

No. 736,302.

PATENTED AUG. 11, 1903.

E. SARVER.  
EQUALIZING AND BY PASS VALVE.

APPLICATION FILED JUNE 28, 1902.

NO MODEL.

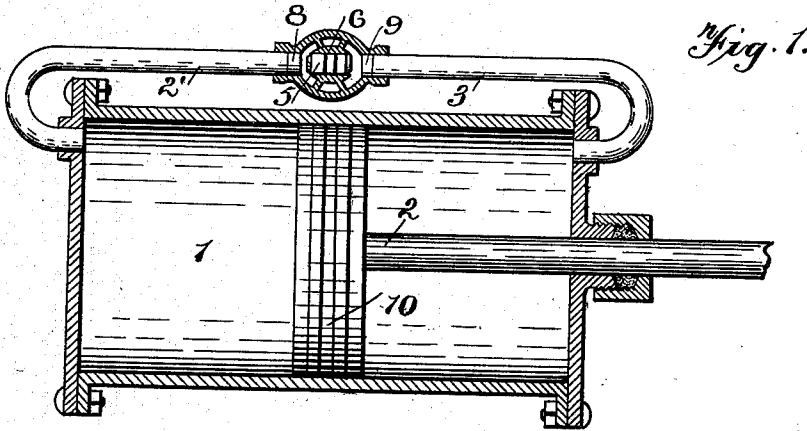


Fig. 1.

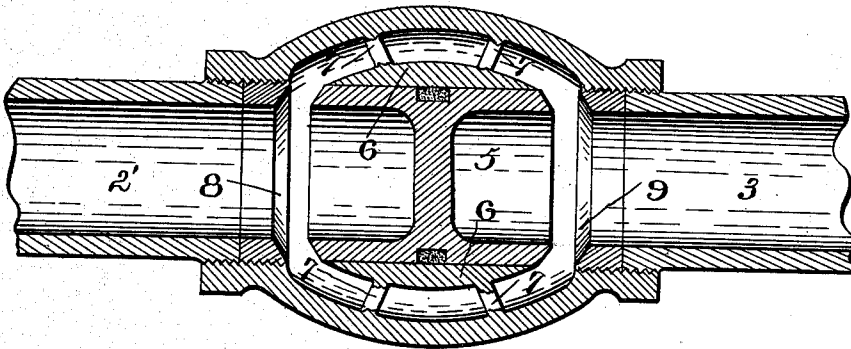


Fig. 2.

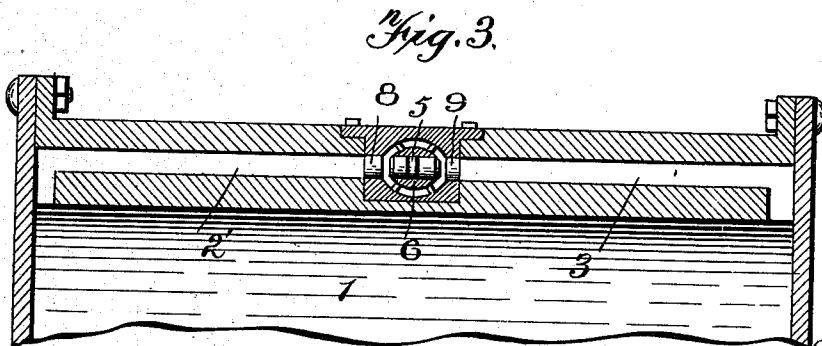


Fig. 3.

Witnesses

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# UNITED STATES PATENT OFFICE.

EDWARD SARVER, OF OGDEN, UTAH.

## EQUALIZING AND BY-PASS VALVE.

SPECIFICATION forming part of Letters Patent No. 736,302, dated August 11, 1903.

Application filed June 28, 1902. Serial No. 113,676. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD SARVER, a citizen of the United States, residing at Ogden, in the county of Weber and State of Utah, have invented new and useful Improvements in Equalizing and By-Pass Valves, of which the following is a specification.

My invention relates to improvements in automatic equalizing and by-pass valves for steam-engines, all of which will be fully described hereinafter.

The object of my invention is to relieve the compression which occurs in expansion or compound steam-engines when the engine is working under steam-pressure and to so construct the same that the valve acts as a by-pass valve when the engine is drifting.

