

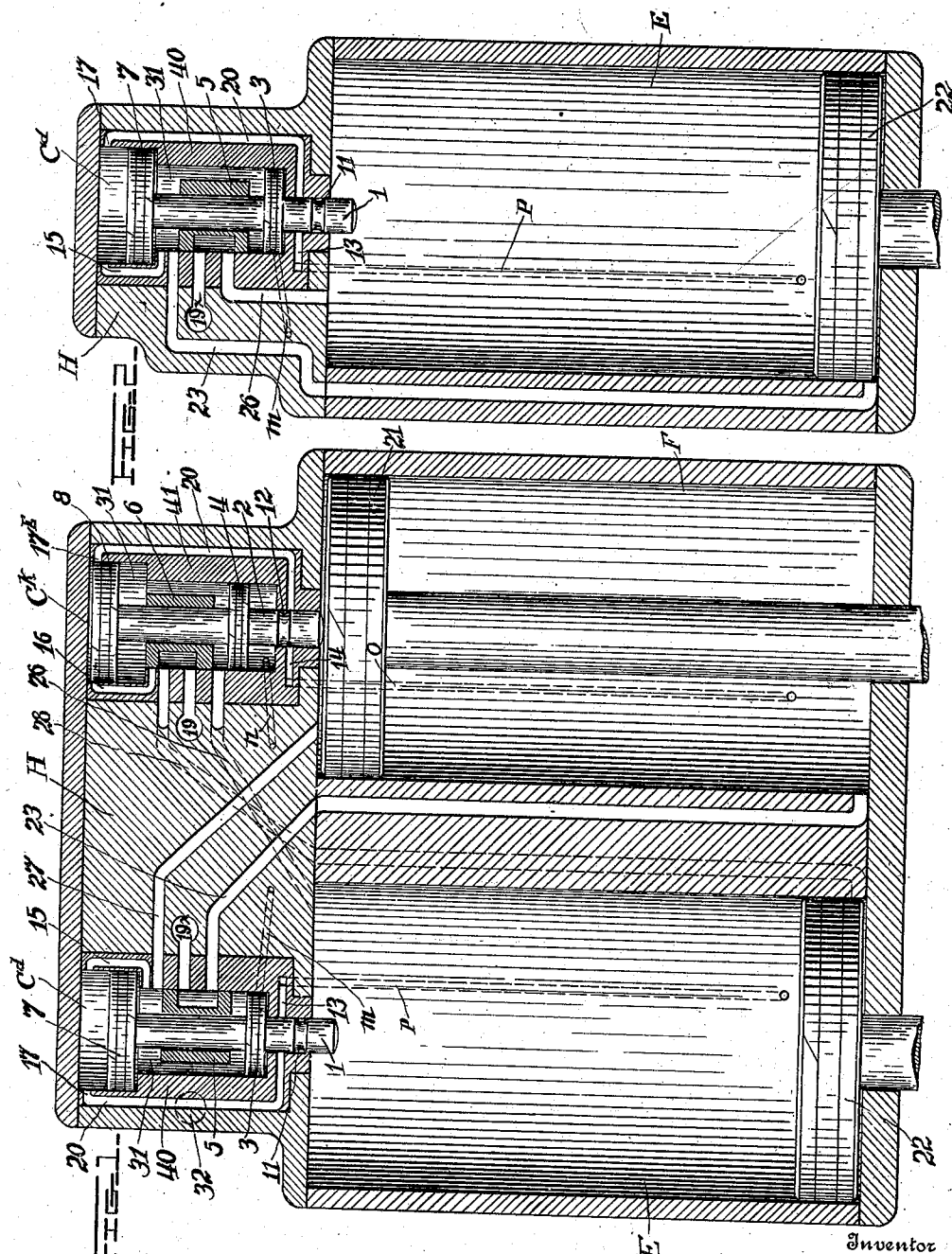
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J. F. BREITENSTEIN.

STEAM ACTUATED VALVE FOR PUMPING ENGINES.

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UNITED STATES PATENT OFFICE.

JULIUS F. BREITENSTEIN, OF BURLINGTON, IOWA.

STEAM-ACTUATED VALVE FOR PUMPING-ENGINES.

No. 847,897.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed September 28, 1906. Serial No. 336,579.

