No. 757,692. PATENTED APR. 19, 1904.

F. V. THOMPSON.

BLOCK SYSTEM EMERGENCY APPARATUS.

APPLICATION FILED JAN. 10, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

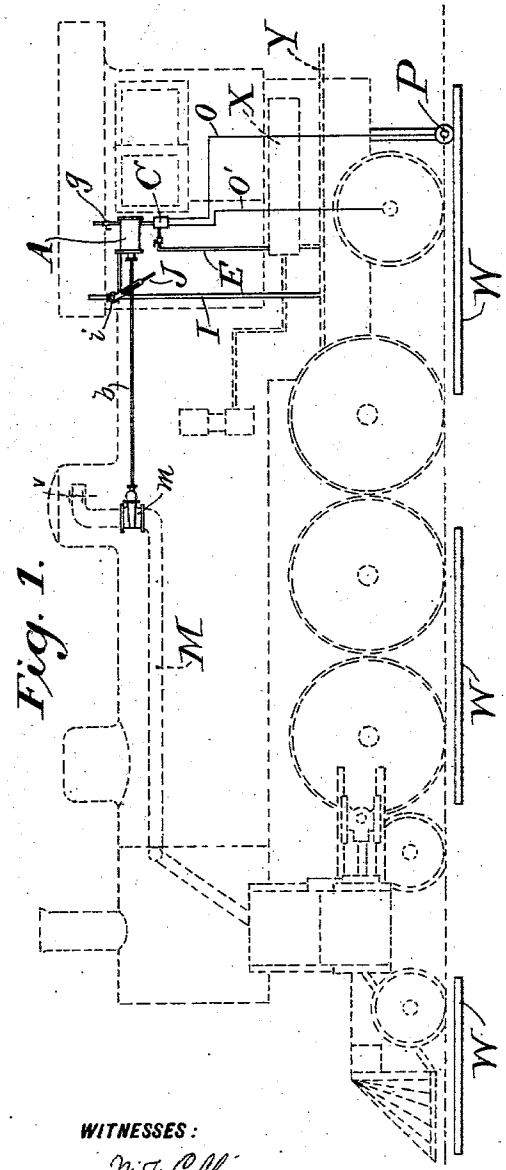

Fig. 1.

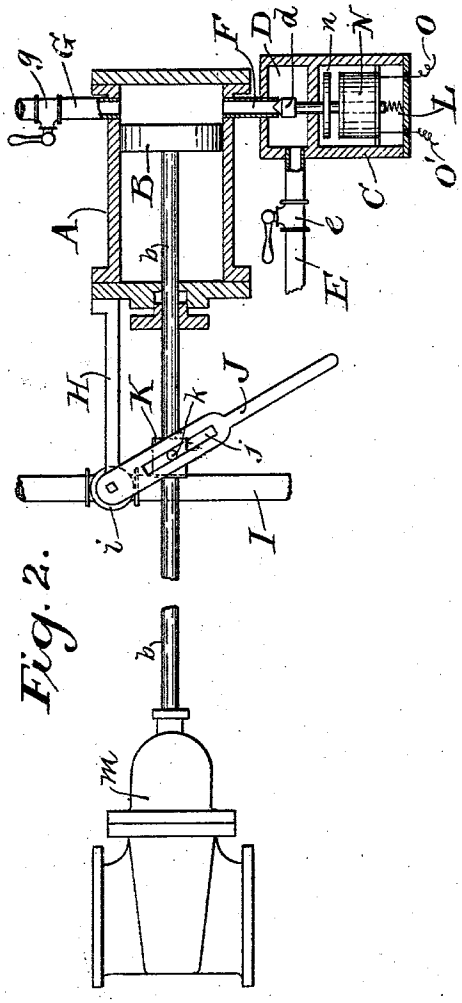

Fig. 2.

WITNESSES:

