No. 772,951. PATENTED OCT. 25, 1904.

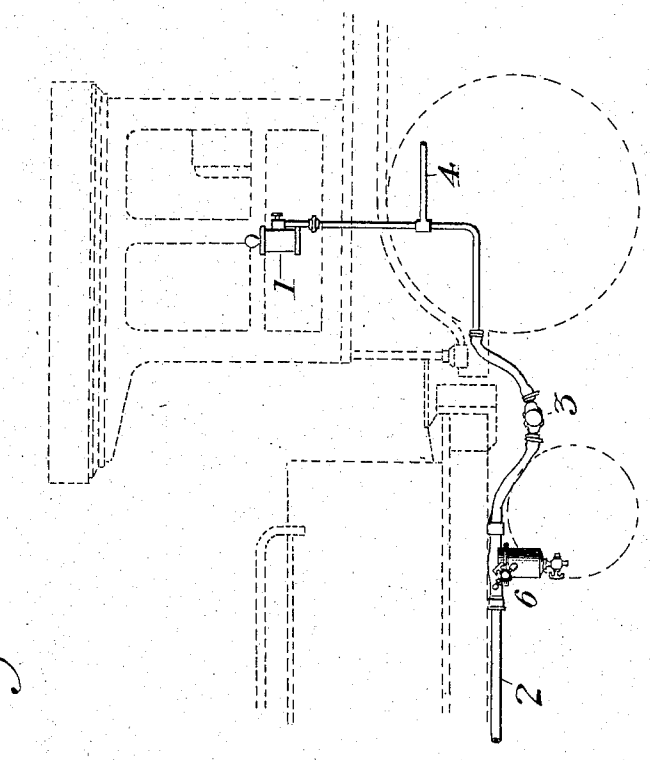
F. B. MORRISON.

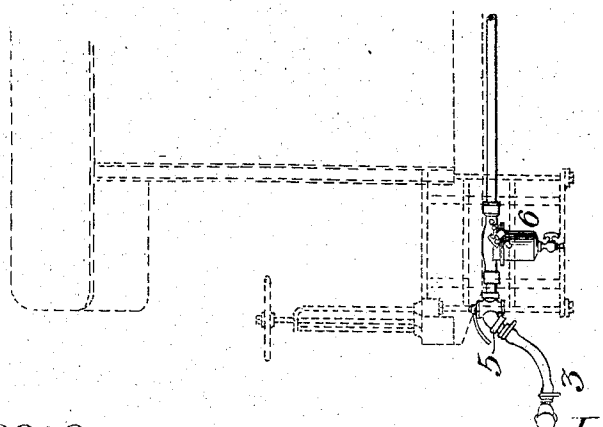
AUTOMATIC AIR SAFETY VALVE.

APPLICATION FILED JAN. 8, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.




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PHOTO-LITHOGRAPHED BY SACHETT & WILHELMS LITHO. & PTG. CO. NEW YORK.

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AUTOMATIC AIR SAFETY VALVE.

APPLICATION FILED JAN. 8, 1902.

