G. E. CONGDON.

AIR BRAKE SYSTEM.

APPLICATION FILED NOV. 19, 1908.

936,415.

Patented Oct. 12, 1909.

Fig. 1.

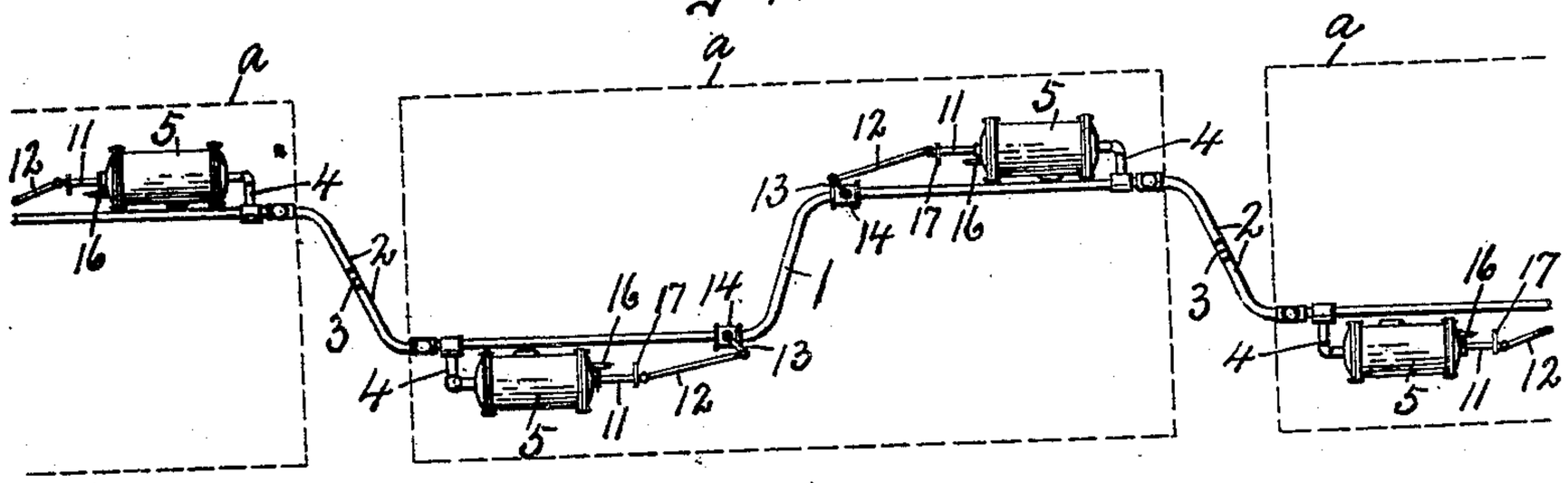


Fig. 2.

