E. MUNGER.

HYDRAULIC PRESS VALVE MECHANISM.

APPLICATION FILED JAN. 8, 1918.

1,292,013. Patented Jan. 21, 1919.

3 SHEETS—SHEET 1.

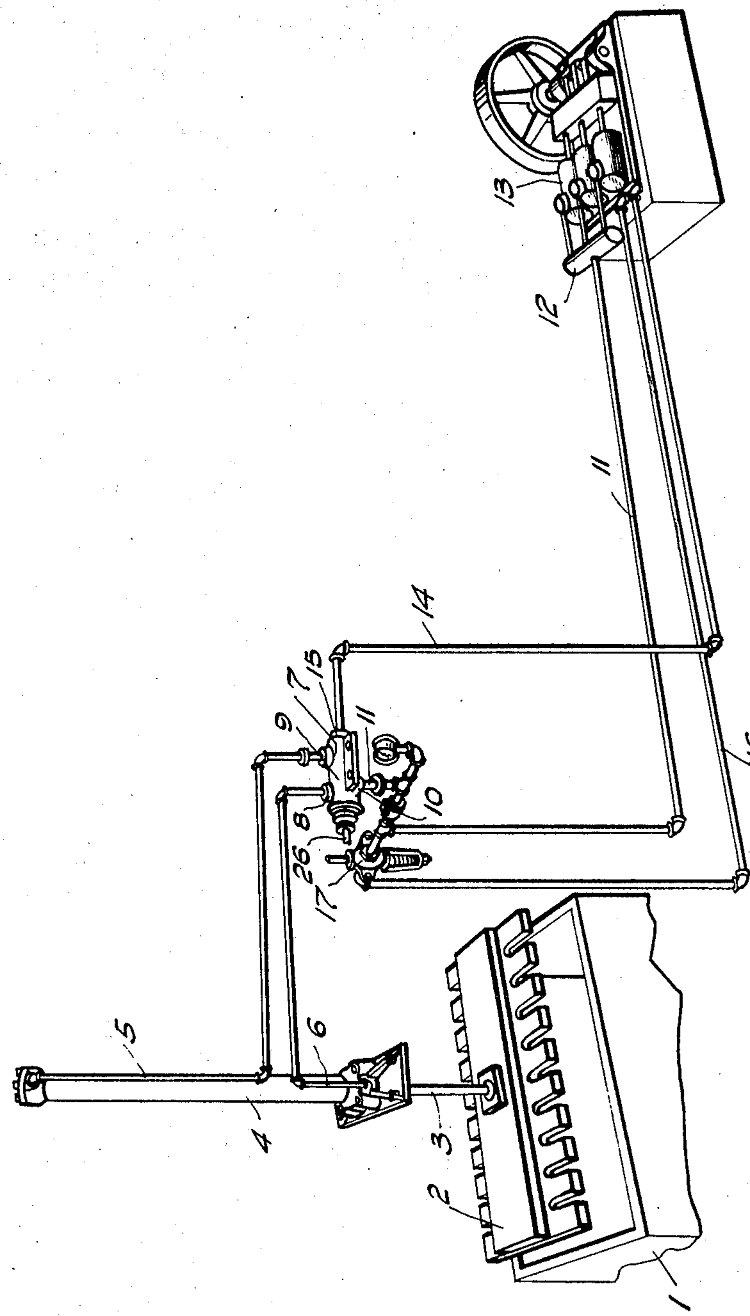

Fig. 1.