NO MODEL

2 SHEETS—SHEET 2.

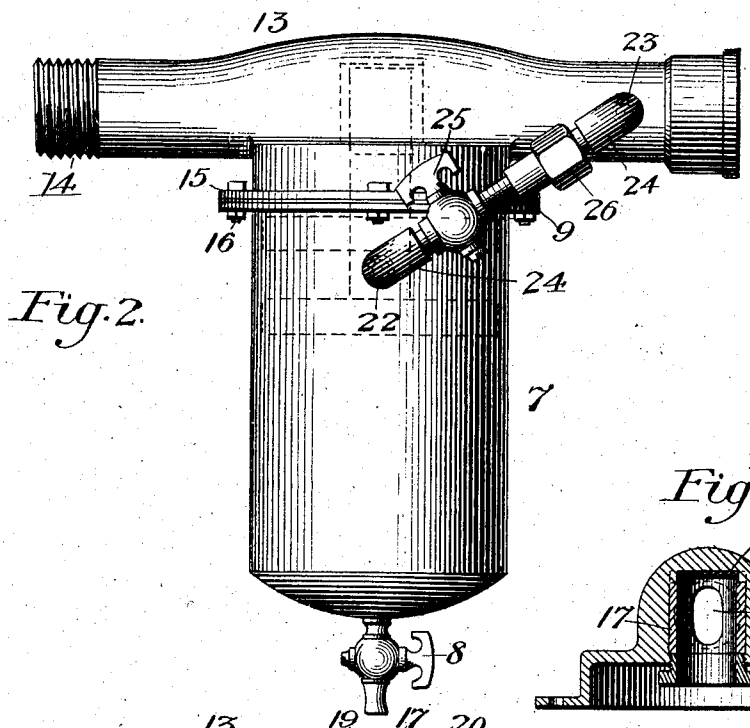



Fig. 2.

Fig. 4.



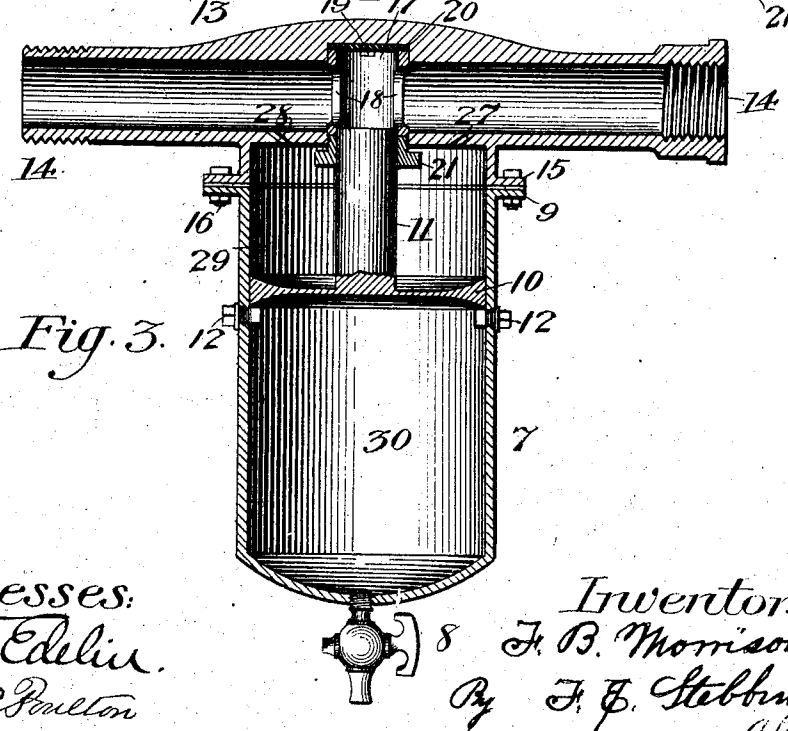




Fig. 3.

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No. 772,951. Patented October 25, 1904.

# UNITED STATES PATENT OFFICE.

FRANK B. MORRISON, OF TOLEDO, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE MORRISON AUTOMATIC SAFETY VALVE COMPANY, OF TOLEDO, OHIO, A CORPORATION OF ARIZONA TERRITORY.

## AUTOMATIC AIR SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 772,951, dated October 25, 1904.

Application filed January 8, 1902. Serial No. 88,902. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK B. MORRISON, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented new and useful Improvements in Automatic Air Safety-Valves, of which the following is a specification.

My invention relates to an automatic air safety-valve, the object being the provision of means in connection with fluid-pressure brakes whereby when a train in motion accidentally or otherwise parts the brakes will be applied gradually.

