W. E. WINE.

TRAIN STOP.

APPLICATION FILED MAY 24, 1913.

1,170,862.

Patented Feb. 8, 1916.

4 SHEETS—SHEET 1.

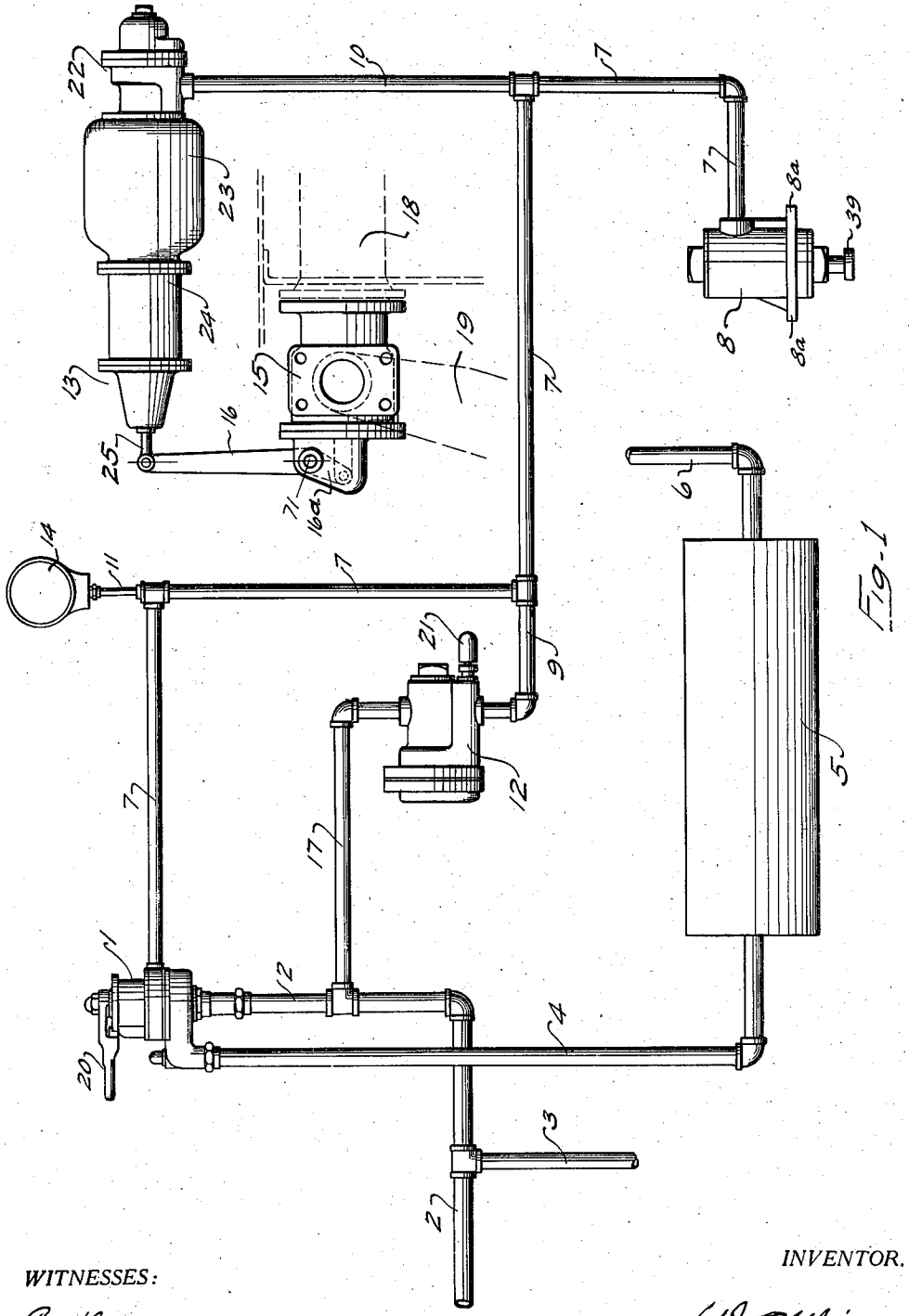

Fig. 1

