No. 869,597. PATENTED OCT. 29, 1907.

J. T. THOMPSON.

AUTOMATIC APPARATUS FOR STOPPING MOVING RAILWAY TRAINS.

APPLICATION FILED FEB. 7, 1907.

2 SHEETS—SHEET 1.

Fig. 2.

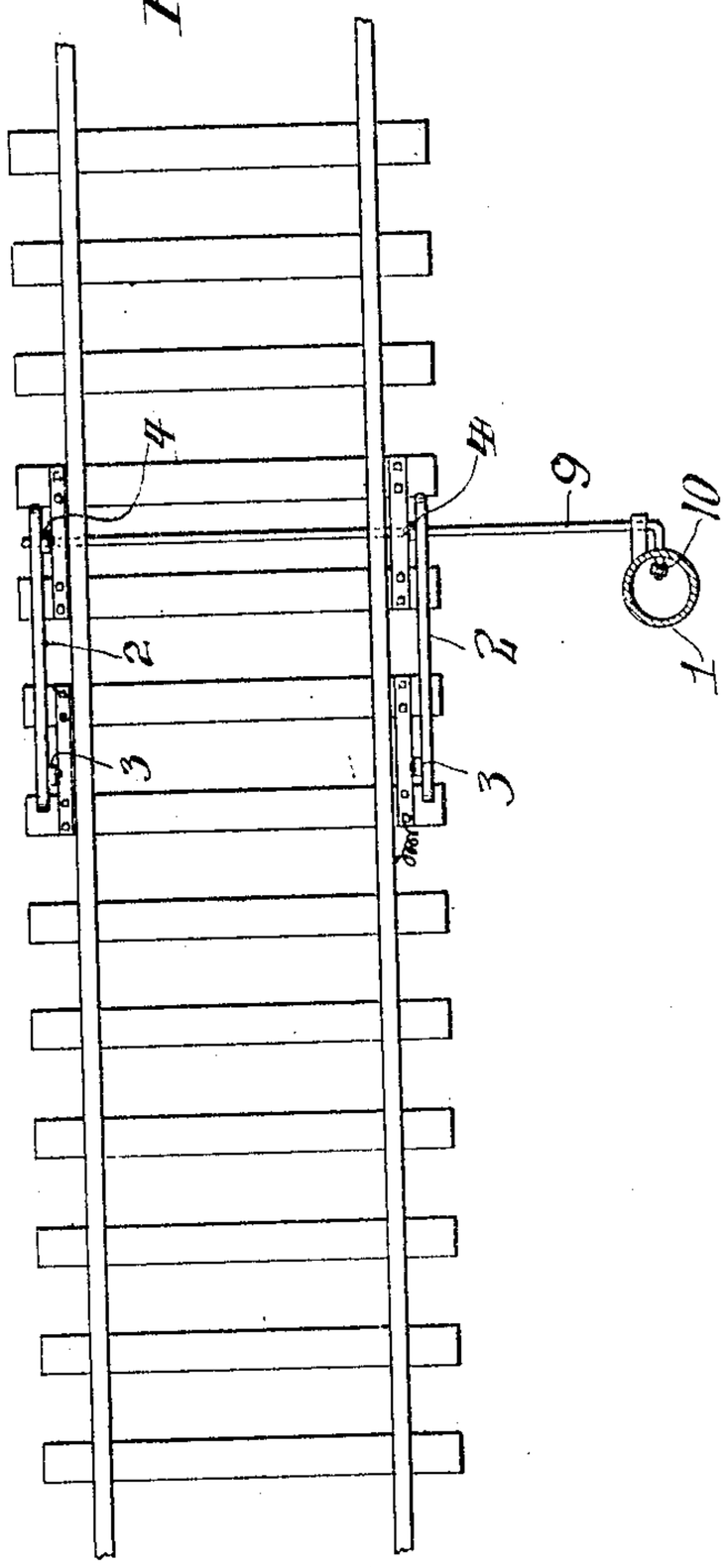

Fig. 1.

Witnesses:
P. H. Alford
W. Whitehall

Inventor:
James T. Thompson
by Robt. F. Brown
Attys.

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2 SHEETS—SHEET 2.

Fig. 5.

