J. P. COLEMAN.

AUTOMATIC CONTROL FOR RAILWAY TRAINS.

APPLICATION FILED NOV. 6, 1907.

903,359. Patented Nov. 10, 1908.

2 SHEETS—SHEET 1.

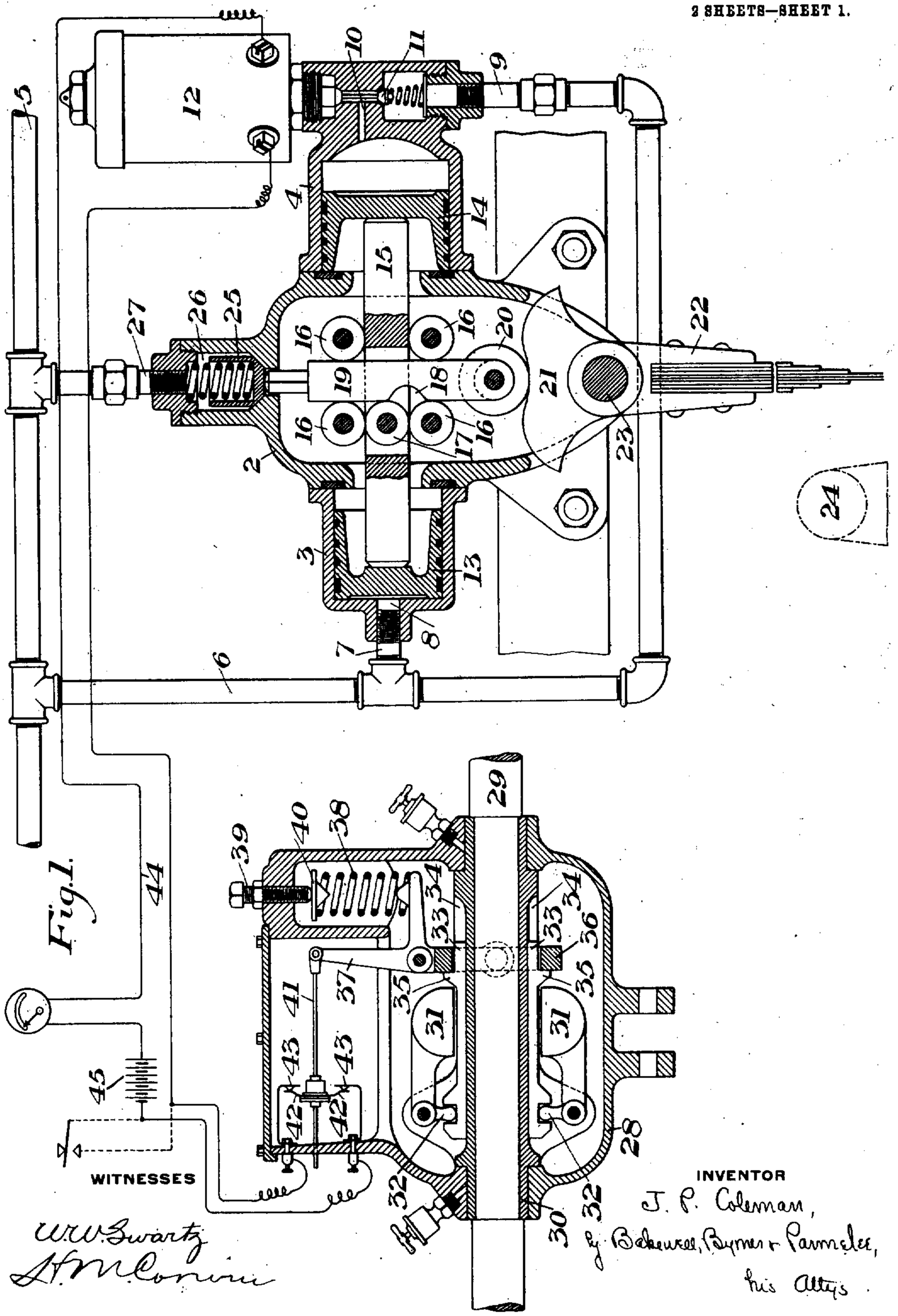

Fig. 1.

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 3.

