J. D. NIX.

RAILWAY SAFETY APPARATUS.

APPLICATION FILED MAR. 16, 1910.

1,069,165.

Patented Aug. 5, 1913.

5 SHEETS—SHEET 1.

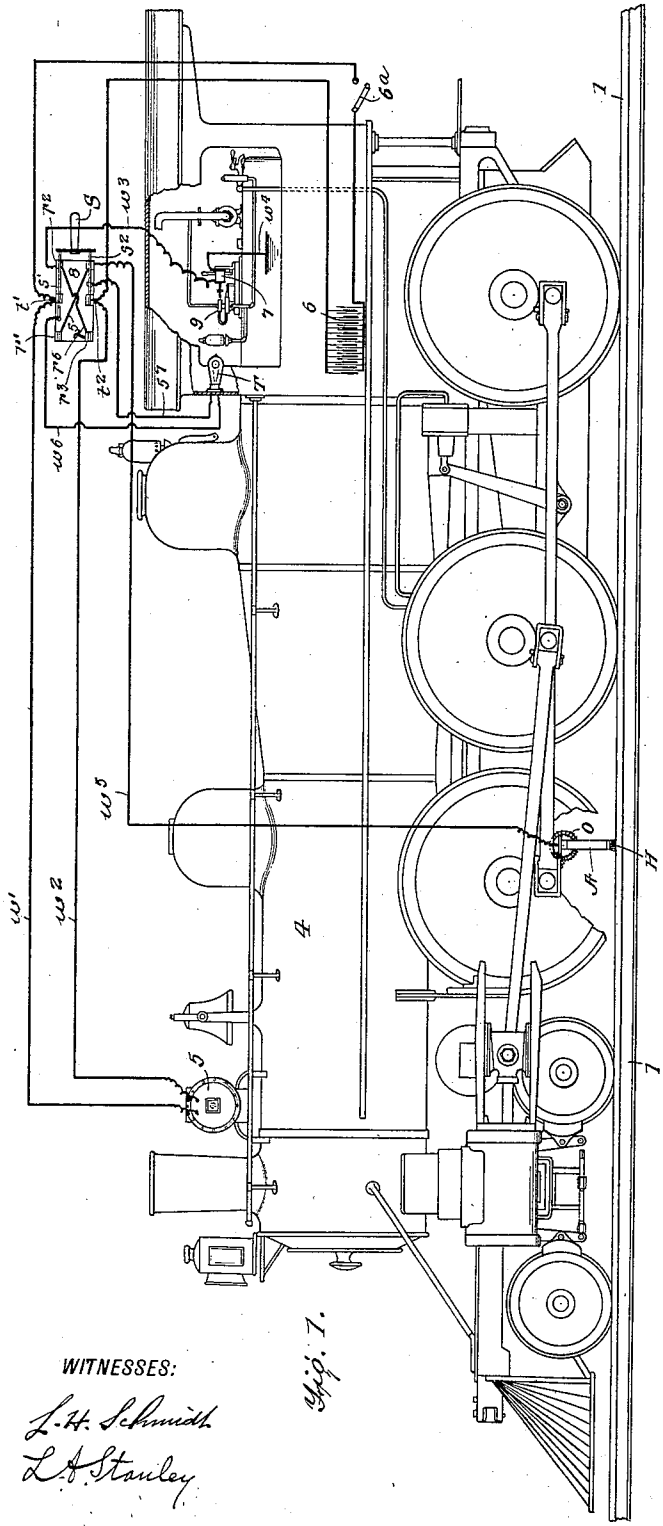

Fig. 1.