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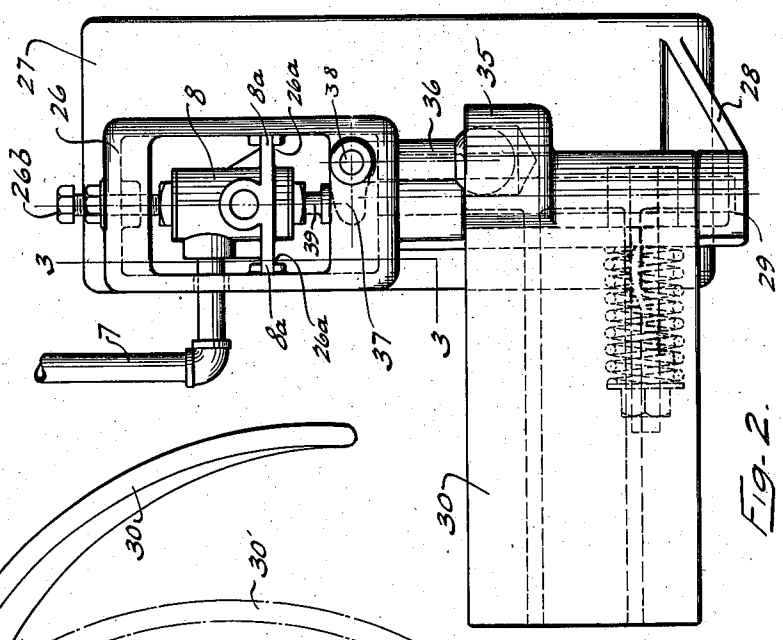

Fig. 2.

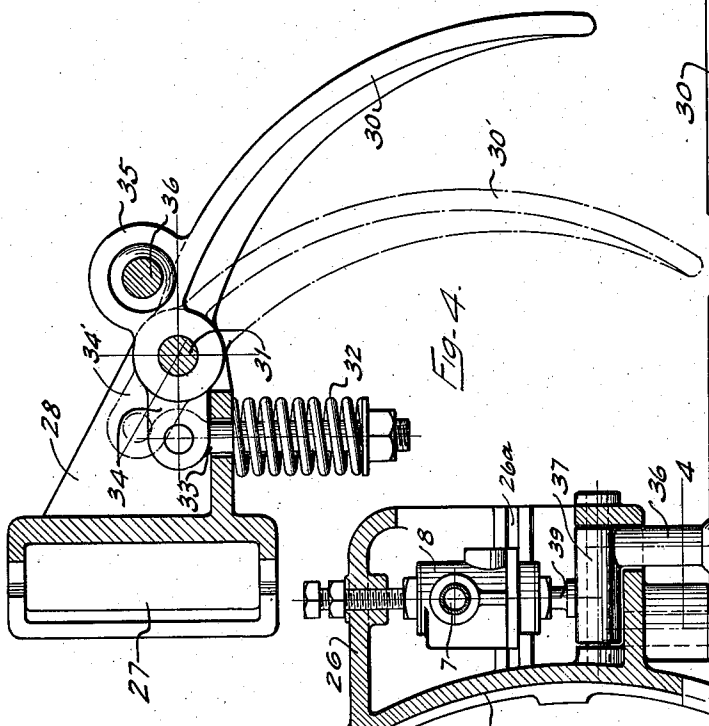

Fig. 4.

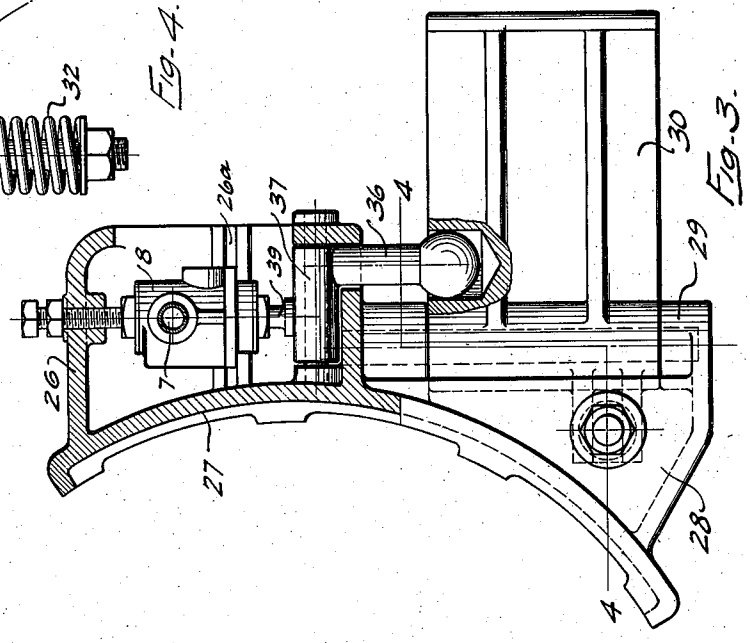

Fig. 3.