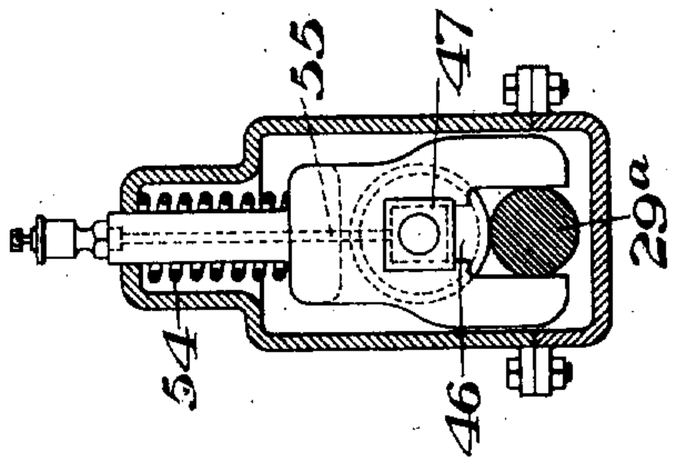
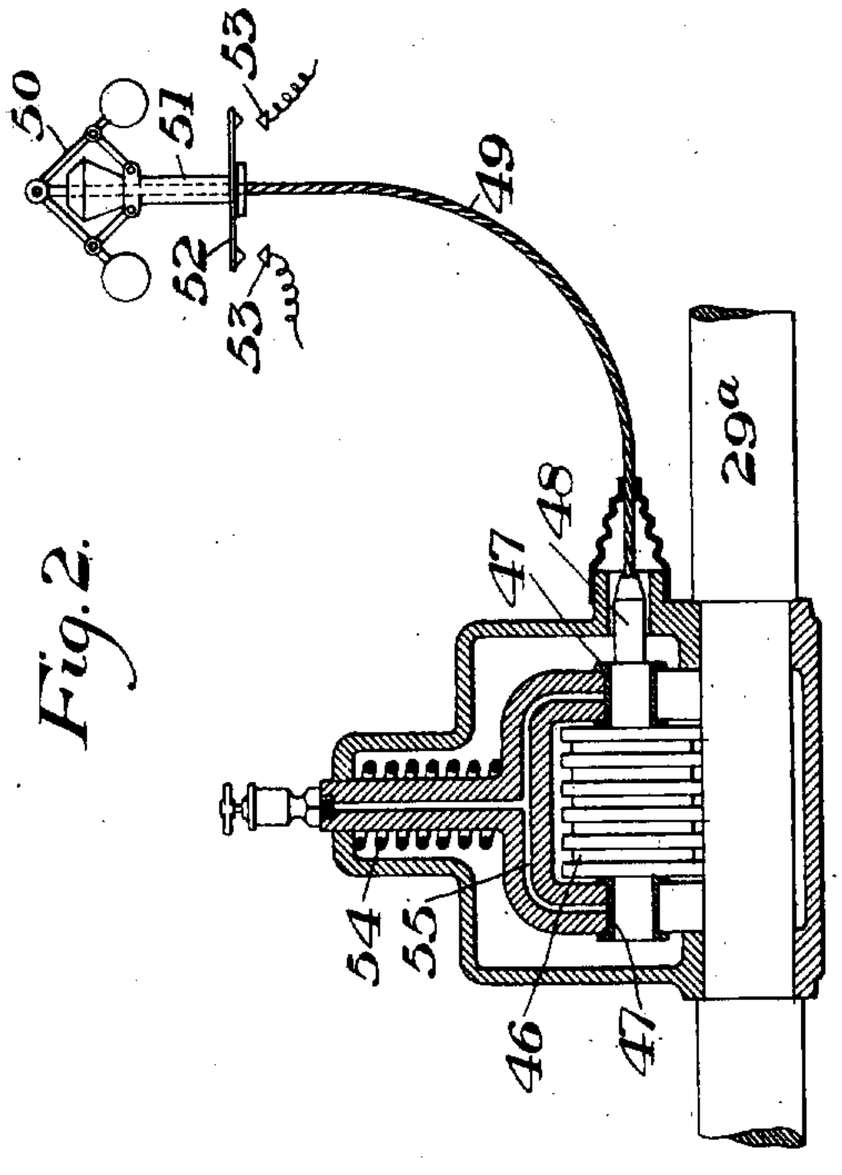


Fig. 2.