Witness

J. Gordon Harker

Inventor

E. Munger

By *[signature]*

Attorney

E. MUNGER.

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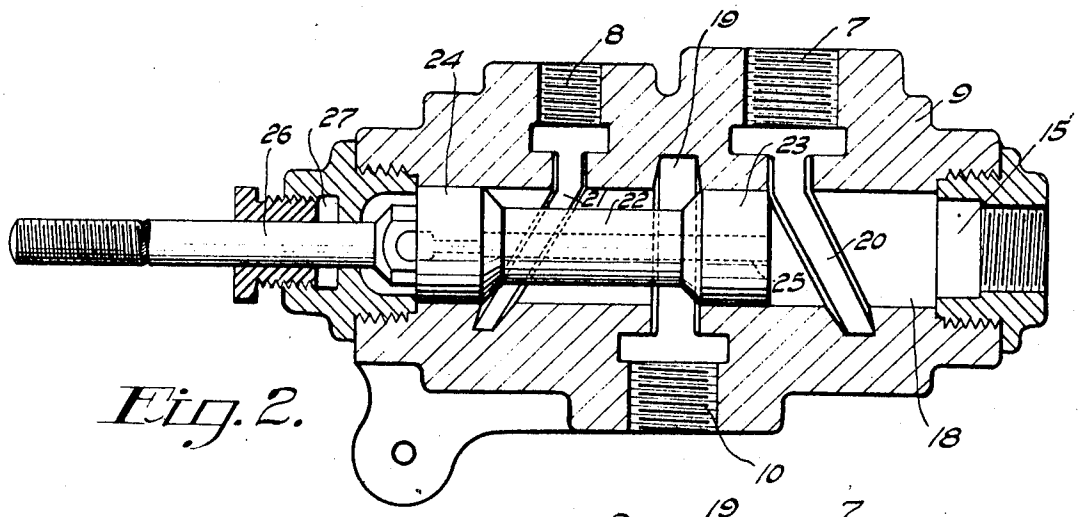

Fig. 2.

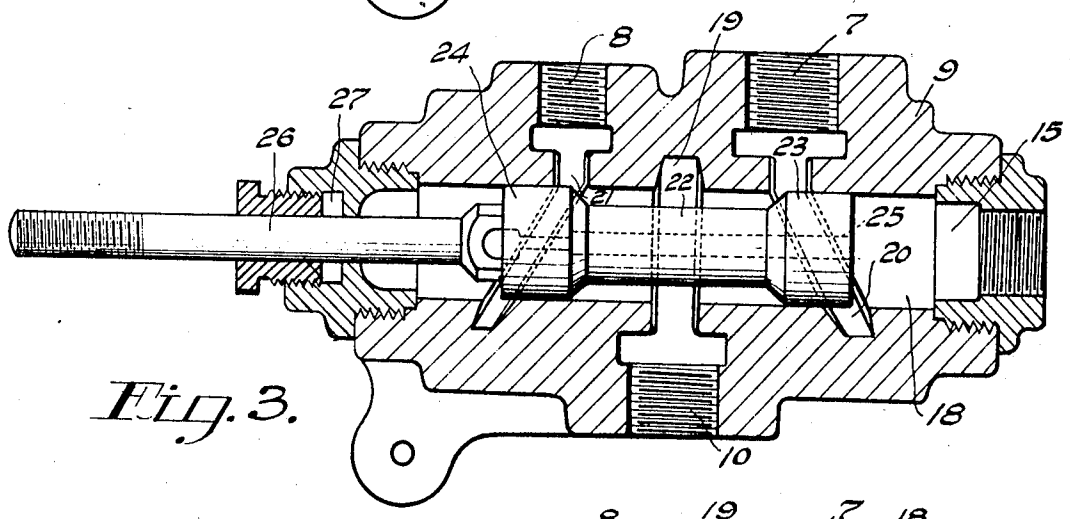

Fig. 3.

