J. P. COLEMAN.

APPARATUS FOR THE CONTROL OF RAILWAY TRAINS.

APPLICATION FILED MAR. 27, 1908.

903,360. Patented Nov. 10, 1908.

3 SHEETS—SHEET 1.

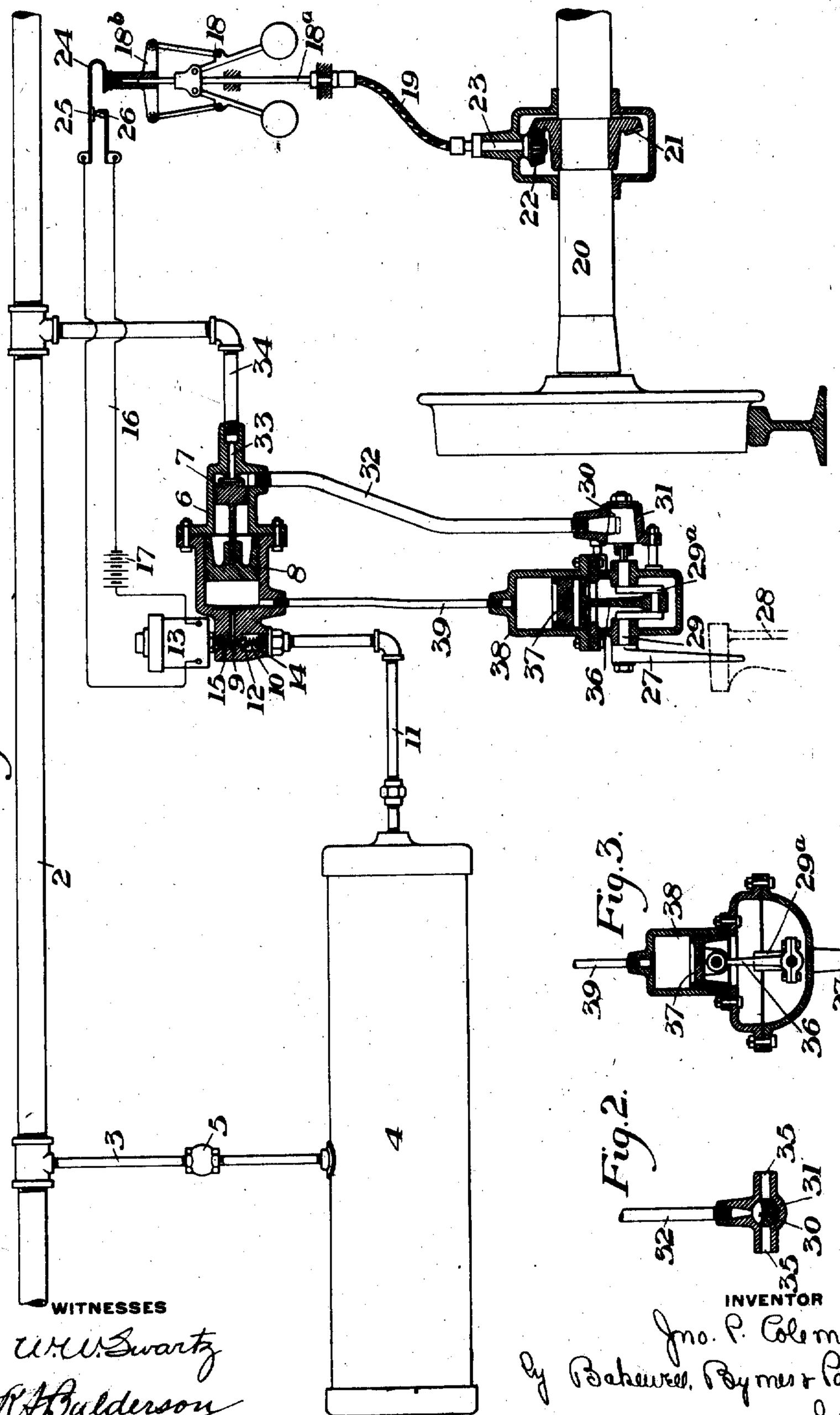

Fig. 1.

Fig. 3.

Fig. 2.

