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PISTON VALVE.

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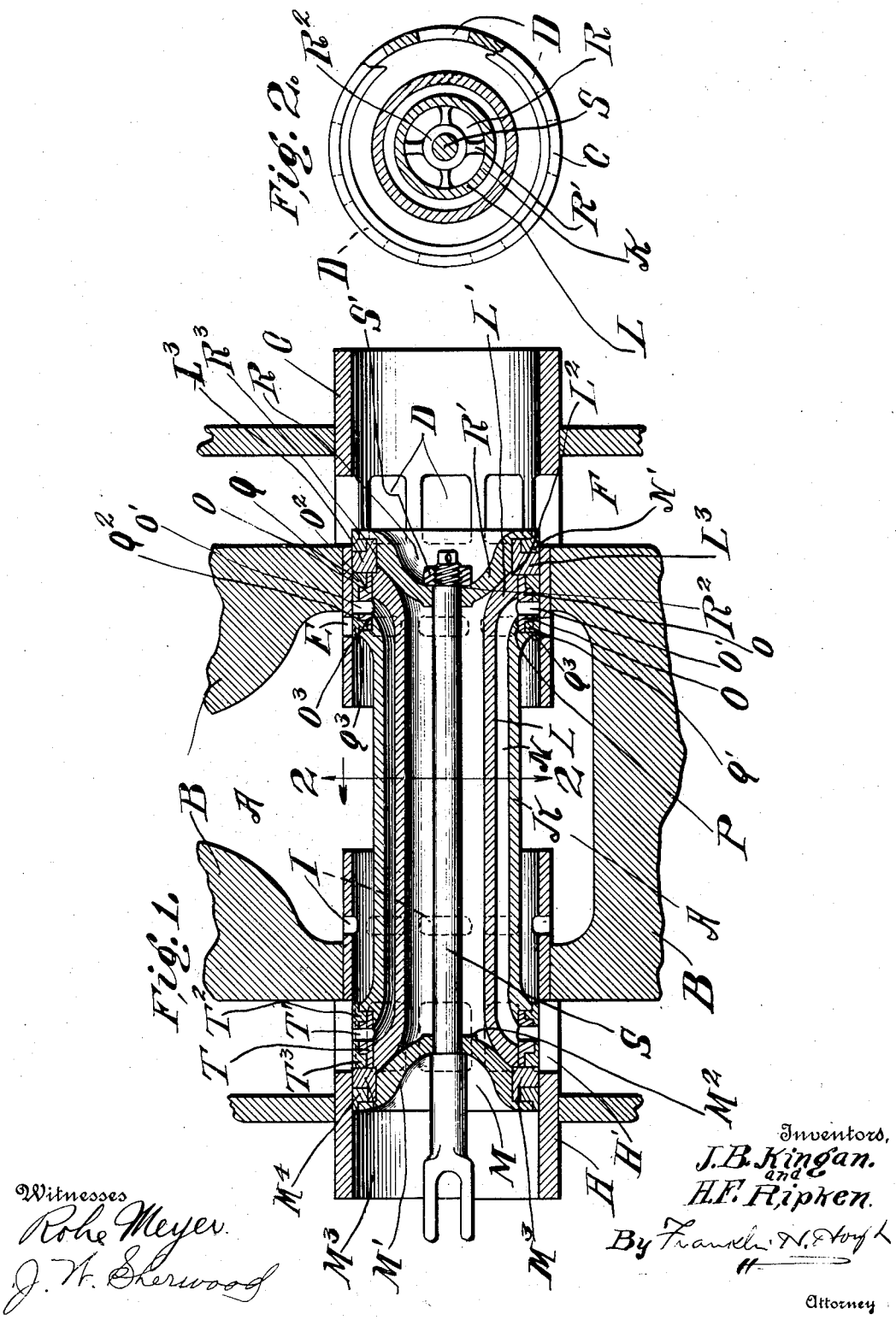

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PISTON-VALVE.

1,037,777. Specification of Letters Patent. Patented Sept. 3, 1912.

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To all whom it may concern:

Be it known that we, JAMES B. KINGAN and HUGO F. RIPKEN, citizens of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Piston-Valves; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in piston slide valves adapted for use for admitting and releasing steam or other liquid under pressure to and from cylinders of engines, pumps, etc.

More specifically the present invention comprises bushings in which the valve is adapted to reciprocate and provided with supplementary ports adapted to register at intervals during the movement of the valve with the supplementary ports in the valve and affording means whereby pressure of the fluid may be introduced through the supplementary ports simultaneously with the pressure admitted to the main ports, thereby admitting a double supply of fluid pressure to the cylinder at the beginning of each piston stroke.

A further object of the invention consists in the provision of means for introducing a double supply of pressure and retaining the same until the valve has traveled a distance equal to the width of the supplementary port at which time the cylinder having been fully supplied the supplementary ports will be closed until the valve approaches its point of cut-off, at which time the supplementary ports will reopen and afterwards close simultaneously with the main port, preventing a slow closure of said port and a consequent dropping away of pressure in the cylinders through straining or "wire drawing" of pressure from lack of port opening before the point of cut-off is reached.