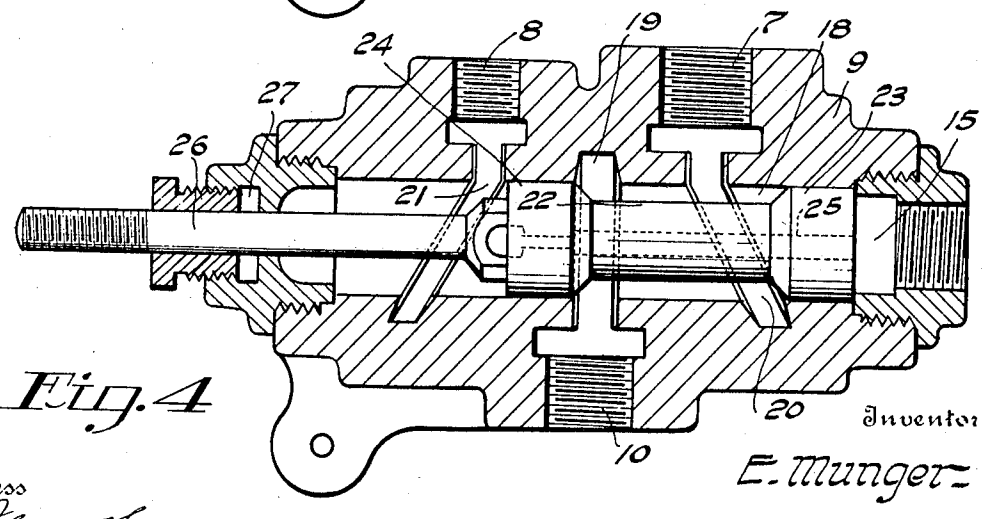

Fig. 4

Witness

J. Gordon Sparkes

Inventor

E. Munger

By

Attorney

E. MUNGER.

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3 SHEETS—SHEET 3.

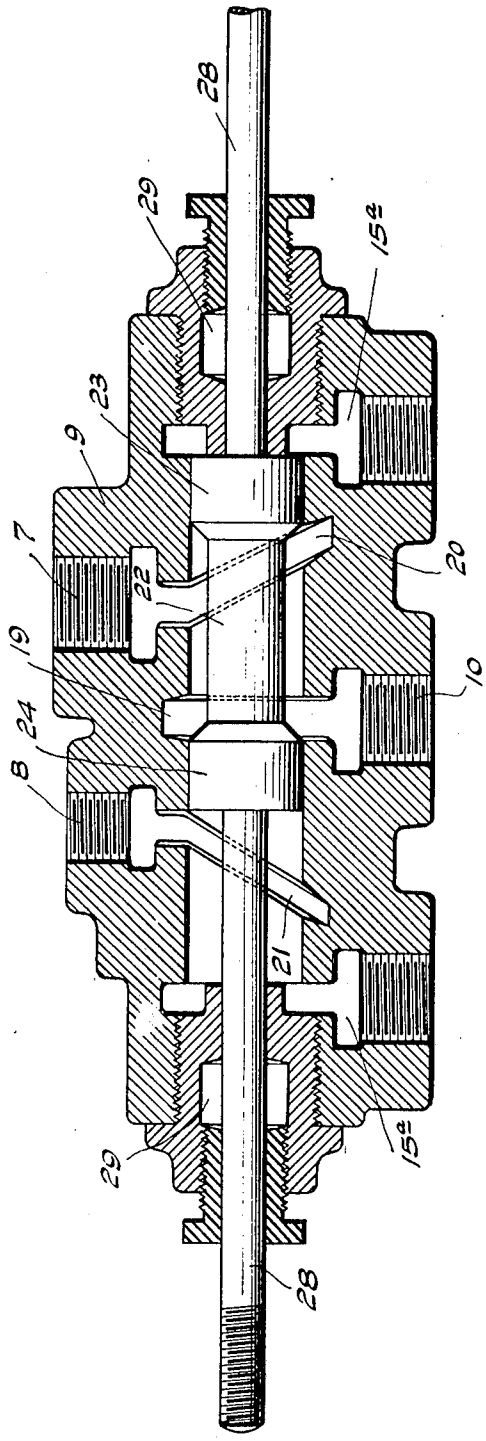

Fig. 5.

Witness

J. Gordon Sparkes.

Inventor

E. Munger.

By Ross Stevens

Attorney

UNITED STATES PATENT OFFICE.

EUGENE MUNGER, OF BIRMINGHAM, ALABAMA, ASSIGNOR TO CONTINENTAL GIN COMPANY, OF BIRMINGHAM, ALABAMA, A CORPORATION OF DELAWARE.

HYDRAULIC-PRESS VALVE MECHANISM.

1,292,013. Specification of Letters Patent. Patented Jan. 21, 1919.

Application filed January 8, 1918. Serial No. 210,951.

To all whom it may concern:

Be it known that I, EUGENE MUNGER, a citizen of the United States of America, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Hydraulic-Press Valve Mechanism, of which the following is a specification.

My invention relates to an improved valve mechanism for hydraulic cotton trampers, baling presses and the like, which has for its object to design a valve mechanism which will avoid the building up of high pressures about the valve so as to interfere with its free and easy operation and which will permit so gradual a cutting on and off of the fluid pressure to its distribution ports that all shocks and jars to the piping system and press are avoided.