WITNESSES

W. W. Swartz

R. A. Balderson

INVENTOR

Jno. P. Coleman,

by Bakewell, Byrnes & Parmelee,

His Attys.

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3 SHEETS—SHEET 2

Fig. 5.

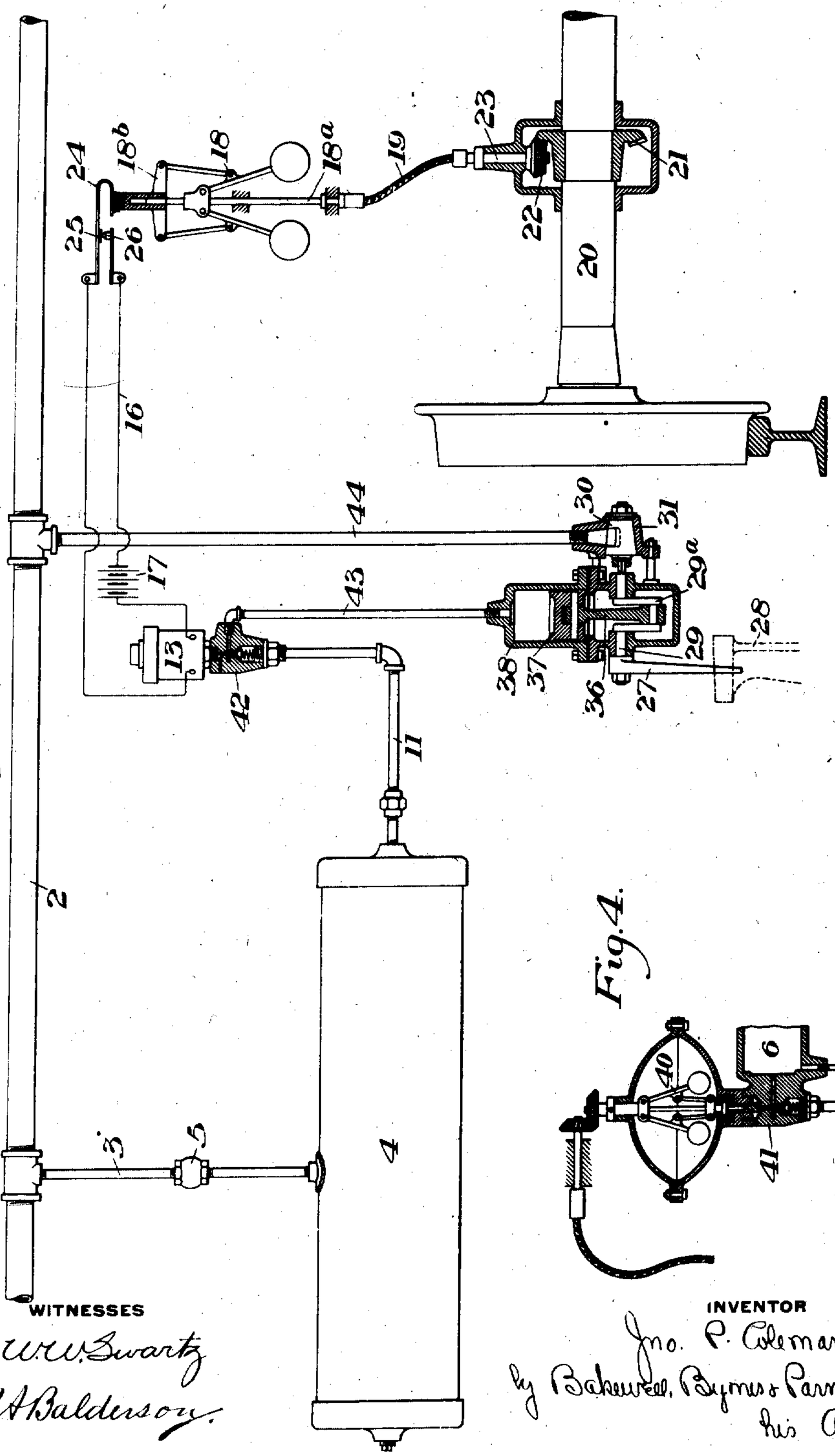

Fig. 4.

