F. C. WILLIAMS.

STOPPING MECHANISM FOR RAILWAY CARS.

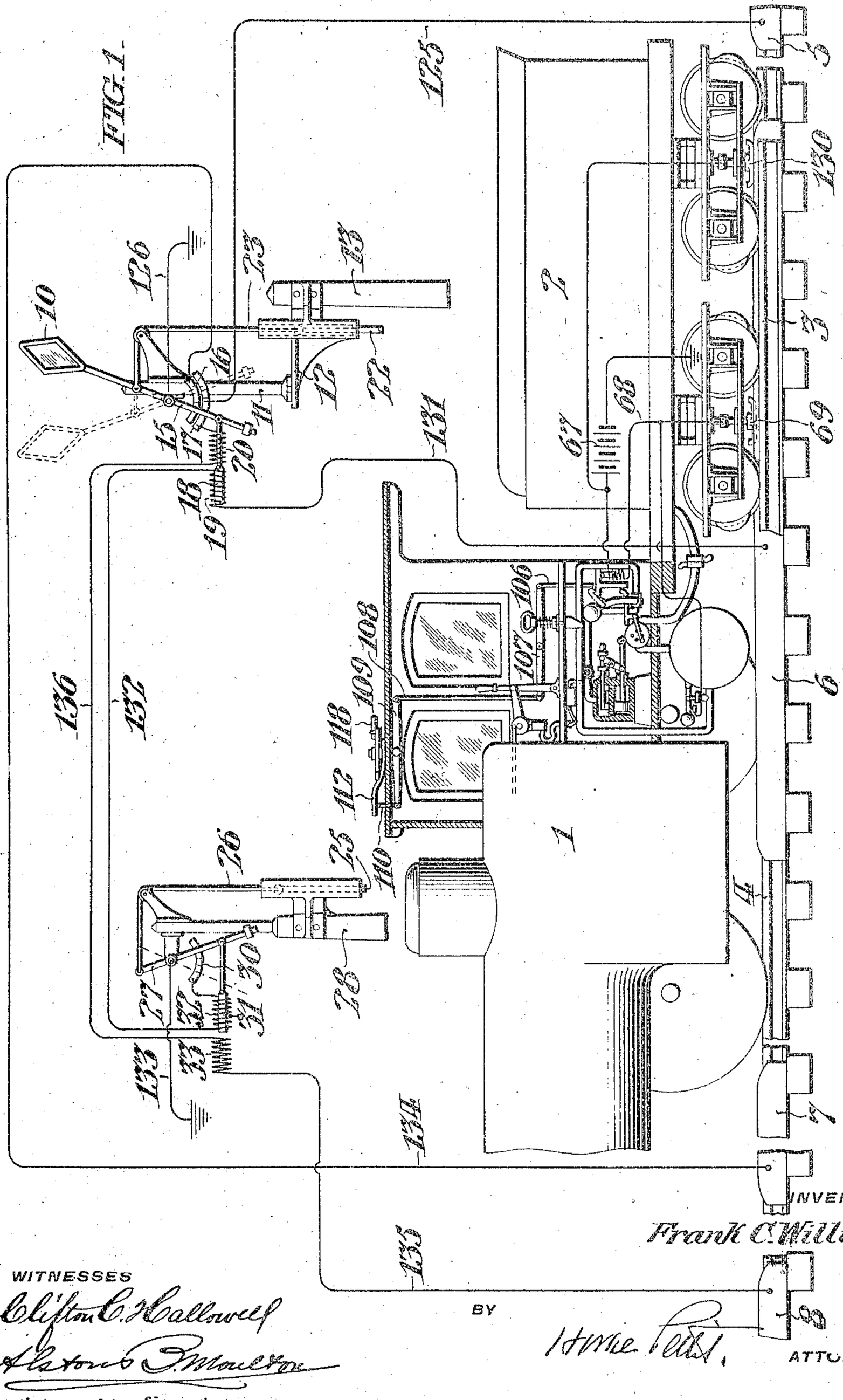
APPLICATION FILED OCT. 26, 1909.

993,428.

Patented May 30, 1911.

3 SHEETS—SHEET 1.

FIG. 1.