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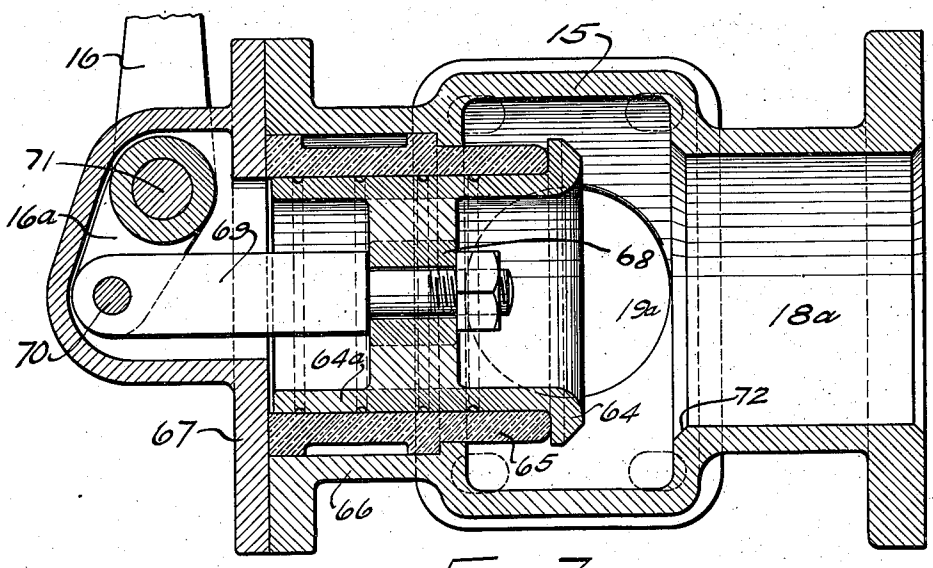

Fig-7

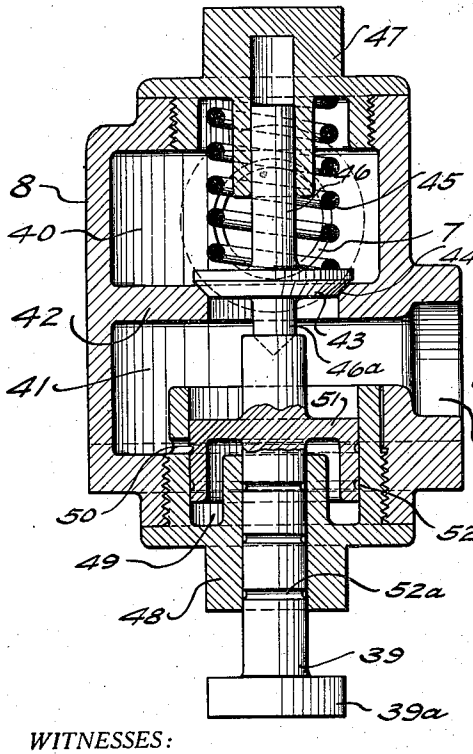

Fig-5

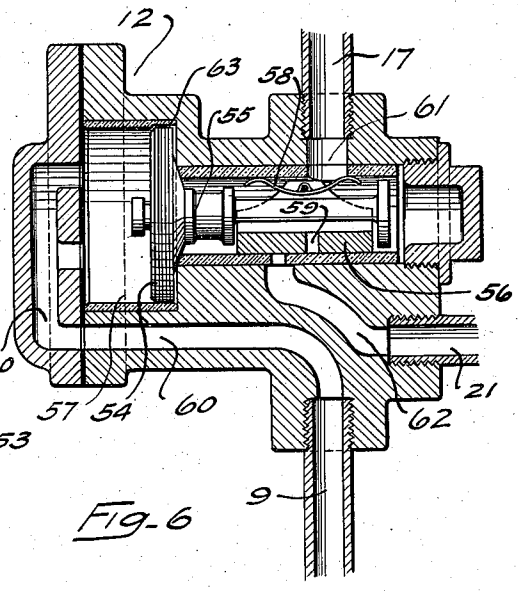

Fig-6

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4 SHEETS—SHEET 4.