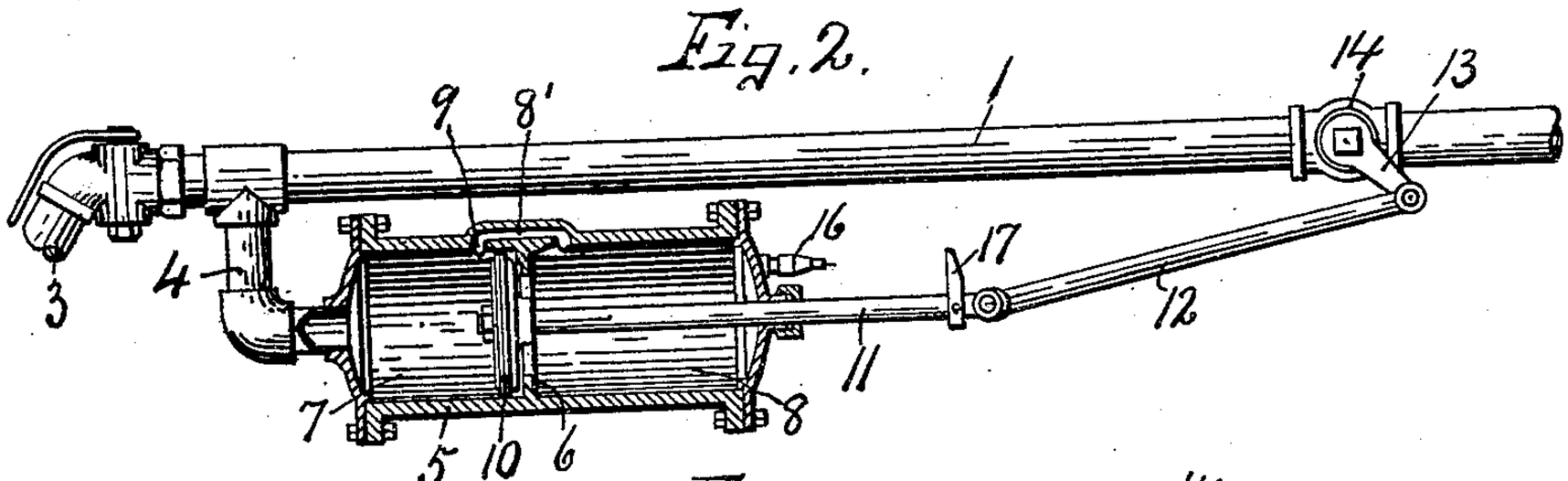


Fig. 3.

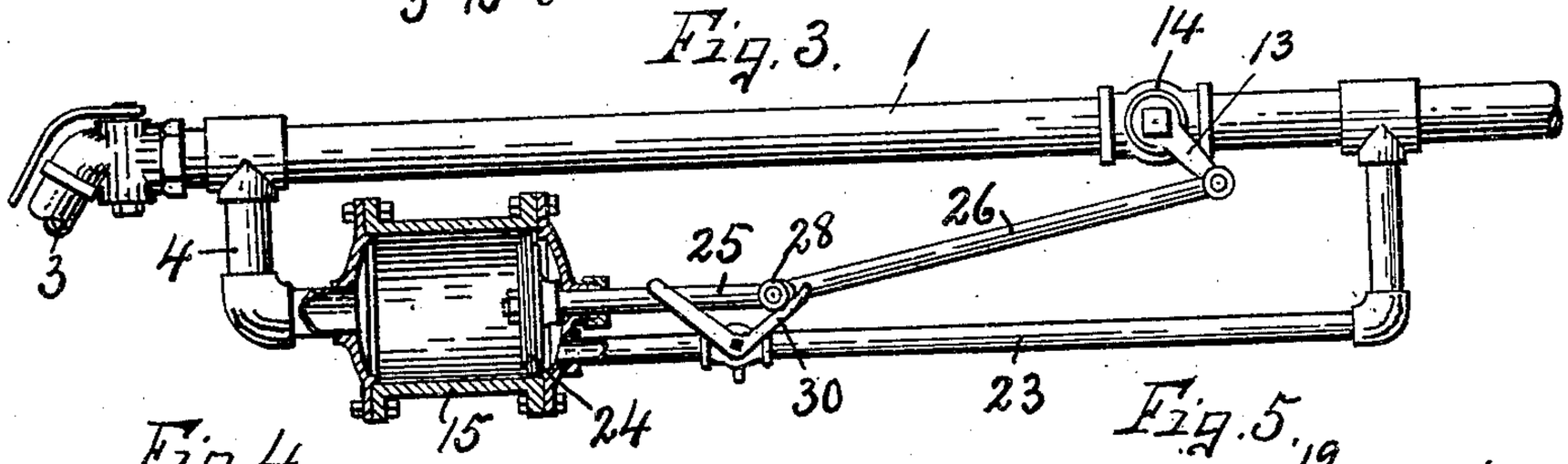


Fig. 4.

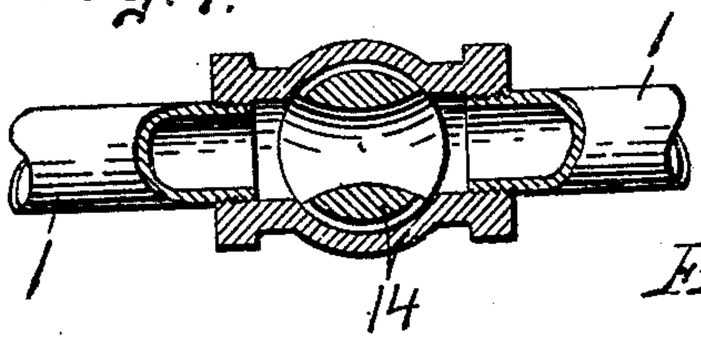


Fig. 5.

