F. POLZER.

FLUID PRESSURE TOOL.

APPLICATION FILED APR. 30, 1908.

914,602

Patented Mar. 9, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

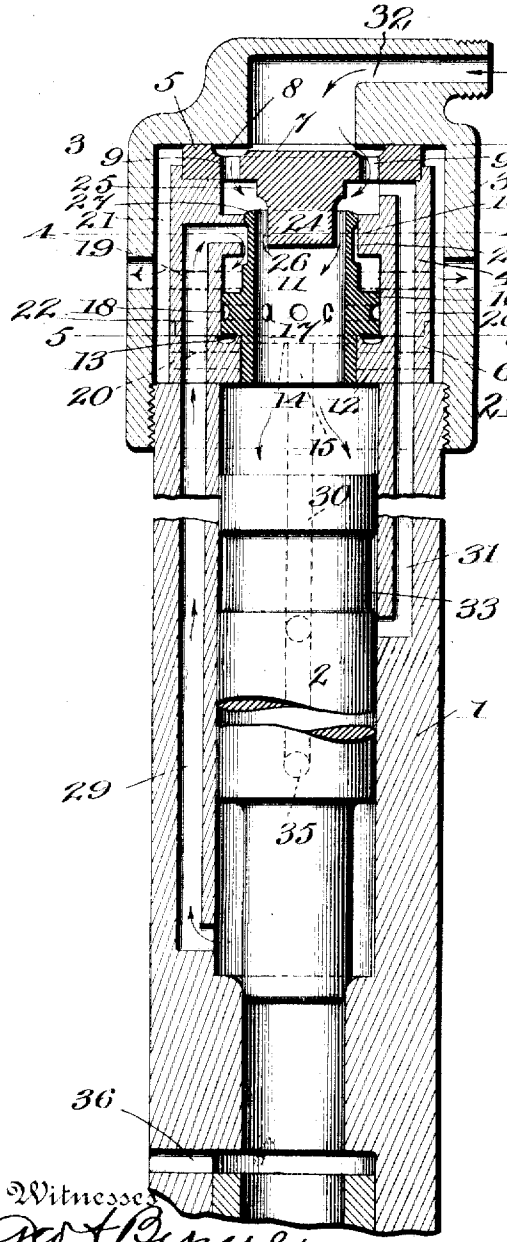
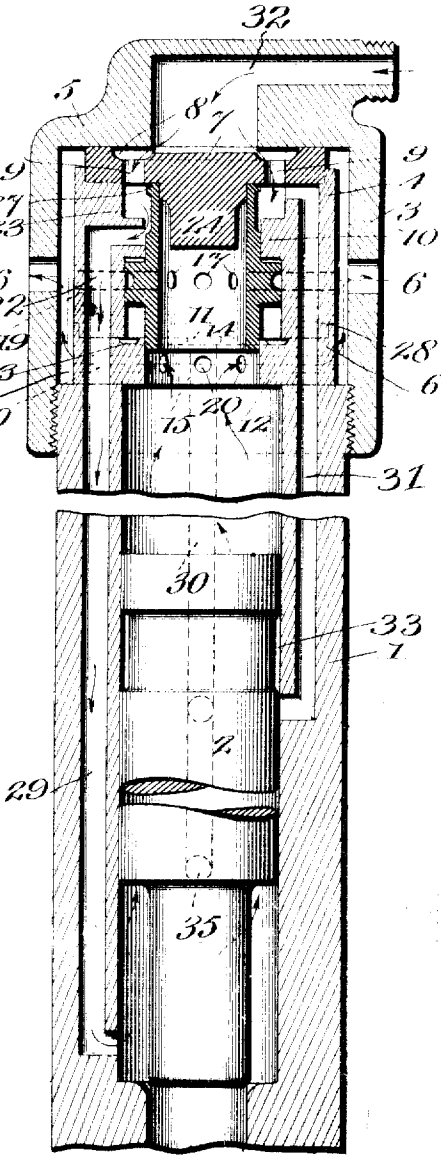


Fig. 2.



Witnesses:

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his Attorney

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2 SHEETS—SHEET 2.

Fig. 3.