To all whom it may concern:

Be it known that I, JULIUS F. BREITENSTEIN, a citizen of the United States, residing at Burlington, in the county of Des Moines and State of Iowa, have invented certain new and useful Improvements in Steam-Actuated Valves for Pumping-Engines, of which the following is a specification.

My invention relates to an improvement in pumping-engines, such as are known as "direct-acting," either duplex or single engines.

The object of my present invention is to provide an improved construction and combination of parts, and more especially to simplify engines of this well-known character and provide a mechanism which is not only simple in construction, but also effective in operation and arranged to utilize the motive agent economically and to the best possible advantage; and a further object is to provide an engine which will not short-stroke.

With the foregoing objects in view my invention consists in either one or two cylinders, accordingly as it is a single or duplex engine, said cylinder or cylinders provided with valve chest or chests, slide valve or valves in said chest for controlling the outlet, and exhaust ports for the cylinder or cylinders, tappet or tappets extending through bushing or backing into the cylinder or cylinders in position to be actuated in one direction by the main piston or pistons, and differential auxiliary pistons carrying the slide-valves and operated and controlled by various ports by direct application of steam through various ports.

My invention further consists in certain novel features of construction and combinations of parts, which will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a sectional view of a duplex engine. Fig. 2 is a similar view of a single engine.

In the construction shown in Fig. 1, E and F represent two cylinders, and 21 and 22 are the pistons fitted to and operating in said cylinders, their piston-rods being connected to the pump or pumps. (Not shown.) The head H of these cylinders is counterbored in alinement with the centers of the pistons to receive the valve-chests 40 and 41, respectively, and the center of the head and the intermediate wall between cylinders is channeled out, as illustrated, to form the various

ducts 23, 26, 27, and 28 and exhaust-ports 19 and 19'. These ducts open into the opposite ends of the cylinders E and F and into the valve-chests 40 and 41 at their opposite ends.

Slide-valves 5 and 6 are located in the valve-chests 40 and 41, respectively, they being secured to the valve-stems 1 and 2. Differential pistons 3 and 7 are secured on stem 1 above and below the slide-valve 5, and similar pistons 4 and 8 are secured on the stem 2 in corresponding position with respect to the slide-valve 6. The differential pistons are fitted to the large and small bores of the valve-chest after the manner of a piston in its cylinder, and they serve to center and guide the slide-valves in their reciprocating movement.

The motive agent—as live steam, for instance—is supplied through port 32, which port has direct communication with the chambers 31 and 31 between pistons 3 and 7, 4 and 8.

By-passes P and O lead from the lower ends of the two cylinders E and F to the inner ends of the two steam-chests, whence they extend diametrically across the lower ends of the latter, as indicated at 13 and 14, and thence they extend to the outer ends of the valve-chests, discharging into the extreme ends C^d and C^k at 17 and 17', respectively, the slide-valves being moved inwardly at alternate intervals by the discharge of exhaust-steam or other agent from the main cylinders against these pistons 7 and 8. The passage of fluid through the ducts 20 is controlled by the cavities 11 and 12, formed in the stems 1 and 2 of the slide-valves, which cavities upon reaching a point opposite the ducts 13 and 14 establish communication between said ducts and ducts 20, and this condition of affairs is brought about by the pistons striking the protruding tappet ends of the stems 1 and 2 in turn at the end of a stroke of each piston. By-passes 15 and 16, leading from the upper ends of the chambers C^d and C^k, enter the chambers 31 to discharge the exhaust-steam or other motive agent from said chambers C^d and C^k. The cavities m and n are utilized to cushion pistons 3 and 4 and also to carry off moisture.

The operation of this duplex pumping-engine is as follows: Main port 32 has a direct communication with chambers 31 and 31.