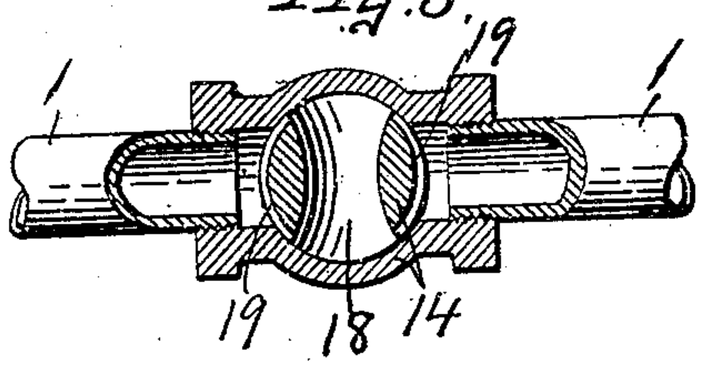


Fig. 6.

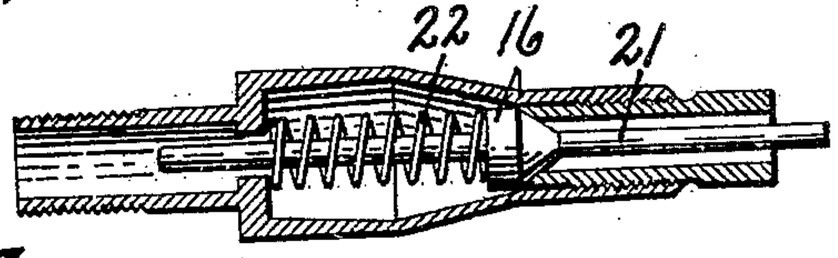
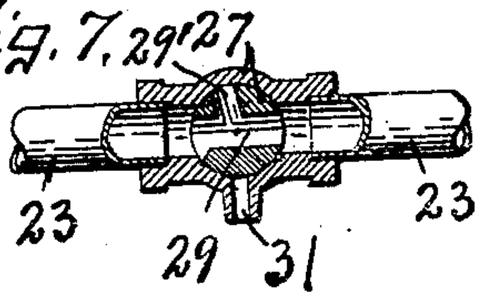


Fig. 7, 29, 27.



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AIR-BRAKE SYSTEM.

936,415. Specification of Letters Patent. Patented Oct. 12, 1909.

Application filed November 19, 1908. Serial No. 463,443.

To all whom it may concern:

Be it known that I, GEORGE E. CONGDON, of Jacksonville, in the county of Tompkins, in the State of New York, have invented new and useful Improvements in Air-Brake Systems, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in air-brake systems for railway trains, the object of which is somewhat similar to that set forth in my Patent #797,265, issued August 15, 1905, that is, to prevent the too sudden application of air brakes in case of separation of the cars and the resultant breakage or leakage of the train pipe at any point in the train system, and also to prevent the too sudden application of the air brake in case of leakage in the train pipe or the connections from any other cause.

In my patent previously referred to, the object was to allow the air brakes to be applied with full force in case of derailment of any portion of the train, and at the same time to cause the air brakes of the front section of the broken train to be applied more gradually or with less suddenness than that applied to the rear section of the train thereby allowing the front end, to which the engine is attached, to readily draw away from the rear section to avoid collision between the two sections, which frequently occurs when the emergency brakes are applied with equal rapidity on both front and rear sections under the usual method.

In my present invention I have sought to provide a simple and practical means for gradually applying the brakes to both sections of the broken train as distinguished from a quick or sudden application of such brakes under the same conditions without disturbing the arrangement or effectiveness of the usual emergency brake system, whereby the entire series of brakes throughout the train may be instantly applied with full force in the usual manner, and also to provide for the same gradual application of the brakes as distinguished from quick or sudden application thereof in case of any leakage in the system from any cause.

My invention is, therefore, intended only as an auxiliary brake controlling mechanism adapted to be automatically brought into action by the breakage or leakage of the usual train pipe or its connections for preventing the usual sudden application of the brakes and causing such brakes to be gradually applied thereby permitting the broken train sections to come to a more gradual stop without the liability of a collision, one with the other, and to prevent the damage usually following a quick or sudden reduction in the train pipe pressure produced by the breaking or giving way of any part of the train pipe or its connections.

Other objects relating to specific parts will be brought out in the following description.

In the drawings—Figure 1 is a top plan of a portion of an air brake system embodying my auxiliary brake controlling mechanism, portions of the train or cars being shown by dotted lines. Fig. 2 is an enlarged top plan of a portion of the train pipe showing the auxiliary cylinder in section and its connection with the train pipe. Fig. 3 is a view partly in section of a similar modified form of my invention. Figs. 4 and 5 are enlarged similar sectional views of the auxiliary controlling valve in the main air pipe showing such valve in different positions. Fig. 6 is an enlarged longitudinal section of the relief valve. Fig. 7 is a section of the relief valve shown in Fig. 3.