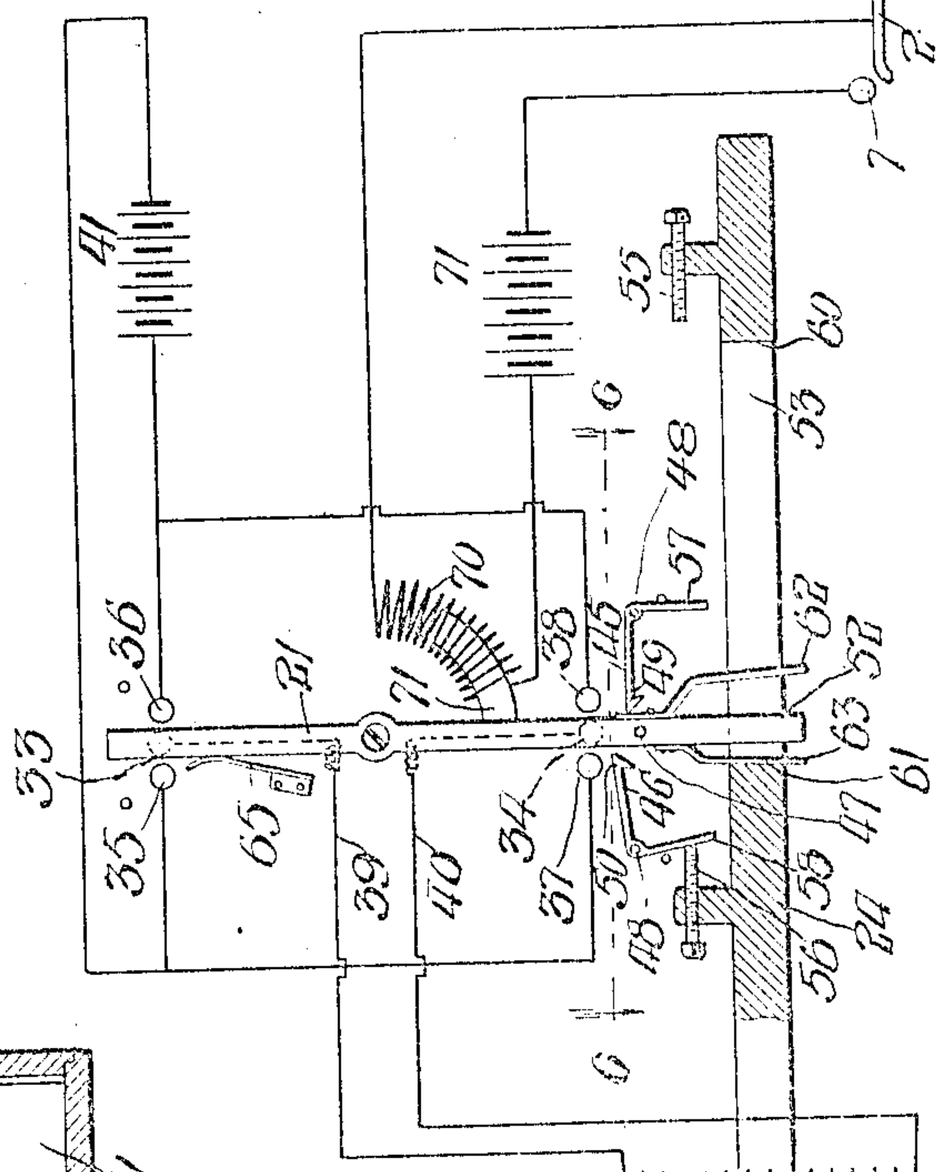


Fig. 6.

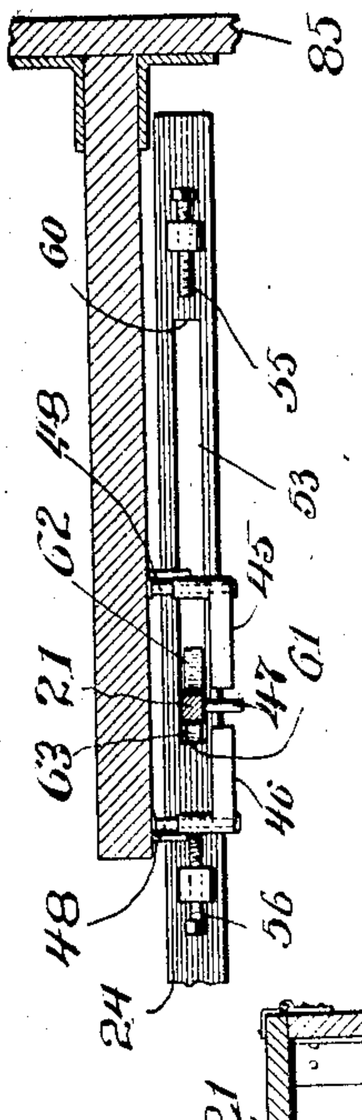


Fig. 3.

