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PERCUSSIVE TOOL

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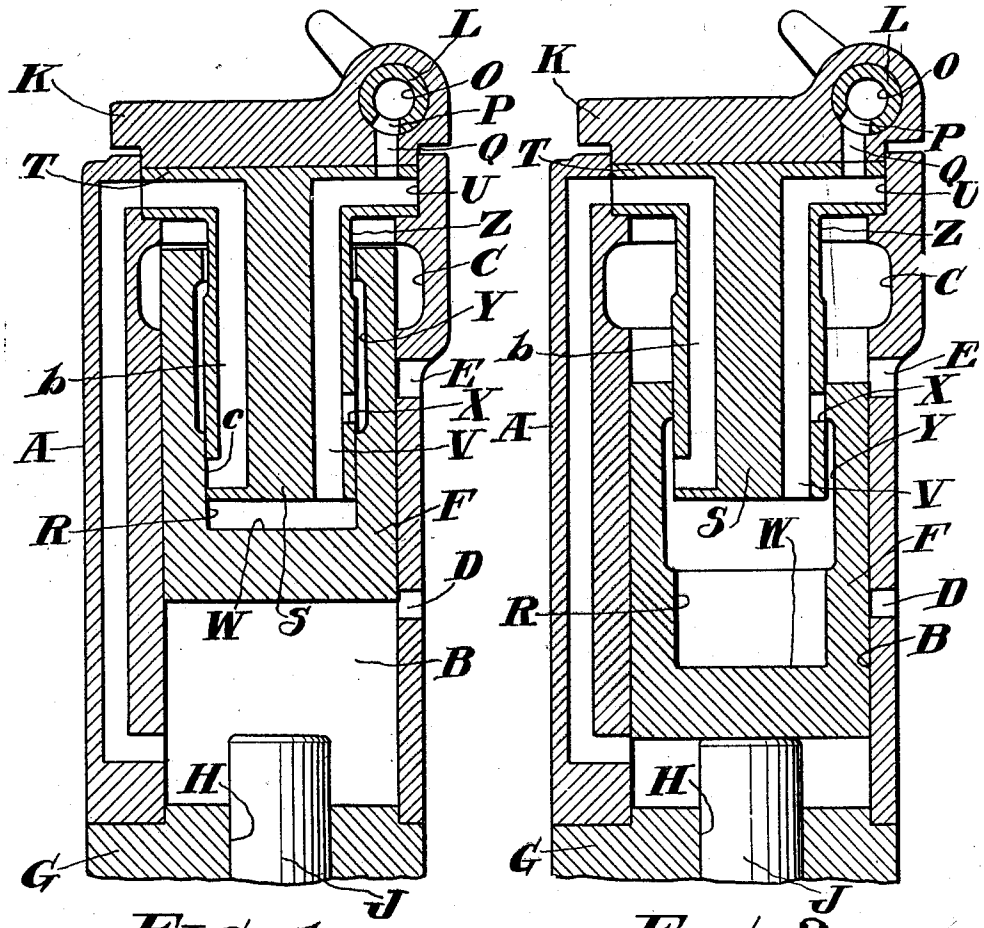


FIG.-1.

FIG.-2.

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PERCUSSIVE TOOL

Application filed November 27, 1929. Serial No. 410,080.

This invention relates to percussive tools, but more particularly to fluid actuated percussive tools of the valveless type in which the distribution of pressure fluid is effected by the hammer piston.

The objects of the invention are to increase the efficiency of tools of this type, to simplify the construction and to obtain a powerful blow of the hammer piston against the working implement with a minimum consumption of pressure fluid.

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

In the drawings illustrating the invention and in which similar reference characters refer to similar parts,

Figure 1 is a sectional elevation constructed in accordance with the practice of the invention and showing the hammer piston at the beginning of its stroke, and

Figure 2 is a similar view showing the hammer piston at the beginning of its return stroke.

Referring more particularly to the drawings, A designates a cylinder of a percussive tool having a piston chamber B in the rearward end of which is an annular groove C. The cylinder A is provided with front and rear exhaust ports D and E respectively which are controlled by a hammer piston F reciprocable in the piston chamber B.

At the front end of the cylinder A is disposed a head G to form a closure for the front end of the piston chamber B and said head is provided with a bore H to act as a guide for a working implement J which extends into the front end of the piston chamber B to receive the blows of the hammer piston.

At the rear end of the cylinder A is disposed a back head K which may be secured fixedly to the cylinder A in any suitable manner. The back head K serves as a casing for a throttle valve L which, as indicated, may be of the rotary type for controlling the admission of pressure fluid into the tool. The throttle valve L has a central chamber O into which pressure fluid may be constantly admitted from a suitable source of supply, and in the wall of the throttle valve L is a port P which registers with a passage Q, also in the back head K.

The piston F is of cup-shape and has a central recess which serves as a pressure chamber R. The piston is otherwise imperforate and is therefore sufficiently durable and strong to withstand the heavy jars and shocks to which it is subjected upon impact against the working implement J.

Extending into the pressure chamber R is an inlet plug S carrying at its rear end a lateral flange T which lies within an enlarged bore U in the rear end of the cylinder and forms a seat for the back head K.