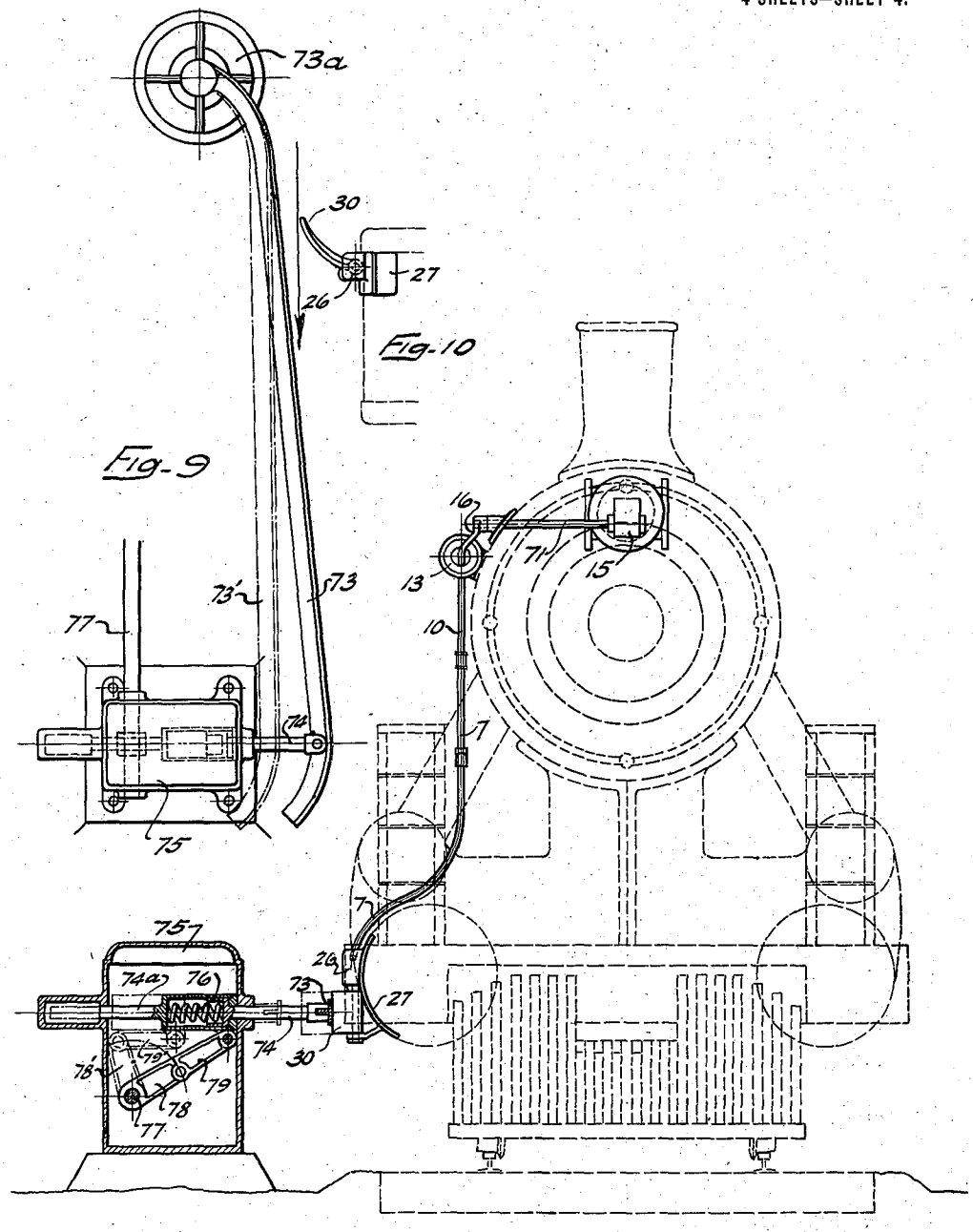

Fig-8

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UNITED STATES PATENT OFFICE.

WILLIAM E. WINE, OF WILMINGTON, NORTH CAROLINA.

TRAIN-STOP.

1,170,862. Specification of Letters Patent. Patented Feb. 8, 1916.

Application filed May 24, 1913. Serial No. 769,654.

To all whom it may concern:

Be it known that I, WILLIAM E. WINE, a citizen of the United States, residing at Wilmington, in the county of New Hanover and State of North Carolina, have invented certain new and useful Improvements in Train-Stops, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to improvements in train stopping and controlling devices, wherein a moving train may be brought to a stop without the assistance of the engineman. Brake operating devices of this character employ electrically operated and other delicately constructed mechanisms on the locomotive to accomplish their object and in some cases the devices are applied as attachments to the present operating levers, etc., which in actual service would not only be impracticable but dangerous to the engineman.

The object of my invention is to so construct a train stopping mechanism that it will operate mechanically and conform, in character and ruggedness of construction to other devices now in use on locomotives.

A further object of my invention is to produce a train stopping device independent in its operation from the present manually operated devices on a locomotive but as an auxiliary device thereto.