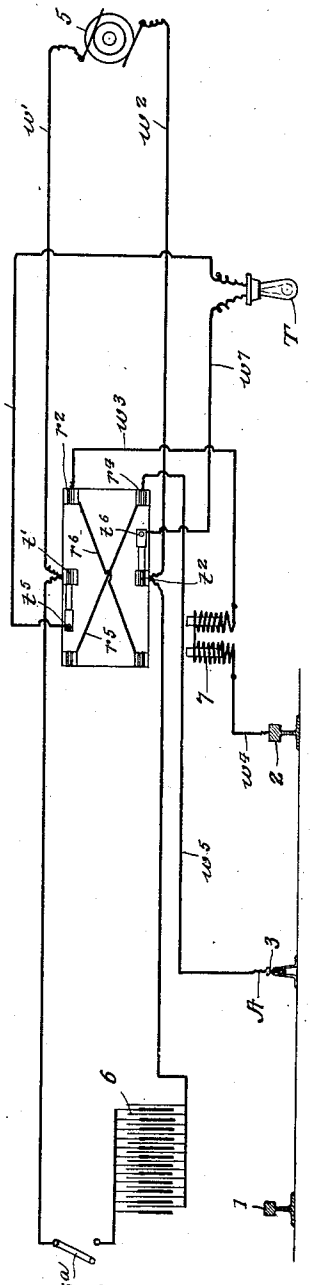

Fig. 2.

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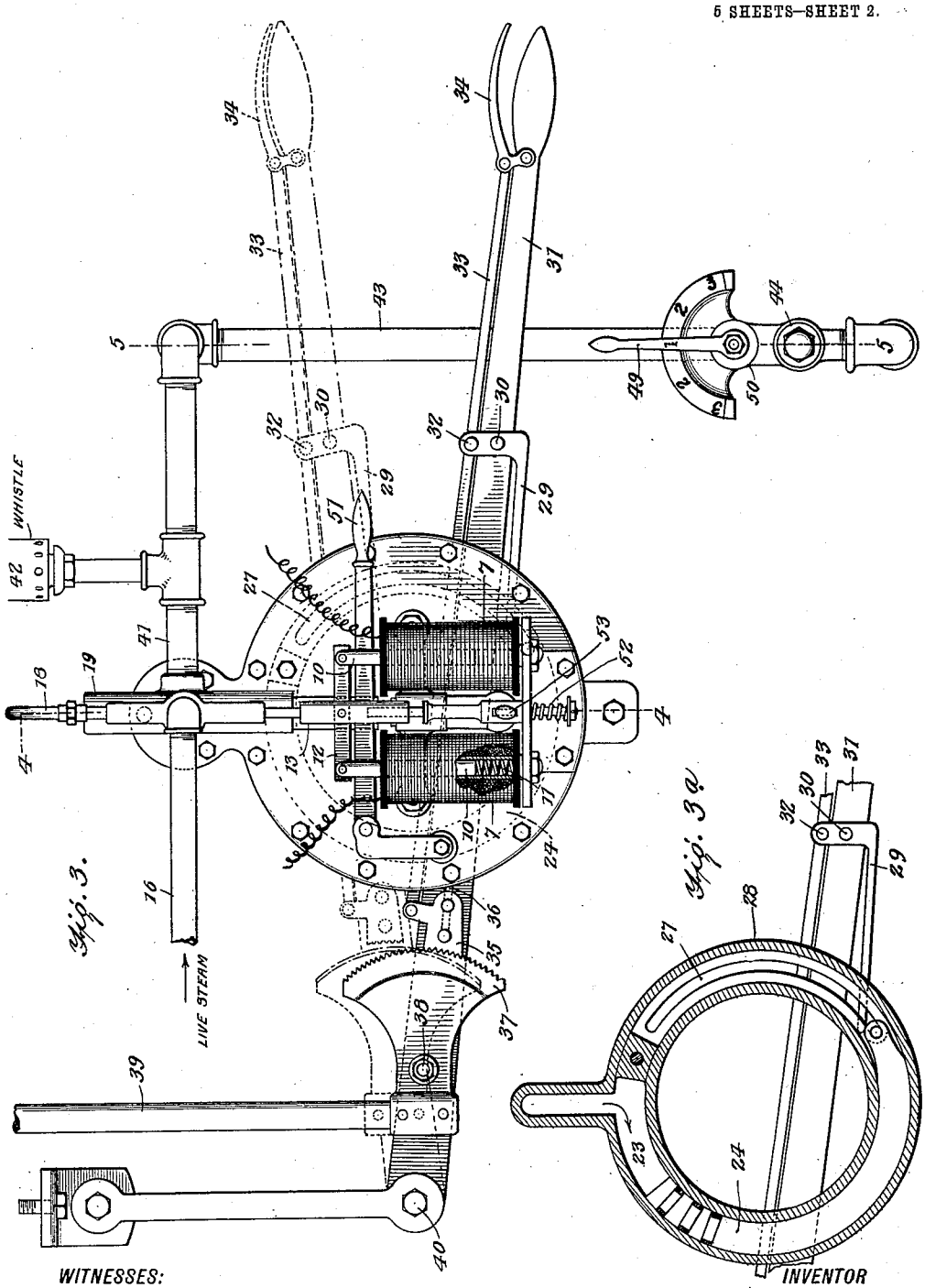