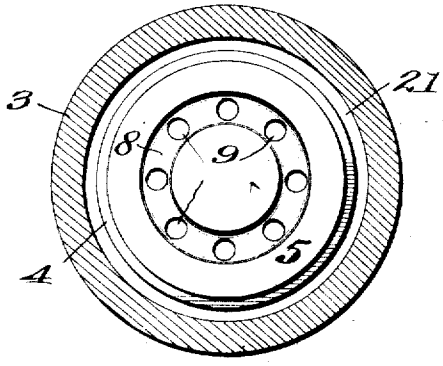


Fig. 4.

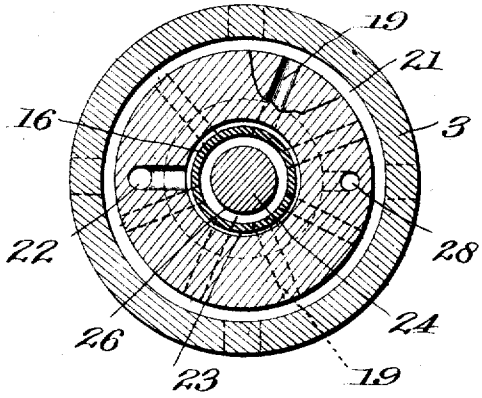


Fig. 5.

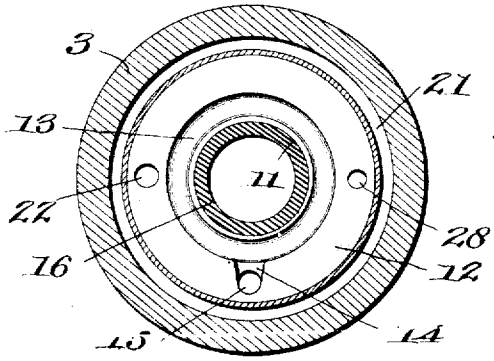


Fig. 6.

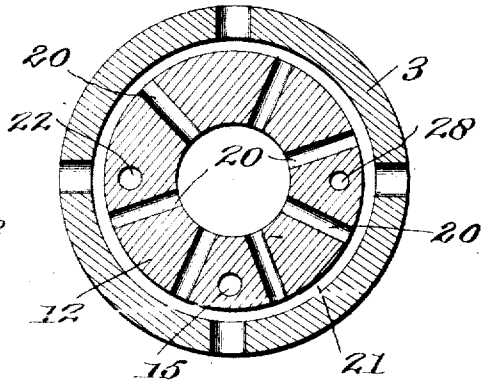


Fig. 7.

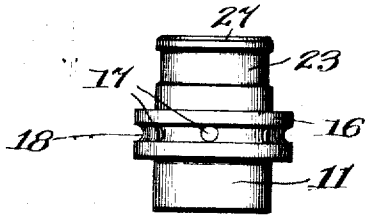
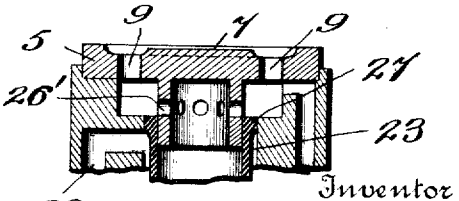


Fig. 8.



Witnesses

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UNITED STATES PATENT OFFICE.

FRIDOLIN POLZER, OF NEW YORK, N. Y., ASSIGNOR TO I. X. L. MANUFACTURING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

FLUID-PRESSURE TOOL.

No. 914,602 Specification of Letters Patent. Patented March 9, 1909.

Application filed April 30, 1908. Serial No. 430,190.

To all whom it may concern:

Be it known that I, FRIDOLIN POLZER, a subject of the Emperor of Austria-Hungary, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Fluid-Pressure Tools, of which the following is a specification.

This invention relates more particularly to the valve mechanism for controlling the admission and exhaust of the motive fluid in this class of tools, and is designed to render unnecessary extreme accuracy in fitting the parts of the valve; to impart increased speed to the action of the tool while at the same time securing quiet and easy running, and to simplify and reduce the cost of manufacture of this class of devices.

With the above objects in view, as well as others which will hereinafter more readily appear, my said invention consists in the novel construction herein described and shown and more particularly pointed out in the accompanying claims.