With these and other objects hereinafter explained in view my invention consists in the construction and combination of elements hereinafter described and claimed.

Referring now to the drawings, Figure 1 shows a condensed arrangement of the device; Fig. 2 is a side view of the trip device; Fig. 3 is a part rear view and section on line 3—3; Fig. 4 is a section on line 4—4; Fig. 5 is a vertical section of the trip valve; Fig. 6 is a vertical section of the control valve; Fig. 7 is a vertical section of the auxiliary throttle valve; Fig. 8 is a front view of the device applied to a locomotive and in the act of being tripped by the tripping device along side the track; Fig. 9 is a plan view of the tripping device; Fig. 10 is a plan view of the trip lever applied to a locomotive cylinder.

Similar characters designate like parts throughout the several figures of the drawings.

Referring now to the parts by number, 1 represents an engineer's brake valve, 2 a train pipe, 3 pipe leading to brake arrangement on the locomotive, 4 pipe leading from engineer's valve 1 to main reservoir 5 which is supplied with compressed air through pipe 6, these devices being in present use on practically all locomotives. It is in conjunction with these devices that the devices of my invention are used. The pipe 7 is connected at a suitable location to the engineer's valve 1, at one end and to the trip valve 8 at the other end. Intermediate the two ends of pipe 7 are branches 9, 10 and 11 leading to the control valve 12, auxiliary throttle valve closing device 13 and the pressure recording gage 14 respectively.

The auxiliary throttle 15 is connected to the closing device by a lever 16, and is located at some point in the steam pipe between the main throttle valve and the cylinders of the locomotive, being shown in the drawings at the junction of the dry pipe 18 and steam pipes 19, shown by dotted lines. The control valve 12 is also connected to the train pipe 2 by branch pipe 17.

The operation of the arrangement is as follows: Air is supplied to the main reservoir 5 through pipe 6, then through pipe 4 and engineer's valve 1 into pipes 2, 17, 7, 9, 10, and 11. But engineer's valve is so constructed that air will not flow into pipe 7 except when the handle 20 of the engineer's valve is in full release position, the object of which will be shown later on in this description. The pressure in all the pipes having equalized and the handle of the valve 1 placed in running position, then should the trip valve 8 be suddenly opened it remains open until the pressure in pipe 7 is reduced to practically that of the surrounding atmosphere and then closes automatically. There being no way for the air pressure to reach pipe 7 through engineer's valve 1 when the handle 20 is in running position, the pressure therein will remain reduced until the handle of the engineer's valve is again placed in full release position. This reduction in pressure causes the control valve 12, (the operation of which will be explained later) to open the pipe 17 to the atmosphere, which immediately reduces the pressure in the train pipe 2 and causes the brakes of the train to be applied in the usual manner. This opening, made

in pipe 17 by control valve 12, will remain open until the pressure in pipes 7 and 9 is again restored and then closes.

The whistle 21 is connected to the opening in pipe 17 in such a manner that when air is caused to be exhausted from the pipe 17 the whistle will sound, bringing the matter to the attention of the engineer and fireman.

In order that a record may be kept of the number of automatic applications of the brakes during a given period, a pressure recording gage 14 is connected to the pipe 7 by the pipe 11.

The reduction in pressure in pipes 7 and 10 causes the triple valve 22 to admit air from auxiliary reservoir 23 into cylinder 24, moving piston rod 25 and lever 16 in a manner to close the auxiliary throttle 15.

It will be seen from the foregoing description that any reduction in the pressure within the pipe 7 will cause the control valve 12 to exhaust air from the train pipe, applying the brake on the entire train, and simultaneously close the auxiliary throttle, cutting off the flow of steam to the cylinders of the locomotive. In order to restore the pressure in pipe 7 it is only necessary for the engineer to turn the handle of the valve 1 into full release position, thereby releasing the brakes on the entire train and simultaneuously restoring all the devices of this invention to their normal position.

From the construction of my device it can be applied to any steam locomotive, requires no additional knowledge or skill in its operation than is now required for the operation and maintenance of a locomotive and will cause the train to be stopped, if by negligence or otherwise the engineer should disregard a danger signal.

The trip valve 8 is mounted in a casing 26 which is preferably located on the locomotive cylinder in order that the heat therefrom may prevent the accumulation of ice about the valve in cold weather.

