

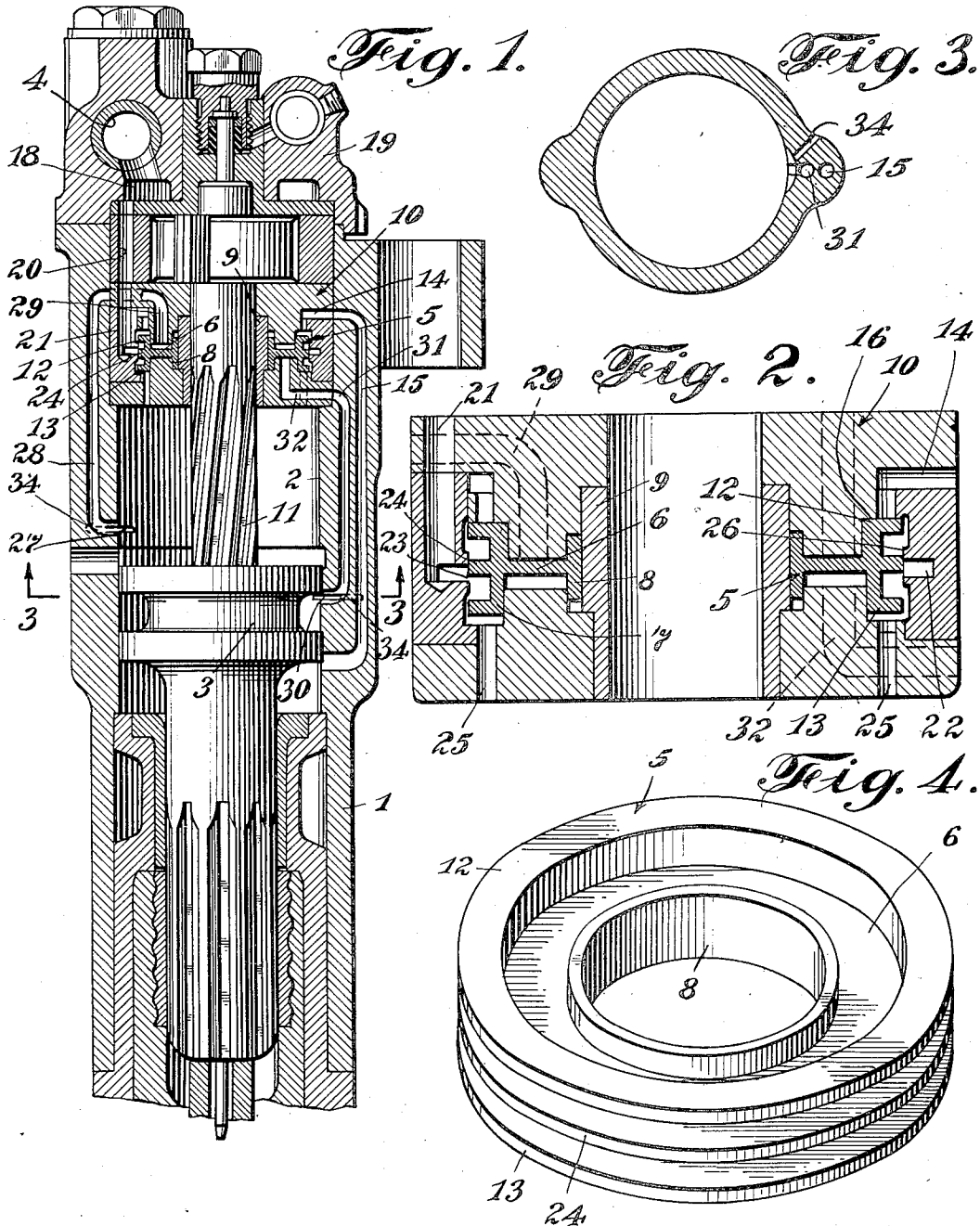
Dec. 24, 1935.

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2,025,403

PERCUSSIVE TOOL VALVE

Filed May 10, 1934



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2,025,403

PERCUSSIVE TOOL VALVE

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Application May 10, 1934, Serial No. 724,836

8 Claims. (Cl. 121—18)

This invention relates to percussive tools and more particularly to valves therefor.

An object of the invention is to provide a valve for controlling the distribution of pressure fluid in a percussive tool, which valve is positive and quick in action, one which is thrown by live pressure fluid from the cylinder, and one which will provide a heavy blow of the hammer piston and will materially cut down the consumption of pressure fluid in proportion to the work performed.

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 drawing, showing percussive tool valves of the preferred form, and the features forming the invention will be specifically pointed out in the claims.