Fig. 3.

Fig. 3a.

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5 SHEETS—SHEET 3.

Fig. 4.

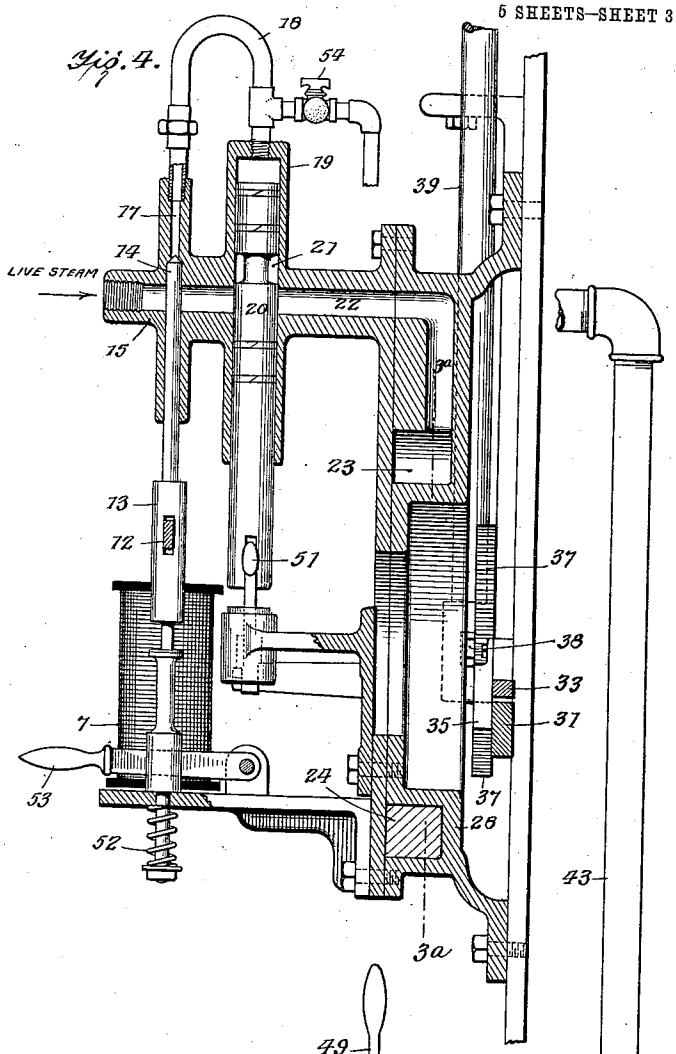
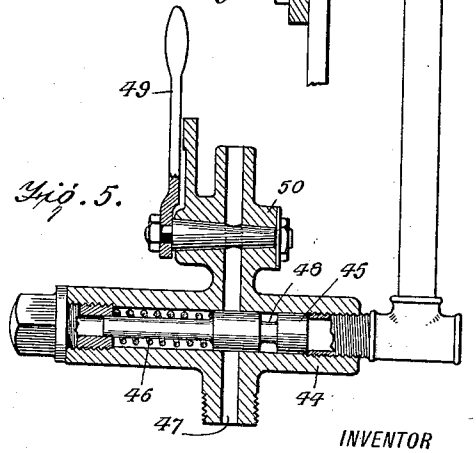


Fig. 5.



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5 SHEETS—SHEET 4.