In order to more fully describe my said invention, reference will be had to the accompanying drawings which form a part of this specification and wherein:—

Figure 1, represents in vertical central section a pneumatic tool embodying my said invention, in which the piston hammer is on the forward stroke; Fig. 2, a similar view of the same tool in which the said piston hammer is on the back stroke; Fig. 3, a cross-section taken on line 3—3 Fig. 1, looking down; Fig. 4, a cross-section taken on line 4—4 Fig. 1, looking down; Fig. 5, a cross-section taken on line 5—5 Fig. 1, looking down; Fig. 6, a cross-section taken on line 6—6 Fig. 2, looking down; Fig. 7, a side elevation of the valve removed from its casing, and Fig. 8, a detail fragmentary sectional view of a modification of the valve mechanism shown in the preceding figures.

In the accompanying drawings I have shown my invention as applied to that type of fluid pressure tools wherein a piston hammer mounted to reciprocate in a cylinder or barrel acts by impact upon a tool inserted in one end of said barrel or extension thereof and wherein the motive fluid, generally compressed air, is controlled in its admission and exhaust from said piston cylinder by means of a valve mechanism located at one end of said cylinder.

Referring to the accompanying drawings. 1 represents the cylinder casing, 2, the piston hammer mounted to reciprocate therein, and 3, the cylinder cap, which parts may be of the usual or any desired construction.

My invention relates more particularly to the means for controlling the admission and exhaust of the motive fluid to and from said cylinder, and in the case shown consists, among other parts, of a valve box mounted within the casing cap 3, and comprising a valve casing 4, having a removable head 5 at the inlet end and a removable head 6 at its opposite end, the latter resting on one end of the cylinder 1 and clamped firmly thereagainst by the cap 3 which screws over the end of the cylinder 1, engaging head 5 of the valve casing, the latter being provided with a concavity 7 in its outer face and with an annular groove 8, and extending through the head 5 into the valve chamber of the casing 4 are a series of intake openings 9.

On the interior of the valve casing 4 is formed an annular flange 10 which makes a sliding fit with the exterior of a tubular valve 11 and to form a valve seat therefor. The casing head 6 also makes a sliding fit with the exterior of valve 11 and forms a seat 12 therefor, the said seat 12 being provided on its inner side with an annular groove 13, which communicates through a port 14 with a port 15 in the valve casing. (See Fig. 5.)

The valve 11 is provided with an exterior annular flange 16, which makes a sliding fit with the inner walls of the casing included between the valve seats 10 and 12. Extending transversely through the side walls of this valve and through said flange, are a series of ports 17 which open into an annular groove 18 in the periphery of flange 16.

Extending transversely straight through the side walls of the valve casing are two sets of exhaust ports 19 and 20, the former leading from the space 21 between the casing head 3 and the exterior of the valve casing 4 to the interior of the valve chamber included between the valve seats 10 and 12, while the latter open at one end into said space 21 and at the other end through the valve-engaging face of the valve seat 12, the ports 19 being preferably in the same horizontal plane as outlets 19′ in the cylinder cap 3.

A port 22 extends longitudinally through

the side walls of the valve casing, thence transversely thereof, opening through the valve-engaging face of valve seat 10. This port 22 is put into communication alternately first with the inlet openings 9 and then with exhaust through ports 19 by means of an annular groove 23 around the exterior of valve 11. The cut-off for the intake through the bore of the valve 11 is effected, in the case shown, by a cylindrical lug 24 formed on the inner face of head 5, having a diameter throughout a portion of its length as at 25 sufficient to make a close fit with the bore of the valve in one of the positions of rest of the valve and a reduced portion 26. This cut-off may, however, be effected by making the extension hollow and of uniform diameter and providing it with a plurality of transverse ports 26′ as shown in Fig. 8.

The upper end of the valve is beveled off as at 27 to admit air pressure on the upper end of the valve to operate it as hereinafter described.

Opening into the valve chamber between the seat 10 and the head 5 is a bypass 28 which extends longitudinally through the side wall of the casing.

The valve port 22 registers with port 29 in the cylinder casing; the port 15 with the cylinder port 30, and the bypass 28 with the cylinder port 31.

