

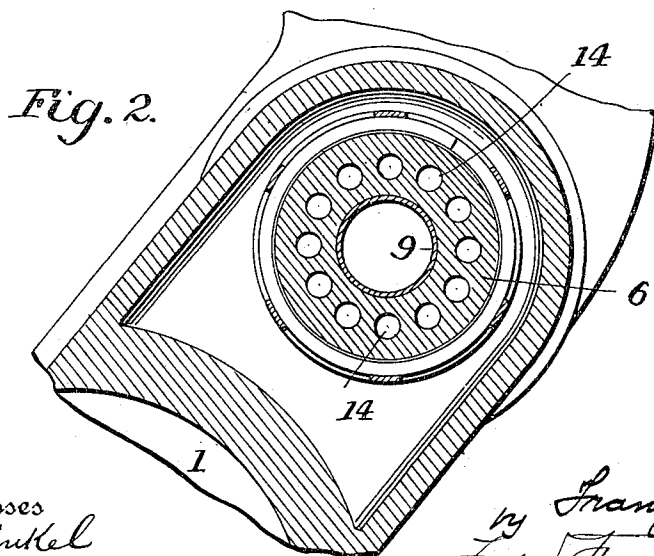
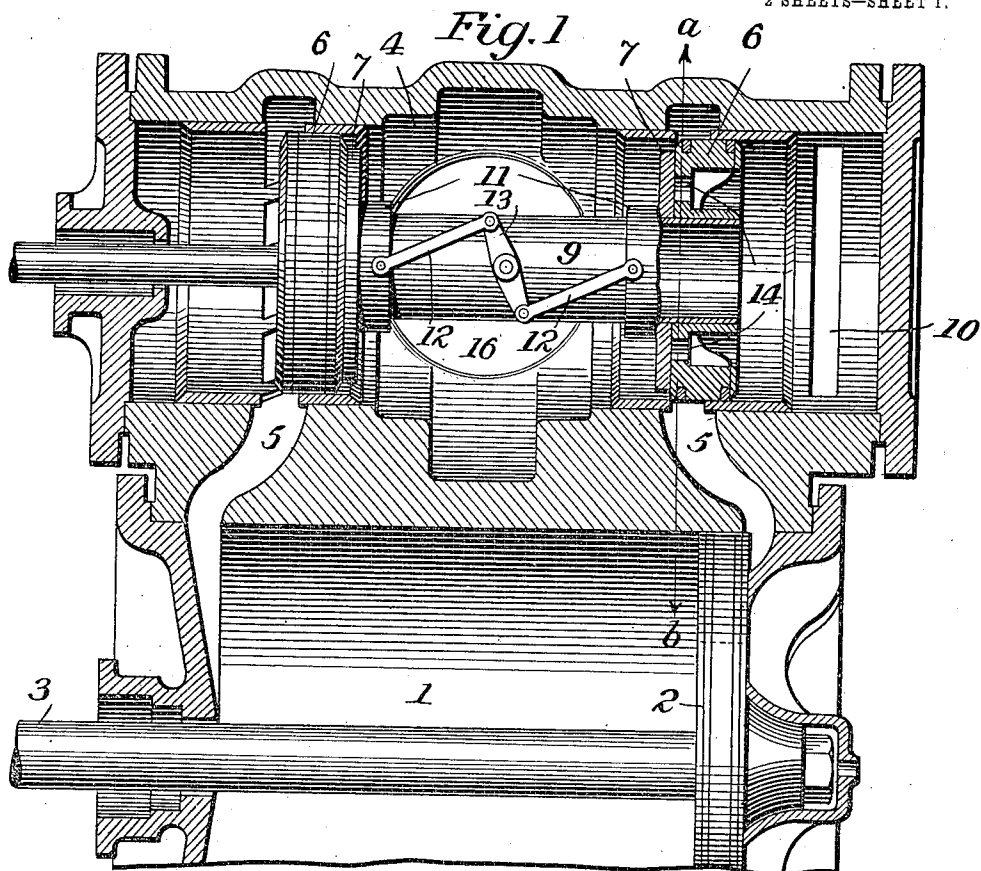
No. 824,903.

PATENTED JULY 3, 1906.

F. BURGER.
AUTOMATIC EQUALIZING PISTON VALVE.

APPLICATION FILED FEB. 15, 1905.