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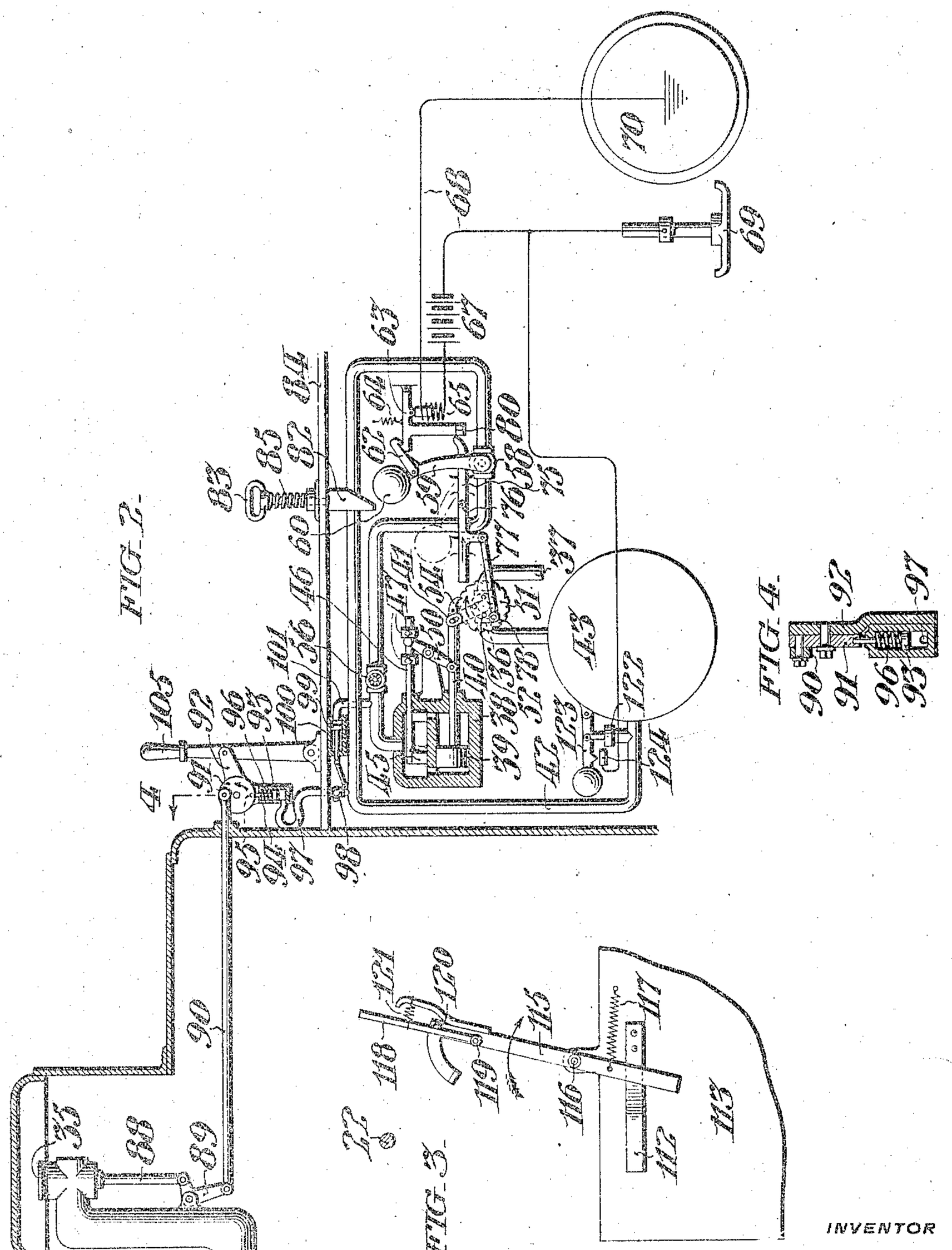