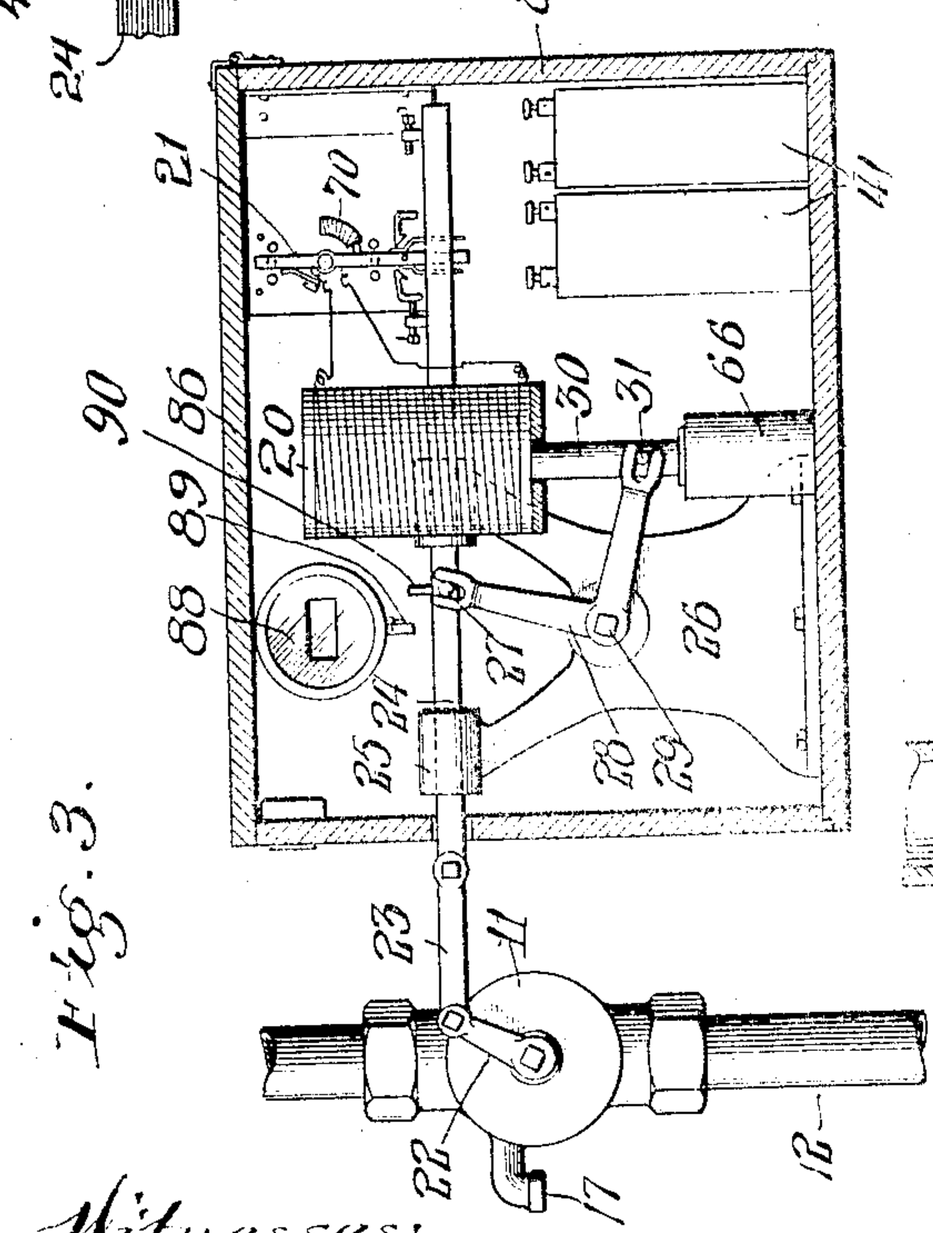
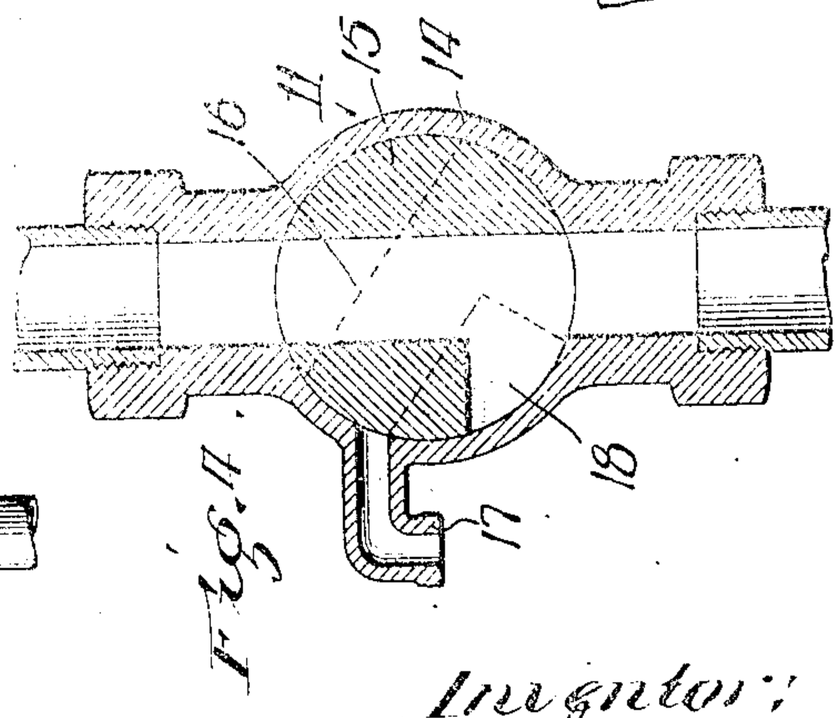