In the drawing:

Fig. 1 is a fragmentary longitudinal section through a percussive tool showing the improved valve therein.

Fig. 2 is an enlarged longitudinal section through the valve chest and valve showing the valve in a different position from that shown in Fig. 1.

Fig. 3 is a cross section on the line 3—3 of Fig. 1.

Fig. 4 is an isometric view of the valve.

Referring more particularly to the drawing, the improved percussive tool or rock drill of the hammer piston type includes the cylinder 1 having the piston chamber 2 therein in which the piston 3 reciprocates. The piston 3 is reciprocated by pressure fluid such as air under pressure which is initially admitted to the tool under control of the throttle valve 4. The pressure fluid is distributed to the cylinder for operating the piston under control of the distributing valve 5.

The distributing valve 5 comprises a body including a disc 6 and a ring 7 formed at the outer edge or circumference of the disc. A bearing ring 8 is formed at the inner edge or circumference of the disc 6 and has bearing engagement with the sleeve 9 which is carried by the valve chest 10 and surrounds the upper end of the rifle bar 11. The rifle bar 11 is the usual type of rifle bar mechanism employed in percussive tools of this type and serves to rotate the piston 3. It forms no part, however, of the present invention and therefore its construction and operation will not be specifically described.

The ring 7 of the valve 5 has transversely extending flanges 12 and 13 formed on the outer

edges of the ring. The flange 13 is of greater area than the flange 12. The flange 12 controls the delivery of pressure fluid to the forward end of the cylinder 1 by controlling the passage of pressure fluid through the passage 14 in the valve chest 10 and the passage 15 in the cylinder. A seat 16 is formed in the valve chest 10 and the flange 12 seats against this seat 16 to cut off the flow of pressure fluid to the forward end of the cylinder. The valve 5 is shown, positioned in Fig. 2 of the drawing to cut off the flow of pressure fluid to the forward end of the cylinder and to admit pressure fluid to the rear end of the cylinder for driving the piston 3 forwardly.

When the valve 5 is in its rearward position, as shown in Fig. 2 of the drawing the pressure fluid passes from the throttle 4 into the annular pressure chamber 18 in the back head 19 of the drill and forwardly through the passage 20 into the passage 21 formed in the valve chest 10. The passage 21 opens into the valve receiving portion of the chest 10 between the flanges 12 and 13, through the medium of the annular channel 22. When the valve 5 is in its rearward position, the pressure fluid passes through the space 23 controlled by the flange 24 into the valve chest and around the periphery or outer edge of the flange 13 and through passages 25 into the forward end of the cylinder for moving the piston 3 forwardly. The flange 24 is formed on the ring 7 intermediate the flange 12 and 13 and it co-operates with flat surfaces 26 formed on the valve chest for cutting off the supply of the pressure fluid to either the front or the rear end of the cylinder depending upon the position of the valve, and it also co-operates with the boundaries of the annular channel 22 to provide openings through which the pressure fluid must pass on its way to the cylinder.

As the piston 3 moves forwardly during the admission of pressure fluid to the rear end of the cylinder it uncovers the port 27 in the cylinder wall which allows some of the pressure fluid to pass out of the cylinder through the passage 28 in the cylinder, passage 29 in the valve chest and against the rear side of the disc 3. When the pressure in the passage 29 has built up sufficiently it will throw the valve 5 forwardly, moving it into the position shown in Fig. 1 of the drawing, at which time the pressure fluid passes about the flange 12 and into the passage 14, through the passage 15 into the forward end of the cylinder, forwardly of the piston for moving the piston rearwardly. As the piston moves rearwardly in the cylinder it will uncover

the port 30, permitting the pressure fluid to pass from the cylinder through the passage 31 in the cylinder and into the passage 32 in the valve chest, against the forward side of the disc 6.

5 When the pressure is built up to a sufficient degree in the passage 32 it will throw or move the valve 5 rearwardly into the position shown in Fig. 2 for delivering the pressure fluid into the forward end of the cylinder and the above described cycle of operation will be repeated.

10 Small bleeder ports 34 communicate with the passages 28 and 31 and with the atmosphere to permit relieving of the pressure in the passages 28 and 29 and 31 and 32 when the ports 27 and 30 respectively are closed or cut off by the piston 3 so as to insure the throwing of the valve 5.

While in the drawing the flange 12 is shown as having a greater area, it is to be understood that either of the flanges 12 or 13 may have the greater area without departing from the spirit of the present invention.

20 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 of a cylinder having a piston chamber and an exhaust port therein, a piston in said chamber, a valve chest having a valve chamber, inlet passages leading from the valve chamber to the piston chamber, a valve in said valve chest comprising a body including a ring, flanges at the ends of said ring for controlling the delivery of pressure fluid to said cylinder, said valve chest provided with a pressure fluid supply port for delivering pressure fluid between said flanges, and a central flange on said ring for controlling said supply port.