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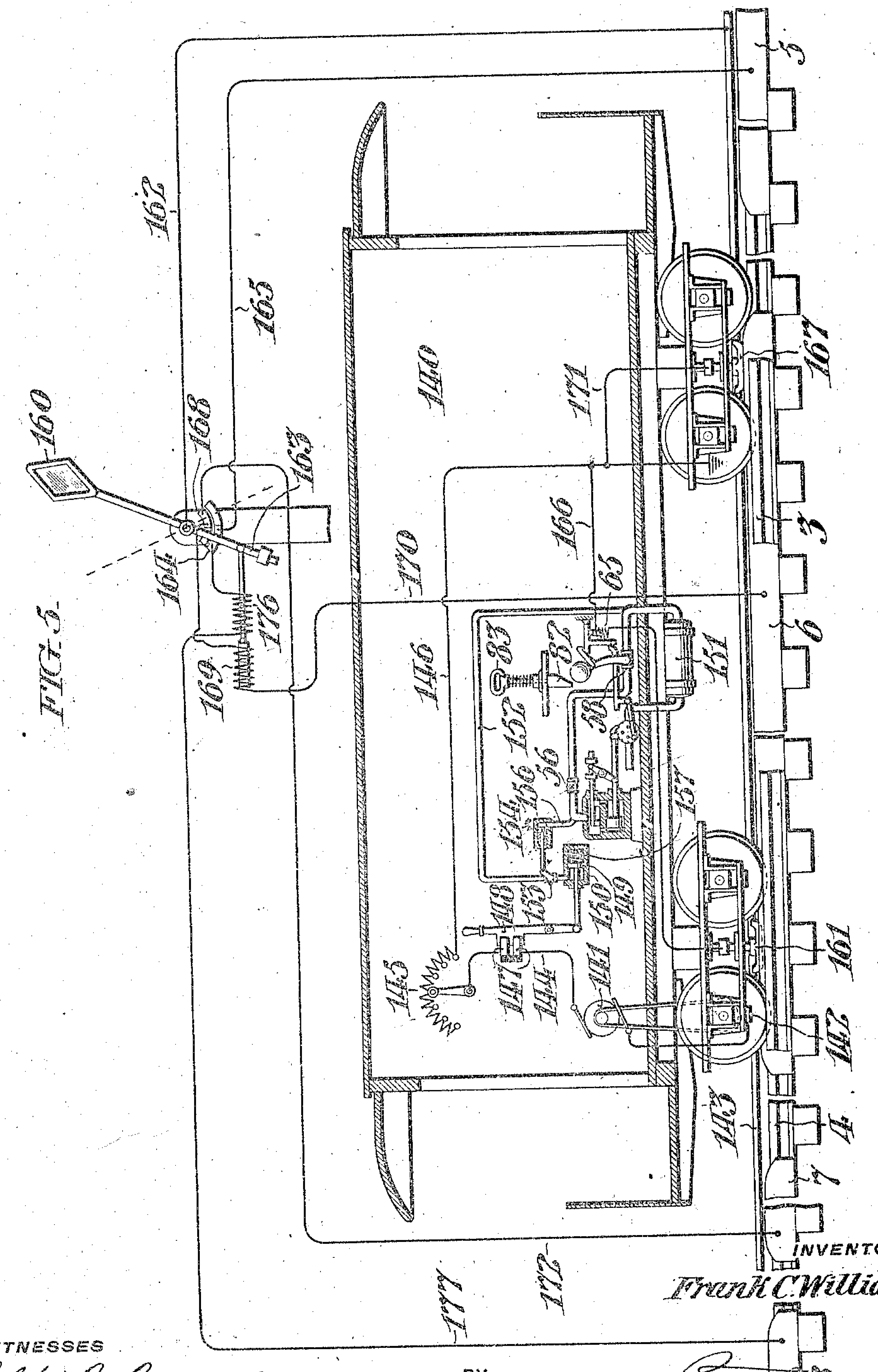
3 SHEETS—SHEET 3.

FIG-5-



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UNITED STATES PATENT OFFICE.

FRANK C. WILLIAMS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE SAFETY BLOCK SIGNAL COMPANY, A CORPORATION OF DELAWARE.

STOPPING MECHANISM FOR RAILWAY-CARS.

993,428. Specification of Letters Patent. Patented May 30, 1911.

Application filed October 26, 1909. Serial No. 524,707.

To all whom it may concern:

Be it known that I, FRANK C. WILLIAMS, a citizen of the United States, and a resident of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Stopping Mechanism for Railway-Cars, of which the following is a specification, reference being had to the accompanying drawings.

This invention particularly relates to mechanism arranged to automatically shut off the motive power, and to contemporaneously actuate the brake mechanism to stop a railway car, or train.

The principal object of this invention is to provide means whereby compressed air is utilized to automatically control the motive power, and to actuate the brake setting mechanism, in accordance with the position of signals disposed at intervals adjacent to the track and automatically actuated by movement of the car, and arranged to effect the stopping of said car in event of its approaching danger or to effect the stopping of said car upon failure to properly actuate said signals.