In order to clearly describe my invention, I have shown a portion of the train equipment with the usual train pipe —1—, the cars —*a*— being shown by dotted lines. The usual emergency brake system is well understood, and for this reason and also to show the independence of my invention I have omitted the usual auxiliary reservoirs, brake cyinders, triple valves and other attachments to the main train pipe. Each car is permanently equipped with the usual train pipe section —1— and these sections are connected at the adjacent ends of the cars by flexible pipes —2— and couplings —3—, the ends of the pipe sections —1— being located substantially at equal distances from and at opposite sides of the longitudinal center of the car. Each end of the pipe section —1— is connected by a pipe —4— to one end of the auxiliary cylinder —5— shown in Figs. 1 and 2, said cylinder being divided transversely by a partition —6— into two compartments —7— and —8— communicating with each other through a suitable opening in the partition —6—, the said compartments being con-

nected by a by-pass —8′—, one port of which as —9— communicates with the piston chamber —7— and is located nearer to the partition —6— than to the head of the piston chamber.

Movable in the piston chamber —7— is a piston —10— having a piston rod —11— extending centrally through the compartment —8— and adjacent end of the cylinder where it is connected by a link —12— to a crank arm —13— of a valve —14—. This valve is normally fully open allowing the air under pressure to pass freely through the train pipe —1— throughout the entire train, and at the same time allowing such compressed air to pass through the branch pipe —4— into the head of the piston chamber —7—, thereby forcing the piston to the opposite end of the chamber until it uncovers the port —9— of the by-pass —8′—, whereupon the compressed air passes through the by-pass into the compartment —8— and establishes equal pressure at the opposite ends of the piston to hold the piston in its normal position, in which position it operates to hold the valve —14— fully open through the medium of the rod —11—, link —12— and crank arm —13—.

The outer end or head of the compartment —8— is provided with a relief or vent valve —16— adapted to be opened by an abutment or shoulder —17— on the piston rod —11— when the piston is moved to the other extreme position toward the head of the piston chamber —7—, the flange or partition —6— serving as a limiting stop for the piston when moved toward the compartment —8—, although such movement would be limited by equalization of the air pressure through the by-pass —8′— when the piston assumes a position between the opposite ends of said by-pass.

The valve —14— is provided with a comparatively large opening —18— and is also provided with a comparatively small passage or channel —19—, consisting of a groove or grooves in diametrically opposite sides of the valve between and communicating with the larger opening —18—, so as to prevent complete closing of the valve in any position and at the same time affording a constricted air passage through the valve casing and thereby allowing a comparatively slow leakage of air through the train pipe in case of a break or accidental leakage in said train pipe. This slow leakage of air through the train pipe causes the brakes to be applied gradually instead of abruptly as when the train pipe is fully open from end to end. For example, assume that all the valves —14— in the train pipe are full open and that a break or leakage occurs, then the compressed air in the train pipe and also in the cylinder pipe and piston chamber —7— is at once reduced allowing the compressed air in the compartment —8— to force the piston —10— toward the head of the piston chamber —7— and causes the partial closing of the valves —14—, which are located a greater distance from the flexible couplings or ends of the car than the connections —4— with the piston chamber —7— so that the reduced pressure is first effected in the piston chamber before it has time to pass through the train pipe between the connection —4— and valves —14—. This closing of the valves —14—, upon the breakage of the connection in the train pipe system is entirely automatic allowing the sections of the train at the opposite sides of the break to be brought to a stop gradually and avoiding collision between said sections, and also preventing damage usually resulting from a quick or sudden reduction of the train pipe pressure produced by the leakage, breakage or giving way of any part of the compressed air system.

As soon as the piston approaches the head of the piston chamber the stop or abutment —17— is brought into engagement with a stem —21— of the valve —16—, thereby opening said valve against the action of a spring —22— allowing the escape of compressed air from the chamber —8— ready to permit the return of the piston to position for opening the valves —14— full open. The peculiar form of the large opening —18— in the valve —14— also serves to prevent any restriction in the flow of air through the train pipe in case said valve should from any cause, other than its intended operation, be moved from its normal position.

As soon as the train pipe is repaired and the compressed air has been restored therein, such compressed air passing through the branch —4— operates against the piston —10— to return the latter toward partition —6— or to its normal starting position, with the by-pass —8′— communicating with both compartments —7— and —8— around the piston —10—, thus holding the valves —14— to their full open position ready for a repetition of the operation previously described in case of any further break in the train pipe or other parts of the compressed air system.