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AUTOMATIC CONTROL FOR RAILWAY-TRAINS.

No. 903,359. Specification of Letters Patent. Patented Nov. 10, 1908.

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To all whom it may concern:

Be it known that I, JOHN P. COLEMAN, of New York, county and State of New York, have invented a new and useful Improvement in Automatic Control for 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 sectional view largely diagrammatic, showing one form of apparatus embodying my invention; Figs. 2 and 3 are detail views illustrating a modified form of speed governor.

My invention has relation to the automatic control of railway trains and is designed to provide means whereby the speed of a train or other vehicle may be automatically reduced, or the train brought to a stop at any designed place, provided the speed of the train at that time is in excess of a certain predetermined limit. Thus, in passing a signal set at danger, my invention will operate automatically to effect a reduction in the train speed, provided the train at the time is running at a speed in excess of that which safety requires.

The invention may be used to effect the same result at curves or at other points where safety requires a relatively slow speed.

The nature of my invention will be best understood by reference to the accompanying drawings which will now be described, it being premised, however, that various changes may be made in the details of construction and arrangement by those skilled in the art without departing from the spirit and scope of my invention.

In these drawings the numeral 2 designates a casing which is suitably supported upon the engine, or at any other suitable point upon the train. This casing is provided at one end portion with a cylinder 3 and at the opposite end portion with a cylinder 4 which is of larger diameter than the cylinder 3.

5 designates the train pipe of the brake system from which extends a branch pipe 6 having a connection 7 which communicates with the outer end of the cylinder 3 by a port 8 and which has a second branch 9 which communicates with the outer end of the cylinder 4 through a port 10 controlled by a spring pressed valve 11. This valve is controlled in a well known manner in this art by an electro-magnet 12 as will be more fully hereinafter described.

In the cylinder 3 is a piston 13 and in the cylinder 4 is a piston 14. 15 is a floating piston rod extending between the two pistons and guided by anti-friction rollers 16. This piston rod carries a roller 17 which is arranged to engage a notch or depression 18 in the vertical tappet rod 19 whose lower end engages, preferably through the medium of an anti-friction roller 20, with a cam shaped head 21 of a trip arm 22. This trip arm is suitably pivoted at 23 to swing in a longitudinal direction when brought into contact with a suitable tripping device located along the road bed, such a device being indicated by dotted lines in Fig. 1, at 24. The tappet 19 is arranged within the central portion of the casing 2 and its upper end is in contact with a spring seated valve 25 seated in the exhaust chamber 26 formed in the extension of the casing 2 and with which communicates a branch 27 from the train pipe 5.

The piston 3 of smaller area is normally exposed to train pipe pressure through the connections 6 and 7. This pressure acts to force the roller 17 into engagement with the notch or depression 18 in the tappet rod 19 when the latter is elevated by the action of the trip arm 22 when the latter strikes one of the trips 24.

When the speed of the train is below the predetermined limit, the magnet 12 remains energized by means presently to be described, thereby holding the valve 11 open and admitting train pipe pressure against the large piston 14. The pressure against this piston overcomes the pressure against the smaller piston 3 and joins the piston rod 15 in such position that its roller 17 cannot engage the depression in the tappet 19. Therefore when the trip arm 22 comes into contact with one of the track trips 24, the only action which results on the tappet 19 is a momentary one and the valve 25 which controls the train pipe exhaust remains closed. When, however, the speed of the train exceeds the predetermined limit, the magnet 12 is deënergized in the manner presently described and the valve 11 is closed, thereby shutting off the pressure from the piston 14. The train pipe pressure acting against the smaller piston 13 now forces the piston rod 15 into such position

that when the trip arm 22 is actuated the roller 17 will engage the depression 18 and will hold the tappet in its elevated position with the valve 25 open. The exhaust now takes place from the train pipe 5 and through any suitable valve mechanism effects the proper degree of the train pipe pressure to effect the gradual or service application of the brakes. The tappet 19 will remain in this position until the speed of the train has been reduced to such an extent as to cause the magnet 12 to be again energized. When this occurs, the roller 17 will be forced out of contact with the tappet 19 by the application of the train pressure to the cylinder 4 and the valve 25 will close by the action of its spring. It will be noted that this closing of the valve 25 is automatically effected, as soon as the speed of the train has been reduced to the minimum speed at which trains under this system are permitted to pass over the automatic stops without actuating their brakes. This avoids the necessity which has heretofore existed for bringing the train to a full stop and having one of the trainmen dismount and reset the valve for a subsequent operation.