The form of this invention hereinafter described provides a car equipped with propelling mechanism actuated by convenient motive power, and a suitable air brake system, and a pneumatic motor automatically actuated in accordance with the position of the signals of a block signal system, and conveniently connected to be driven by compressed air from the air brake system, and controlled by a weighted valve automatically opened by tripping mechanism to start said motor. Said motor valve is shifted to closed position by the action of said motor, which is connected to intermittently open and close the train pipe valve, until stopped by the closing of said weighted valve. The movement of said train pipe valve is stopped in such position as to render it operative to maintain the brakes set, until manually shifted to normal position, to release said brakes.

My invention further includes the various novel features of construction and arrangement as hereinafter more definitely specified.

The particular signal system, and the wiring connections thereof, herein shown, are employed merely to facilitate the understanding of the operation of the stopping mechanism carried by the train, and form no part of this invention, but are the subject-matter of a co-pending application, Serial No. 466,580, filed December 9, 1908.

In the accompanying drawings, Figure 1 is a fragmentary sectional view of a locomotive, with its tender shown in side elevation, together with a diagrammatic illustration of a suitable block signal apparatus; Fig. 2 is a fragmentary diagrammatic view showing the controlling mechanism illustrated in Fig. 1 on an enlarged scale; Fig. 3 is an enlarged fragmentary plan view of the mechanical tripping mechanism arranged to be shifted by engagement with projections extending in its path from the signal apparatus; Fig. 4 is a longitudinal sectional view of the throttle releasing mechanism taken on the line 4 in Fig. 2; and Fig. 5 is a sectional view, partly in elevation, of an electrically propelled car conveniently embodying my improvements as arranged to break the motor circuit and set the brakes.

In the form of my invention shown in Figs. 1 to 4 inclusive, the locomotive 1 and tender 2 are arranged to traverse the track rails 3 and 4 between which, contact plates 5, 6, 7 and 8 are disposed. Said contact plates 6 and 8 are in alinement adjacent to the rail 3, and form the terminals of separate electric circuits arranged to actuate the block signal, and the contact plates 5 and 7 are in alinement adjacent to the rail 4, and form the terminals of separate circuits arranged to be closed through said signal in accordance with its position to electrically trip the stopping mechanism in said locomotive, as hereinafter described.

The signal system includes the semaphore 10, pivoted upon the standard 11, which is mounted on the bracket 12, carried by the support 13, adjacent to the track. Said semaphore 10 is provided with a downwardly extending arm 15, arranged to ride over contact plates 16 and 17, and is connected to be shifted by the solenoid 18, which is provided with double windings 19 and 20.

A reciprocatory bar 22, arranged to be shifted by the semaphore 10, is connected therewith by the flexible connector 23, and a similar reciprocatory bar 25, is connected by the flexible connector 26, with the lever 27, which is pivoted upon the support 28, disposed adjacent to the track, in advance of the support 13. Said lever 27 is arranged to engage the contact plate 30, and, is connected to be shifted by the solenoid 31, having the double windings 32 and 33, which are electrically connected with the respective windings 19 and 20. Said solenoids are arranged to be energized to oppositely shift said lever 27 and semaphore 10 by electric circuits to be hereinafter described.

The stopping mechanism carried by each locomotive 1, is connected to actuate the throttle valve 35, to shut off the motive power and contemporaneously actuate the train pipe valve 36, in the train pipe 37 to apply the air brakes. Said stopping mechanism comprises the cylinder 38 having the piston 39, connected by the rod 40, with the lever 41. The piston 39 is arranged to be actuated by air pressure, and is conveniently connected by the pipe 42 with the air pressure tank 43, of the air brake system, and said air pressure is properly admitted to the cylinder by the slide valve 45, having the valve rod 46, provided with adjustable collars 47, which are arranged to be engaged to shift said valve rod in accordance with the movement of the piston rod 40, by the rocker 50, which is centrally pivoted and engaged with said piston rod, to be shifted thereby. It may be here noted that the stroke of the piston 39 may be varied as desired by adjusting the collars 47 on the valve rod 46.

The train pipe valve 36 is provided with a ratchet 51, having apertures 52 arranged to register with suitable apertures in the face of said valve, and said ratchet is intermittently rotated by the pawl 54, carried by the lever 41, and is so rotatively progressed that the valve 36, when actuated by the movement of the piston 39, is intermittently opened and closed to prevent the sudden application or jamming of the brakes, which effects a jarring of the train, when the train pipe is abruptly held open. The speed of the piston 39 may be conveniently regulated by the valve 56, in the pipe 42, said valve being provided with a suitable hand wheel for manual operation.

