A. OLESON.

AIR BRAKE OR TRAIN PIPE VALVE.

APPLICATION FILED NOV. 20, 1905.

956,153. **Patented Apr. 26, 1910.**

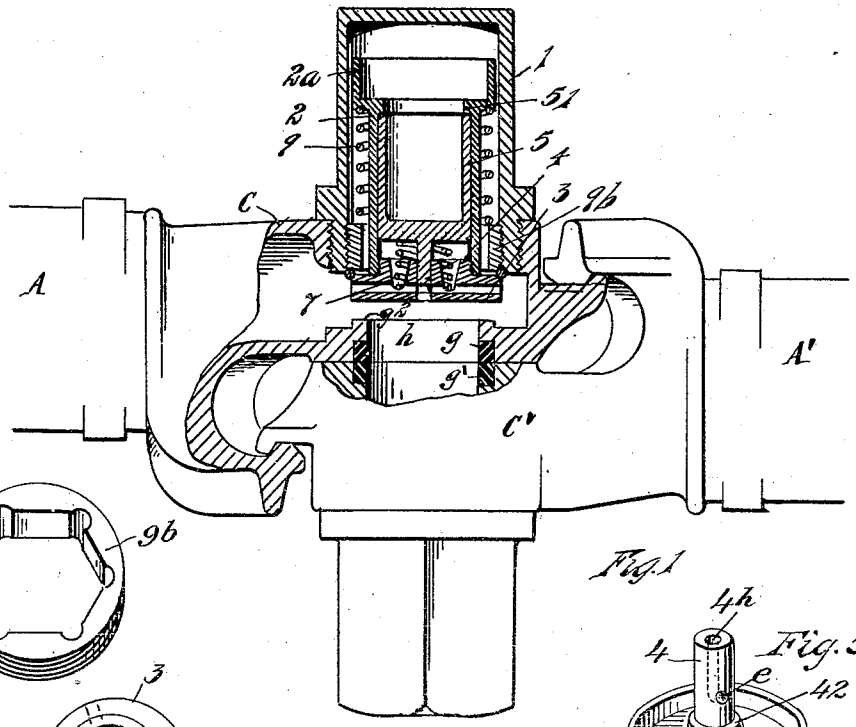

Fig. 1

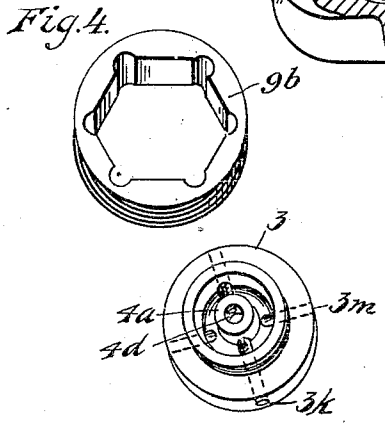

Fig. 7.

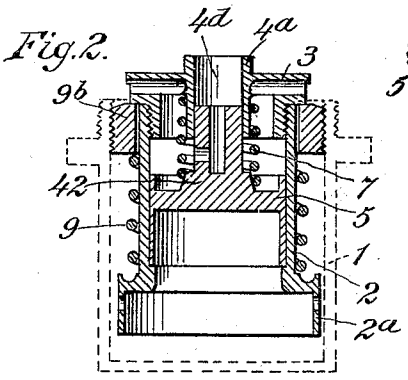

Fig. 2.

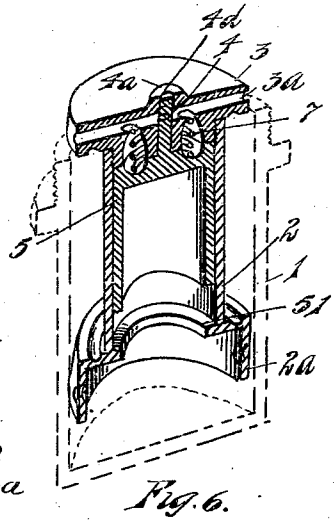

Fig. 6.

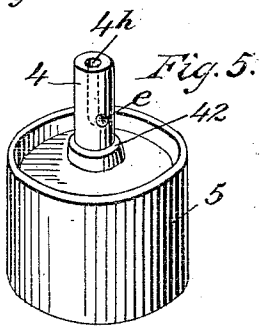

Fig. 5.