The operation of the tool shown is as follows:—Referring first to Fig. 1, which shows the piston hammer as having started on its forward stroke, the valve 11 occupies the position shown, in which the motive fluid, air or other, enters from intake passage 32 in the cylinder head, passes through intake passages 9, thence into one end of the bore of the hollow valve 11, through said valve to the piston 2. In this position of the valve, the exhaust ports 19 are open and the ports 20 closed. The upper end of the valve cuts off the air supply from the inlet to the port 22, but the annular groove 23 places said port and the exhaust ports 19 in communication, the motive fluid from in front of the piston hammer exhausting through ports 29, 22 and 19 as indicated by the arrows. The bypass port 31 is closed by the piston 2, until the annular groove 33 of the piston comes opposite the end of said port opening into the cylinder, when communication will be established from said air inlets 9, through bypass 28, cylinder port 31, cylinder port 30, port 15, to annular groove 13, introducing pressure back of the flange 16 on the valve around the annular groove 13. The valve 11 is then driven to the position shown in Fig. 2. In this position port 22 is placed into communication through valve groove 23 with the intake passages 9, and the motive fluid passes to the forward end of the cylinder through cylinder port 20. At the same time the valve has opened the end of the cylinder back of the piston to exhaust through both sets of exhaust ports 19 and 20, a greatly increased exhaust area over that provided for the forward end of the cylinder on the forward stroke of the hammer piston, the exhaust through the ports 19 and 20 taking place through straight passages affording the least possible resistance to the air in passing out. For this purpose the exhaust openings 35 in the casing head are located preferably directly in line with the ports 19.

The valve 11 occupies the position shown in Fig. 2 until the piston 2 has traveled far enough on its back stroke to open the lower end 35 of the port 30 to the cylinder. This opens the space around the groove 13 back of the valve flange 16 to atmosphere through ports 14, 15, 30, cylinder forward of piston, and outlet 36. The pressure behind the valve being thus reduced, fluid pressure entering through intake passages 9 will act upon the upper beveled end 27 of the valve and send it back to the position shown in Fig. 1.

The above described mechanism is extremely simple and easy to manufacture, and the ports are so arranged that great accuracy in fitting the valve is not necessary. Moreover, by the arrangement of the admission and exhaust ports shown I am enabled to attain an increase in piston speed without injurious effects to the mechanism, the said tool running quietly and smoothly.

While I have herein shown a specific embodiment of my said invention which has proven very satisfactory in actual practice still I do not wish to be understood as confining my invention to the exact constructional details of such a tool except where these are particularly pointed out in the claims.

What I claim is:—

1. A fluid pressure tool, comprising a cylinder casing, a piston hammer arranged to reciprocate therein, and a valve to control the admission and exhaust of the motive fluid to and from said cylinder, said valve having a greater port area open for the exhaust from said cylinder on the back stroke of the piston hammer than on the forward stroke thereof.

2. A fluid pressure tool, comprising a cylinder casing, a piston hammer arranged to reciprocate therein, and a valve to control the admission and exhaust of the motive fluid to and from said cylinder, said valve having a greater port area open for the exhaust from said cylinder on the back stroke of the piston hammer than on the forward stroke thereof, and a greater intake port area open on the forward stroke than on the back stroke of said piston hammer.

3. A fluid pressure tool, comprising a cyl-

inder casing, a piston hammer arranged to reciprocate therein, a valve casing having a valve chamber, and a valve movable in said chamber to control the admission and exhaust of the motive fluid to and from said cylinder, there being a plurality of independent sets of exhaust ports opening transversely straight through the said valve casing and all of said exhaust ports being opened simultaneously to the said piston cylinder on the back stroke of said piston hammer.

4. A fluid pressure tool comprising a cylinder casing, a piston hammer arranged to reciprocate therein, a valve casing having a valve chamber, and a valve movable in said chamber to control the admission and exhaust of the motive fluid to and from said cylinder, there being a plurality of independent sets of exhaust ports opening transversely straight through the said valve casing and all of said exhaust ports being opened simultaneously to the said piston cylinder on the back stroke of said piston hammer, and one set only of said exhaust ports being opened to the said cylinder on the forward stroke of said piston.