In Figs. 2, 3, and 4 the casing 26 is secured to flange 27 which is adapted to be bolted to the side of the cylinder of a locomotive. The flange 27 is provided with a bracket 28 on its lower end which has a supporting bearing 29 on its outer end on which rests the trip lever 30. The trip lever 30 is held in position between casing 26 and bearing 29 by pin 31 and is caused to normally stand in position shown by the spring 32 which is connected by rod 33 to an arm 34. The position of the trip lever in the act of being tripped is shown by dotted lines as 30′. Near the inner end of the trip lever is a pocket 35 which engages a depending arm 36 of the trip valve operating bell crank 37, the bell crank being journaled on the pin 38 engages the vertically reciprocating operating stem 39. In moving the trip lever 30 into position 30′ the bell crank 37 operates on stem 39 moving same upward, the result of which will be fully explained under the description of the trip valve 8. The trip valve 8 is provided with lugs 8^a engaging guide ways 26^a on the inside of the casing 26. In order that the trip valve may be held rigidly in position a set screw 26^b is placed in the top of the casing 26 and engages the top of valve 8, thus preventing either lateral or vertical movement of the trip valve.

In Fig. 5 the trip valve 8 is shown in vertical section, the upper chamber 40 being in open communication with the pipe 7 and separated from chamber 41 by the dividing wall 42 and puppet valve 43. The valve 43, held on its seat 44 by spring 45 has a guide stem 46 on its upper side engaging a suitable guide way in the cap 47. The operating stem 39 is provided with a disk 39^a on its lower end in order to provide ample bearing surface for the short arm of the bell crank 37. The cap 48 is provided with a cylindrical chamber 49 which communicates with chamber 41 through port 50. The piston 51 is attached to the operating stem 39 near its upper end and is provided with water grooves 52, the operating stem being also provided with water grooves 52^a. In the top of the operating stem 39 is a seat which engages the lower extension of the valve stem 46^a. The operation of the trip valve 8 is as follows: The operating stem 39 being pushed upward by bell crank 37 the puppet valve 43 is lifted from its seat and piston 51 uncovers port 50, allowing air to escape from chamber 40 into chamber 41 and out through port 53 to the atmosphere, at the same time filling chamber 49 through port 50 with air at its exhausting pressure. As soon at the bell crank 37 has released the operating stem 39 the spring 45 forces the valve 43 and piston 51 downward until piston 51 closes port 50 men the downward movement is suddenly checked by the compression of the air in chamber 49, until the air in this chamber has had time to leak around piston 51.

The control valve 12 is very much like the triple valves now used on all railway cars and locomotives.

The piston 54 is attached to one end of the piston rod 55, which loosely engages a slide valve 56 and is free to move horizontally in the cylinder 57. The slide valve is provided with a spring 58 for holding it in proper working position and also has a port 59 vertically through it. The body of the control valve is provided with ports or air passages 60, 61 and 62 which are connected to pipes 9 and 17 and whistle 21 respectively. The positions of piston 54 and slide valve 56 shown in Fig. 6 are their normal running positions with the ports 59 and 62 closed, and pressures equalized on both sides of piston 54. As soon as the trip valve is operated exhausting air from pipes 7 and 9 the pres-

sure immediately drops in port 60 and behind piston 54 causing the pressure in port 61 and in front of piston 54 to push the piston to the other end of the cylinder and to cause port 59 to gage with port 62, thereby providing a direct passage for the air from pipe 17 through ports 61, 59 and 62 and whistle 21, which reduces the pressure in pipe 17 and 2, applying the brakes on the entire train.

In order to restore the control valve to its normal position the handle of the engineer's valve is placed in full release position, which admits air pressure from the main reservoir into both pipes 9 and 17 but as the port 61 is still open to the atmosphere through ports 59 and 62 the pressure in pipe 9 and port 60 behind the piston increases beyond that on the front side of the piston and pushes it back into the position shown, thus causing the ports 59 and 62 to be closed. The air pressure then builds up equally on both sides of the piston. As pipe 9 and port 60 are supplied with air pressure through the engineer's valve only when the handle of same is in full release position, a groove 63 is provided whereby air may slowly pass around and maintain an equal pressure on both sides of the piston 54 and throughout the entire piping system of the device.