M. H. Ellis

M. M. Hamilton

INVENTOR

Frederick V. Thompson

BY

Harding & Harding

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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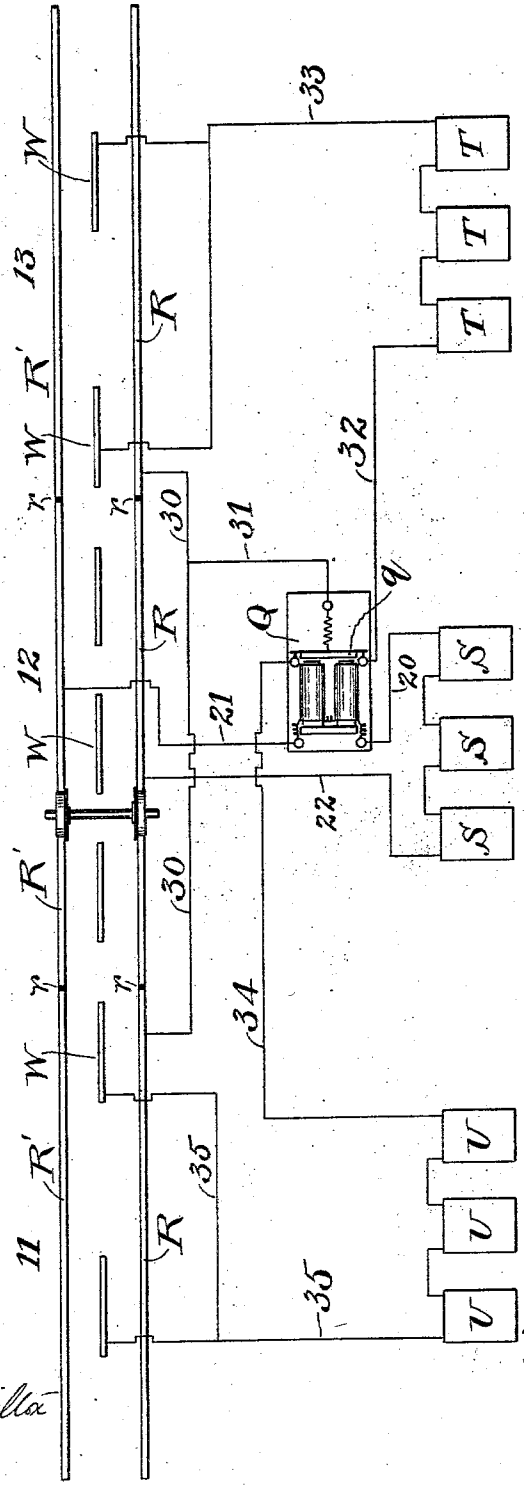
NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

FREDERICK V. THOMPSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO FRANK BAKER, OF PHILADELPHIA, PENNSYLVANIA.

BLOCK-SYSTEM EMERGENCY APPARATUS.

SPECIFICATION forming part of Letters Patent No. 757,692, dated April 19, 1904.

Application filed January 10, 1903. Serial No. 138,480. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK V. THOMPSON, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Block-System Emergency Apparatus, of which the following is a full, clear, and exact descripton, reference being had to the accompanying drawings, which form a part of this specification.

The object of my invention is to automatically stop a train in case another train is a certain distance ahead of it on the same track.

My invention consists of a railway-track divided into blocks or sections insulated one from the other, each block being provided with one or more special third rails, a system of relays corresponding to said blocks, an exciting-circuit consisting of electric connections from the opposite main rails of each block to the corresponding relay, and actuating-circuits extending from each relay to one of the main rails and the third rails of each adjacent block, the locomotive being adapted to close the exciting-circuit by bridging the rails, an electric device on the locomotive adapted to close the actuating-circuit, and means operated by said electric device to shut off steam to the locomotive-cylinder and to apply the train air-brakes.

In the drawings, Figure 1 is a side view of the emergency apparatus on the locomotive for shutting off steam and applying the air-brakes, the view also showing the application of the same to a locomotive and the electric connection to the track. Fig. 2 is a detailed view of the emergency apparatus, partly in side elevation and partly in section. Fig. 3 is a diagrammatic view of the block system.

I will first describe the apparatus carried by the locomotive for cutting off the steam and applying the train air-brakes and the electric device carried by the locomotive for controlling the operation of the same and then describe the block system and the means for actuating the said electric device.

A is a cylinder, B a piston therein, and *b* the piston-rod.

C is a box inclosing a small chamber D, to which extends a pipe E, leading from the air-reservoir X. From chamber D extends a pipe F, leading to cylinder A.

d is an automatic pin-valve in chamber D, normally closing the opening from said chamber to pipe F.

e is a normally open hand-valve on pipe E.

G is a relief-pipe leading from cylinder A to the atmosphere.

g is a normally closed hand-valve on pipe G.

H is a bracket secured to cylinder A.

I is a pipe leading from the train-line pipe Y, the opening of which by the engineer in the ordinary air-brake system causes the application of the brakes.

i is an automatical normally closed valve on pipe I. Pipe I and the casing of valve *i* are supported by bracket H.

K is a sleeve on piston-rod *b*. Said sleeve carries a radially-extending pin *k*.

J is a lever pivoted to the valve *i* and having a slot *j* engaging the pin *k*.