In the accompanying drawings, Figure 1 is a sectional view of an engine-cylinder with its piston and my invention applied thereto. The steam-chest is of the ordinary form, which forms no part of my invention, and thus it is not shown in the drawings. Fig. 2 is an enlarged sectional view of my improved equalizing and by-pass valve. Fig. 3 is a sectional view of an engine-cylinder, showing my invention applied thereto by casting the engine-cylinder with the passage-ways and the support and seats for the equalizing and by-pass valves.

It is well known by those skilled in the art that in expansion or compound engines, whether of the stationary, marine, or locomotive type, some compression takes place in all of the cylinders except the last or low-pressure cylinder.

My invention is designed to perform the double function of overcoming this compression when the engine is working under steam-pressure and to act as a by-pass valve to prevent compression at opposite ends of the cylinder when the engine is drifting.

Referring now to the drawings, 1 indicates an engine-cylinder, and 2 the piston. Connected and communicating with opposite ends of the cylinder are the passage-ways 2' and 3. Situated in the passage-ways and adapted to control them is my improved equalizing and by-pass valve, which I will presently explain.

In Fig. 1 I show the passage-ways 2' and 3 and the equalizing and by-pass valve located outside of the body of the cylinder. How-

ever, it will be readily understood that these passage-ways and the support and seats for the valves may be cast in the wall of the cylinder, as shown in Fig. 3, without departing in any sense from the spirit and scope of my invention.

My improved equalizing and by-pass valve 5 is suitably supported and guided by the walls 6, the walls or guides 6 being supported through the medium of suitable webs or spiders 7. This construction forms a passage-way around the valve 5 and its supporting or guiding walls 6. The passage-ways 2' and 3 at the point where the valve is situated are preferably enlarged, as shown, and at the end of this enlargement the valve-seats 8 and 9 are provided. The opposite ends of the valve 5 are so shaped as to coact with the seats 8 and 9 in a manner to form a steam-tight joint when one or the other end of the valve 5 is in engagement with either of the aforementioned valve-seats.

The valve 5 has a longitudinal movement through its support or guide 6, and for the purpose of causing a frictional action between the valve and its support I provide any suitable form of frictional packing 10. This frictional packing or ring 10 will create a sufficient amount of friction to require about one pound of pressure to move the valve in its support or guideway 6.

The operation of my invention is as follows: The piston being driven in one direction through the medium of the steam, the steam driving the piston rushes through the passage-way 2' and strikes the valve 5 with such velocity that it causes its opposite end to engage its seat and to prevent the passage of the steam around the valve, with which it makes a steam-tight joint. The valve remains in this position until the piston of the engine has moved sufficiently far to create compression equal to one pound greater than the pressure at the opposite side of the valve 5, which moves the valve in the opposite direction to the position shown in Fig. 2. When in this position, the compression is released and passes to the opposite end of the cylinder, and consequently to the opposite side of the piston, by passing around the valve 5, as will be readily understood. When the engine is drifting, the valve will remain in the

central position, (shown in Fig. 2,) making a perfect by-pass valve and permitting the air compressed at opposite ends of the cylinder to freely pass from one end of the cylinder to the opposite with great advantage to an engine to which it is attached whether it be simple or compound, locomotive, marine, or stationary.

While I here show a reciprocating valve and a packing to cause frictional contact for the purpose heretofore explained, it will be readily understood that any other form of valve adapted to act as the friction-ring acts in the construction here shown will be within the scope and spirit of my invention, and I do not, therefore, limit the scope of my invention to the specific construction herein shown and described, since various modifications of the principle and operation therein involved will occur to those skilled in this art.

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

1. An engine-cylinder having a passage-way in direct communication with opposite ends thereof, an equalizing-valve situated in said passage-way and adapted to be closed by pressure from either end of the cylinder.

2. An engine-cylinder having a passage-way in direct communication with opposite ends thereof, a reciprocating valve located in said passage-way and adapted to be closed by the pressure from either end of the cylinder.

3. An engine-cylinder having a passage-way in direct communication with opposite ends thereof, a valve situated within the passage-way intermediate its ends and adapted to be closed by pressure passing through the passage-way in opposite directions and to permit a passage of the pressure from either end of the cylinder to the opposite end, and means for resisting the movement of the valve in either direction.

4. An engine-cylinder having a passage-way connecting opposite ends thereof, a valve located within the passage-way, the passage-way having the valve-seat adjacent opposite sides of the valve, and passage-ways around the valve, and means for resisting the movement of the valve in both directions toward either of the said valve-seats, substantially as described.