The auxiliary throttle 15 is so constructed that when the engineer's throttle is open the steam flowing through the steam pipes to the cylinders acts upon valve 64, pushing it open as shown in Fig. 7, the object being to have the valve held closed against the steam pressure by the operating device 13, when the trip valve 8 has been operated, so that if anything should fail to work about the operating device, the steam pressure will hold this valve open. The valve 64 is provided with a cylindrical portion 64^a surrounded by a guide cylinder 65 which is held tightly in the body 66 by the head 67. Within the cylindrical portion 64^a is a lug 68 engaging the end of the valve operating rod 69 the opposite end of which is connected to the lever 16^a by pin 70. The levers 16 and 16^a are both attached to shaft 71, thus completing the mechanism between the operating device 13 and the valve 64. When trip valve 8 is operated and the pressure in pipes 7 and 10 reduced, the triple valve 22 admits air from auxiliary reservoir 23 into cylinder 24, which causes push rod 25 to move outwardly and through the intervention of levers 16 and 16^a, shaft 71 and valve rod 69 the valve 64 is moved to its seat 72, thus shutting off communication between chamber 18^a and 19^a. The valve 64 having thus been closed it will remain closed until the pressure in pipes 7 and 10 has been restored to normal, when the valve will resume its position as shown in Fig. 7. But, for some unknown cause, should the valve not return to its normal position, it will be opened by the steam pressure in chamber 18^a when the engineer's throttle is opened. From the construction of the valve 64 it will be seen that any ratio between the areas of the two ends of the valve may be obtained by increasing or reducing the diameter of the cylindrical portion 64^a.

The foregoing description has been confined exclusively to that part of the device which is used on the locomotive, but in the remaining paragraphs the part of the device used in conjunction with the signals or other track devices, for tripping or operating the trip valve and lever, will be dealt with.

In Fig. 8 the trip lever 30 and casing 26 containing trip valve 8 are attached to the cylinder of a locomotive, the latter being shown by dotted lines.

The auxiliary throttle 15 is shown in position in the smokebox of the locomotive and connected by shaft 71 to the operating device 13 on the outside of the boiler.

As described earlier in these specifications the pipes 7 and 10 connect the trip valve 8 with the auxiliary throttle operating device 13.

The device here shown for operating the trip lever 30 consists of an anchor post 73^a on top of which is pivoted the trip bar or movable ramp 73 at one end, the opposite end being connected to the reciprocating member 74, operating through the casing 75. The reciprocating member is made up of three parts 74, 74^a and spring 76, and is here shown operated by shaft 77, lever 78 and link 79 connected to the portion 74^a. The lever 78 and link 79 form a solid strut when the ramp is out in danger position in order that no shock may be transmitted to the operating mechanism when the trip lever is brought in contact with the ramp by the passing locomotive. The spring 76 is placed between the portions 74 and 74^a of the reciprocating member in order to prevent undue strains in the device due to the velocity of the moving trip lever on the locomotive.

When the tripping device shown in Figs. 8 and 9 is located a proper distance from the track and is set, either by automatic or manually operated devices, into the position shown by full lines it is in danger position and will engage and operate the trip lever 30 and valve 8 of a locomotive so equipped which attempts to pass. When the ramp 73 is moved into clear position 73′ the operating parts take positions 74′, $74^{a\prime}$, 78′ and 79′. It will now be seen that in order to stop a moving train equipped with the devices of this invention, the shaft 77 is caused to be rotated in such a manner as to cause the ramp 73 to be moved out into the path of the moving trip lever on the side of the cylinder of the locomotive. The anchor post 73^a is placed at a sufficient distance from casing 75

to make the angular movement of the ramp as small as possible without impairing the strength of the bar. This small angle serves to diminish the compressive strains in the operating parts within the casing 75 and increasing the tensile or longitudinal strains in the ramp.

It will be seen from the foregoing description that I have accomplished all the objects sought in a thoroughly practical manner without the use of complicated and intricate parts, and that the same ruggedness of construction can be followed in its parts as now used in the construction of locomotive parts.

Having thus described my invention I aim in the appended claims to cover all modifications not involving a departure from its spirit and scope.

1. In an automatic train stop, the combination with an air brake system, provided with an engineer's valve, of means for operating said brake system, comprising a trip valve and a control valve, an operative connection between said trip valve and said control valve and a direct operative connection between said engineer's valve and said control valve, whereby an operation of the trip valve controls the actuation of the control valve to one position and an operation of the engineer's valve controls the actuation of the control valve to another position.

2. In an automatic train stop, the combination with an air brake system provided with an engineer's valve, of means for operating said brake system, comprising a trip valve communicating with a port in said engineer's valve, and a control valve having opposite chambers therein, one of said chambers communicating with a chamber in said engineer's valve and the trip valve, the other of said chambers communicating with said brake system.

3. In an automatic train stop, the combination with an air brake system provided with an engineer's valve, of means for operating said brake system, comprising a trip valve provided with a chamber therein communicating with a chamber in said engineer's valve, and a control valve provided with a reciprocating member operating within a chamber therein, the chamber in the trip valve having communication with the chamber in the control valve, said chamber in the control valve having a port communicating with the train line of said brake system.