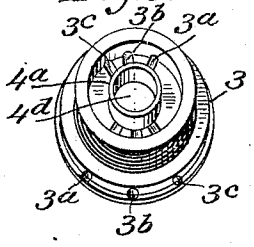

Fig. 3.

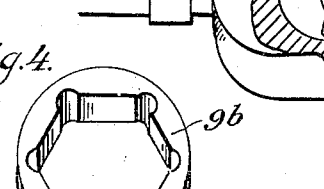

Fig. 4.

WITNESSES

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UNITED STATES PATENT OFFICE.

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AIR-BRAKE OR TRAIN-PIPE VALVE.

956,153. Specification of Letters Patent. **Patented Apr. 26, 1910.**

Application filed November 20, 1905. Serial No. 288,109.

To all whom it may concern:

Be it known that I, ALBERT OLESON, a citizen of the United States, residing at Toledo, county of Lucas, State of Ohio, have invented a certain new and useful Improvement in Air-Brake or Train-Pipe Valves, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to check valves for controlling the pressure of air in the train pipe of the air brake system of a railroad train, and has for its object an automatic check valve adapted to prevent a sudden diminution from the pressure normally maintained in a train pipe upon a sudden break therein due to some such cause as the breaking in two of the train or accidental parting or bursting of any portion of the pipe.

The principles of operation of an air brake system being based upon equalization of pressure between the auxiliary air reservoir on each car and the pressure maintained in the train line, and a setting or releasing of the brakes effected by variations in such equilibrium, it is essential that some means be provided for guarding against the very radical diminution in pressure from the 70 pounds normally maintained in the train pipe to atmospheric pressure in the event of a break in the pipe, which would much more quickly and sharply allow the pressure from the auxiliary reservoir in each car to set the brakes, than would be the case in the event of the reduction of 7 to 10 pounds in the train line pressure made by the engineer intentionally and under his complete control when he desires to set the brakes for a routine stop. In the case of a train breaking in two, the automatic setting of the brakes due to this diminution in pressure is desirable as far as the rear section of the train is concerned, but should the same result occur with the front section, even though it is still connected with the main reservoir carried by the engine, it would be impossible to keep up the pressure in the train line especially as to the cars nearest the break in the line; this would result in setting the brakes, stopping this forward section, and possibly a collision with the detached cars. Attempts have been made to overcome this difficulty by locating valves actuated as to their forward movement by spring pressure only at the terminals of the train line pipe on each car, such valves being attached to the flexible or hose portion on the coupler member or head to close the aperture in the casting when the face of the valve normally controlling the flow through the train pipe is exposed by break, by boring in the outer end of the cap member, a hole through which, when the valve is drawn away from that end, atmospheric air can enter thus preventing the formation of a vacuum at the rear of the valve member when the valve is actuated and of a pressure when it is sought to restore it to its normal position. This, however, has proved objectionable and unreliable because of the tendency of the cap and the entire coupling to become coated with ice in cold weather.

In the drawings:—Figure 1, is an elevation partly in section of a pair of meeting train pipe couplers, the lower portion of the drawing, which is not in section, being added to illustrate the position of the cap in reference of the coupler. Fig. 2, is a detail sectional elevation of the interior of the valve and cylinder members. Fig. 3, is a perspective of the inside of the crown piece of the cylinder shown in Figs. 1 and 2. Fig. 4, is a perspective of the ring used to hold the parts together within the cap portion. Fig. 5, is a perspective of the piston member of Figs. 1 and 2. Fig. 6, is a sectional elevation partly in perspective of a modified form of valve member. Fig. 7, is a perspective of the inner face of the crown piece of the type of cylinder shown in Fig. 6.

A and A′ represent the train pipes of two adjacent cars, the line leading from A being intended to represent the foremost of the two in the arrangement of the train.

C and C′ are the usual type of coupler members, and *g* and *g′* are the rubber gaskets which enable their point of union to be made air tight.

1 is a cap or closed cylindrical casing screwed into the opposite side of the coupler member from that occupied by the gasket *g*, and when screwed in position it forms an air tight bay or recess for the reception of the

automatic check valve, which forms the subject of this invention.