M is the steam-pipe extending from the throttle-valve *v* to the cylinder of the locomotive.

m is an auxiliary throttle-valve in pipe M. This valve is normally open and is placed between the regular throttle-valve and the cylinder and is directly connected to the piston-rod *b* and is adapted to be closed by the forward movement of the latter.

The withdrawal of the pin-valve *d* from its seat allows the compressed air to flow from the supply-tank through pipe E, chamber D, and pipe F to the cylinder A, moving the piston B and piston-rod *b* forward, closing the auxiliary throttle-valve *m* and, through the slot-and-pin connection with lever J, opening the valve *i*. This causes the steam-supply to be shut off and the train-pipe of the air-brake system to be opened. The reseating of the pin-valve *d* closes the communication from the air-supply to cylinder A. By opening the valve *g* the air exhausts from cylinder A through pipe G. The engineer then turns the lever J to its normal position, thereby moving piston B to its normal position, opening valve

m, and closing valve i. The operation of the emergency apparatus is thus controlled by the valve d. The valve d is secured to an armature n of a magnet N and is normally pressed upward against its seat by a spring L. The excitation of the magnet attracts the armature and withdraws the valve d from its seat. The terminals O O′ of the magnet are connected, respectively, to one of the wheels of the locomotive and to a brush P, carried by the locomotive and arranged to make contact with one of the third rails of the block system to be hereinafter described. The operation of the valve, therefore, is dependent upon the closing of the circuit through the magnet, which is arranged to be closed whenever a train is on an adjacent block, as will be understood from the following description of the block system.

The track is divided into sections of convenient length insulated from each by non-conducting plates r, interposed between the abutting ends of the rails R R′ of contiguous sections. For convenience of illustration I have shown three blocks or sections 11, 12, and 13. The relay or exciting circuit for the middle block 12 and the emergency or actuating circuits for the blocks 11 and 13 are shown complete. This will be sufficient to enable it to be shown how the presence of a train on block 12 will automatically stop any train entering blocks 11 and 13, although it will be understood that there is a relay and an emergency circuit for each block, so that a train entering block 12 will be stopped if there is another train on block 11 or 13.

Q is a relay-magnet connected with one pole of the battery S through the conductor 20 and with one of the rails R′ of block 12 through the conductor 21.

22 is a conductor connecting one of the rails R with the other pole of the battery S. The relay-circuit is thus normally open, but is closed by the entrance of a train on block 12.

30 is a conductor connecting one of the rails R of block 11 with one of the rails R of block 13.

31 is a conductor connecting conductor 30 with the armature q of the relay-magnet.

T is a battery, one pole of which is connected through conductor 32 with the relay-magnet and the other pole of which is connected through conductor 33 with the third rails W of block 13. These third rails are short flat rails set at convenient distances apart and with which the brush P, carried by the locomotive, is adapted to make contact.

If there is a train in block 12, the relay-circuit 20 21 22 is closed, as before described, and the magnet is energized, attracting the armature. If now a train enters block 13, as soon as brush P contacts with a third rail W the emergency-circuit will be completed through rail R, conductors 30 and 31, armature q, conductor 32, battery T, third rail W, brush P, terminal O, magnet N, terminal O′, and wheel to rail R. This energizes magnet N, thereby opening valve d and stopping the locomotive by the means before described.

The battery U is connected by conductor 34 with the relay and by conductors 35 with the third rails W of the block 11. A train approaching block 12 from either direction is therefore automatically stopped.

When the train has moved off block 12, the engineer of the train in block 13 opens the relief-valve g and returns lever J to its normal position, as before described, and the engine is free to be controlled in the ordinary manner.

While the train in block 13 will be automatically stopped as described, the entrance of a train into block 13 will of course at the same time operate the air-brake-applying and steam-throttling apparatus on the engine in block 12, thus notifying the engineer of the latter engine that a train has entered one of the adjacent blocks. Neither engine can leave the block until the valve e is closed and the valve g opened, thus cutting off the supply of air and exhausting the air in cylinder A and permitting lever J to be reset. As soon as one train has cleared its block the valve d of the other engine closes, so that it is not necessary to close the valve e of the latter to release lever J. The valve G is merely opened, as before described. It should be closed as soon as lever J is reset.

As before stated, the relay or exciting circuit for the middle block 12 (for which current is supplied by battery S) and the emergency or actuating circuits for blocks 11 and 13 (for which current is supplied by batteries U and T, respectively) are shown complete; but it will be understood that there is also a relay-circuit in block 11 (for which current is supplied by battery U) and in block 13, (for which current is supplied by battery T,) that there is an emergency-circuit in block 12, (for which current is supplied by battery S,) and that the emergency-circuit in block 12 is controlled by the relays of sections 11 and 13. In other words, each block has a relay-circuit and an emergency-circuit controlled by the same battery, each relay-circuit controlling the emergency-circuits of adjacent blocks and each emergency-circuit being controlled by the relay-circuits of adjacent blocks. Of course there may be, if desired, separate batteries for the relay and emergency circuits. To avoid confusion, however, these various circuits, being merely duplicates of those shown, are not illustrated.