2 SHEETS—SHEET 1.



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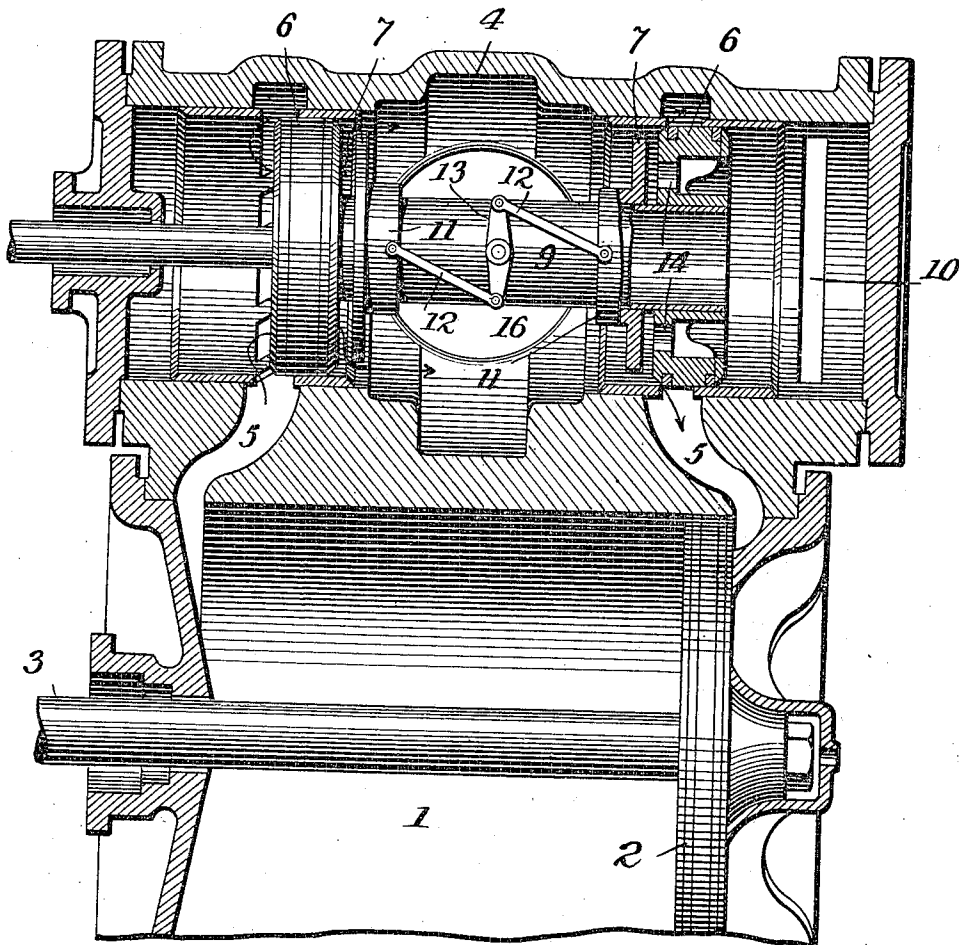
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2 SHEETS—SHEET 2

Fig. 3



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UNITED STATES PATENT OFFICE.

FRANZ BURGER, OF FORT WAYNE, INDIANA, ASSIGNOR OF THREE-
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AUTOMATIC EQUALIZING PISTON-VALVE.

No. 824,903.

Specification of Letters Patent.

Patented July 3, 1906.

Application filed February 15, 1905. Serial No. 245,773.

To all whom it may concern:

Be it known that I, FRANZ BURGER, a citizen of the United States, residing at Fort Wayne, in the county of Allen, State of Indiana, have invented certain new and useful Improvements in Automatic Equalizing Piston-Valves, of which the following is a specification.

My invention relates to automatic equalizing piston-valves; and it has for its object to provide a valve that is adapted to automatically operate to equalize the air-pressure when the engine is drifting or operating without the active energy of the motor fluid; and to these ends my invention consists in the various features of construction and arrangement of parts having the general mode of operation and accomplishing the results substantially as hereinafter more particularly set forth.

In the accompanying drawings, wherein I have shown one embodiment of my invention, Figure 1 is a vertical section of a valve embodying the invention operating in connection with the distributing-valve of a steam-cylinder. Fig. 2 is a detail cross-section on the line *a b*, Fig. 1; and Fig. 3 is a vertical section similar to Fig. 1, showing the parts in different positions.

While my invention may be embodied in different structures, the details being changed to adapt it to the particular circumstances under which it is used, and while my invention may be used in connection with many and various motors operated with different motor fluids, it is especially applicable for use in connection with locomotives, and I have illustrated my invention in connection with a locomotive-cylinder and will describe it in connection with the use of steam as a motor fluid without limiting the invention to the use of this particular fluid or in this particular connection.

It is well known that in operating locomotives it is often desirable and even necessary to cut off the flow of motor fluid or steam which is being supplied to the cylinders for propelling the locomotive, and while this is done the pistons continue to reciprocate in the cylinders, and in this movement they tend to compress the air in the cylinders and connecting valve mechanism, which of course is a waste of energy. Numerous devices have been provided to avoid this waste

of energy under these and other circumstances, and, broadly speaking, my invention includes an automatically-operating equalizing-valve arrangement intended to accomplish the above results.