When the pressure fluid is trapped at the valve its pressure will build up almost instantaneously in the valve casing to such an extent that its density will offer so considerable a resistance to the movement of the valve that it is difficult to throw the valve except with a rapid movement which is undesirable by reason of a shock resulting therefrom to the press and distribution piping system. I have found therefore that the valve mechanism must be designed so as to by-pass the fluid to the exhaust during the throw of the valve and this I have accomplished in its preferred form by providing one or more valve distribution ports inclined relatively to the axis of movement of the valve so that the fluid pressure supply port is always open to the cylinder or the exhaust. This by-passing function of the valve mechanism may be accomplished in a variety of ways, but my preferred arrangement is a valve casing having an intermediate fluid inlet and end exhaust ports and pressure distribution ports on each side of the end port which are relatively and oppositely inclined to the axis of movement of a cylindrical valve which is reduced between its ends in such manner that the fluid will flow always about this reduced portion either into one or the other of the distribution ports, or to the exhaust. Such an arrangement of the ports permits a slow and gradual cutting on and off of the pressure to and from the distribution ports and also the by-passing of the pressure through the ports past the unreduced end of the valve when in intermediate positions.

I have illustrated my valve mechanism in connection with a hydraulic tramper apparatus for cotton baling presses, but it will be understood that the principles of my invention are readily adaptable to all conditions of hydraulic pressure distribution.

Referring to the drawings:—

Figure 1 is a view showing a cotton tramper with its hydraulic pressure system and control valves in perspective.

Figs. 2, 3 and 4 are longitudinal sectional views through the four-way distributing valve showing it in three different positions.

Fig. 5 is a detailed view of a modified form of my valve in which exhaust ports are provided at each end of the valve casing.

Similar reference numerals refer to similar parts throughout the drawings.

In the embodiment of my invention illustrated, 1 is a press or baling box with which the follower block or platen 2 co-acts to tramp and press the cotton, the platen being operated by the piston rod 3 of a piston which reciprocates in a vertical press cylinder 4. The hydraulic pressure fluid is delivered to or exhausted from the top of this cylinder by a distribution pipe 5 and is delivered to or exhausted from the bottom end of the cylinder by a distribution pipe 6, these pipes being connected to suitable fluid pressure outlet ports 7 and 8, respectively, in the distributing valve casing 9. This valve casing has a fluid pressure inlet port 10 therein connected to a pressure fluid supply pipe 11 which leads from the manifold 12 of the hydraulic pressure generating pump 13. The fluid under pressure flowing through the pipe 11 returns to the pump either by means of an exhaust pipe 14, leading from the exhaust port 15 of the valve casing 9, or by a short circuit return pipe 16 to which it is admitted under control of a by-pass valve 17.

The valve casing itself is provided with a cylindrical valve chamber 18 having therein a central annular port 19 which I call the supply port surrounding its center and disposed in a plane at right angles to the axis of the chamber. The fluid pressure distribution ports 7 and 8 communicate with

reversely inclined annular ports 20 and 21 which surround the chamber 18 and are inclined in reverse directions at an acute angle to the axis of the valve chamber. Within the valve chamber is a piston valve having a reduced central portion 22 and cylindrical ends 23 and 24 which make a pressure tight sliding fit in the valve chamber. The length of the valve stroke and of its ends 23 and 24 determine the proper angle of inclination for the ports 20 and 21, it being essential that the fluid shall by-pass the valve end 23 or 24 or both through the ports during the valve stroke. In the design of valve shown in Figs. 2 to 4, where the exhaust port is disposed at one end only of the valve casing, an exhaust port 25 extends from end to end axially through the valve which at its end opposite the exhaust port 15 is connected to a valve stem 26 which works through a stuffing box 27 and is connected at its outer end to any suitable operating device or mechanism (not shown). It will be observed that the ends 23 and 24 of the valve are of such length and are so spaced that at no point in its travel does it interrupt communication between the supply port 19 and one of the ports 20 and 21 so that the pressure is either flowing to the cylinder or through an inclined distribution port to the exhaust by which means I avoid the building up in the small chamber about the valve of abnormal hydraulic pressure and by the gradual opening and closing of the distribution ports 20, 21, I similarly avoid the too sudden supply and exhaust of the hydraulic pressure which will cause a shock to the whole distribution piping system.