5. A fluid pressure tool, comprising a valve casing having a passage in the wall thereof which serves alternately as an intake and exhaust port, two sets of exhaust ports through the side walls of said casing, an intake opening through one end of said casing, a hollow valve open at both ends and arranged to reciprocate in said casing, said valve being constructed and arranged to connect said first named passage alternately with the said intake opening and with one set of said exhaust openings, and to alternately open both sets of exhaust ports simultaneously and to allow the fluid from said intake opening to pass through its bore to the exclusion of the first mentioned passage.

6. A fluid pressure tool, comprising a valve casing having a passage in the wall thereof which serves alternately as an intake and exhaust port, two sets of exhaust ports through the side walls of said casing, an intake opening through one end of said casing, a hollow valve open at both ends and arranged to reciprocate in said casing, said valve being constructed and arranged to connect said first named passage alternately with the said intake opening and with one set of said exhaust openings, and to alternately open both sets of said exhaust ports simultaneously and to allow the fluid from said intake opening to pass through its bore to the exclusion of the first mentioned passage.

7. A fluid pressure tool, comprising a valve casing in which is formed a valve chamber, a tubular valve adapted to reciprocate in said chamber, the said casing being provided with two annular valve seats surrounding said valve, said valve having an exterior annular flange adapted to reciprocate in the chamber formed in said casing between said valve seats, said valve being provided also with a plurality of exhaust ports passing through its walls and opening on the outside of said valve in the periphery of the said flange, said casing being provided with a port opening through the valve-engaging face of one of said valve seats, a plurality of exhaust ports opening through the valve-engaging face of the other of said valve seats, and a plurality of exhaust ports opening into the chamber formed between said valve seats.

8. A fluid pressure tool, comprising a valve casing in which is formed a valve chamber, a tubular valve adapted to reciprocate in said chamber, the said casing being provided with two annular valve seats surrounding said valve, said valve having an exterior annular flange adapted to reciprocate in the chamber formed in said casing between said valve seats, a head on one end of said casing having a plurality of intake openings leading into said valve chamber of said casing and provided with a cut-off extension adapted to project into one end of said valve, the said valve seat through which passes the exhaust ports having an annular groove around its inner side wall, a port leading through the said casing to the said groove, and a bypass leading longitudinally through the wall of said casing and opening into the valve chamber between the intake head and the valve seat adjacent thereto.

9. A fluid pressure tool, comprising a valve casing in which is formed a wall chamber, a tubular valve adapted to reciprocate in said chamber, the said casing being provided with two annular valve seats surrounding said valve, said valve having an exterior annular flange adapted to reciprocate in the chamber formed in said casing between said valve seats, said valve being provided also with a plurality of exhaust ports passing transversely through its walls and opening on the outside of said valve in an annular groove around the periphery of said flange, and with an annular groove around the exterior of said valve near one end, a head on one end of said casing having a plurality of intake openings leading into the valve chamber of said casing and provided with a cut-off extension adapted to project into one end of said valve, said casing being provided with a port passing therethrough and opening through the valve-engaging face of one of said valve seats and adapted to act alternately as an intake and exhaust port, a plurality of exhaust ports passing transversely straight through the side walls of said casing and opening through the valve-engaging face of the

other of said valve seats, a plurality of exhaust ports passing transversely straight through the side walls of said casing into the chamber formed between said valve seats, an annular groove around the inner side walls of that one of said valve seats through which passes the exhaust ports, a port leading through the said casing to the said groove, and a bypass leading longitudinally through the wall of said casing and opening into the valve chamber between the intake head and the valve seat adjacent thereto, the intake taking place in one of the operating positions of the valve from said intake passages into one end of the hollow valve and thence longitudinally all the way through its bore, the exhaust in said position taking place through said alternative port in the wall of the casing by the annular groove on the exterior of said valve near one end thereof, the valve chamber between said valve seats and out through said exhaust ports opening into said chamber; the intake in other position of said valve taking place from said intake passages through one end of the valve chamber, by said annular groove on said valve near one end thereof and thence into said alternative port, and the exhaust in said last named position of the valve taking place simultaneously through the exhaust ports which open into the chamber between said valve seats and the exhaust ports which open through the seat face of one of said valve seats.

In testimony whereof I have hereunto set my hand in the presence of two witnesses in the city, county and State of New York this 21st day of April 1908.

FRED POLZER.

Witnesses:

CORA B. GARDNER,

ARLINGTON S. BOYCE.