2 is a cylindrical valve member having a collar 2^a of somewhat larger diameter at one end thereof. The crown piece 3 screws into the opposite end of the cylinder from the collar 2^a; this crown piece is pierced at its center for the engagement therethrough of a pin valve 4, which is itself longitudinally bored for a portion of its length, as hereinafter described, and which is carried by and is a part of a piston member 5 which engages within the cylindrical member 2. The crown piece is also pierced with transverse passages 3^a and 3^b and 3^c which reach only to the "chimney" 4^a surrounding the center hole 4^d which is shown at the top of Figs. 2 and 6. The entire valve member 2 is intended to fit only loosely in the inclosing casing 1, thus leaving a passage around the collar 2^a and between it and the walls of the cap 1 through which the compressed air passes on into the chamber within that portion of the valve piece 2.

When first adjusted and coupled up, the train pipe air is, of course, at atmospheric pressure; this is raised by the air pump on the engine to usually about 70 pounds; this increase of pressure, of course, extends to all parts of the system, both the train pipe and the auxiliary reservoir on each car. When this condition is reached, the parts, including the brake cylinder and train line check valves, are in a state of equilibrium, and are held thus while the train is running and as long as no accident occurs. Effort of the compressed air within the train line to distribute itself uniformly has resulted in some of it escaping from the train pipe through the holes 3^a, 3^b, 3^c, and the bore 4^h in the pin valve 4 into the interior of the cap 1. Some of this pressure operates upon the stem or pin valve 4 and the head of the piston member 5 which carries the pin valve, to press it inward, that is, toward the closed end of the cap. The travel of the piston in this direction is limited by the inwardly extending flange 51. Compressed air has also traveled around the collar 2^a, which fits somewhat loosely within the cap 1 this end of the cylinder valve member being at the extreme end of the cap 1, and thus gains access to the chamber behind the piston member 5, tending to force it away from the closed end of the cap, but not actually moving it from this position until a reduction in the train pipe pressure reduces the pressure on the outer end of the piston member. Within the outer end of the cylindrical member 2 is a spiral spring 7 abutting against the encircling collar 42 at the base of the pin valve 4 on the outer end of the piston member 5, and with its other end against the inner face of the crown piece 3 without, however, interfering with the free passage of air through the holes 3^a, 3^b, 3^c, which at that point are in the form of troughs or valleys in the inner face of the crown piece; this spring is of such strength that upon the slightest variation in the pressure on the two faces of the crown piece 3, and so upon the outer face of the piston 5 against which it abuts, the piston will, by the pressure of air behind it, be forced outwardly against the resistance of the spiral spring 7 against the crown piece 3, which it in turn forces outwardly and against the resistance of the spring 9 until it, the crown piece, engages tightly the edges of the passage h which leads to the coupler at the end of the flexible pipe on the adjoining car. The outward travel of the entire cylindrical member is resisted by the spring 9, which engages against the collar 2^a and the inwardly toothed ring 9^b (which is shown in detailed perspective in Fig. 4), whose open portions permit the passage past it of the compressed air when traveling toward the inner compartments of the valve in practically undiminished quantity. Its shape also admits of easy clamping seizure of the ring by the adjusting wrench.

In the normal position of the parts of the valve shown in Fig. 2, the piston member 5 of which the stem or pin 4 is a part, is such that the small arm e of the bored center portion of the pin opens freely and directly into the space between the crown piece 3 and the head of the piston 5, thus coöperating with the holes 3^a, 3^b, and 3^c in the crown piece in furnishing communication with the train pipe or the atmosphere, as the case may be. When, however, a decrease of pressure on the outer face of the piston results in its movement toward the crown piece the pin 4 moves farther into the chimney 4^a until the outer end of the part e of the bore is closed by the walls of the chimney. The extent to which the piston and pin are moved depends of course on the degree of exhaustion of pressure on the outer side (which is communicated to the inside by the always open holes 3^a, 3^b, and 3^c in the crown piece 3) and the strength of the spring 7, and is limited by the collar 42 abutting against the inner end of the chimney 4^a, and the outer rim of the piston member abutting against the annular portion of the crown piece which threads into the end of the cylinder. When the piston has advanced sufficiently to close the part e, the continued pressure behind the piston 5 forces the entire cylinder out from the cap 1 and against the seat g^2 effectually closing that section of the train pipe which it terminates against all communication with the part to the rear when the coupling heads are separated or an intermediate portion begins to leak; the part forward of this point being still connected with the engine, and thus with the main reservoir, the pressure is maintained therein with little change, and