4. In an automatic train stop, the combination of an air brake system, provided with an engineer's valve and a source of power having a regulating means, of means for operating said brake system comprising a trip valve communicating with a port in said engineer's valve, and a control valve having chambers therein communicating with said engineer's valve and the trip valve, and means operated by said trip valve for controlling said power.

5. In an automatic train stop, the combination with an air brake system provided with an engineer's valve, of means for operating said brake system, comprising a trip valve communicating with a port in said engineer's valve, and a control valve having opposite chambers therein, one of said chambers communicating with a chamber in said engineer's valve and the trip valve, the other of said chambers communicating with said brake system and means located along the roadway for operating said trip valve.

6. In an automatic train stop, the combination with an air brake system provided with an engineer's valve, of means for operating said brake system, comprising a trip valve having a chamber therein, means of communication between said trip valve and said engineer's valve, and a control valve having ports communicating with said brake system and said chamber in the trip valve, said trip valve having upper and lower chambers therein, a dividing wall between said chambers, a valve in the dividing wall and means for retarding the movement of said valve.

7. In an automatic train stop, the combination with an air brake system provided with an engineer's valve, of means for operating said brake system, comprising a trip valve having a chamber therein, means of communication between said chamber and a chamber in said engineer's valve, and a control valve having a cylindrical chamber therein communicating with said trip valve, a piston in said chamber and a valve operated by said piston adapted to open and close a port in said brake system.

8. In an automatic train stop, the combination with an air brake system provided with an engineer's valve, of means for operating said brake system, comprising a trip valve having a chamber therein, means of communication between said chamber in the trip valve and a chamber in the engineer's valve through a port when said engineer's valve is in full release position, and a control valve having chambers therein and provided with ports communicating with said brake system and said chamber in the trip valve.

9. In an automatic train stop, the combination with an air brake system provided with an engineer's valve and a pressure reservoir, of means for operating said brake system, comprising a control valve provided with a chamber having ports communicating with said brake system, and a trip valve provided with a port communicating with said control valves and having upper and lower chambers therein, a valve dividing

said chambers and a piston in one of said chambers adapted to retard the movement of said valve.

10. In an automatic train stop, the combination with an air brake system provided with an engineer's valve and a pressure reservoir, of means for operating said brake system, comprising a trip valve, means of communication between said trip valve and said pressure reservoir through said engineer's valve, a control valve provided with a chamber having ports communicating with said brake system and said trip valve, said trip valve being provided with upper and lower chambers therein, a valve dividing said chambers, means in one of said chambers adapted to retard the movement of said valve, and means for operating said trip valve, comprising a trip lever, means for yieldingly holding the trip lever in normal position and means for transmitting movement from said trip lever to said trip valve.

11. In an automatic train stop, the combination with an air brake system, provided with an engineer's valve, of means for operating said brake system, comprising a trip valve, means of communication between said trip valve and a chamber in said engineer's valve and a control valve provided with a reciprocating member operating within a chamber therein, the chamber in the trip valve having communication with the chamber in the control valve, said chamber in the control valve being in direct communication with said brake system, and an alarm device having intermittent communication with said chamber in the control valve.

12. In an automatic train stop, the combination with an air brake system provided with an engineer's valve, of means for operating said brake system, comprising a trip valve communicating with said engineer's valve, a control valve having chambers therein, one of said chambers communicating with the chambers in the said engineer's valve, and the trip valve, another of said chambers communicating with said brake system, a housing for said trip valve, said trip valve being provided with guide flanges which engage guideways in said housing and means for securing said trip valve within the housing.

13. In an automatic train stop, the combination with an air brake system provided with an engineer's valve, of an automatic brake operating system, comprising a trip valve, means of communication between said trip valve and a chamber in said engineer's valve, a control valve, means of communication between said control valve and said trip valve, means of communication between said control valve and said brake system, and a pressure recording means for said brake operating system.

14. In an automatic train stop, the combination with an air brake system provided with an engineer's valve and a source of power having a regulating means, of means for operating said brake system comprising a trip valve communicating with a port in said engineer's valve and a control valve having chambers therein communicating with a chamber in said engineer's valve and with the trip valve and means operated by said trip valve for controlling said power supplemental to said regulating means comprising an air cylinder, air reservoir and triple valve and means for transmitting movement from said air cylinder to said controlling means.

This specification signed and witnessed this 5th day of May A. D. 1913.

W. E. WINE.

In the presence of—
R. HUNT,
GEO. G. LYNCH.