As is well known to those operating railway-trains, the couplings of adjacent cars sometimes become detached or a draw-bar pulls out and incident thereto the hose-couplings of the brake system are disconnected or the hose ruptured, whereupon, the air escaping from the train-pipe suddenly, the brakes are applied almost instantaneously, and this results in hurling the passengers from their seats and endangering life and limb, and on freight trains movable articles are displaced, the load shifted, and the individual cars are subjected to severe shocks, with accompanying damage to the car-bodies and draft-rigging. The purpose of my invention is to obviate all such casualties and damage by causing the rear section of the train to be brought to a stop slowly and at the same time permit the front section to advance far enough so that a collision will not take place between the two sections.

My invention consists in certain novelties of construction and combinations of parts hereinafter set forth and claimed.

The accompanying drawings illustrate an example of the physical embodiment of my invention constructed according to the best mode I have so far devised for the practical application of the principle.

Figure 1 shows a locomotive-cab, an end of a tender, and the end of a car provided with an automatic fluid-pressure brake system of any suitable type and with my automatic safety-valves applied thereto. Fig. 2 is a view of the automatic valve as a whole detached from the train-pipe. Fig. 3 is a longitudinal sectional view of Fig. 1, showing the movable piston and stem in their normal positions. Fig. 4 is a vertical cross-section of Fig. 2.

Referring to Fig. 1, the numeral 1 designates the engineer's valve; 2, the train-pipe, which connects with the ordinary triple valves and auxiliary reservoirs, the same being of a well-known construction, and hence not illustrated; 3, the hose-couplings; 4, a pipe leading to the main reservoir; 5, an angle-cock, and 6 designates my automatic safety-valves applied in this instance to each end of a car directly between the hose-coupling and the adjacent end of the train-pipe.

Referring to Figs. 2, 3, and 4, which show the valve proper detached from the train-pipe, the numeral 7 designates the cylinder of the valve, having a concavo-convex end; 8, a stop-cock; 9, a perforated flange; 10, a movable piston; 11, the piston-stem; 12 designates stops which limit the downward movement of the piston; 13, the pipe-section of the valve; 14, the threaded ends of the pipe-section; 15, a perforated flange which matches the flange 9 of the cylinder; 16, bolts which unite the flanges; 17, a small cylinder set in the pipe-section and at right angles to the passage therethrough; 18, elliptical holes through the small cylinder; 19, a lug which engages a recess in the end of the small cylinder so it cannot turn; 20, a cushion which is engaged by the piston-stem when the latter is forced upwardly within the small cylinder; 21, a hexagonal jam-nut encircling the end of the piston-stem; 22, a hole in the cylinder located above the piston when the latter is in its lowered position and below it when in its raised position; 23, a hole in the pipe-section; 24, small pipes inserted in the holes 22 and 23, as shown; 25, a stop-cock. 26 is a coupling-nut, and 27 28 two holes on opposite sides of the small cylinder.

The construction of the valve is clearly shown by the figures. I preferably place a packing between the flanges which unite the cylinder and pipe-section and make the pis-

ton of the shape shown to secure lightness in weight. The stops 12 may be cast integral with the cylinder when so desired.

The *modus operandi* is as follows: Suppose a train is equipped with any type of automatic fluid-pressure brake having my automatic air safety-valves at each end of the cars. When the engineer releases the brakes by admitting compressed air to the train-pipe, it will flow by way of the pipes 24 and holes 27 28 to the inclosed chamber 29 above the piston. As the piston has no packing, the air will pass between it and the wall of the cylinder and fill the chamber 30, equal pressures being above and below the piston. Under normal conditions of service and when the train is in motion the piston will occupy the position shown in Fig. 3 and by dotted lines, Fig. 2. In service and emergency application of the brakes it has been found by actual trial the piston will remain in its lowermost position or move a slight distance upwardly, but not far enough to pass the hole 22, which is located above the piston. However, when the train breaks apart and the hose becomes disconnected the action is quite different. The sudden discharge of air from the train-pipe at the front end of the rear section relieves the pressure in chamber 29, and the counterbalancing-pressure in chamber 30 forces the piston upwardly the entire length of its travel, and the stem closes the holes 18 in the small cylinder. As the piston is now above the hole 22, compressed air from the train-pipe passes to chamber 30 and holds the piston in the position shown by dotted lines, Fig. 2. With the parts thus disposed the air from the train-pipe slowly discharges through small hole 27 into the chamber 29 and from the said chamber through the small hole 28 to the atmosphere. It is obvious that the brakes will be applied throughout the rear section of the train gradually and without shock. When all the air in the train-pipe has exhausted to the atmosphere, the piston 10 will drop by gravity.