the brakes held from setting and stopping the train. The re-opening of the closure caused by the movement of the pin valve into the hole in the center of the crown piece 3 is brought about by the gradual leakage of the train line compressed air into the outer end of the cap 1 and around the stem or pin 4 and spring 7 through the passages 3^a, 3^b, and 3^c in the crown piece 3; this results in bringing the pressure on this end of the piston 5 up to what is on the other face of the piston, and enables its gradual actuation by the spring 7; its movement withdraws the pin 4 from the hole 4^d in the center of the crown piece 3, and soon the end *e* of the bore is free from engagement with the inner face of the chimney, thus greatly increasing the supply of air brought to bear on the face of the piston 5, and making its retractive movement more rapid, until the entire piece returns to its normal position; by this time, however, ample opportunity has been given to get the train under control and stopped for repairs.

The type of valve illustrated in Figs. 6 and 7 is similar in structure and operation to that heretofore described except that the pin 4, in place of being as large as that of the type of Fig. 2 and bored longitudinally, is smaller and solid. When the piston 5 is forced forward by the compressed air behind it the pin completely closes the hole 4^d and also 3^k which extends through the entire crown piece, including the chimney 4^a, whose walls it intersects. The holes 3^m are of the same type as the holes 3^a of the type of crown piece shown in Fig. 3. When the valve has been actuated and driven forward upon the gasket *g* the only opening for the reëntry of train pipe air into the piston chamber between the crown piece 3 and the head of the piston 5 is through the holes 3^m until the piston has been retracted sufficiently to withdraw the pin from the hole 4^d, which at the same time again brings into action the holes 3^k and greatly increases the rush of train pipe air into the piston chamber.

What I claim is:—

1. In a check valve, in combination with a coupling member and an inclosing cap, a valve member comprising a cylindrical portion, a piston engaging therein carrying an engaging stem, a crown piece provided with a plurality of passages through its body closing one end of the cylinder, through which the stem engages, a spring located between said piston and said crown piece, and a spring external to said cylindrical portion arranged to oppose the travel of said valve member from said cap, substantially as described.

2. In a check valve, in combination with an inclosing cap and a coupling member carrying the same, a cylindrical valve member, a crown piece closing one end of the same, a piston engaging within said cylinder, carrying a stem engaging through said crown piece, a spring within said cylinder between said crown piece and piston member, and a spring surrounding said cylindrical member adapted to yieldingly hold the same in its position within the cap, substantially as described.

3. In a check valve, in combination with an inclosing cap, a valve member comprising a cylindrical portion loosely fitting therein, a piston member terminating in a valve stem engaging therein, a crown piece closing one end of the cylinder and provided with a plurality of passages through its body, a spring contained within said cylinder and opposing the movement of the piston toward the crown piece, and a second spring external to said cylinder and holding the same against withdrawal from said cap, substantially as described.

4. In a check valve, in combination with a coupling member, a cap in communication only with the interior of said coupling member, and a cylindrical member normally within said cap and adapted to be partially ejected therefrom against a seat in one face of said coupling member upon diminution in the pressure upon the exposed face of said cylindrical member, substantially as described.

5. In a check valve, in combination with an inclosing cap and a coupling member carrying the same, a valve member comprising a cylinder normally carried within said cap and having its end at the open portion of said cap exposed to the interior of said coupling member, and means within said cap and connected with said cylinder whereby upon a diminution of pressure upon the exposed end of said cylinder it may be caused to move from its normal position against a seat in the inner face of said coupling member, substantially as described.

6. The combination, with an air brake train pipe, of a normally open valve member engaging within a recessed portion thereof, adapted, when brought to a position of closure with respect to the pipe, to interfere with the further passage of air therethrough, the inner face of the valve being under the actuating pressure of a supply of motive fluid stored behind the valve when the pressure upon its outer face is suddenly diminished, thereby projecting the valve member to its position of closure, substantially as described.

7. The combination, with an air brake train pipe coupling, of a cap member communicating with the air passage therein, and a valve normally held in a position of equilibrium within said cap member, and out of interfering position with the free passage of motive fluid through the coupling, by an equality of pressure thereof on the opposing

faces of the valve, and adapted to be projected from said cap member to a position of closure with respect to said passage by a sudden diminution of pressure upon that face adjacent to said passage, and a continuation of the train pipe pressure on that face adjacent to the cap member, substantially as described.