Fig. 4.



Witnesses:
F. H. Allen.
M. Lovell.

Inventor:
James T. Thompson.
by Poole & Brown
Attys.

UNITED STATES PATENT OFFICE.

JAMES T. THOMPSON, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-FOURTH TO C. S. ROSENTHAL AND ONE-FOURTH TO T. P. GALLIGAN, OF CHICAGO, ILLINOIS.

AUTOMATIC APPARATUS FOR STOPPING MOVING RAILWAY-TRAINS.

No. 869,597. Specification of Letters Patent. Patented Oct. 29, 1907.

Application filed February 7, 1907. Serial No. 356,247.

To all whom it may concern:

Be it known that I, JAMES T. THOMPSON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Apparatus for Stopping Moving Railway-Trains; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to means for automatically applying the brakes to a railway train and stopping the train whenever the train is driven past a semaphore of a block signaling apparatus set in the danger position, or whenever at other times it is desired to stop the train through the agency of a force applied from without the train.

The invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.

My invention will be better understood by reference to the accompanying drawings, in which,—

Figure 1 is a view showing in outlines a locomotive, equipped with my improved apparatus. Fig. 2 is a plan view of the track together with contact bars located thereon which engage parts carried by the locomotive to set the brake applying apparatus in operation. Fig. 3 is a side view of an emergency air releasing valve and the electro-magnetic actuating mechanism therefor, designed to be located in the cab of a locomotive. Fig. 4 is a vertical axial section of said valve. Fig. 5 is a side elevation of a reversing switch constituting part of said valve actuating mechanism and illustrating diagrammatically the arrangement of the electric circuits and electro-magnets for operating said valve. Fig. 6 is a horizontal section, taken on line 6—6 of Fig. 5.

As shown in said drawings, 1 indicates a semaphore post of ordinary form carrying near its top end a swinging arm designed to indicate to an engineer if the block division of the track beyond said semaphore post be clear or obstructed.