For the purpose of controlling the magnet 12 automatically by the speed of the train, any suitable form of speed governor may be employed. In the arrangement shown in Fig. 1, 28 designates a casing which is mounted on the axle 29 of the engine or other vehicle. Secured to the axle to rotate therewith is a sleeve 30 to which are pivoted two or more centrifugally acting weight levers 31 whose shorter arms 32 engage recesses in the bars 33 arranged to slide in recesses 34 of the sleeve 30. These sliding bars are formed with shoulders or projections 35 which are in contact with the ring 36 to which is pivoted a bell-crank lever 37. Bearing against one arm of this bell crank lever is a spring 38 whose tension may be adjusted by screw 39 and follower 40. Connected to the free arm of the bell crank lever 37 is a rod 41 carrying contacts 42 which are arranged to bridge the terminals 43 of an electric circuit 44 supplied by battery 45 or other suitable source.

As the speed of the train increases, the increased speed of rotation of the axle 29 carrying with it the sleeve 30 and the centrifugally acting levers 31 causes the levers to swing outwardly. This causes an endwise movement of the sliding bars 33 thereby actuating the bell crank lever 37 against the tension of the spring 38 to move the rod 41 to the right and thereby separate the contacts 42 carried by said rod from the terminal contacts 43. The magnet 12 before described is included in the circuit 44. When therefore, the speed of the train exceeds the predetermined limit, which is determined by the adjustment of the spring 38, the circuit 44 will be opened and the magnet 12 deënergized in the manner described.

In Figs. 2 and 3, I have shown a modified form of a speed governor. In these figures the numeral 46 designates a roller which is suitably journaled at 47 and which is in frictional contact with the axle 29ª. Connected to the shaft 48 of the roller 46 is a flexible shaft 49 which transmits the movement of said shaft to the shaft of a ball governor 50 of the usual type. The vertically movable sleeve 51 of this governor carries a contact piece 52 which is arranged to bridge the terminals 53 of the circuit corresponding to the circuit 44 before described. The roller 46 is held in frictional engagement with the axle 29ª by a spring 54. 55 designates lubricant passages for lubricating the bearings 47 of said roller.

It will be seen that as the speed of the train increases the ball governor will operate to open the electric circuit 44. Various other suitable forms of speed governors may be employed.

It will be understood from the foregoing that when the speed of the train exceeds the predetermined limit the magnet 12 will be deënergized, and the parts of the trip actuated mechanism placed thereby in position so that if the trip arm 22 is operated the exhaust valve 25 will be opened and held open to effect the application of the brakes. If, however, the speed of the train is below the predetermined limit, the magnet 12 remains energized and the actuation of the trip arm 22 has no effect upon the brakes. The arrangement therefore forms an efficient safeguard which is independent of the engineer for insuring proper reduction of the train speed at any desired point or points.

It will be understood that by the term "train", as used in this specification and in the claims, I intend to include either a train proper or one or more vehicles of any kind.

I claim:—

1. In an apparatus for automatically controlling the speed of trains, differential pistons, one of which is at all times exposed to train pipe pressure and the other of which is exposed to train pipe pressure only when the speed of the train is below the predetermined limit, a trip device and means controlled by the conjoint action of the trip device and pistons for controlling the application of the train brakes; substantially as described.

2. In apparatus for controlling the speed of railway trains, a pair of differential pistons one of which is at all times exposed to train pipe pressure, means for admitting pressure to the other piston, when the speed of the train is below a predetermined limit, an exhaust valve, a trip device for operating

said valve, and means whereby said valve is effectively operated only when the speed of the train is in excess of the predetermined limit; substantially as described.

3. In apparatus for controlling the speed of railway trains, a pair of differential pistons, a constantly open connection between the cylinder of one piston and the train pipe, a valve controlled communication between the cylinder of the other piston and the train pipe, means for controlling the valve by the speed of the train, a train pipe exhaust, and a trip device for opening said exhaust, the action of said trip device being controlled by said pistons; substantially as described.