Our invention comprises various details of construction and combinations and arrangements of parts which will be hereinafter fully described, shown in the accompanying drawings and then specifically defined in the appended claims.

We illustrate our invention in the accompanying drawings, in which:—

Figure 1 is a vertical sectional view longitudinally through our piston valve, and Fig. 2 is a transverse sectional view taken on line 2—2 of Fig. 1.

Reference now being had to the details of the drawings by letter, A designates a steam chamber within the casing B and into which chamber the fluid pressure is introduced. A bushing C is fitted within one end of the casing and has a series of circumferential ports D therein, affording communication for the exhaust from the cylinder, and a portion of said bushing within which the piston reciprocates extends into the steam chamber and is provided with a series of auxiliary ports E, preferably of smaller dimensions than the ports D. Said ports E are in communication with the interior of the chamber, while the ports D are continually in communication with the space F leading to the cylinder, not shown. A similar bushing, designated by letter H and provided with circumferential ports H′, is mounted within said casing and has the circumference of the portion which extends within the steam chamber provided with supplementary ports I communicating with the steam chamber.

The piston is made up of a plurality of parts, comprising two concentrically mounted cylinders K and L, which are spaced apart forming a passageway N whereby the fluid pressure entering through the auxiliary ports in one bushing or the other may pass to the cylinder, one end or the other thereon. The inner of said cylinders L has a flaring end L′, the circumference of which is provided with an annular shoulder L^2 adapted to receive the bull ring L^3, the circumference of which has a sliding contact with the inner surface of the bushing C. Said bull ring has in turn an annular shoulder about its circumference for the reception of the flanged ring N′. A second bull ring, designated by letter O, also has a bearing about the circumference of the flaring end of the cylinder L and is provided with circumferential ports O′ therein. Said bull ring O is provided with two annular shoulders upon its circumference, designated respectively by letters O^2 and O^3, and a flanged packing ring Q is adapted to surround a portion of the bull ring O and engage the shoulder O^2 with the inner end of the flange of said

packing ring Q flush with the marginal edges of the ports O′ in said ring O, while a packing ring Q′ is provided with two flanges Q^2 and Q^3, and which packing ring surrounds a portion of the bull ring O, the edge of the flange Q^2 being flush with the adjacent marginal edges of the ports O′. The outer cylinder K, which also has outwardly flaring ends, is provided with an annular shoulder P about which a portion of the bull ring O passes and contacts therewith and the flange Q^3 of the packing ring Q′ engages over the circumference of the flaring end of said cylinder K.

A follower, designated by letter R, is provided with a series of spider arms R′ which, at their inner ends, terminate in a disk R^2 which is apertured and is adapted to receive one end of the piston stem S upon which a threaded nut S′ is mounted to hold the follower in place. Said follower R is adapted to telescope within the bull ring L^3 and a flange R^3 formed about the outer end of said follower is held in frictional contact with the outer face of the bull ring L^3 and the outer face and flange of the packing ring N′ with the outer face of said flange R^3 flush with the edge of said packing ring N′.

A similar arrangement of packing and bull rings is provided within the bushing H and consists of the follower M with radial arms M′ terminating at their inner ends in an apertured disk M^2 for the reception of the piston rod and about the follower is the bull ring M^3 which is annularly shouldered for the reception of the packing ring M^4 which is flanged and extends about the circumference of the flaring or flanged end of the follower M. A bull ring T, provided with circumferential ports T′, is mounted about the adjacent flaring ends of the two cylinders, and flanged packing rings T^2 and T^3 surround the bull ring T and the adjacent edges of the flanges of said packing rings T^2 and T^3 are flush with the marginal edges of the ports T′.

In operation, steam or other fluid under pressure enters the space intermediate the outer circumference of the cylinder K and the inner surface of the portion of the bushing H which projects within the pressure chamber and, when the parts of the apparatus assume the position shown in Fig. 1 of the drawings, the fluid pressure is allowed to pass through the space intermediate the inner marginal edges of the ports H′ and the adjacent edge of the packing ring T^2, and simultaneously a supplementary supply of fluid under pressure is allowed to pass from the pressure chamber through the supplementary ports in the bushing C and into the space intermediate the two packing rings Q′ and Q which, together with the wall of the ports in the bull ring O, form the walls of ports leading into the space intermediate the two cylinders L and K, said auxiliary supply of fluid under pressure being allowed to pass through the ports T′ in the bull ring T and into the cylinder. By this provision, it will be noted that a double supply of fluid under pressure will be admitted simultaneously to the passageway leading to the cylinder of the engine during the period that the port O′ is in communication with the pressure chamber. It will also be noted that, by the provision of the construction shown, the packing rings form portions of the walls of the ports through which the fluid under pressure is admitted and exhausted, and are wider than the supplementary ports, the packing rings remaining at all times inside the bushing and thoroughly protected from breakage or harm from any cause.