The action of the safety-valve at the rear end of the front section of the train acts in a similar manner to that already described; but, as the train-pipe of the front section is in communication with the main reservoir upon the locomotive the discharge of air through the hole 28 will be replaced and the pressure be retained, and the brakes will not be applied until the engineer reduces the pressure in the pipe in the well-known way.

In coupling the two sections of the train when brought together the stop-cock 25 is turned, shutting off communication between the train-pipe and the chamber 30, then stop-cock 8 is opened, allowing air to escape to the atmosphere, whereupon the piston and stem drop and open a passage through the holes 18 of the small cylinder.

From the foregoing description it is clear that I have provided an automatic safety-valve which fulfils all the conditions set forth as the purpose and object of my invention.

While I have illustrated only one example of the physical embodiment of my invention, I do not thereby intend to restrict the scope thereof to said example, inasmuch as the principle may be embodied in other ways and under different forms of construction. I have shown one of my valves applied to the train-pipe section upon the tender; but it may be omitted in that location. I contemplate the use of two valves upon the train-pipe section on each car; but under certain conditions I use only one. All such variations of use, as well as modifications of construction, I intend to embrace within the scope of my claims.

What I claim as new, and desire to secure by Letters Patent, is—

1. A valve connected to the main line carrying an air or fluid pressure, the valve having a piston and chambers on both sides of the piston which are so connected with the main line as, in case of a break in the main line, the fluid-pressure will operate the valve to urge or force a cut-off across the main line, with means to allow the pressure of the main line to gradually pass out of the main line, and when the pressure in the main line is lowered gravity will cause the cut-off across the main line to resume its normal position to open the line.

2. The combination with a fluid-pressure brake system, of a main line, a chamber containing an element bodily movable therein and located below the main line, and suitable passage-ways for air, said movable element adapted, when the couplings are separated to move under the action of fluid under pressure from its normal position to a position which will close or partially close the main passage-way to the atmosphere and leave a relatively small passage-way open to the atmosphere.

3. The combination in a fluid-pressure brake system of means embracing a piston and stem located in a casing, which, when the couplings are separated will be moved by the fluid under pressure from its normal position to a position which will close or partially close the main passage to the atmosphere; and means which will allow the air in the train-pipe to be gradually discharged until gravity actuates the piston and stem to again open the main passage.

4. An automatic air safety-valve embracing a cylinder, a pipe-section, a piston and stem operated by fluid-pressure, said piston dividing the cylinder into two chambers which are in communication with the pipe-section in such manner that, when a break occurs in the train-pipe, the normally open passage-way in the pipe-section will be closed, or partially closed, so as to allow the fluid-pressure in the pipe-section to gradually decrease until the piston and stem again open the pas-

sage-way in the pipe-section under the action of gravity.

5. An automatic air safety-valve embracing a cylinder, a pipe-section, a piston and stem operated by fluid-pressure and means with an open passage connecting the cylinder and pipe-section; said piston dividing the cylinder into two chambers the upper one of which is in communication with the pipe-section by a plurality of holes, whereby when the stem closes the normally open passage in the pipe-section air from the train-pipe will be caused to pass into the upper chamber of the cylinder and from there to the atmosphere.

6. In an air-brake system a conduit for the fluid, a valve in connection with the conduit normally open under the influence of gravity, a piston which is actuated by variations of the pressure of the fluid on opposite sides of the piston, means for maintaining normally an equal pressure on both sides of the piston, and means for causing a retarded flow of fluid past the valve when it is closed.