4. In apparatus for controlling the speed of railway trains, a pair of cylinders, a piston in each cylinder, said pistons having different areas, a constantly open connection between the train pipe and one of said cylinders, a connection between the train pipe and the other cylinder, a valve controlling the last named connection, a magnet for controlling said valve and itself controlled by the speed of the train, an exhaust valve connected with the train pipe and a trip device for opening the exhaust valve, the action of the trip device being controlled by the movement of said pistons; substantially as described.

5. In apparatus for controlling the speed of railway trains, a pivoted trip arm, a tappet arranged to be actuated by said arm, a train pipe exhaust valve arranged to be actuated by the tappet, differential pistons arranged to control the action of the tappet and means governed by the speed of the train for controlling the action of the pistons; substantially as described.

6. In apparatus for controlling the speed of railway trains, a pair of differential pistons, a piston rod connecting the pistons, a tappet device arranged to be engaged by the said piston rod, an exhaust valve controlled by the tappet device, and means whereby the tappet device will not be engaged by the piston rod unless the speed of the train exceeds the predetermined limit; substantially as described.

7. In apparatus for the control of railway trains, a train pipe exhaust valve, a track operated trip arm, a tappet device arranged to be operated by the trip arm to open said valve, a pair of differential pistons, a locking device for the tappet controlled by the pistons, and means governed by the speed of the train for controlling the action of the pistons; substantially as described.

8. In apparatus for automatically controlling the speed of railway trains, a pair of differential pistons, trip mechanism coöperating with the pistons and arranged to control an exhaust valve of the train brake system, a valve for controlling the action of the pistons, a magnet controlling the action of the valve and a speed governor arranged to control the circuit of the magnet; substantially as described.

9. In a brake setting mechanism, the combination of the train pipe of the brake system, a branch therefrom terminating in a valve, means upon the roadway for actuating said valve to exhaust air from train pipe, and means for preventing the exhaust of a train pipe through said valve, except when the speed of a train has exceeded a predetermined rate, substantially as described.

10. In a brake setting mechanism, the combination of the train pipe of the brake system, a branch therefrom terminating in a valve, means upon the roadway for actuating said valve to exhaust the air from train pipe, and means for automatically closing said valve after its operation when the speed of the train has been reduced to a predetermined rate, substantially as described.

11. In an apparatus for automatically controlling the speed of trains, an escape valve, trip mechanism for opening said valve and for holding the same in open position while the speed of the train exceeds the predetermined limit, and means whereby said valve is automatically closed as soon as the speed of the train has been reduced to the desired limit, substantially as described.

12. In apparatus for controlling the speed of trains, an escape valve, a trip device for operating said valve, means controlled by the speed of the train for regulating the time during which the valve shall remain in open position when operated by the trip mechanism, and means for effecting the automatic closing of said valve after the speed has been reduced to the proper limit, substantially as described.

13. In apparatus for the control of railway trains, a train pipe exhaust valve, a track-operated trip arm, a tappet device arranged to be operated by the trip arm to open said valve, means controlled by the speed of the train for determining the time during which the valve shall remain open, and means for automatically closing the valve when the speed of the train has been reduced to the desired limit, substantially as described.

14. In apparatus for controlling the speed of railway trains, a train pipe exhaust valve, a track-operated trip arm, a tappet arranged to be actuated by said arm, piston and cylinder means arranged to control the action of the tappet, means governed by the speed of the train for controlling the action of the pistons, and means for automatically closing the escape valve when the speed of the train has been reduced to the proper limit, substantially as described.

15. In train-controlling mechanism, a trip-opened escape valve, and means controlled by a reduction in the speed of the train for effecting the closing of said valve, substantially as described.

16. In train-controlling mechanism, a train pipe escape valve, a trip-operated means for opening the same, a governor driven by a moving part of the train, and means controlled by said governor and operated thereby upon a reduction in the speed of the train to automatically close said valve, substantially as described.

In testimony whereof, I have hereunto set my hand.

JOHN P. COLEMAN.

Witnesses:
G. A. BLACKMORE,
H. A. HAMILTON.