In Fig. 3 I have shown a modified form of my invention in which a cylinder —15—, somewhat shorter in length than the cylinder —5—, is connected at one end by the pipe —4— to the main train pipe —1—, the opposite side of said cylinder being connected by a pipe —23— to the main train pipe —1— at a point beyond the valve —14—. A piston —24— is movable in the cylinder —15— and provided with a piston rod —25— connected by a link —26— to the crank arm —13— of the valve —14—, the pipe —23— being provided with a suit-

able valve or vent valve —27— which is opened by a suitable abutment —28′— on the piston rod —25—, and piston —24— is moved to the limit of its stroke in closing or opening the valve —14—. The valve —27— is provided with a main passage —29— and a branch passage —29′— at an angle thereto, the main passage being normally full open to allow direct passage of the compressed air through the passage —23— to the adjacent end of the cylinder —15— when the valve —14— is full open thereby equalizing the pressure at opposite sides of the piston. The valve —27—, in this instance, is also provided with an operating lever in the form of a bell crank —30—, the arms of which project into the path of the abutment —28— on the piston rod —25— but are spaced some distance apart to allow the movement of the piston through the greater part of its stroke from end to end of the cylinder before it effects the operation of the relief valve —27—, the latter having a branch opening —31— to the atmosphere as best seen in Fig. 7. The abutment —28—, therefore, plays between the arms of the bell crank lever —30— and when approaching one extreme position of the piston, as, for example, in opening the valve —14— fully open, it engages one of the arms to close the vent —31— and establish direct communication through the pipe —23— to the cylinder —15— but when the piston —24— is moved to its other extreme position to partially close the valve —14— as in case of a leak or breakage in the train or its connections, said abutment engages the opposite arm of said bell crank lever nearest the cylinder —15— and opens the vent valve —27— thereby stopping the flow of the compressed air through the passage —23— to the cylinder —15— allowing the compressed air in the outer end of the cylinder to vent to atmosphere ready to permit the return of the piston to position for opening the valves —14— full open. As soon as the train pipe has been repaired and the compressed air has been restored therein, such compressed air passing through the branch —4— operates against the piston —24— to return the latter to its normal starting position,—opening the valve —14— fully open,—closing the vent valve —27— and permitting the flow of air through the passage —23— until the pressure on both sides of the piston —24— is equalized and the device is ready for a repetition of the operation previously described.

What I claim is:

1. In an air brake system for railway cars, the combination with a train pipe in which compressed air is normally maintained, of a piston chamber, a piston movable therein, said train pipe normally communicating with the piston chamber at opposite ends of the piston to normally hold the piston in one of its extreme positions, a normally fully-open valve in the train pipe, and connections between the piston and valve for partially closing said valve when the piston is actuated by reduced pressure at one end thereof.

2. The combination with the train pipe of an air brake system, of a normally fully-open valve in the train pipe, a cylinder, a piston movable in the cylinder, means for normally conducting compressed air from the train pipe to the cylinder at one end of the piston to move the latter to its normal position, additional means for equalizing the air pressure at the opposite end of the piston when in its normal position, and connections between the piston and valve for partially closing the latter when the piston is shifted from its normal position by the reduced pressure at one end thereof when a break or leak occurs in the train pipe or its connections.

3. The combination with the train pipe of an air brake system, of a cylinder, a piston movable in the cylinder, connections between said cylinder at opposite ends of the piston and train pipe to equalize the pressure at both ends of said piston, a normally fully open valve in the train pipe, means for partially closing said valve when pressure at one end of the system is reduced, and additional means for reducing the pressure at the opposite end of the piston when the valve has been partially closed.

4. In combination with an air brake system for the cars of trains, a train pipe, a normally fully open valve in the train pipe, a cylinder, a piston movable in the cylinder connected to said valve, means for introducing compressed air from the train pipe to the cylinder at opposite ends of the piston when the valve is in its normal position, said piston being operated by reduced pressure in one end of the cylinder to partially close the valve, and means actuated by such movement of the piston for releasing the compressed air from the opposite end of the piston whereby the piston and valve may be returned to its normal position when the pressure at opposite ends of said piston is equalized.

In witness whereof I have hereunto set my hand this 7th day of November 1908.

GEORGE E. CONGDON.

Witnesses:
H. E. CHASE,
C. M. MCCORMACK.