7. In a fluid-pressure line, a normally open conduit for the fluid, an auxiliary chamber located below the conduit, a bodily-movable element in said chamber having a seat in said conduit and adapted to gradually close said conduit when approaching its seat, fluid-pressure means for forcing said movable element to its seat, said movable element being adapted to move from its seat back into the auxiliary chamber under the influence of gravity.

8. In a fluid-pressure line, a normally open conduit for the fluid, an auxiliary chamber located below the conduit, a bodily-movable element in said chamber normally kept in said chamber under the influence of gravity, a seat in said conduit for said movable element, said movable element being adapted to gradually close said conduit when approaching its said seat, said auxiliary chamber adapted to receive compressed air for forcing said movable element to its said seat, and said movable element adapted to move from its said seat back into said chamber under the influence of gravity.

9. In an automatic safety-valve for air-lines, a conduit for the fluid, a chamber connected with said conduit, a movable element in said chamber dividing it into two compartments and normally held away from said conduit by gravity, means for equalizing the fluid-pressure in both of said compartments, said movable element being so formed as to be forced to and held in said conduit by fluid-pressure and partially close the same when the pressure in said conduit is suddenly reduced.

10. In an automatic safety-valve for fluid-pressure systems, a conduit for the fluid, a valve-seat in said conduit, a chamber connected with said conduit and having the same fluid-pressure, a valve in said chamber dividing it into two compartments, means for equalizing the fluid-pressure in both of said compartments, said valve adapted to be forced to and held in its seat in the conduit by fluid-pressure and partially close the same when the pressure in said conduit is suddenly reduced below that in said chamber, and said valve adapted to drop by force of gravity to its normal position out of the passage-way of said conduit when the pressure thereon equalizes with that in the chamber.

11. In an automatic check-valve for fluid-pressure systems, the combination with a reservoir, a casing, a valve-seat in casing, of a piston, a stem integral with said piston and adapted to rest in valve-seat when piston is down, and fluid-pressure means in said reservoir for forcing stem to its seat and closing passage in main pipe, substantially as specified.

12. In an automatic safety-valve for fluid-pressure systems, a casing, a valve-chamber, a valve, a cylinder, a piston in said cylinder adapted to open and close passage through valve-chamber as it reciprocates in said cylinder, inlet and outlet ports in cylinder communicating with fluid-line, and independent means for permitting fluid to pass into cylinder, substantially as specified.

13. In an automatic safety-valve for fluid-pressure systems, a casing having a valve-chamber, a piston-chamber having ports communicating with pipe-line, a piston, a stem attached to piston and adapted to seat in valve-chamber, means for permitting fluid to circulate between piston and floor of piston-chamber and around stem and slowly exhaust, substantially as specified.

14. In an automatic safety-valve for fluid-pressure systems, a casing, a seat in said casing, a stem adapted to rest in said seat, a cylinder, a partition between cylinder and valve-chamber having an opening for stem to project through, a series of ports in the partition, a piston in the cylinder and secured to the stem, and like means on both sides of the piston-head for reciprocating said stem and piston, substantially as specified.

15. In an automatic check-valve for fluid-pressure systems, comprising a casing having a valve-seat and inlet and outlet passages, a cylinder secured in said casing and having communication with main line through ports in casing, a piston in said cylinder, a valve-stem attached to said piston and adapted to pass through one of said ports and to its seat in casing, and means for the admittance of fluid in portion of cylinder above piston whereby as pressure in main pipe is reduced the expansion of fluid above said piston forces the piston down and the valve-stem to its seat in casing, stopping the free passage of fluid therethrough, substantially as specified.

16. In an automatic safety-valve for fluid-

pressure systems, the combination of a casing adapted to connect with train-pipe, a valve chamber and seat, a reservoir, a piston in said reservoir having connection with the valve, means whereby the fluid may enter said reservoir and circulate around and on both sides of piston-head, independent means for admitting fluid to reservoir from pipe-line, and means whereby the valve is forced to its seat by fluid-pressure, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK B. MORRISON.

Witnesses:

CHARLEY E. COZZENS,

G. G. FENNEBERG.