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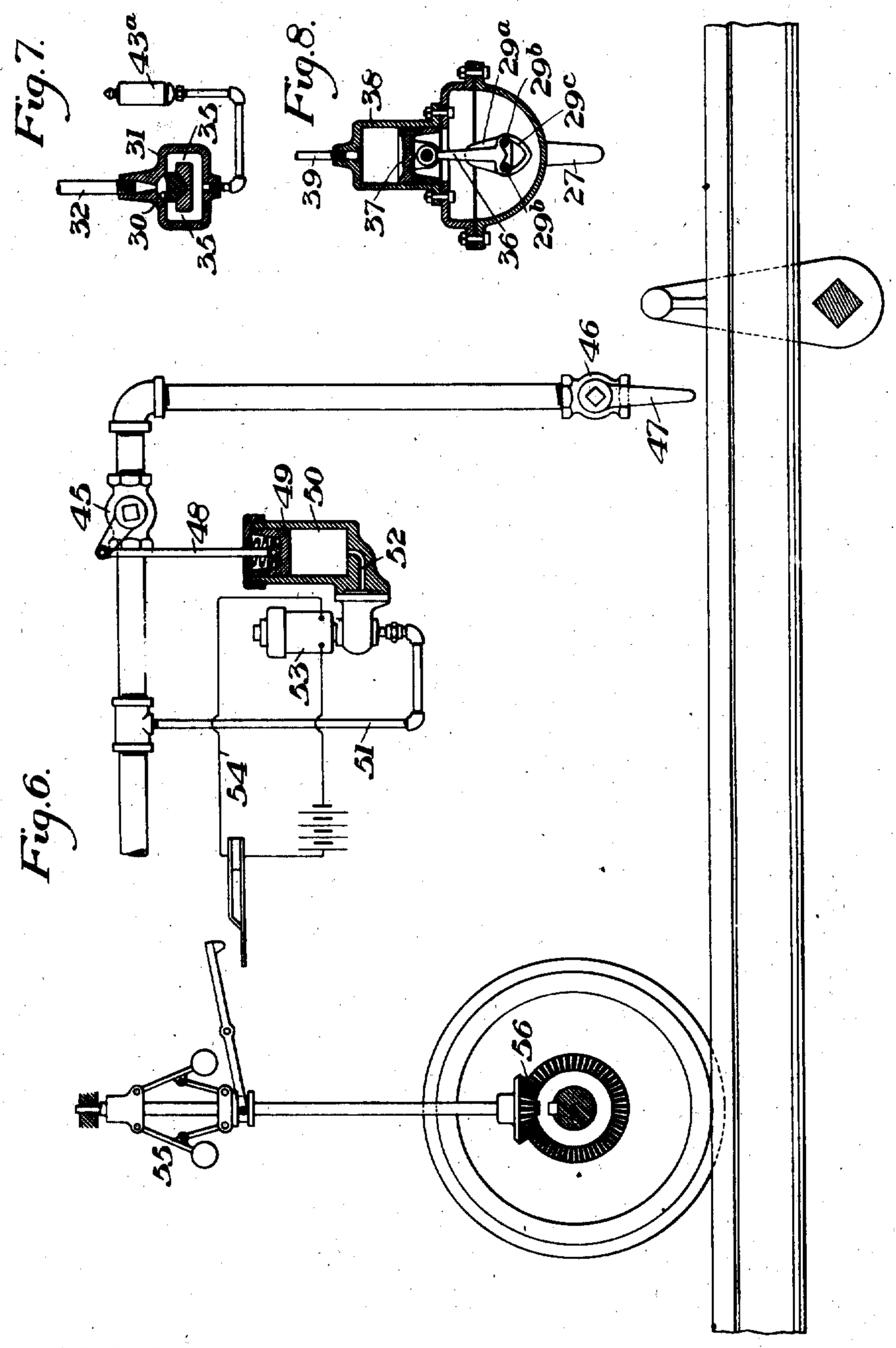

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UNITED STATES PATENT OFFICE.

JOHN PRESSLEY COLEMAN, OF NEW YORK, N. Y., ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

APPARATUS FOR THE CONTROL OF RAILWAY-TRAINS.

No. 903,360. Specification of Letters Patent. Patented Nov. 10, 1908.