2, 2 indicate two short, horizontal contact bars located parallel with and closely adjacent to the track rails. Said bars 2, 2 are mounted on the upper ends of short vertical levers 3, 3 and 4, 4 by the movement of which about their horizontal pivots said bars 2, 2 may be raised and lowered. Upon the main frame of the locomotive is mounted a downwardly depending bracket 5 in which is slidably mounted a bar 6 carrying at its lower end a roller 7. The bar 6 is pressed downwardly by means of a coil spring 5^a and is of such length that when the adjacent contact bar 2 is in its raised position the roller 7 will engage said bar as the locomotive is driven past the same. Each contact bar 2 and an adjacent roller constitutes the terminals of a normally open starting circuit, as the apparatus herein shown is organized, and when brought into contact in the manner stated, closes said circuit to set in operation the valve closing mechanism. When my apparatus is applied to a single track, two of such contact bars 2 are employed, one on each side of the track, that coöperate with a single contact device on the engine, one of the contact bars coming into use for each direction of travel of the locomotive. The contact bars are curved downwardly at their ends to facilitate the riding of the rollers thereon, and the springs 5^a insure a reliable contact. The closing of said electric circuit energizes an electro-magnet which, by attracting its armature, effects the operation of the braking means in a manner to be hereinafter explained. The levers 4, 4 are rigidly fixed to a horizontal rock-shaft 9 carrying at its end a crank-arm 10. Said crank-arm 10 is connected by means of a vertical rod with the semaphore arm at the upper end of said semaphore post in such manner that, upon raising said semaphore arm to a horizontal position to indicate danger, or that the track ahead is obstructed, said shaft 9 is rotated to raise the contact bars 2 into position for contact with the roller 7. When the semaphore arm is lowered the contact bars 2 are also lowered out of the path of said roller so that the passage of the train into the block at this time does not act to operate the apparatus.

Referring now to the means for applying the brakes by a momentary closing of an electric circuit through said roller 7 and the rail 2 when an attempt is made to enter a closed block or pass a semaphore set to indicate danger, said parts are made as follows:

11 designates an emergency valve in the train pipe 12 at the upper end of which is located the engineer's controlling valve 13, which latter is operated in the usual manner to supply air to the train pipe and to control the air brake system for both ordinary and emergency service. The valve 11 is located in the pipe 12 below the engineer's valve 11 and operates independent of the latter valve. Said valve 11 is normally open to provide free communication between the engineer's valve and the train pipe so as not to interfere with the usual operation of the air-brake system. The valve comprises, as shown in Fig. 4, a casing 14 having oppositely extending hollow branches which communicate with the pipe 12 above and below the same and a rotative plug 15 provided with a through port 16 which stands normally in register with said branches so as to afford an unobstructed passage therethrough. The casing is provided at one side with an escape nipple 17 normally closed by the plug. The said plug is provided with a branch port 18 that is so related to the through port and said nipple that when the plug is ro-

tated to bring one end of said through port in register with the escape nipple, the branch port is in communication with the lower or outlet branch of the valve, thus affording an avenue of escape of the air from the train pipe and also cutting off communication between the engineer's valve, or source supplying air, and the train pipe. The valve at this time assumes the function of an emergency valve and operates in the same manner as the engineer's valve when the latter is thrown over to emergency position, to release air from the train pipe and reduce pressure therein to shift the triple valve to emergency position and stop the train. The mechanism for operating said valve embraces in this instance a solenoid 20 suitably connected with the valve and a pole changing switch 21 included in a suitably arranged operating circuit with the solenoid, the parts being so arranged that the valve is shifted to its emergency position while current is passing through the solenoid in one direction, and the current is reversed through said solenoid through the action of the pole changing switch to shift the valve back to its normal position. The mechanism referred to is herein shown as one convenient means for effecting the desired result, but it will be understood that any suitable means may be employed which will accomplish this result in substantially the manner indicated. The mechanism for operatively connecting the solenoid with the valve and for operating the pole changing switch is made as follows:

To the movable part of the valve 11 is fixed a short crank-arm 22, to the outer end of which is pivoted one end of a link 23, the other end of the link being loosely connected with a horizontal bar 24 slidably mounted in bearings 25, 25 formed on a supporting frame 26. The bar 24 is provided with oppositely disposed studs or trunnions 27 adapted to engage with slots at the forked end of a bell-crank lever 28 mounted at its angle upon a pivot 29 fixed to said support 26. The core 30 of the solenoid is arranged vertically and is provided with like studs or trunnions 31 adapted to engage with like slots in the opposite end of said bell-crank lever 28. Vertical movement of the core, therefore, transmits a horizontal movement to the valve actuating bar. As shown in Fig. 3, the core 30 is at the lowest point of its travel and the horizontal rod 24 is at the extreme right hand end of its travel, these positions corresponding to the normal position of the valve 11. The armature core 30 is permanently magnetized and the pole changing switch 21 coöperates with suitably arranged terminals in the operating circuit to reverse the direction of current through said solenoid 20, whereby the core is attracted or repelled, thus producing reversal of its endwise movement to reverse the valve. The pole changing switch is shown as pivoted between its ends and is provided near its ends with insulated contact pieces 33, 34 adapted to engage with stationary contact pieces 35, 36, 37 and 38. The contact pieces 33 and 34 are connected, respectively, by means of wires 39 and 40 to the terminals of the solenoid 20. The contact pieces 35 and 37 are connected to one pole of a battery 41 and the contact pieces 36 and 38 are connected with the opposite pole of said battery. From the foregoing it will be seen that when the pole changing switch 21 is in one of its closed positions, or in a position with the contact pieces 33 and 34 engaging with the contact pieces 35 and 38, respectively, the circuit is completed through said contact pieces 33 and 34, wires 39 and 40, and through the solenoid 20 in one direction; and when said switch is in its other "closed" position, or in a position with its contact pieces 33 and 34 engaging with the contact pieces 36 and 37, respectively, the circuit is completed through said contact pieces and wires and through the solenoid in the opposite direction.