The admission of air through the pipe 42, to the cylinder 38, is automatically controlled by the motor valve 58, whose stem is provided with the arm 59, having a weighted ball 60 at its free extremity, which overhangs one side of the axis of rotation of said valve. Said arm is normally maintained in position to close the valve 58, by the hook 62, which is arranged to engage the hooked end of the detent lever 63, normally upheld by the spring 64, but arranged to be drawn downwardly against the tension of said spring by the solenoid 65, to release the arm 59 and permit the weighted ball to drop to the position indicated in dot and dash lines in Fig. 2 to open the valve 58, which opens communication from the pressure reservoir 43 to the cylinder 38. Said solenoid may be actuated by the battery 67 included in the circuit 68 having its opposite terminals respectively connected with the contact shoe 69 and a car wheel 70, to ground.

The valve 58 is arranged to be automatically reset by the slide bar 75, which is provided with the projection 76, preferably a roller, and connected by the link 77, with the ratchet 51, and so arranged that the intermittent rotation of said ratchet by the reciprocation of the piston 39, shifts said bar in the direction of the arrow indicated thereon, to engage the arm 59 of the valve 58, with the projection 76 to shift said arm 59 to the position indicated in full lines in Fig. 2, in which position the pressure in the pipe 42, is shut off from the cylinder 38, and the piston 39 ceases to reciprocate, thereby leaving the ratchet 51, in position to maintain the brakes set. Said ratchet 51, is arranged to be manually rotated by the handle 78, in the direction of the arrow indicated thereon, to reset the valve 36, to normal position to release the brakes.

To insure that the operator properly resets the train pipe valve 36, the bar 75 is arranged to engage the hooked end of the lug 80, depending from the detent lever 63, to retain said lever in such position as to prevent its hook engaging the hook 62, carried by the valve arm 59, until after the train pipe valve 36 has been properly set to normal position, as indicated in Fig. 2 of the drawings. In order to retain the valve 58 in closed position until the valve 36 has been shifted to normal position, and the bar 75 has been withdrawn, as indicated in Fig. 2 and in such position as to permit the lever 63 to engage the hook 62, a plunger 82, having an inclined face, is provided to be pressed down by the operator into engagement with the ball 60, to hold the latter. Said plunger 82 has the handle 83 extending above the operator's seat 84, and is normally upheld in inoperative position by the spiral spring 85, and may be conveniently pressed downwardly by the operator, against the tension of said spring, to engage the ball 60, and hold the valve 58 closed until the operator has properly reset the mechanism by rotating the ratchet 51, by its handle 78 in the direction of the arrow, to the position shown in Fig. 2 of the drawings, as above described.

The means for closing the throttle valve

35, having the stem 88, connected by the bell crank lever 89, to the throttle rod 90, includes the disk 91, to which said rod 90 is eccentrically pivoted, and which is rotatably mounted on the frame 92 which latter carries the cylinder 93, provided with a piston bolt, 94, arranged to engage an aperture 95, in the periphery of the disk 91, and normally maintained in said aperture by air pressure from the reservoir 43 through the pipe 97, which is connected with the pressure side of the pipe 42. Said pipe 97 is provided with the valve 98, arranged to be actuated to release said pressure by outward movement of the piston 99 in the cylinder 100, which is connected by the pipe 101, with the pipe 42, between the valve 58 and the cylinder 38, so that as may be readily seen, when the valve 58 is automatically shifted to its open position, as indicated by the dot and dash lines in Fig. 2 of the drawings, air pressure is admitted into the cylinder 100, to shift the piston 99 toward the left, which closes the valve 98 to shut off pressure from the cylinder 93, and open the pipe 97 to atmosphere, whereupon the spring 96 shifts the bolt 94, out of engagement with the aperture 95, and permits rotation of the disk 91, in the direction of the arrow indicated thereon relatively to the frame 92 effected by the steam pressure on the throttle valve 35, which is then closed by said pressure. It may be observed that said throttle is thus permitted to close irrespective of the position of the throttle lever 105, by which said throttle is normally controlled by the operator, when the bolt 94 engages the aperture 95, and the disk 91 and frame 92 are normally engaged as shown in Fig. 2 of the drawings.