Steam or other motive agent from port 32 enters one of the chambers 31. Piston 22, it will be assumed, has just completed its stroke and uncovered by-pass P in cylinder E, allowing the steam or other fluid in cylinder E to pass up through by-pass P, thence into duct 13, passing through cavity 11 in the stem 1, thence through duct 20, discharging into chamber C^d through port 17. This causes pistons 7 and 3 to descend, carrying with them the slide-valve 5, which uncovers by-pass 15, leading from chamber C^d into chamber 31, allowing the same to be held in position until the piston 22 makes its return stroke. With the slide-valve in this position the steam or other motive agent passes from chamber 31 through port 27, discharging on tappet of piston 21, thereby forcing piston 21 down and allowing the steam below said piston to pass out through duct 23 into the exhaust-port 19^x. Piston 21 continues its downward stroke, and just before it reaches the end this stroke uncovers the lower end of duct O, which permits steam or other motive agent to pass up through said duct O, thence following through duct 14 passes cavity 12 in the stem 2, thence into duct 20, and finally into chamber C^k at 17^e. Said chamber C^k being occupied by the upper end of valve-piston 8, the latter is now forced down. The pistons 4 and 8, carrying the slide-valve 6, cause the latter to uncover the ports 28 and 26, which allows the steam on tappet of piston 22 in cylinder E to exhaust through port 26 into exhaust-port 19 through the cavity in the slide-valve 6. As soon as slide-valve 6 covers port 26, connecting same with exhaust-port as just mentioned, the piston 21 will meet with resistance retarding its movement on the downward stroke to keep same from striking each pump of cylinder F.

In the single engine, (illustrated in Fig. 2,) the parts are designated by characters corresponding to the parts already described and the various elements are to all intents and purposes the same as described in connection with the duplex engine, the only substantial difference being that the parts 23 and 26 extend direct from chamber 31 to the lower and upper ends, respectively, of the cylinder instead of crossing over from steam-chests on one side to the cylinder on the opposite side, and hence it will hardly be necessary to describe this single engine further, as it would be simply a repetition of what has already been described.

It is evident that slight changes might be resorted to in the form and arrangement of the several parts described without departure from the spirit and scope of my invention, and hence I do not wish to limit myself to the exact construction herein set forth; but,

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

1. In an engine, the combination with a cylinder, piston, valve-chest and live and exhaust ports leading from said valve-chest, of a slide-valve, pistons connected with said valve, and by-passes extending from the cylinder to the remote end of the valve-chest and the valve-chamber, the valve moved in one direction by the piston and having means for controlling both by-passes.

2. In an engine, the combination with a cylinder, piston, and a valve-chest in communication with the cylinder, of a slide-valve adapted to reciprocate in said valve-chest, the stem of the valve in the form of a tappet at one end adapted to be struck by the piston at one end of its stroke, said tappet having a cavity, and a by-pass leading from the cylinder to the valve-chest, and crossing the path of the tappet, the passage of steam or other motive agent through said by-pass being controlled by the tappet-cavity.

3. In an engine, the combination with a cylinder, piston, and a valve-chest in communication with the cylinder, of a slide-valve adapted to reciprocate in said valve-chest, the stem of the valve in the form of a tappet at one end adapted to be struck by the piston at one end of its stroke, said tappet having a cavity, and a by-pass leading from the cylinder to the remote end of the valve-chest, the passage of steam or other motive agent through said by-pass being controlled by the tappet-cavity, and a by-pass leading from the outer end of the valve-chest to the slide-valve chamber at a point where it is controlled by the slide-valve.

4. In an engine, the combination with a cylinder, a piston, a valve-chest and live and exhaust ports, of a slide-valve operating in a chamber formed in the valve-chest, differential pistons connected with the stem of the valve, and by-passes connecting said chamber with the outer end of the valve-chest and controlled by the valve, and a by-pass connecting the outer end of the valve-chest with the main cylinder and means connected with the slide-valve for controlling this last-mentioned by-pass, said means being controlled by the main piston.

5. In a duplex pumping-engine, the combination of two cylinders, the usual pistons therein, a valve-chest at the end of each cylinder, each having ports leading to opposite ends of the more remote cylinder, a tappet-rod extending into the adjacent cylinder in position to be actuated by the cylinder-piston, a slide-valve and pistons in each valve-chest, by-passes crossing the paths of the tappets and connecting the remote ends of the valve-chests and adjacent cylinders, said by-passes controlled by the tappets.

6. In a duplex pumping-engine, the combination of two cylinders, the usual pistons therein, a valve-chest at the end of each cylinder, each having ports leading to opposite
5 ends of the more remote cylinder, a tappet-rod extending into the adjacent cylinder in position to be actuated by the cylinder-piston, a slide-valve and pistons in each valve-chest, by-passes crossing the paths of the
10 tappets and connecting the remote ends of the valve-chests and adjacent cylinders, said

by-passes controlled by the tappets, and a by-pass connecting the remote ends of the valve-chests with the valve-chambers and controlled by the slide-valves.

In testimony whereof I have signed my name to this specification in the presence of
15 subscribing witnesses.

JULIUS F. BREITENSTEIN.

Witnesses:

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