Means are provided for locking or retaining said switch in both of its closed positions until released at the proper time, and such release is conveniently effected by means actuated by the sliding bar 24. For this purpose latches 45 and 46 are provided, adapted alternately to engage with a stud or pin 47 projecting laterally from the switch 21. Said latches are pivotally mounted on horizontal studs 48, 48 and are provided with cam furnished, hooked ends 49, 50 adapted to separately engage with the stud 47 to hold the switch 21 in either of its closed positions.

From the foregoing it will be seen that when the switch 21 is in position for closing the circuit in either direction through said coil 20, one of the latches 45 or 46 will engage with the stud 47 and the switch will remain in such position until released by suitable releasing devices provided therefor. For effecting such release the following construction is provided.

The switch 21 is extended at its lower end to form an arm 52 which projects through a slot 53 in the end of the sliding actuating bar 24. On the top surface of the sliding bar are located two adjustable stops 55, 56 adapted to engage with downwardly extending arms 57 and 58 formed integral with the respective horizontal arms of the latches 45 and 46. Said stops comprise two screws, projecting toward each other through threaded lugs extending upwardly from the bar 24, so that by adjusting said screws through their lugs, their positions may be changed with respect to the slot 53. Upon horizontal movement of the bar 24, the stops 55 and 56 are adapted to engage respectively with the arms 57 and 58 to effect the release of the latches 45 and 46. The end walls 60 and 61 of the slot 53 are adapted to engage with springs 62 and 63 mounted upon the arm 52 of the switch and swing the switch out of engagement with the contact pieces 35 and 38 or 36 and 37. The parts are so constructed and arranged that when the switch 21 is in a position for contact with the contact points 35 and 38, or with its lower end swung toward the right of a vertical position and locked therein by the latch 45, the solenoid 20 exerts its influence to move the bar 24 toward the left. When the bar 24 is near the end of its travel, the end wall 60 engages the spring 62 and compresses the same, and upon further horizontal movement of the bar 24, the latch 45 is tripped by the stop 55. Thereupon, the spring 62 expands, and by reason of its reaction against the end wall 60 of said slot, acts to forcibly swing the switch 21 to the left and into its opposite closed position. In its movement from the first mentioned closed position to the other, under the influence of the spring 62, the movement of the switch is additionally urged by a flat spring 65 exerting pressure against the upper end of the switch. When the switch is in a position to make contact with the contact points 36 and 37, the solenoid 20 exerts its influence to repel the core 30 and move the same downwardly, whereupon the

bar 15 is moved toward the right to shift the valve to its normal position. When the bar 24 is near the end of its travel, the end wall 61 strikes the spring 63 and compresses the same. Upon further movement of the bar 24 the stop 56 trips the latch 46 and the spring 63 expands and moves the switch out of contact with the contact points 36 and 37. The spring 63 is so proportioned in strength to the spring 65 that upon a balance being reached between the influence of said springs 63 and 65, the switch tends to remain in its open position, or out of contact with all of the contact points 35, 36, 37 and 38.

It is desirable that the valve shall remain open for a substantial time in order to permit the desired reduction of pressure in the train pipe. As herein shown, this result is effected by slowly opening and slowly closing the valve. For this purpose, the lower end of the core of the solenoid coöperates with a dash-pot 66 of the usual or any preferred form to retard the movement thereof in both or either direction, as desired.