Mechanical mechanism is provided for automatically tripping the valve 58 in event of failure of the solenoid to trip said valve, and comprises a rod 106, connected to the centrally fulcrumed lever 107, which is connected by the link 108, to the centrally fulcrumed lever 109, connected by the link 110, with the spring plate 112, mounted upon the roof of the locomotive cab 113. As best shown in Fig. 3, said spring plate 112 is arranged to be depressed by the lever 115, which is pivoted at 116 and normally held in a position as shown in said figure by the spring 117. Said lever 115, extends substantially horizontally from the side of the locomotive cab, and carries an arm 118 pivoted thereto at 119. Said arm 118 is yieldingly held against the lug 120, by the spring 121, and is arranged to engage either of the reciprocatory bars 22 or 25, which shift said lever 115, upon its pivot 116, in the direction of the arrow indicated thereon, to depress the spring 112, and through the levers and links above described shifts the rod 106 downward to mechanically depress the detent lever 63, which releases the arm 59, and by the weight 60, said arm 59 is shifted to the position indicated in dot and dash lines in Fig. 2 to open the valve 58, as when released by the solenoid 65.

In order to prevent the pressure in the tank 43 from falling below a predetermined limit, a safety valve 122 is provided having the weighted lever 123, having a contact point arranged to contact with the contact plate 124, which is connected to the circuit 68, so that when the circuit is closed by the dropping of said lever 123, the solenoid 65 is energized to release the valve 58 to stop the train, which thus prevents the falling of the air pressure below a pressure sufficient to actuate the brakes.

The mechanism above described operates as follows: Assuming the semaphore 10 to occupy the position shown in Fig. 1 of the drawings, and the operator disregarding the warning signal, endeavors to enter the block protected thereby, the contact shoe 69 engages the contact plate 5, which closes the circuit 68 through the line 125, the contact plate 17, semaphore arm 15, and the line 126, to ground. If, however, the signal is set in the safety position as indicated in dotted lines of Fig. 1, of the drawings, the locomotive is permitted to proceed and the contact shoe 130 engages the contact plate 6, which closes the circuit through the battery 67, line 131, solenoid winding 19, line 132, solenoid winding 32, contact plate 30, lever 27, line 133, to ground, whereby the solenoid cores 18 and 31 are shifted to the positions indicated in Fig. 1 to set the signal to protect the block, thereby occupied and to withdraw the projecting bar 25 out of the path of arm 118. If, however, the movement of the engine fails to set the signal 10 as above described, the contact shoe 69 contacts with the plate 7 and closes the circuit 68 through the line 134, contact plate 16, arm 15, and line 126, to ground, thereby releasing the valve 58 and permitting it to open to effect the shutting off of the motive power and setting of the brakes in the same manner as when said shoe 69 formed a contact with the plate 5. Upon leaving the block section the contact shoe 130 engages the contact plate 8 and closes the circuit including the line 135, solenoid winding 33, line 136, solenoid winding 20, contact plate 17, arm 15, line 126, to ground, whereby the semaphore 10 is reset to safety position as indicated by the dotted line in Fig. 1 and the lever 34 and its rod 25 are reset in opposition to the position shown in full lines in Fig. 1.

In event of the electrical mechanism failing to perform the functions as above set forth, the movement of the engine causes the arm 118 to engage one or the other of the rods 22 or 25, one of which always extends

in its path to trip the lever 63, and permit the valve 58 to automatically open to effect the stopping of the train.

In the form of my invention shown in Fig. 5, the electrically propelled car 140 is arranged to traverse the track rails 3 and 4 and is arranged to be driven by the electric motor 141, electrically connected by the third rail shoes 142, with the third rail 143, said motor being normally controlled by the rheostat 145, which is connected through the line 146, to ground. The motor line 144 includes the switch terminal contacts 147 arranged to be closed by the knife switch 148, which normally occupies the position shown in Fig. 5, and is connected to the piston 149 in the cylinder 150. Said piston is normally maintained in the position shown in Fig. 5 by air pressure from the tank 151 through the pipe 152, which includes the valve 153, arranged to be shifted by the piston 154, when pressure is admitted through the pipe 156, by the automatic opening of the valve 58 to release the pressure in the cylinder 150, whereupon the piston 149 is shifted by the spring 157 to throw the knife switch 148, to break the circuit through the motor line 144.

It may be observed that the stopping mechanism operates precisely as illustrated in Fig. 2, with the exception that the knife switch lever 148 is actuated to break the motor circuit, which is the equivalent of the throttle shown in Fig. 2.