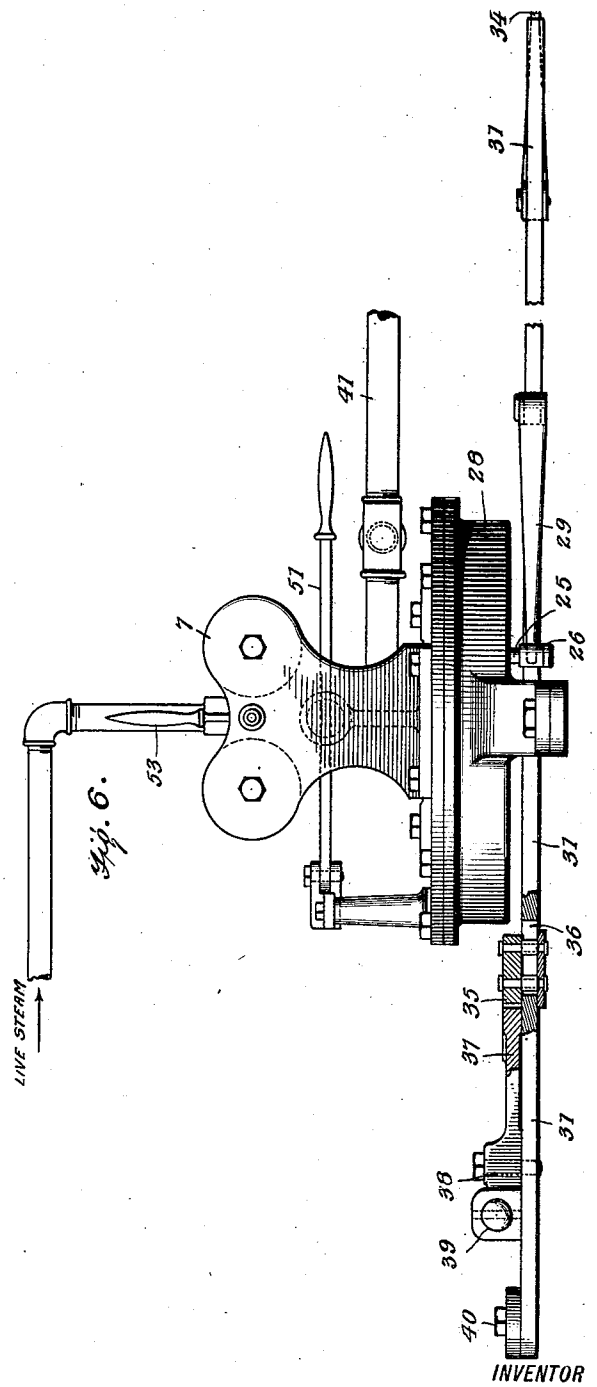

Fig. 6.

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6 SHEETS—SHEET 6.

Fig. 7.

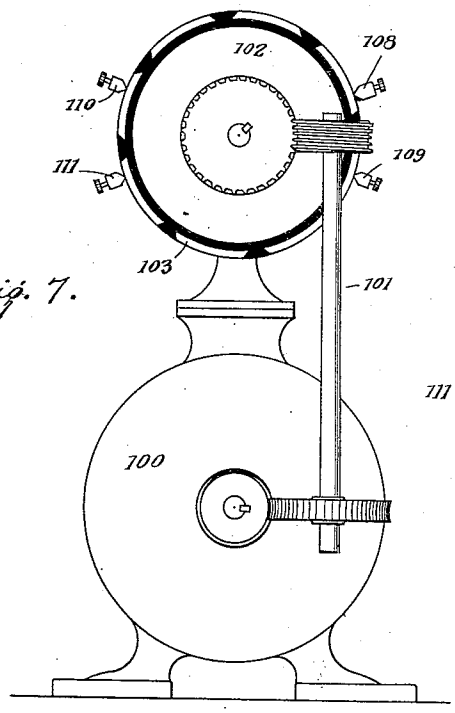
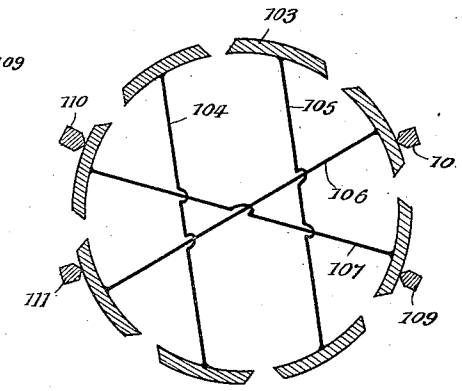


Fig. 8.