Referring to the embodiment of the invention shown in the drawings, 1 represents a steam-cylinder of a locomotive in which is adapted to reciprocate a piston 2, having a piston-rod 3, adapted to be connected in any suitable manner to the driving-wheels of the locomotive. Connected with this cylinder 1 is a valve-chamber 4, shown in the present instance as connected with the opposite ends of the cylinder 1 through the ports 5 5. Mounted in this valve-chamber is a reciprocating piston-valve 6 6 of a conventional and well-known type, and this valve controls the flow of motor fluid from the valve-chamber 4 to and from the opposite ends of the cylinder 1, the motor fluid being supplied to the valve-chamber through the opening 16, communicating with the usual supply-pipe.

In the present instance the two valve-pistons are united by a tube 9, through which the exhaust-steam passes from the left-hand end of the cylinder 1 to the exhaust-port 10 in the valve-chamber, it passing, of course, from the right-hand end of the cylinder directly to the exhaust-port through the port or passage 5 at that end of the cylinder.

I provide the valve-pistons 6 6 with one or more openings or by-passes, shown in the present instance in the form of holes 14 through the bodies of the valve-pistons, and I also provide an automatically-operating valve or valves adapted to control these openings or by-passes in the valve-pistons to accomplish the results set forth. In the present instance I have shown as mounted on the tube 9 two valves 7 7, shown in the form of disks and adapted to slide on the tube and to open or close the passages or holes 14 in the respective valves 6 6. When steam or other motor fluid is admitted to the valve-chamber 4, these auxiliary valves 7 7 are automatically moved to close the openings or by-passes 14, and I provide means for automatically opening said by-passes or holes in the valve-heads when the motor fluid or steam is cut off from the valve-chamber 4. This means may include a spring-actuated means tending to cause said auxil-

iary valves 7 to leave their valve-seats; but in the present instance I have shown the auxiliary valves 7 as having hubs 11, to which are pivoted the connecting-rods 12, the inner ends of which are connected to the opposite ends of a double lever 13, pivotally mounted on the tube 9. It is preferable, of course, to duplicate these connecting-rods and levers on opposite sides of the tube, they being shown on one side only in the drawings.

Such being the preferred embodiment of my invention, the operation will be largely understood from what has been set forth above, and it will be seen that as soon as motor fluid is admitted to the valve-chamber 4 the auxiliary valves will be automatically closed and the piston-valve operated to control the admission of motor fluid to the different ends of the cylinder in the usual way. When, however, the motor fluid is cut off and the engine or power piston 2 continues to operate, it tends to produce a vacuum at one end of the cylinder and to compress the air at the other end, and assuming the parts to be in the position shown in Fig. 3, with the piston 2 about to move to the left, it will be seen that there will be a tendency to produce a vacuum in the valve-chamber 4, while there will also be a tendency to compress the air in the left-hand portion of the cylinder and valve-chest behind the left-hand piston-valve 6. The result is that the auxiliary valves 7 7 will be automatically operated and moved away from their respective valve-seats, opening the passages 14 14 in the valve-pistons, permitting thereby an equalization of the air-pressure in the cylinder and valve chest or chamber. In doing this the auxiliary valves will be moved toward each other, and the connecting rods and lever will cause them to move concurrently and simultaneously the required distance to secure the desired equalization of the pressure. When, of course, the motor fluid is again admitted to the valve-chamber 4, these auxiliary valves 7 are automatically operated to close the by-passes through the valve-pistons 6.

It will thus be seen that my improved construction provides a simple and effective automatically-operating equalizing piston-valve which will be self-regulating and control the openings or by-passes according to the rapidity of operation of the engine and the pressure within the cylinder and valve-chest, thereby establishing communication

between both ends of the power-cylinder when the supply of motor fluid is cut off.

What I claim is—

1. The combination with a cylinder, piston, valve-chamber and valve therein, of an auxiliary valve mounted to open freely and automatically to equalize the pressure in the cylinder and valve-chamber when the motor fluid is cut off, substantially as described.

2. The combination with a cylinder, piston, valve-chamber and double-piston valve therein having openings in said pistons, of two auxiliary valves and connections whereby both valves will move together inward and outward all arranged to insure the valves simultaneously and automatically operating to establish and maintain communication between both ends of the cylinder and the valve-chamber when the motor fluid is cut off, substantially as described.

3. The combination with a cylinder, piston, valve-chamber and valve having two separated pistons, each of the latter having openings, of an auxiliary valve automatically operating to close the openings of each piston under pressure of the motor fluid and mounted to open freely when the motor fluid is cut off from the valve-chamber, substantially as described.

4. The combination with a cylinder, piston, valve-chamber and double-piston valve therein having openings in said pistons, of two auxiliary valves simultaneously and automatically operating to establish and maintain communication between both ends of the cylinder and the valve-chamber when the motor fluid is cut off, substantially as described.

5. The combination with a cylinder, piston, valve-chamber and piston-valve therein, of a tube connecting the valve-pistons, the pistons having openings through their bodies, auxiliary valves slidably mounted on said tube, and connections between said auxiliary valves whereby they are simultaneously and automatically operated, as and for the purpose set forth.

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

FRANZ BURGER.

Witnesses:

GEO. K. TORRENCE,
C. B. WATERS.