Application filed March 27, 1908. Serial No. 423,546.

To all whom it may concern:

Be it known that I, JOHN PRESSLEY COLEMAN, of New York city, in the county and State of New York, have invented a new and useful Apparatus for the Control of Railway-Trains, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a view largely diagrammatic of one form of apparatus embodying my invention; Fig. 2 is a detail sectional view of the three-way escape valve; Fig. 3 is a detail sectional view showing the motive device for closing the escape valve and re-setting the trip arm; Fig. 4 is a detail sectional view showing a modification of the speed-controlled valve; Fig. 5 is a view similar to Fig. 1, but showing a modification; Fig. 6 is a diagrammatic view showing a still further modification; Fig. 7 is a detail view showing a whistle attachment for the brake release valve; and Fig. 8 is a detail view showing a modified form of connection for closing the release valve and returning the trip to operative position.

My invention has relation to the control of railway trains, and more particularly to a safety device of that class which have for their object the automatic stopping of trains in the event of their attempt to pass certain points along the track contrary to information conveyed to them at such points by block signals or other means.

In my application, Serial No. 400,914, filed November 6, 1907, I have described and claimed mechanism of this general character, including certain mechanical locking devices for holding the trip-operated valve open, or for permitting it to close after operation, depending upon the train's rate of speed at the time of the operation.

My present invention is designed to avoid the employment of mechanical locks, pawls, springs, or like appliances, and to provide a simple, cheap and effective trip valve mechanism carried by the vehicle, and which will be free from delicate parts or other complications which tend to retard the free and accurate working of the valve even though it and its supports may be coated with ice and sleet, which is unavoidable at certain times of the year in certain latitudes.

A further object of my invention is to provide improved means of this character which will be rendered effective to influence the speed of the train only when such speed exceeds a predetermined rate.

The precise nature of my invention will be best understood by reference to the accompanying drawings, in which I have shown several embodiments thereof, it being premised, however, that various other changes may be made therein by those skilled in the art, without departing from the scope of my invention as defined in the appended claims.

In these drawings, the numeral 2 designates the train pipe of a brake system, which is shown as provided with a branch 3 leading to a reservoir 4, which may be placed within the locomotive cab or in the motorman's box, or at any other convenient location. The pipe 3 is provided with a check valve 5, which is so arranged as to permit the reservoir to receive air from the train pipe at the usual pressure, but to retain air within the reservoir at a practically constant pressure, even when that within the train pipe is completely exhausted.

6 designates a cylinder, having therein two connected pistons 7 and 8 of unequal areas. This cylinder is provided with an inlet port 9, leading into a small chamber 10, which is connected by a pipe 11 with the reservoir 4. The port 9 is controlled by a valve 12, which is carried by the movable core or plunger of an electro-magnet 13. When this magnet is energized, the valve 12 is held in its opened position, and pressure from the reservoir is admitted into the cylinder 6 against the larger piston 8. When the magnet 13 is deënergized, the valve 12 is closed by a spring 14, and thereby cuts off the air supply to the cylinder and also connects the latter to the atmosphere through the exhaust port 15. This magnet is connected in a circuit 16 supplied by a battery 17, or other suitable source of current, the circuit being controlled by a centrifugal device 18, which is driven by a connection 19 with one of the vehicle axles 20.

In the drawing, I have shown the axle 20 as provided with a bevel gear 21, the teeth of which are engaged by a bevel pinion 22 on a short shaft 23 to which the flexible connection 19 is attached. The other end of the flexible connection 19 is attached to the shaft 18^a of the centrifugal device, which is

here shown as being similar to an ordinary centrifugal governor. The movable member 18^b of this device is shown as arranged to engage and actuate an arm 24 carrying a contact 25, which by engagement with the coöperating contact 26 normally closes the circuit 16. Any suitable form of centrifugal device actuated by a suitable connection with any moving part of the train or vehicle may, however, be employed to control the circuit 16.