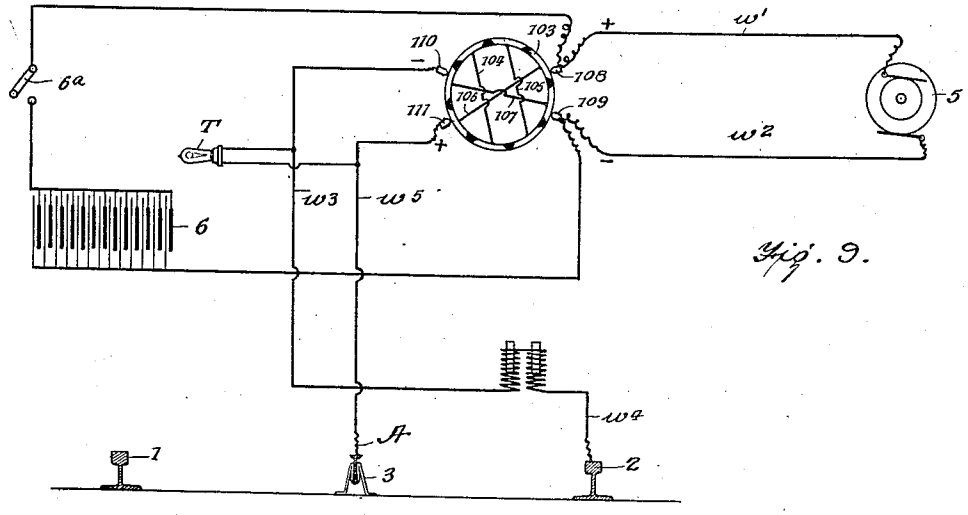


Fig. 9.

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UNITED STATES PATENT OFFICE.

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RAILWAY SAFETY APPARATUS.

1,069,165. Specification of Letters Patent. Patented Aug. 5, 1913.

Application filed March 16, 1910. Serial No. 549,625.

To all whom it may concern:

Be it known that I, JOHN DAY NIX, a citizen of the United States, and a resident of Ferriday, in the parish of Concordia and State of Louisiana, have made certain new and useful Improvements in Railway Safety Apparatus, of which the following is a specification.

My invention relates to appliances for preventing collisions on railways and it consists in the combinations, constructions and arrangements herein described and claimed.

The invention herein disclosed is somewhat similar to that disclosed in my prior Patent No. 938,331, of October 26, 1909, but differs in certain details which will be described hereinafter and which will be particularly pointed out in the appended claims.

An object of my invention is to provide an apparatus to be installed on locomotives for automatically shutting off steam, setting the brakes and sounding an alarm when another train is within the same block. This apparatus comprises a solenoid or magnet, the action of which is effected by circuit connections through a similar apparatus on two locomotives in the same block, said magnets effecting the movement of certain valves so as to permit the entrance of steam for effecting the various operations mentioned.

A further object of my invention is to provide a novel form of apparatus for accomplishing the above mentioned results.

Other objects and advantages will appear in the following specification and the novel features of the apparatus will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming part of this application in which similar reference characters indicate like parts in the several views and in which—

Figure 1 is a diagrammatic view of a locomotive equipped with my invention, Fig. 2 is a diagrammatic view showing the circuit connections, Fig. 3 is a plan view showing the controlling solenoids and the means for operating the throttle lever, Fig. 3ª is a section along the line 3ª—3ª of Fig. 4, Fig. 4 is an enlarged vertical section along the line 4—4 of Fig. 3, Fig. 5 is a vertical section along the line 5—5 of Fig. 3, certain parts being shown in elevation for the sake of clearness, Fig. 6 is an edge view of the part shown in Fig. 3, certain of the parts being shown in section for the sake of clearness, Figs. 7 and 8 are diagrammatical views of an automatic circuit changer, and Fig. 9 is a diagrammatical view showing the automatic circuit changer substituted for the double pole switch of Fig. 2.