5. An engine-cylinder having a passage-way connecting opposite ends thereof, the passage-way having an intermediate enlargement, the opposite ends of the enlargement provided with valve-seats, a valve-support within the enlargement, the enlargement having passage-ways around the said support, a valve located within the support and adapted to be actuated and caused to engage respectively, the said valve-seats, according to the direction of the pressure passing through the passage-way, and means for resisting the movement of the valve in both directions, substantially as described.

6. An engine-cylinder having a passage-

way connecting opposite ends thereof, the passage-way having an intermediate enlargement, valve-seats located at opposite ends of the enlargement, a longitudinally-extending valve-support within the enlargement, the enlargement constructed with passage-way around the valve-support, a reciprocating valve within the support adapted to coact respectively with the said valve-seats for interrupting the communication when moved in either direction, and to open the passage-way when in its central position, and means for resisting the movement of the said valve.

7. An engine-cylinder having a passage-way connecting opposite ends thereof, the passage-way having an intermediate enlargement, valve-seats located at opposite ends of the enlargement, a valve-support within the enlargement, the enlargement having passage-way around the support, a valve located in the support and shorter than the distance between the said valve-seats, whereby the movement of the valve in opposite directions will respectively coact with the said valve-seats for interrupting communication at opposite ends of the cylinder, substantially as described.

8. An engine-cylinder having a passage-way connecting opposite ends thereof, the passage-way having an intermediate enlargement, valve-seats located at opposite ends of the enlargement, a longitudinally-extending valve-support within the enlargement, the enlargement constructed to have a passage-way around the said support, a reciprocating valve located within the support and shorter than the distance between the said valve-seats, and adapted to coact respectively therewith when moved in opposite directions, and a friction device between the valve and the said support, substantially as described.

9. An engine-cylinder having a passage-way connecting opposite ends thereof, the passage-way having an intermediate enlargement, valve-seats located at opposite ends of the enlargement, a longitudinally-extending valve-support stationarily held by a web within the enlargement, whereby a passage-way is provided around said support, a reciprocating valve located within the support and shorter than the distance between the said valve-seats, and adapted to coact respectively therewith when moved in opposite directions, and a friction device between the valve and said support, substantially as described.

10. An engine-cylinder having a passage-way connecting opposite ends thereof, the passage-way having an enlarged central portion, valve-seats located at opposite ends of the enlarged central portion, a centrally-located longitudinally-extending valve-support, a web supporting said valve-support, within the enlarged central portion, and a reciprocating valve within the support and shorter than the distance between the said valve-seats, substantially as described.

11. An engine-cylinder having a passage-

way in direct communication with the opposite ends thereof, an equalizing-valve situated in said passage-way and adapted to be closed by pressure on the ends thereof through the said passage-way from either end of the cylinder.

12. An engine-cylinder having a passage-way in direct communication with the opposite ends thereof, a reciprocating valve situated in said passage-way and adapted to be closed by pressure on the ends thereof through the said passage-way from either end of the cylinder.

13. An engine-cylinder having a passage-way connecting the opposite ends thereof and having an enlarged portion intermediate the ends, an equalizing-valve situated in said enlarged portion and adapted to be closed by pressure from either end of the cylinder.

14. An engine-cylinder having a passage-way connecting the opposite ends thereof and having an enlarged portion intermediate its ends, a reciprocating valve located in said enlarged portion and adapted to be closed by the pressure from either end of the cylinder.

15. An engine-cylinder having a passage-way connecting opposite ends thereof, the passage-way having an intermediate enlargement, valve-seats located at opposite ends of

the enlargement, a longitudinally-extending valve - support stationarily held by a web within the enlargement whereby a passage-way is provided around said support, a reciprocating valve located within the support and shorter than the distance between the said valve-seats and having concaved steam-engaging ends, and adapted to coact respectively therewith when moved in opposite directions, and a friction-packing carried by the valve adjacent the support.

16. An engine-cylinder having a passage-way connecting opposite ends thereof, a valve located within the passage-way the passage-way having the valve-seat adjacent opposite ends of the valve, and passage-ways around said valves.

17. An engine-cylinder having a passage-way connecting opposite ends thereof, valve-seats located in said passage-way, and a valve located between said seats and of a length less than the distance between said seats.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EDWARD SARVER.

Witnesses:

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W. A. EAHEART.