2. In a percussive tool, the combination of a cylinder having a piston chamber and an exhaust port therein, a piston in said chamber, a valve chest having a valve chamber, inlet passages leading from the valve chamber to the piston chamber, a valve in said valve chest comprising a body including a ring, flanges at the ends of said ring for controlling the delivery of pressure fluid to said cylinder, said valve chest provided with a pressure fluid supply port for delivering pressure fluid between said flanges, and a central flange on said ring for controlling said supply port, seats formed on said valve chest, said end flanges having end seating engagement with said seats for controlling said inlet passages.

3. In a percussive tool, the combination of a cylinder having a piston chamber and an exhaust port therein, a piston in said chamber, a valve chest having a valve chamber, inlet passages leading from the valve chamber to the piston chamber, a valve in said valve chest comprising a body including a ring, flanges at the ends of said ring for controlling the delivery of pressure fluid to said cylinder, said valve chest provided with a pressure fluid supply port for delivering pressure fluid between said flanges, and a central flange on said ring for controlling said supply port, seats formed on said valve chest, said end flanges having end seating engagement with said seats for controlling said inlet passages, said central flange having edge engagement with co-operating surfaces on the valve seat and co-operating with adjacent portions of the valve seat for controlling the passage of pressure fluid to said end flanges.

4. In a percussive tool, the combination of a cylinder having a piston chamber and an exhaust port therein, a piston in said chamber, a valve chest having a valve chamber, inlet passages leading from the valve chamber to the piston chamber, a valve in said valve chest comprising a body including a disc and a ring at the outer edge of the disc, flanges at the ends of said ring for controlling delivery of pressure fluid to said cylinder, said valve chest provided with a pressure fluid supply port for delivering pressure fluid between said flanges, a central flange on said ring for controlling said supply port, ports and passages in said cylinder and valve chest for delivering pressure fluid from the cylinder against the opposite sides of said disc for throwing the valve.

5. In a percussive tool, the combination of a cylinder having a piston chamber and an exhaust port therein, a piston in said chamber, a valve chest having a valve chamber, inlet passages leading from the valve chamber to the piston chamber, a valve in said valve chest comprising a body including a disc and a ring at the outer edge of the disc, flanges at the ends of said ring for controlling delivery of pressure fluid to said cylinder, said valve chest provided with a pressure fluid supply port for delivering pressure fluid between said flanges, a central flange on said ring for controlling said supply port, ports and passages in said cylinder and valve chest for delivering pressure fluid from the cylinder against the opposite sides of said disc for throwing the valve, and a bearing ring formed at the inner edge of said disc.

6. In a percussive tool, the combination of a cylinder having a piston chamber and an exhaust port therein, a piston in said chamber, a valve chest having a valve chamber, inlet passages leading from the valve chamber to the piston chamber, a valve in said valve chest comprising a body including a disc and a ring at the outer edge of the disc, flanges at the ends of said ring for controlling delivery of pressure fluid to said cylinder, said valve chest provided with a pressure fluid supply port for delivering pressure fluid between said flanges, a central flange on said ring for controlling said supply port, piston controlled ports in said cylinder, and passages and ports in said cylinder and valve chest communicating with said piston controlled ports for delivering pressure fluid against the sides of said disc for throwing the valve.

7. In a percussive tool, the combination of a cylinder having a piston chamber and an exhaust port therein, a piston in said chamber, a valve chest having a valve chamber, inlet passages leading from the valve chamber to the piston chamber, a valve in said valve chest comprising a body including a disc and a ring at the outer edge of the disc, flanges at the ends of said ring for controlling delivery of pressure fluid to said cylinder, said valve chest provided with a pressure fluid supply port for delivering pressure fluid between said flanges, a central flange on said cylinder, and passages and ports in said cylinder and valve chest communicating with said piston controlled ports for delivering pressure fluid against the sides of said disc for throwing the valve, one of said end flanges being of larger area than the other end flange.

8. In a percussion tool, the combination of a cylinder having a piston chamber and an exhaust port therein, a piston in said chamber, a valve

chest having a valve chamber, inlet passages leading from the valve chamber to the piston chamber, a valve in said valve chest comprising a body including a ring, flanges at the ends of said ring
5 for controlling the delivery of pressure fluid to said cylinder, said valve chest provided with a pressure fluid supply port for delivering pressure

fluid between said flanges, and a central flange on said ring for controlling said supply port, one of said end flanges being of larger area than the other end flange.

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