Referring now to Fig. 2, it will be seen that I have provided a track having the ordinary rails 1 and 2, and between them a third rail, the latter forming part of the electrical circuit which will be described more particularly hereinafter.

The general arrangement of the apparatus on the locomotive is best shown in Fig. 1. In this figure the locomotive 4 is provided with a dynamo or current generator 5 of any approved type and with the storage battery 6, which may be used in case the dynamo should not be running. A solenoid 7 is located in the cab of the engine and derives its current through a double pole reversing switch 8. The solenoid controls a valve 9 which permits the steam to effect the closing of the throttle, setting of the brakes, and sounding of an alarm. The mechanism for accomplishing these results will now be described.

Referring now particularly to Figs. 3, 4 and 6, it will be seen that I have provided the solenoids 7, whose movable cores 10 are normally held by the springs 11 in an outward position. The cores 10 of the solenoids are connected by a cross piece 12 which is pivotally connected to a valve stem 13. The latter controls a valve 14, (see Fig. 4,) in the valve casing 15, which is connected with the boiler by means of the pipe 16, see Fig. 3. The valve 14, see Fig. 4, seats in the end of a passage 17 which is connected by means of the curved pipe 18 with the cylinder 19. The latter is provided with a piston 20 having an annular groove 21 adapted to be brought into registration with the passage 22 to permit the flow of steam from the pipe 16. The passage 22 communicates with the annular passage 23 which contains a crescent shaped valve 24, see Fig. 3ª. The latter is provided with a downwardly depending pin 25 bearing a roller 26, see Fig. 6. The pin projects through a slot 27 in the casing 28. The roller 26 is arranged to bear on a bell-crank lever 29, see Fig. 3, which is pivoted at 30 upon the throttle lever 31, and which has a pivotal connection

32 with the link 33 of the locking lever 34, The link 33 is pivotally connected with a locking member 35 which is adapted to slide in a slot 36 in the lever 31, see Figs. 3 and 6. The locking member 35 is provided with teeth arranged to engage the teeth of the segment 37. The latter is pivoted at 38 upon the throttle lever 31 and is connected with the throttle valve stem 39. The end of the throttle lever 31 is pivoted at 40.

From the foregoing description it will be seen that when the valve 14 is moved by the movement of the core 10 of the solenoid, steam will be admitted into the cylinder 19 and will drive the piston 20 forward so as to bring the annular opening 21 in alinement with the passage 22, thereby admitting steam to the annular valve casing. The valve 24 will be driven forwardly and the roller 26 bearing on the bell crank lever 29 will cause a movement of the link 30 and the locking member 35, thereby releasing the segment 37 from the latter. A further movement of the annular valve 24 will bring the lever in contact with the side of the lever 31 and will move it into the dotted line position shown in Fig. 3. The trottle valve stem 39 will be moved accordingly.

An inspection of Fig. 3 will show that the valve casing 19 communicates by means of a pipe 41 with a whistle 42 and also by means of the pipe 43 with the valve casing 44, see Figs. 3 and 5. The latter is provided with a piston 45 which is normally held by means of the spring 46 in such position as to close the air passage 47 which leads to the train pipe. The piston 45 has an annular groove 48 which may be made to register with the passage 47 when steam pressure is applied to the piston 45. The handle 49 is shown in position for emergency in Figs. 4 and 5, being set at 1 on the dial. When it is moved to 2, it is for a service stop, and when it is put on 3 the air is closed off entirely by means of the cock 50.

In Figs. 3 and 6, I have shown a hand lever 51 by means of which the piston 20 may be brought back into position so as to cut off the steam from the whistle, throttle, and air brake mechanism, after these parts have been operated. The connection of this lever with the piston is shown in Fig. 4. The valve 14 is returned to its original position by means of a spring 52, see Fig. 4, when the solenoid is deënergized and if the spring should fail to close the valve it may be closed manually by means of the lever 53. Moreover the lever 51 may be used as an emergency lever to move the piston 20 so as to admit steam to the operating mechanism to shut off the throttle, set the brakes and sound the alarm. This will accomplish, it will be observed, instantly what would require three or four different movements on the part of the engineer. The pressure on the valve and the piston 20 in the pipe 18 may be relieved by opening the cock 54. In order for these parts to be restored, however, the solenoid must be deënergized in the manner hereinafter explained.