Initial movement is given to the pole changing switch 21 for closing the operating circuit through the battery 41 and solenoid 20 by means of a magnet 70 which is included in the starting circuit, whose terminals comprise the roller 7 and the contact bar 2, and which circuit is closed when said roller contacts with said bar. The said starting circuit includes a battery 71. As shown in Fig. 1, said circuit is completed partially through the frame of the locomotive and the track rails, which are electrically connected with the contact bars 2. The closing of the starting circuit energizes the magnet 70, which, in turn, attracts its armature, and closes the operating circuit to shift the valve 11 to its emergency position. In the present instance, the magnet 70 comprises a solenoid, and its armature or core 71 is attached directly to the pole changing switch 21.

The operation of my device is as follows: When the semaphore arm is in its "danger" position, as shown in Fig. 1, the contact bars 2, 2 are in their raised or operative position. If a locomotive is then driven past the semaphore post into the closed block of the track, the roller 7 will make contact with one of said contact bars and complete the starting circuit through the solenoid magnet 70 and thereby energize the same to draw its core and the attached switch toward the right, placing the switch in a closed position, in which its lower end is swung to the right of a vertical position. The operating circuit is now closed through the solenoid with the result of slowly shifting the valve, against the influence of the dash-pot 66, to its emergency position, thereby applying, the brakes. When the valve actuating bar 24 has reached the end of its travel, in which position the valve 11 is opened to "emergency position" to its farthest extent, the pole changing or reversing switch is swung into its opposite closed position, thereby reversing the direction of current through the solenoid 20, thus effecting the restoration of the valve 11 slowly to its normal position. This latter movement of the valve 11 prevents further escape of air from the train pipe and also restores the braking apparatus to the engineer's control. By the closing of the valve 11 the air brake system is automatically restored to the full and complete control of the engineer by means operating independently of his control, so that the entire device may be located in a place inaccessible to the engineer, whereby he is prevented from interfering with the proper working of the apparatus. The operative parts of the valve actuating mechanism are contained in a suitable casing 85, having a swinging door 86, whereby access may be had to the parts. As a further and separate improvement, a registering device 88 is arranged to be actuated each time the supplemental valve 11 is operated, whereby the operating superintendent may be apprised of the number of times a locomotive has attempted to enter closed blocks and has been stopped by the apparatus described. The said registering device is located in a position inaccessible to the engineer so that it may not be tampered with. Conveniently it is located in the casing 85. It is provided with an actuating arm 89 that is engaged by a lug 90 on the valve actuating bar 24 in each cycle of its reciprocation, the arm being constructed to permit the lug to wipe past the same without actuating the register in one direction of movement of the arm, but to actuate the register in the other movement thereof, as clearly shown in Fig. 3.

It will be understood that the details of my apparatus may be varied without departing from the spirit of my invention and I do not wish to be limited to such details except as hereinafter made the subject of specific claims. It will be furthermore understood that the contact bar or analogous device may be set into its operative position by means other than through its connection with a semaphore or other signaling device. For instance, such track contact device may be raised into the path of a contact device on the locomotive by other means, as by means of an electrical device from a distant station.

I claim as my invention:—

1. Means for arresting a moving railway train comprising a valve in the air brake system of the train which is operated independently of the engineer's valve, a contact device on the railway track adapted to be raised into the path of a contact device carried by the locomotive, and automatic mechanism for opening and closing the valve, operating upon engagement of said contact devices.

2. The combination with the train pipe of an air brake system, of a valve in said train pipe between the engineer's valve and the train service pipes, said valve being normally in position to afford communication between the service pipes and engineer's valve and adapted to be operated to close such communication and open the train pipe to the atmosphere, and means, independent of the engineer's control, for automatically opening and closing said valve.

3. Means for arresting a moving railway train comprising a valve in the train pipe of the air brake system of the train which is operated independently of the engineer's valve to open the pipe to the atmosphere and to close the pipe to the pressure reservoir of said air brake system, electro-magnetic mechanism on the locomotive for opening and closing said valve, and a contact carried by the locomotive adapted to engage a stationary contact on the track for closing a circuit to set said valve actuating mechanism in operation.

4. The combination with the train pipe of the air brake system of a railway train, of a valve in said train pipe between the service pipes and the engineer's valve, said valve being constructed to open the train pipe for emergency service, electro-magnetic mechanism on the locomotive for operating the valve, an operating circuit in which said mechanism is included, and a starting circuit for closing said operating circuit embracing a contact carried by the locomotive adapted for engagment with a stationary contact on the track.