27 designates a depending trip arm, which is arranged to engage and be operated by track trips placed at desired points along the track (one of which is shown at 28 in dotted lines). These track trips are placed at the desired points along the track, and may be controlled by connection with the usual block-signaling mechanism, or in any other suitable manner. The arms 27 are secured to the frame of the locomotive or other vehicle, so as to depend in position to engage these trips. The arm 27 is carried by the shaft 29, to which is secured a three-way valve 30, seated in a casing 31, which is connected by a pipe or passage 32 with that end of the cylinder 6 in which the smaller piston 7 is seated. The same end of the cylinder 6 is connected by a port 33 and pipe 34 with the train pipe 2. The three-way valve 30 has three positions. In one of these positions it closes the pipe 32 and in its other two positions it connects the said pipe with one or the other of the exhaust passages 35 in the casing 31 (see Fig. 2).

The shaft 29 has a crank 29^a, which is connected by a pitman 36 with a piston head 37, working in a cylinder 38, which is connected by a pipe 39 with that end of the cylinde. 6 in which is seated the larger piston 8. In the modification shown in Fig. 8, the shaft 29 has two crank pins 29^b, which are engaged by a cam slot 29^c on the lower end of the pitman 36. This insures the return of the cranks to a definite vertical position after each operation, and eliminates the possibility of dead centers.

The operation is as follows: So long as the speed of the train exceeds a certain predetermined rate, the circuit 16 will be maintained open by the action of the centrifugal device 18, and pressure will be cut off from the cylinder 6 by the valve 12. The pressure acting upon the smaller piston 7, supplied by the ports 33 and connection 34 to the train pipe, will move the pistons 7 and 8 from the position shown in Fig. 1 to the left, thereby closing the entrance from said cylinder to the pipe 39 and connecting the pipe 34 with the pipe 32. If, during this time, the trip arm 27 is engaged by one of the track trips 28, the shaft 29 will be rocked in one direction or the other to connect the pipe 32 with the atmosphere to one of the exhaust ports 35. This will cause an exhaust from the train pipe 2, and will thereby apply the brakes. The trip arm 27 will remain in the position to which it is moved by its engagement with the track trip 28 by the inertia of the parts, there being no pressure in the cylinder 38, and air will continue to exhaust from the train pipe until the speed of the train has fallen below the predetermined rate. When the speed of the train has fallen below the predetermined rate, the centrifugal device 18 will no longer hold the circuit 16 open, and said circuit will close, thereby energizing the magnet 13. The valve 12 now opens and pressure is admitted from the reservoir 4 to the larger end of the cylinder 6. The action of this pressure against the piston 8 overbalances the pressure acting upon the smaller piston 7, and the pistons are moved to the positions shown in Fig. 1, thereby cutting off the communication between the pipes 34 and 32 and at the same time admitting pressure from the cylinder 6 to the cylinder 38. This pressure acting upon the piston 37 will, through the pitman 36, close the valve 30 and return the trip arm to its normal position. If the speed of the train is below the predetermined rate at the time the arm 27 is engaged by one of the track trips, the valve 30 will momentarily open, but there will be no escape of air, since the piston 7 is acting as a valve to close the communication between the pipe 34 and the pipe 32, said piston being held in this position by the pressure against the piston 8. The pressure in the cylinder 38 will immediately close the valve 30 and return the trip arm 37 to its normal position.

It will therefore be observed that the apparatus described has no influence upon the speed of the train in passing one of the track trips, provided such speed is already below the predetermined maximum. If, however, the speed is above such maximum, the apparatus will act to effect a reduction of the train pipe pressure, and thereby a reduction of the train speed to the desired limit.

In the modification shown in Fig. 4, the electro-magnet 13, together with its circuit, is omitted, and a centrifugal device 40, which is similar to centrifugal device 18, is connected directly to the stem of the valve 41, which corresponds to the valve 12 of Fig. 1, and which controls the communication between the tank or reservoir 4 and the cylinder 6. In this form, when the speed of the train is below the predetemined rate, the valve 41 is held open and air is admitted from the reservoir to the cylinder 6. When the speed is above the predetermined rate, the valve is closed and the communication between the reservoir and the cylinder is shut off.