In Fig. 2 the valve is shown in position at one end of its stroke in which the fluid pressure is delivered through the port 8 and pipe 6 to the bottom of cylinder 4, while the pipe 5 leading from the top of the cylinder is open to the exhaust. In Fig. 3 the valve is shown in intermediate position in which the supply port 19 is in partial communication through both ports 20 and 21 with the cylinder and the exhaust port 15, for by virtue of the inclination of these ports the pressure will exhaust through them to the port 15 and being thus by-passed will avoid any tendency to a closed circuit which might build up an excessive pressure about the valve. In Fig. 4 the valve is shown diverting pressure through port 7 and pipe 5 to the top of the cylinder, while the bottom of the cylinder through pipe 6, port 8 in the casing, and port 25 in the valve is in communication with the exhaust. Not only does the peculiar relative position of the ports 20 and 21 avoid the trapping of excessive pressures about the valve but they also definitely and positively provide for a slow and gradual cutting on and off of the pressure to and from the ports 7 and 8 by causing a gradual opening of these ports without wire drawing them.

In Fig. 5 the valve and its casing are the same as have already been described, except that the port 25 is omitted through the valve and additional exhaust ports 15^a are provided at each end of the casing and the valve is mounted on an operating stem 28 which extends through stuffing boxes 29 at each end of the valve casing so as to balance the valve. The operation of the valve is the same as that already described.

With this type of four-way valve mechanism I have found it possible to manipulate the valve slowly with the greatest ease and without requiring any appreciable power, whereas in earlier types of four-way hydraulic press valves, I have found it very difficult to operate them by hand except by a quick movement which would tend to produce severe shocks to the distribution piping system as the pressure was suddenly cut on and exhausted from the distribution pipes.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a four-way hydraulic valve mechanism, a balanced piston valve reduced between its ends, a valve chamber having intermediate supply and distribution ports and end exhaust ports, the distribution ports being inclined relatively to the line of movement of said valve sufficiently to overlap the adjacent unreduced valve end in mean operating positions and connect the supply and exhaust, as and for the purposes described.

2. In a hydraulic pressure distribution system, a valve casing having a valve chamber provided with an intermediate fluid pressure supply port, fluid distribution ports on each side of said supply port, and an exhaust means in communication with both ends of said valve chamber, an intermediately reduced piston valve working in said chamber, and means to operate the valve, the distribution ports being spaced and inclined sufficiently to communicate both with the supply and exhaust ports during the intermediate positions of the valve in reversing the fluid pressure to said distribution ports.

3. In a hydraulic pressure distribution system, a valve casing having a valve chamber provided with an intermediate fluid pressure supply port, fluid distribution ports on each side of said supply port, and an exhaust means in communication with both ends of said valve chamber, an intermediately reduced piston valve working in said chamber, and means to operate the valve, the distribution ports being spaced and inclined sufficiently to simultaneously communicate both with the supply and exhaust

ports during the intermediate positions of the valve in reversing the fluid pressure to said distribution ports.

4. In a hydraulic pressure distribution system, a valve casing having a valve chamber with an intermediate supply port and distribution outlet ports on each side of the supply port, and an exhaust for both ends of the chamber, said distribution ports opening into the valve chamber at a reverse inclination, and a piston valve working in said chamber and having an intermediate reduced portion and ends of such length that in middle position of the valve the inclined distribution ports will by-pass fluid past the valve to the exhaust, substantially as described.

5. In a hydraulic pressure distribution system, a four-way valve mechanism comprising a casing having a valve chamber having its ends open to the exhaust, said chamber having an intermediate fluid inlet port and fluid distribution ports on each side of the inlet port, said distribution ports extending circumferentially about the valve chamber in reversely inclined planes at an acute angle to the center line of said valve chamber, and a piston valve having an intermediate reduced portion which in middle position of the valve laps the near ends of said distribution ports while the unreduced portions of the valve leave the far ends of said distribution ports open to the exhaust, substantially as described.

In testimony whereof I affix my signature.

EUGENE MUNGER.

Witness:

NOMIE WELSH.