The plug S is provided with a supply passage V into which the passage Q opens. The supply passage V extends forwardly through the plug S and opens into the pressure chamber R so that when the throttle valve L is opened pressure fluid will be constantly admitted into the pressure chamber R to act against a pressure surface W at the front end of the pressure chamber R tending to actuate the piston F forwardly.

In the inlet plug S and at a point intermediate the ends of the supply passage V wherewith it communicates is a supply port X which opens into the periphery of the plug S and in the piston F is an annular groove Y which is adapted to afford communication between the supply port X and a neck Z in the periphery of the plug S and preferably adjacent the flange T.

The annular groove Y also serves to establish communication between the pressure chamber R and a front inlet passage *b* which extends through the plug S and through the cylinder A to the front end of the piston chamber B. The inlet opening or port *c* of the inlet passage *b* is preferably located only slightly rearwardly of the front end of the plug S.

The operation of the tool is as follows: With the piston in the rearmost position illustrated in Figure 1, pressure fluid flowing through the supply passage V will pass through the supply port X into and through the annular groove Y. From the groove Y the pressure fluid passes around the neck Z into the rear end of the piston chamber B

to assist the pressure fluid acting against the pressure surface W to drive the piston F forwardly against the working implement.

Shortly after the piston has started on its forward stroke, communication between the annular groove Y in the piston and the neck Z in the plug S will be cut-off. This cut-off of pressure fluid to the rear end of the piston chamber will occur before the piston uncovers the exhaust port E. The pressure fluid acting against the rear end of the piston as well as that acting against the pressure surface W will then act expansively to drive the piston forwardly.

Immediately prior to the delivery of the blow of the hammer piston against the working implement the rear end of the piston will uncover the exhaust port E and the pressure fluid will then be exhausted from the rear end of the piston chamber B to the atmosphere. At the same time the annular groove Y in the piston will uncover the front inlet passage *b*. Pressure fluid will then flow from the pressure chamber R through the inlet passage *b* into the front end of the piston chamber B to act against the piston F for driving said piston rearwardly against the opposing pressure acting against the pressure surface W.

As the piston F proceeds rearwardly the front exhaust port D will be uncovered thereby and the pressure fluid will be exhausted from the front end of the piston chamber. At the same time pressure fluid will be admitted into the rear end of the piston chamber to again assist that acting against the pressure surface W for driving the piston F forwardly.

During the rearward stroke of the piston, said piston will be actuated throughout a portion of its stroke by the expansive action of the pressure fluid. This is due to the fact that communication will be cut-off between the pressure chamber R and the inlet passage *b* before the exhaust port D will be uncovered by the piston.

As will be observed, by providing the rear end of the piston chamber B with the annular groove C an ample charge of pressure fluid may be introduced into the rearward end of the piston chamber to assure a powerful blow of the piston against the working implement. This groove C also serves as a clearance pocket during the rearward stroke of the piston since, as will be observed, the rear exhaust port E will be covered by the piston shortly after the piston starts on its rearward stroke and any air in the back end of the piston chamber will therefore not be compressed to a sufficiently high value to retard the return movement of the piston.

We claim:

1. In a fluid actuated percussive tool, a cylinder having exhaust ports, a plug extending into the cylinder and having a supply passage and a supply port leading from the supply passage to the periphery of the plug, an inlet passage in the plug and the cylinder for conveying pressure fluid to one end of the cylinder, and a piston in the cylinder into which the plug extends and adapted to control communication between the supply port and one end of the cylinder for driving the piston in one direction and between the supply passage and the inlet passage for actuating the piston in the opposite direction.

2. In a fluid actuated percussive tool, a cylinder having exhaust ports, a plug extending into the cylinder and having a supply passage and a supply port leading from the supply passage to the periphery of the plug, an inlet passage in the plug and the cylinder for conveying pressure fluid to the front end of the cylinder, a cup-shaped imperforate piston having a constant pressure chamber into which the plug extends, and an annular groove in the piston to establish communication between the supply port and the rear end of the cylinder and between the supply passage and the inlet passage.

3. In a fluid actuated percussive tool, a cylinder having exhaust ports, a piston in the cylinder having a pressure chamber therein, an inlet plug extending into the pressure chamber and having a supply passage to constantly admit pressure fluid into the chamber, an inlet passage extending through the plug and the cylinder to the front end of the cylinder, a supply port in the plug and in constant communication with the supply passage, and an annular groove in the piston to establish communication between the pressure chamber and the inlet passage in one position of the piston and between the supply port and the rear end of the cylinder in another position of the piston.

4. In a fluid actuated percussive tool, a cylinder having exhaust ports, a piston in the cylinder having a pressure chamber therein, a plug extending into the cylinder and having a supply passage for constantly admitting pressure fluid into the chamber, a front inlet passage extending through the plug and the cylinder to the front end of the cylinder, a supply port in the plug and in constant communication with the supply passage, a neck on the plug, and an annular groove in the piston to establish communication between the pressure chamber and the neck to supply pressure fluid to the rear end of the cylinder and to establish communication between the pressure chamber and the front inlet passage.

In testimony whereof we have signed this specification.

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