8. In combination with an air brake train pipe and couplings therefor, a controlling valve on each coupling normally out of closing position with respect to the air passage therethrough, pressure controlled means whereby each of said valves is caused to close upon the opening of the couplings, there being a part of said valve containing a service leak leading to the other portions of the valve, normally closed but adapted to be opened upon the movement of the main portion of the valve to a position of closure with respect to the coupling.

9. The combination with an air brake train pipe, of a valve controlling the passage therethrough, said valve being composed of a plurality of parts adapted to have relative movement with respect to one another, a spring for holding the valve normally open, and pressure controlled means for closing the valve upon a sudden diminution of pressure in the train pipe.

10. In combination with a train pipe, a valve member in combination therewith adapted to receive a store of motive fluid of the same pressure as that normally passing through said train pipe, and to be normally held by the equality of the pressure thereof upon its opposing faces in a position of non-interference with its free passage therethrough, and means adapted to be actuated by said stored fluid within the valve upon a diminution of pressure in the train pipe, and thereby upon the exposed face of the valve, whereby the valve is brought to a position of closure with respect to the passage through the train pipe, substantially as described.

11. In combination with a train pipe for the conduct of a supply of motive fluid, a valve normally held from closing position with respect thereto, said valve having one portion adapted to be exposed to normal train pipe pressure to effect a closure, and a second portion adapted to coöperate in said operation of closure and to subsequently yield to pressure of less degree than said train pipe pressure to effect an opening of the parts, substantially as described.

12. In combination with a train pipe, a valve in communication therewith and adapted to be brought by continued train pipe pressure into closing position with respect thereto upon a diminution in pressure upon the outer face of the valve, said valve having one portion adapted to participate in the operation of closure and subsequently to automatically permit a gradual leakage precedent to the restoration of the parts to their normal position of rest.

13. The combination, with an air brake train pipe, of a valve member engaging within a recessed portion thereof, and adapted to close the pipe against the passage of air therethrough, said valve consisting of a plurality of parts, one adapted to be projected from its normal position of non-interference with the passage of air upon the cessation of the normal equality of air pressure upon the outer face and the inner face of the valve, and the other adapted to move with the first named part in its closure movement, and to thereafter move relatively thereto to accomplish a gradual reopening of the passage through the pipe, substantially as described.

14. In combination with a train pipe adapted to conduct a supply of motive fluid under pressure, a valve member having a plurality of relatively movable parts in connection therewith normally open and out of interfering position with the passage of motive fluid therethrough, said valve being provided with an inner chamber adapted for the storage of a supply of motive fluid under pressure in a position to cause relative movement of said parts and thereby the ejection of said valve member to a position of closure with respect to the train pipe upon a diminution of pressure of motive fluid therein, substantially as described.

15. In a train pipe air system, in combination with a coupling member and an inclosing cap secured thereto, a valve member whose parts are adapted to move relatively to one another within said cap and normally held, when subjected to equal pressure on each face, in a position of partial projection therefrom, though out of interfering position with the free passage of motive fluid through the train pipe, and adapted to be projected by relative movement of its parts consequent upon a diminution in the pressure upon one face and a continuation of train pipe pressure upon the other face, to a position of closure with respect to the train pipe, substantially as described.

16. The combination, with an air brake train pipe, of a normally open valve exposed only to pressure communicated to it through the train pipe to control the passage therethrough, the parts of the valve being adapted to move relatively to one another, means actuated by a continuation of the normal train pipe pressure on one face of the valve simultaneously with a sudden diminution on the other face whereby it is moved to a position of closure with respect to the train pipe, and means for automatically opening a leak leading to the atmosphere after the movement of the valve to a position of closure has been completed.

17. The combination, with an air brake

train pipe, of a normally open valve adapted to close the passage therethrough, automatic means for closing said valve upon a sudden diminution of pressure, a secondary piston-operated valve controlling a port leading to the atmosphere, closed by pressure upon the closing of the main valve, and a spring for opening said secondary valve upon the equalizing of the pressure upon both sides of the piston.

In testimony whereof, I sign this specification in the presence of two witnesses.

ALBERT OLESON.

Witnesses:

CHARLES F. BURTON,
WILLIAM M. SWAN.