In event of the operator disregarding the semaphore 10, the contact shoe 161 engages the contact plate 5 and closes the circuit, from the third rail 143, through the line 162, semaphore arm 163, contact plate 164, line 165, contact shoe 161, line 166, including the solenoid 65, to ground. However, if the semaphore 160 occupies the safety position as indicated in dotted lines in Fig. 5, the contact shoe 167 engages the contact plate 6 and closes the circuit from the third rail 143, through the line 162, semaphore arm 163, contact plate 168, solenoid winding 169, line 170, contact shoe 167, and line 171, to ground, thereby shifting the semaphore 10 to the danger position shown in full lines in Fig. 5. Upon failure of the said signal to be shifted by the movement of the car and the contact of the shoe 167 with the plate 6, the further movement of the car causes the shoe 161 to contact with the contact plate 7, which closes the circuit from the third rail 143, through the line 162, contact plate 168, line 172, contact shoe 161, line 166 including the solenoid 65, to ground, which actuates the stopping mechanism to stop the car as before. Assuming that the signals have been properly set, the car is permitted to proceed, and when leaving the block or division occupied thereby the contact shoe 167 engages the contact plate 8 and closes the circuit from the third rail 143, line 162, the contact plate 164, semaphore arm 163, solenoid winding 176, line 177, contact shoe 167, and line 171, to ground, thereby resetting the semaphore from danger position to safety position as indicated in dotted lines in Fig. 5.

I do not desire to limit myself to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention as defined in the appended claims.

Having thus described my invention, I claim;

1. The combination with stopping mechanism comprising an air brake system, of pneumatic mechanism arranged to control said system, and means arranged to actuate said pneumatic mechanism, said means being reset by the actuation of said pneumatic mechanism.

2. The combination with stopping mechanism comprising an air brake system, of a valve arranged to control said system, and pneumatic mechanism arranged to shift said valve, to operative position by intermittent strokes.

3. The combination with stopping mechanism comprising an air brake system including a train pipe, of a valve arranged to control said train pipe, a pneumatic motor included in said system arranged to shift said valve intermittently to operative position, and tripping mechanism arranged to actuate said pneumatic motor.

4. The combination with stopping mechanism, comprising an air brake system including a train pipe, of a controlling valve in said train pipe, and a pneumatically operated motor connected to be driven by the pressure in said system, arranged to intermittently open and close said train pipe valve to gradually set the brakes.

5. The combination with stopping mechanism comprising an air brake system including a train pipe, of a controlling valve in said train pipe, a pneumatic motor arranged to intermittently open and close said train pipe valve to gradually set said brakes, and a valve automatically actuated by the motor to control said motor.

6. The combination with stopping mechanism comprising an air brake system including a train pipe, of a controlling valve in said system, a pneumatically operated motor arranged to actuate said valve to intermittently open and close said train pipe to set the brakes, a valve controlling said motor, and means arranged to actuate said motor valve, by the action of said motor.

7. The combination with stopping mecha-

nism comprising an air brake system, of a valve in said system, a pneumatic motor connected to be operated by the air pressure in the air brake system, an automatically operated valve arranged to control said motor, means arranged to normally maintain said valve in closed position, means arranged to release said valve, and means including said motor to set said valve back to its normally closed position.

8. The combination with stopping mechanism comprising an air brake system, of a valve in said system, a pneumatic motor connected to be operated by the air pressure in the air brake system, an automatically actuated valve arranged to control said motor, means to trip said valve to actuate said motor, and means actuated by said motor to close said valve to stop said motor.

9. The combination with stopping mechanism comprising an air brake system, of a valve in said system, a ratchet carried by said valve, a pneumatic motor connected to be driven by the air pressure in the brake system and arranged to rotate said ratchet to intermittently open and close said valve to set the brakes, an automatically actuated valve arranged to control said motor, a detent arranged to normally maintain said valve in closed position, means actuated by said motor arranged to close said motor valve, and maintain said detent in inoperative position, and means arranged to hold said motor valve in closed position until said detent lever is released by resetting the valve in said system.

10. The combination with stopping mechanism comprising an air brake system including a train pipe, of a valve controlling said train pipe, a pneumatic motor connected to be driven by compressed air and arranged to intermittently open and close said train pipe valve to set the brakes, an automatically actuated valve arranged to control said motor, a detent arranged to normally maintain said motor valve in closed position, a solenoid connected to shift said detent to release said motor valve, and means connected with the train pipe valve operative to close said motor valve as said train pipe valve is opened.