The packing rings in our improved device may be applied to the valve without the usual necessity of straining or springing of the rings over the body of the valve, which practice tends to distort the original shape of the rings and rendering them, to a large extent, unfit for the functions which they are adapted to perform.

While our drawings and specification show a construction of two separate tubes marked K and L respectively, we do not desire to be limited in this construction, as this portion of the valve body may be made integral or in the form of a casting in one solid piece.

What we claim to be new is:—

1. A piston slide valve for engines, etc., comprising a casing, bushings mounted therein and provided each with a series of ports adapted to communicate with the cylinder in the engine, an auxiliary series of ports communicating with a steam chamber, concentrically mounted piston cylinders with longitudinal ducts intermediate the same, a stem fixed to said piston cylinders, bull rings mounted upon said cylinders and provided with circumferential ports, flanged packing rings mounted upon each bull ring, the edges of said packing rings forming parts of the walls of said ports, the space about the outer cylinder forming a direct passageway for the steam and the space between the cylinder an auxiliary passageway for the steam, as set forth.

2. A piston slide valve for engines, etc., comprising a casing, bushings mounted therein and provided each with a series of ports adapted to communicate with the cylinder in the engine, an auxiliary series of ports communicating with a steam chamber, concentrically mounted piston cylinders spaced apart and provided with flaring ends, forming an auxiliary passageway for the fluid pressure intermediate the cylinders, a bull ring supported about the flaring end of the inner cylinder and supporting the outer cylinder, bearing rings about said bull ring,

portions of the bearing rings forming the marginal edges of the ports leading through the bull ring, and a stem fastened to the cylinder, as set forth.

3. A piston slide valve for engines, etc., comprising a casing, bushings mounted therein and provided each with a series of ports adapted to communicate with the cylinder in the engine, an auxiliary series of ports communicating with a steam chamber, concentrically mounted piston cylinders spaced apart and provided with flaring ends, forming an auxiliary passageway for the fluid pressure intermediate the cylinders, a bull ring supported about the flaring end of the inner cylinder and supporting the outer cylinder, bearing rings about said bull ring, portions of the bearing rings forming the marginal edges of the ports leading through the bull ring, followers for supporting the inner cylinder, and a stem fastened to the followers, as set forth.

4. A piston slide valve for engines, etc., comprising a casing, bushings mounted therein and provided each with a series of ports adapted to communicate with the cylinder in the engine, an auxiliary series of ports communicating with a steam chamber, concentrically mounted piston cylinders spaced apart and provided with flaring ends, forming an auxiliary passageway for the fluid pressure intermediate the cylinders, a bull ring supported about the flaring end of the inner cylinder and supporting the outer cylinder, bearing rings about said bull ring, portions of the bearing rings forming the marginal edges of the ports leading through the bull ring, followers for supporting the inner cylinder, a bull ring surrounding each follower and bearing against the end of the inner cylinder, and a stem fastened to said followers, as set forth.

5. A piston slide valve for engines, etc., comprising a casing, bushings mounted therein and provided each with a series of ports adapted to communicate with the cylinder in the engine, an auxiliary series of ports communicating with a steam chamber, concentrically mounted piston cylinders spaced apart and provided with flaring ends, forming an auxiliary passageway for the fluid pressure intermediate the cylinders, a bull ring supported about the flaring end of the inner cylinder and supporting the outer cylinder, bearing rings about said bull ring, portions of the bearing rings forming the marginal edges of the ports leading through the bull ring, followers for supporting the inner cylinders, a bull ring surrounding each follower and bearing against the end of the inner cylinder, and a bearing ring surrounding the outer end of each follower and a portion of the adjacent bull ring, as set forth.

6. A piston slide valve for engines, etc., comprising a casing, bushings mounted therein and provided each with a series of ports adapted to communicate with the cylinder in the engine, an auxiliary series of ports communicating with a steam chamber, concentrically mounted piston cylinders spaced apart and provided with flaring ends, forming an auxiliary passageway for the fluid pressure intermediate the cylinders, a bull ring supported about the flaring end of the inner cylinder and supporting the outer cylinder, bearing rings about said bull ring, portions of the bearing rings forming the marginal edges of the ports leading through the bull ring, followers having spider arms terminating at their inner ends in apertured disks, a stem fitted in said disk, a bull ring surrounding each follower and bearing against a shoulder at the end of said inner cylinder, and a bearing ring mounted about the outer end of each follower and a portion of the bull ring which surrounds the follower, as set forth.

In testimony whereof we hereunto affix our signatures in the presence of two witnesses.

JAMES B. KINGAN.
HUGO F. RIPKEN.

Witnesses:
F. L. PALMER,
D. G. CAMPBELL.