The apparatus has been sufficiently described to give a clear understanding of the description of the circuit connections. These are fully illustrated in Figs. 1 and 2. Conductor w' extends from the dynamo to the central terminal t' of the switch, while conductor w^2 extends from the opposite pole of the dynamo to the terminal t^2. If the dynamo is not in use, the storage battery 6 may be brought into use by closing the switch 6^a. The spring contact r^2 is connected with one side of the solenoid by the wire w^3, the other side of the solenoid 7 being grounded by means of the conductor w^4. The contact r^4 is connected by means of the conductor w^5 with the brush A which rides on the third rail 3. The terminals t^5, t^6 are connected by the respective conductors w^6 and w^7, to a pilot lamp T.

From the foregoing description of the various parts of the device the operation thereof may be readily understood. With locomotives equipped with the apparatus thus described, the entrance of one locomotive into a block occupied by another will bring both locomotives to a stop. The means by which this is done is as follows: Let us assume that two locomotives equipped as above described are in the same block. Referring now to Fig. 1, it will be seen that if the dynamo 5 is generating a current, the current will pass through the solenoids of both locomotives by the following path, 5, w', t', s', r^2, w^3, solenoid 7, w^4, to ground, through the rails, up through the approaching locomotive, into the solenoid by the grounded wire similar to w^4 in Fig. 1, to the terminal similar to r^2. If the locomotive is an approaching locomotive the switch handle S should be placed in a position opposite to that shown in Fig. 1. In this case the current will pass through the parts of the approaching locomotive corresponding to r^6, r^3, s^2, t^2, w^2, 5, w', t', s', r', r^5, r^4, w^5, A, third rail 3, to the first locomotive, then up through A of the first locomotive, w^5, r^4, s^2, t^2, w^2 to generator. This completes the circuit and energizes the solenoid of the approaching engine. As soon as the solenoid of the approaching engine is energized the valve 14 is moved by the movement of the cores 10, steam is admitted to the cylinder 19 through the pipe 18 and the movement of the piston 20 admits steam for closing the throttle lever, sounding the whistle and setting the brakes in the manner already described.

If the engineer of the engine should wish

to proceed cautiously he merely lifts the switch handle S thereby deënergizing the solenoid, the valve 14 being brought back into position by means of the spring 52 in the manner already described. If this spring does not close the valve it may be closed by the emergency lever 53. The throttle lever can now be manipulated manually to start the train. The movement of the throttle lever reseats the annular valve 24 which is now ready for the next operation.

In Figs. 7, 8 and 9 I have shown a circuit changer, the use of which renders my system particularly effective. Referring now to Figs. 7 and 8, 100 denotes a motor of any approved form. This motor drives, by means of any suitable mechanism, as the worm and gear mechanism 101, the commutator 102, having insulated segments 103, which are connected with each other in the manner shown in Fig. 8, by means of the cross wires 104, 105, 106 and 107. On one side of the commutator are the brushes 108 and 109 and on the other side the brushes 110 and 111. While I have described a particular form of switch for changing the polarity of the electrical connections, it will be understood that this is merely for the purpose of illustration and that any circuit changer or commutator, which will accomplish the same result, might be used. In Fig. 9 it will be apparent, if the wire w' is the positive wire leading from the dynamo 5, that the current will flow from the brush 108 through the segment 103, wire 106 to the brush 111, while the brush 109 will be connected with the brush 110 by means of the wire 107. The brush 110 therefore will have a negative polarity while the brush 111 will have a positive polarity. Now with one-quarter of a revolution, the parallel wires 104 and 105 will be connected with the respective brushes 111 and 110 on one side, and 109 and 108 on the other. This, obviously, will reverse the polarity of the brushes 111 and 110. This, of course, as explained before, will be when the terminals have opposite polarity. Since each circuit changer changes the polarity of its particular set of terminals every 100 ft. the device will positively cause the actuation of the solenoid of one or both of the engines, thus insuring the stopping of the train and the sounding of the signal. In using the circuit changer I place the pilot light T across the wires w^3 and w^5. The flashing of the pilot lamp, as the polarity is changed, will indicate that the polarity changer is in working order. If this lamp should not flash regularly it would indicate that something is wrong with the apparatus.

