL

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PERCUSSIVE TOOL

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This invention relates to fluid actuated percussive tools, and more particularly to a by-pass around the piston of such a tool.

The object of the invention is to provide a means for utilizing a portion of the pressure fluid commonly lost in the exhaust and thus decrease the consumption of pressure fluid.

Other objects are either obvious or will be referred to in the following specification.

The accompanying drawing is a sectional elevation of the rearward part of a rock drill in which my invention has been embodied. Similar reference characters refer to similar parts in the drawing.

In the drawing a piston 5 having a fluted extension 6 is disposed in a piston chamber 7 of a cylinder 7*a*. A fluid inlet passage 8 leads to the rear of the piston chamber and a similar fluid passage 9 leads to the front of the piston chamber. In the wall of the cylinder is an exhaust port 10 which is controlled by the movement of the piston in the chamber. A front cylinder bushing 11 forms a closure for the front end of the piston chamber. The piston extension 6 passes through this bushing to deliver the blows of the piston to a working implement (not shown).

A rifle bar 12 which may engage a rifle bar nut (not shown) in the piston controls, in cooperation with the parts next described, the rotation of the piston on its back stroke. A rifle bar head 12*a* having pawls 13 which engage in ratchets 24 in a ratchet plate 24*a* comprise the rotation mechanism referred to, the action of which is well understood by all familiar with the art.

The rear closure of the piston chamber consists of a back cylinder washer 15. The rear surface of this washer is used as a seat for a distributor valve 17 which in this instance is of the tapered disc type. A valve cover 16 having a valve chamber 25 and enclosing a valve bushing 18 fits against the back cylinder washer.

Seated upon the valve chest is the ratchet plate 24*a* and surmounting it is a back head 19 containing a throttle valve 21 and a fluid chamber 22. Fluid is conducted to the tool by any suitable means (not shown) and is introduced through the throttle valve 21 whence it flows through the chamber 22 and passages 23 to the valve chamber 25. It is distributed by the oscillation of the valve 17 alternately to the front and rear of the piston chamber through the passages 9 and 8 respectively.

In the piston chamber somewhat to the rear of the exhaust port 10 and communicating with the inlet passage 9 is a port 28. At the outer end of this port a bevelled valve seat 29 is formed in which is seated a poppet valve 30 having a hollow shank 31. A screw plug 32 is threaded into an aperture 35 in the outer wall of the cylinder 7*a* in alignment with the port 28. A reduced extension 33 of the screw plug 32 fits easily into the hollow stem 31 of the valve 30 and acts as a valve guide. A spring 34 interposed between the screw plug 32 and the valve 30 holds the valve in its seat.

In operation, the piston is caused to reciprocate by the pressure of fluid admitted alternately to the front and rear ends of the piston chamber by the action of the valve 17. On its downward stroke and shortly before it uncovers the exhaust port 10 the piston uncovers the by-pass port 28 and the pressure fluid in the rear of the piston chamber forces open the valve 30 permitting pressure fluid to enter the inlet passage 9, thereby increasing the pressure of fluid in that passage and to some extent in the front end of the piston chamber. This increase of pressure in the passage 9 will assist movement of the distributor valve 17 so that it will shift at a relatively early part of the forward stroke of the piston. Such early valve movement is economical of pressure fluid as the flow of fluid at line pressure through the exhaust port 10 will be curtailed.

For the best results the port 28 should be placed near the exhaust port 10. If the port 28 is too far from the exhaust port the fluid by-passed through the inlet passage 9 might act as a cushion to the blow of the piston and might create such back pressure on the part of the valve 17 which covers the inlet passage 9 as to cause it to oscillate prematurely and

possibly remain in a state of balance thereby halting the reciprocating action of the piston. If the port 28, however, is properly placed, an amount of pressure fluid sufficient to accelerate the movement of the valve 17 but insufficient to cushion the blow will be by-passed and an appreciable saving in pressure fluid consumption will be effected.

It can easily be seen that a similar by-passing action may be obtained on the return stroke of the piston by a valve-controlled passage from a port slightly forward of the exhaust port to the inlet passage at the rear of the piston chamber.

I claim:

In a fluid actuated percussive tool the combination of a cylinder having a piston chamber with a piston therein, fluid inlet passages to the front and rear thereof, a distributor valve controlling said inlet passages, means to operate said valve, an exhaust port in the piston chamber controlled by the piston, a port controlled by the piston leading from a part of the piston chamber slightly rearward of the exhaust port to the front inlet passage, and a valve in said port permitting pressure fluid to pass from the rear of the piston chamber into the front inlet passage to assist movement of the distributor valve while the piston is traversing the distance between the said port and the exhaust port.

In testimony whereof I have signed this specification.

FRED M. SLATER.