Having now fully described my invention, what I claim, and desire to protect by Letters Patent, is—

1. In a block-system emergency apparatus, the combination of a locomotive and a track divided into sections, a relay for each section, a battery for each section, a relay-circuit for each section including the relay and battery

of that section, the opposite poles of which are connected respectively to the main rails of the track of the corresponding section, whereby said circuit is adapted to be closed by the bridging of the rails of said section, a third rail in each section, emergency-circuits controlled by the relay of one section and including the batteries of the two adjacent sections, the opposite poles of which are connected to one of the main rails and the third rail of said adjacent sections respectively, said emergency-circuits being adapted to be closed through said relay by the closing of said relay-circuit, a contact device on the locomotive adapted to contact with said third rail, an emergency apparatus on the locomotive and a magnet on the locomotive controlling said emergency apparatus in circuit between said contact device and the locomotive-wheels, whereby, when said locomotive is on one of said adjacent sections, the corresponding emergency-circuit is closed by means of the locomotive and the closed relay-circuit, substantially as described.

2. In a block-system emergency apparatus, the combination, of a locomotive, a track divided into sections, a third rail for each section, a relay for each section, a battery for each section, a relay-circuit for each section including the battery and relay of such section, the opposite poles of which are connected respectively to the main rails of the tracks of such section whereby such relay-circuit is adapted to be closed by bridging the rails of such section, electrical connection from the armature of each relay to the main rails of adjacent sections, electrical connections from each relay to the batteries of adjacent sections, and electrical connection from each battery to the third rail of the corresponding section, thus forming an emergency-circuit for each section, whereby the closing of the relay-circuit of one section attracts the armature of such relay and closes the emergency-circuits of adjacent sections except between the third rail and main rail of such sections, an emergency apparatus on the locomotive and electrical devices on the locomotive controlling said emergency apparatus and adapted to close the emergency-circuit between said third rail and main rail, substantially as described.

3. In a block-system emergency apparatus, the combination of a track divided into sections, a third rail for each section, a relay-circuit in circuit with each section, an emergency-circuit controlled by each relay and connected with the third rails of adjacent sections, a locomotive, the train-line pipe of an air-brake system on the locomotive, a valve adapted to open the train-line pipe, the throttle-valve, a steam-pipe leading to the throttle-valve, an auxiliary throttle-valve in said steam-pipe, means for operating the first valve and the auxiliary throttle-valve by pressure fluid, a valve adapted to control the action of said pressure fluid, and electrical devices on the locomotive controlling said valve, said electrical devices and relay-circuit being adapted to close said emergency-circuit.

4. In a block-system emergency apparatus, the combination of a track divided into sections, a third rail for each section, a relay-circuit in circuit with each section, an emergency-circuit controlled by each relay and connected with the third rails of adjacent sections, a locomotive, the train-line pipe of an air-brake system on the locomotive, a pipe leading to the train-line pipe, a valve on the first-named pipe, the throttle-valve, a steam-pipe leading to the throttle-valve, an auxiliary throttle-valve in said steam-pipe, means for operating the first valve and the auxiliary throttle-valve by pressure fluid, a valve adapted to control the action of said pressure fluid, and electrical devices on the locomotive controlling said valve, said electrical devices and relay-circuit being adapted to close said emergency-circuit.

5. In a block-system emergency apparatus, the combination of a track divided into sections, a third rail for each section, a relay-circuit in circuit with each section, an emengency-circuit controlled by each relay and connected with the third rails of adjacent sections, a locomotive, the train-line pipe of an air-brake system on the locomotive, a valve adapted to open the train-line pipe, a throttle-valve, a cylinder, a piston therein adapted to be operated by pressure fluid, connections between said piston and said valves, a pipe leading to the cylinder, a pipe leading from a source of fluid-supply, an intermediate chamber, a pin-valve adapted to seat in the pipe leading to the cylinder, and electrical devices on the locomotive controlling said valve, said electrical devices and relay-circuit being adapted to close said emergency-circuit.

In testimony of which invention I have hereunto set my hand, at Philadelphia, on this 26th day of December, 1902.

FREDERICK V. THOMPSON.

Witnesses:
FRANK L. BUSSER,
M. M. HAMILTON.