While the double pole switch herein described may be advantageously used I prefer to use the circuit changer described, since by means of it, both trains may be stopped.

I claim:

1. In an electrical safety system for railroads, a solenoid, a steam valve controlled thereby, a throttle lever, an air release valve, an annular valve connected with said steam valve, a valve in said annular casing arranged to engage the throttle lever for unlocking and moving the same and connections between said steam valve and said air release valve for operating the latter.

2. In an electrical safety system for railroads, a solenoid, a steam valve controlled thereby, a cylinder in communication with the steam valve, a piston in said cylinder, the movement of said piston serving to admit steam, an annular valve chamber adapted to communicate with said cylinder, a movable valve member in said annular valve casing, and a throttle lever, locking means therefor arranged to be actuated by a movement of the valve in said annular chamber, said throttle lever being moved by a further movement of said valve.

3. In an electrical safety system for railroads, the combination with a locomotive having throttle lever operating mechanism, and a brake setting mechanism, of a solenoid, a steam pipe, the core of said solenoid forming a valve for said steam pipe, a cylinder in communication with said steam pipe, said valve controlling admission of steam into the said cylinder, a piston within said cylinder, the movement of said piston serving to admit steam through said steam pipe, and connections between said steam pipe and said throttle lever actuating mechanism and said brake setting mechanism.

4. In an electrical safety system for railroads, a solenoid, a steam valve controlled thereby, a cylinder in communication with said steam valve, a piston in said cylinder, a steam pipe, the movement of said piston serving to admit steam through said steam pipe, a train pipe outlet passage, a spring-pressed piston valve for normally closing said train pipe outlet passage, a cylinder for said piston valve, and connections between said last named cylinder and said steam pipe.

5. In an electrical safety system for railroads, the combination with a locomotive having a throttle, of a solenoid, a steam pipe, the core of said solenoid forming a valve for said steam pipe, a cylinder in communication with said steam pipe, said valve controlling the admission of steam in said cylinder, a piston within said cylinder provided with an annular recessed portion arranged to be brought into registration with said steam pipe, and means for manually moving said piston for cutting off the passage of steam through said pipe.

6. In an electrical safety system for railroads, the combination with a locomotive having a throttle, of a solenoid, a steam pipe, the core of said solenoid forming a valve for said steam pipe, a cylinder in communication with said steam pipe, said valve controlling the admission of steam in said cylinder, a piston within said cylinder provided with an annular recessed portion arranged to be brought into registration with said steam pipe, and means for manually moving said piston for cutting off the passage of steam through said pipe, said means comprising a pivoted hand lever arranged to engage said piston.

7. In an electrical safety system for railroads, the combination with a locomotive having a throttle, of a solenoid, a steam pipe, the core of said solenoid forming a valve for said steam pipe, a cylinder in communication with said steam pipe, said valve controlling the admission of steam in said cylinder, a piston within said cylinder provided with an annular recessed portion arranged to be brought into registration with said steam pipe, means for manually moving said piston for cutting off the passage of steam through said pipe, and manual means for operating the solenoid valve.

8. In an electrical safety system for railroads, the combination with a locomotive having a throttle, of a solenoid, a steam pipe, the core of said solenoid forming a valve for said steam pipe, a cylinder in communication with said steam pipe, said valve controlling the admission of steam in said cylinder, a piston within said cylinder provided with an annular recessed portion arranged to be brought into registration with said steam pipe, means for manually moving said piston for cutting off the passage of steam through said pipe, manual means for operating the solenoid valve, said valve operating means comprising a pivoted lever, and connections between said lever and said solenoid for operating the latter.

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