In the modification shown in Fig. 5, the

cylinder 6 and the pistons 7 and 8 are omitted, and the electro-magnet 13 is made to control the valve 42 which controls the communication between the pipe 11 leading from the reservoir 4 and the pipe 43 leading from the valve 42 directly to the cylinder 38. The valve chamber 31, containing the three-way valve 30 is in this form directly connected to the train pipe by pipe 44. This arrangement effects substantially the same result as that of Fig. 1 except that it permits air to escape from the train-pipe while the trip arm or lever is being moved by the track trip under all conditions, there being no secondary valve for shutting off the escape connection with the train pipe when the speed of the train is below the predetermined rate. While this is not a serious objection, this arrangement is not as desirable as that shown in Fig. 1 for the reason that in the event of the train coming to a full stop, while the trip arm is in contact with a deflector by the track trip, the accumulation of air pressure in the train pipe will be prevented by reason of the open position of the three-way valve 30.

It is obvious that the pressure in the reservoir may be derived from some other source than the train pipe, and also that some other fluid besides air may be used. For instance, a tank of carbonic acid gas may be substituted for the reservoir shown without departing in any way from the purpose and scope of the invention, the purpose of this reservoir or its equivalent being to maintain a sufficient pressure to effect the closing of the three-way escape valve notwithstanding the reduction of pressure in the train pipe.

The modification shown in Fig. 6 is a still more simple arrangement of the parts. In this form of the invention a valve 45 is placed between the train pipe and the usual train stop valve 46, which is actuated by the trip arm or lever 47. The stem of the valve 45 has a connection 48 with a piston 49 working in a cylinder 50, which is connected by a pipe 51 with the train pipe through a port 52, controlled by an electro-magnetic actuated valve similar in all respects to that shown in Figs. 1 and 5, the magnet 53 which controls this valve being included in a circuit 54 controlled by a centrifugal device 55, driven by gear connections 56 with one of the axles. The valve 45 is simply opened or closed by the action of the piston 49, the pressure in the latter being controlled by the centrifugal speed governor. This form of the invention does not restore the system to the normal condition after the stop valve has been actuated, but depends upon manual operations for the re-setting of the valve in accordance with the general practice heretofore. The piston 49 holds the valve 45 closed at all times when the speed of the train is below the predetermined maximum, but at all other times, the magnet 53 is de-energized, thus cutting off the supply of pressure to the cylinder 50, and the valve 45 is opened, so that when the trip arm or lever 47 is engaged by one of the track trips the train pipe will be exhausted at the valve 46.

It will be obvious that any suitable arrangement of indicators may be provided in the circuit 54 which will enable the engineman or motorman to ascertain just when he is exceeding the requisite speed for passing over a track trip without setting his brakes, or this may be determined in any well known way by pressure gage attachment to the pipe 39 of Fig. 1 on the pipe 43 of Fig. 5. A whistle 43ª may also be attached to the valve casing 35, as shown in Fig. 7, and which will be blown by the escaping air when the valve 30 is opened in either direction.

The advantages of my invention result from the simplicity of the arrangement, whereby mechanical locking devices of any kind are avoided for the valves, and the parts are so arranged that there is nothing to prevent their free and accurate working under all conditions.

I desire it to be understood that the word "train" as used herein and in the claims, is designed to apply not only to trains proper but to vehicles of any kind either singly or attached, whose speed it may be desired to control automatically at desired points.

It will also be understood that the details of the mechanism, such as the character and construction of the several valves, and the arrangement of the ports and pipe connections, may be widely varied, without departing from the spirit and scope of my invention.

What I claim is:—

1. In apparatus for the control of railway trains, a trip device, an escape valve controlled by the movement of the trip device, and means interposed between the escape valve and the train pipe, and controlled by the speed of the train, for preventing the exhaust of air from the said valve except under predetermined conditions: substantially as described.

2. In apparatus for the control of railway trains, a trip device, a train pipe release valve controlled by the movement of the trip device, a second valve interposed between the release valve and the train pipe, and means controlled by the speed of the train for controlling the position of the said second valve; substantially as described.

3. In apparatus for the control of train pipes, a release valve, a trip device arranged to open said valve, a motive device for closing said valve, and speed-control means for controlling the motive device; substantially as described.

4. In apparatus for train control, a trip

arm, a release valve connected to said arm to be opened and closed by the movement thereof, a motive device arranged to close said valve and to return the trip arm to normal position after operation, and speed-controlled means for controlling the operation of the motive device; substantially as described.