11. The combination with stopping mechanism comprising an air brake system, of a valve controlling said system, a pneumatic motor arranged to successively open and close the train pipe by intermittently actuating said valve to set the brakes, an automatically actuated valve arranged to control said motor, a detent arranged to retain said motor valve in normal position, and means including an electric circuit connected to shift said detent to release said motor valve.

12. The combination with stopping mechanism comprising an air brake system, of a valve controlling said system, a pneumatic motor connected to successively open and close the train pipe by intermittently actuating said valve to set the brakes, an automatically actuated valve arranged to control said motor, a detent arranged to retain said motor valve in normal position, and means actuated to shift said detent to release said motor valve.

13. The combination with stopping mechanism for railway cars, comprising an air brake system, of a pneumatic motor connected to be driven by compressed air from said system and arranged to open and close the train pipe of said system to set the brakes, a throttle, a cylinder having a piston arranged to control said throttle and normally held by air pressure, and means to actuate said motor and release the pressure from said piston to close said throttle, and set the brakes.

14. The combination with stopping mechanism for railway cars, comprising an air brake system including a train pipe, of a train pipe valve, a pneumatic motor comprising a reciprocatory piston controlled by the movement of the car, arranged to intermittently rotate said valve to open and close said train pipe to set the brakes.

15. The combination with stopping mechanism comprising an air brake system including a train pipe, of a train pipe valve, a pneumatic motor controlled by the movements of a car, arranged to intermittently rotate said valve to open and close said train pipe.

16. The combination with stopping mechanism comprising an air brake system including a train pipe, of a train pipe valve, pneumatic mechanism controlled by the movement of a car, arranged to intermittently rotate said valve to open and close said train pipe.

17. A car provided with motive power, means to control said motive power, and pneumatic means arranged to automatically shut off said motive power independent of said controlling means, comprising a detent maintained operative by pneumatic pressure.

18. A car provided with motive power, the combination with means connected to control said motive power, means actuated by pneumatic pressure to maintain the normal connections of said controlling means, and a valve automatically actuated and arranged to release said pressure to break said connection to shut off said motive power.

19. A car provided with motive power, the combination with a valve rod to control said motive power and provided with a joint, means actuated by pneumatic pressure to maintain said joint operative to be actuated manually, and means arranged to be

automatically actuated to release said pressure and break said joint to shut off said motive power, and render said rod manually inoperative until the air pressure is re-established.

20. The combination with stopping mechanism comprising an air brake system, of a valve controlling said system, comprising a rotary perforated disk having peripheral teeth, a pneumatic motor having a reciprocal pawl arranged to engage said teeth to intermittently rotate said disk, and register said apertures, with apertures in said valve to open and close the train pipe and set the brakes, and an automatically actuated valve arranged to control said motor, and means connected with said disk operative to close the motor valve.

21. A car provided with motive power, means to control said motive power, and pneumatic means arranged to automatically shut off said motive power independent of said controlling means, comprising means maintained operative by pneumatic pressure.

22. A car provided with motive power, the combination with a valve rod to control said motive power and provided with a joint, means actuated by pneumatic pressure to control said motive power, means actuated by pneumatic pressure to maintain said joint operative to be actuated manually, comprising a cylinder connected with pneumatic pressure and a piston maintained operative by said pressure, and means arranged to be automatically actuated to release said pressure and break said joint to shut off said motive power, comprising a valve operative to shut off the pressure to said cylinder and to permit the escape of the pressure therein.

23. A car provided with motive power, the combination with a valve rod to control said motive power and provided with a joint, means actuated by pneumatic pressure to control said motive power, means actuated by pneumatic pressure to maintain said joint operative to be actuated manually, comprising a cylinder connected with pneumatic pressure and a piston maintained operative by said pressure, means arranged to be automatically actuated to release said pressure and break said joint to shut off said motive power, comprising a valve operative to shut off the pressure to said cylinder and to permit the escape of the pressure therein, and means comprising a cylinder and a piston connected with said valve actuated by pneumatic pressure to control said valve.

In witness whereof, I have hereunto set my hand this 25th day of October, 1909.

FRANK C. WILLIAMS.

Witnesses:
CLIFTON C. HALLOWELL,
ALSTON B. MOULTON.