5. The combination with the train pipe of an air brake system, of a valve in said train pipe between the engineer's

valve and the train service pipes, said valve being normally in position to afford communication between the service pipes and engineer's valve, electrically actuated means comprising a circuit which is closed by a contact on the track for setting said valve for emergency service, and means operating at the end of the throw of the valve to reverse the valve, whereby it is shifted to normal.

6. The combination with the train pipe of the air brake system of a railway train, of an auxiliary valve in the train pipe between the engineer's valve and the service pipes, automatic means, independent of the engineer's control, for opening said valve to an emergency position to set the brakes, and for closing said valve, and a register for registering the emergency operations of said valve.

7. Automatic means for applying brakes to a moving railway train, comprising an auxiliary air releasing valve in the train pipe, an electro-magnetic device for operating said valve independently of the engineer's control, and means for reversing the direction of current through said device to reverse the valve.

8. Automatic means for applying the brakes to a railway train, comprising an air releasing valve in the train pipe, an electro-magnetic device for operating said valve, and means for reversing the direction of current through said electro-magnetic device to reverse the valve, said means comprising a pole changing device in circuit therewith.

9. Automatic means for applying the brakes to a moving train comprising an air releasing valve in the train pipe, an electro-magnetic device for operating said valve, means for closing an operating circuit through said device, a pole changer for reversing the direction of current through said operating circuit, and means controlled by a movable part of the valve operating mechanism for actuating said pole changer.

10. In an automatic braking apparatus for railway trains, an air releasing valve in the train pipe, means, independent of the engineer's control, for automatically shifting said valve to its releasing position and for thereafter returning the valve to normal position, and means for timing the releasing position of said valve.

11. Automatic means for applying brakes to a railway train comprising an auxiliary air releasing valve in the train pipe, and an electro-magnetic device for opening and closing said valve independently of the engineer's control, and arranged to automatically effect such opening and closing movements in a continuous operation of said device.

12. Automatic means for applying brakes to a railway train comprising an air valve operatively connected with the air brake apparatus, and an electro-magnetic device independent of the engineer's control for opening and closing said valve.

13. Automatic means for applying brakes to a railway train comprising an auxiliary air releasing valve in the train pipe, and an electro-magnetic device independent of the engineer's control for opening and closing said valve.

14. Automatic means for applying brakes to a railway train comprising a valve operatively connected with the air-brake apparatus in such manner that by its movement the brakes are applied, and means independent of the engineer's control for operating said valve and for restoring the braking apparatus to the engineer's control.

15. Means for arresting the movement of a railway train comprising in combination with the train pipe of an air brake system, and a source supplying air thereto, a valve, in said pipe, provided with a vent passage, said valve being constructed to normally permit free passage of air through the pipe from said source supplying air, and to be shifted to a position to connect said train pipe with said vent passage and cut off the passage of air from said source supplying air, and means controlled by a contact adjacent to the track for actuating said valve to move it to its venting position and for thereafter restoring the valve to its normal position during a continuous automatic operation of the valve actuating means.

16. Means for arresting the movement of a railway train comprising in combination with the train pipe of an air brake system and the engineer's valve therein, an auxiliary valve, in said pipe, provided with a vent passage, said valve being constructed to normally permit free passage of air through the pipe from the engineer's valve and to be shifted to a position to cut off the passage of air from the engineer's valve and to connect said train pipe with said vent, and means controlled by a stationary contact adjacent to the track for actuating said valve to move it to its venting position and for thereafter restoring the valve to its normal position during a continuous automatic operation of the valve actuating means.

17. Means for arresting the movement of a railway train comprising in combination with the train pipe of an air brake system and the engineer's valve in said pipe, an auxiliary valve located in said pipe between the engineer's valve and train service pipe and provided with a vent passage, said valve being normally in position to permit free passage of air through said pipe from the engineer's valve to the train service pipes and constructed to open the pipe between the train service pipe and valve to the vent and cut off the passage of air from the engineer's valve, electrically controlled mechanism on the locomotive operating to open and close said valve in a continuous automatic operation of said mechanism, and a circuit controlling device adjacent to the railway track adapted for contact with a part carried by the locomotive to control said electrically operated mechanism.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 2nd day of February A. D. 1907.

JAMES T. THOMPSON.

Witnesses:
WILLIAM L. HALL,
GEORGE R. WILKINS.