5. In apparatus for train control, a train pipe release valve, a trip device for opening said valve, a speed control mechanism for automatically closing said valve after a definite reduction in speed and for also returning the trip device to its normal position; substantially as described.

6. In apparatus for train control, a trip operated escape valve, and means controlled by the speed of the train for automatically closing said valve upon a predetermined reduction in speed and for simultaneously returning the trip mechanism to normal position; substantially as described.

7. In apparatus for train control, a trip arm, a shaft to which the trip arm is connected, a train pipe release valve also connected to said shaft, and a motor for operating said shaft to close the valve and return the trip arm to normal position together with means controlled by the speed of the train for controlling the operation of said motor; substantially as described.

8. In apparatus for train control, a trip arm, a shaft to which the trip arm is connected, a train pipe release valve also connected to said shaft, a motor for operating said shaft to close the valve and return the trip arm to normal position, together with means controlled by the speed of the train for controlling the operation of the motor; substantially as described.

9. In apparatus for train control, a trip operated train pipe exhaust valve, a motor connected to said valve, and means controlled by the speed of the train for controlling the supply of motive fluid to the motor; substantially as described.

10. In apparatus for the control of railway trains, a trip device, a train pipe escape valve arranged to be opened by the trip device, a motor normally acting to hold the trip device in its normal position with the escape valve closed, and means for controlling the supply of operating fluid to the motor controlled by the speed of the train; substantially as described.

11. In apparatus for train control, a train pipe escape valve, a trip mechanism arranged to open said valve, a secondary valve interposed between the train pipe and the release valve, and means controlled by the speed of the train for controlling said second valve, and also for closing the first-named valve; substantially as described.

12. In apparatus for train control, a train pipe release valve, a trip arm or lever arranged to open said valve, a cylinder having a piston therein connected to the said arm or lever and to the valve, and means controlled by the speed of the train governing the admission of motive fluid to said cylinder; substantially as described.

13. In apparatus for the control of railway trains, a train pipe release valve, a trip device for opening said valve, a motive cylinder for closing said valve and for returning the trip arm to normal position, a reservoir for supplying pressure to the motive cylinder, a valve for controlling said supply, and means controlled by the speed of the train for controlling the operation of the last-named valve; substantially as described.

14. In apparatus for train control, a train pipe release valve, a trip arm for opening said valve, a motive cylinder for closing the valve, a reservoir for supplying pressure to said cylinder, and means controlled by the speed of the train for controlling the admission of motive fluid from the reservoir to the cylinder; substantially as described.

15. In apparatus for train control, a train pipe release valve, trip mechanism for opening said valve, a motive cylinder for closing the valve, a secondary valve interposed between the train pipe and the release valve, a reservoir for supplying the cylinder, and means controlled by the speed of the train for controlling the supply of motive fluid to said cylinder, and also for controlling the position of the secondary valve, substantially as described.

16. In apparatus for the control of railway trains, a train pipe release valve, trip mechanism for opening the said valve, a motive cylinder for closing said valve and for returning the trip mechanism to normal position, a reservoir for supplying the motive cylinder, a second cylinder connected with the reservoir and also with the train pipe, a connection between the second cylinder and the release valve, differential pistons in said cylinder, and a valve controlling the admission of pressure from the reservoir to the second cylinder, means controlled by the speed of the train for controlling the position of the last named valve, and a connection between said cylinder and the motive cylinder, substantially as described.

17. In apparatus for train control, a trip operated escape valve, and means controlled by the speed of the train for automatically closing said valve upon a predetermined reduction in speed and for simultaneously returning the trip mechanism to normal position, together with an alarm arranged to be sounded by the opening of the said valve, substantially as described.

18. In apparatus for train control, a train pipe release valve, a trip means for opening

said valve, a motive cylinder for closing said valve and returning the trip means to normal position, means controlled by the speed of the train for controlling the operation of the motive cylinder, said valve and the trip means having a connecting member, and a connection between the piston of the cylinder and the connecting member arranged to prevent a dead center relation of the operating parts, substantially as described.

In testimony whereof, I have hereunto set my hand.

JOHN PRESSLEY COLEMAN.

Witnesses:

PER UTRIE,

E. HARMES.