L. W. HORNE & W. N. CRANE.

TRAIN SPEED CONTROL AND STOPPING DEVICE.

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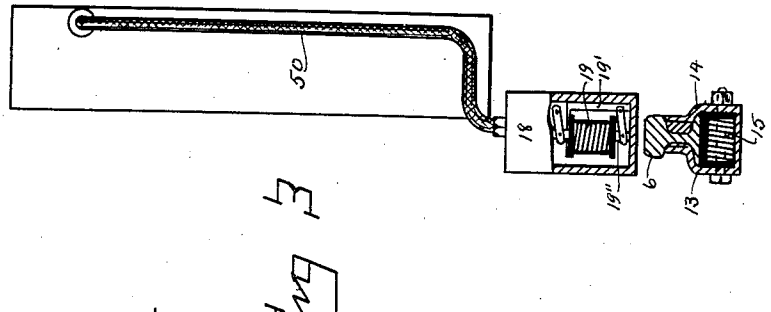

Fig 3

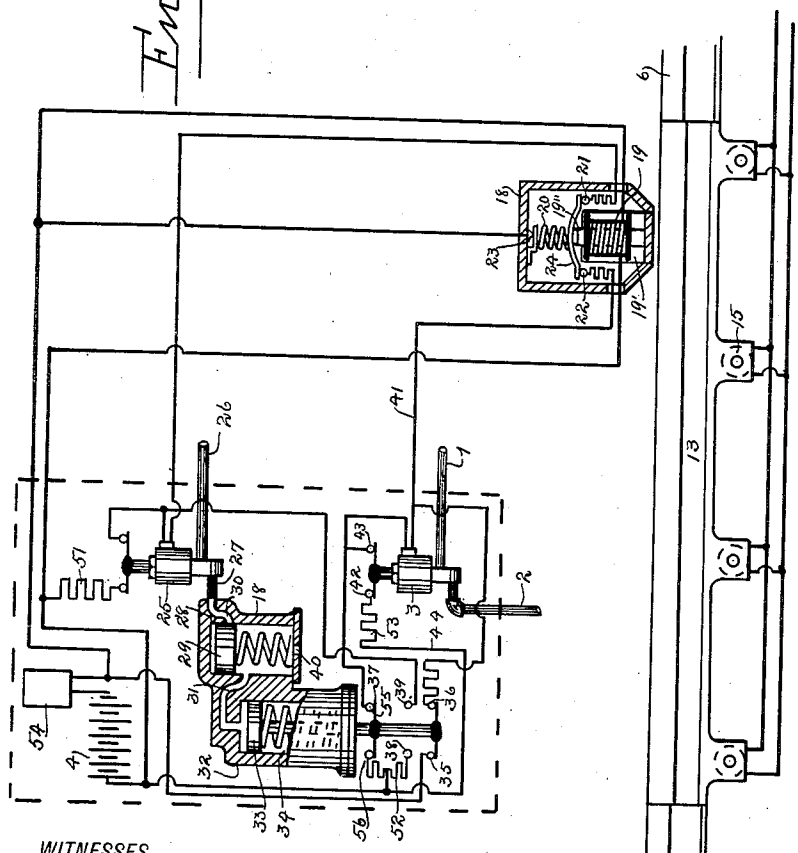

Fig 1

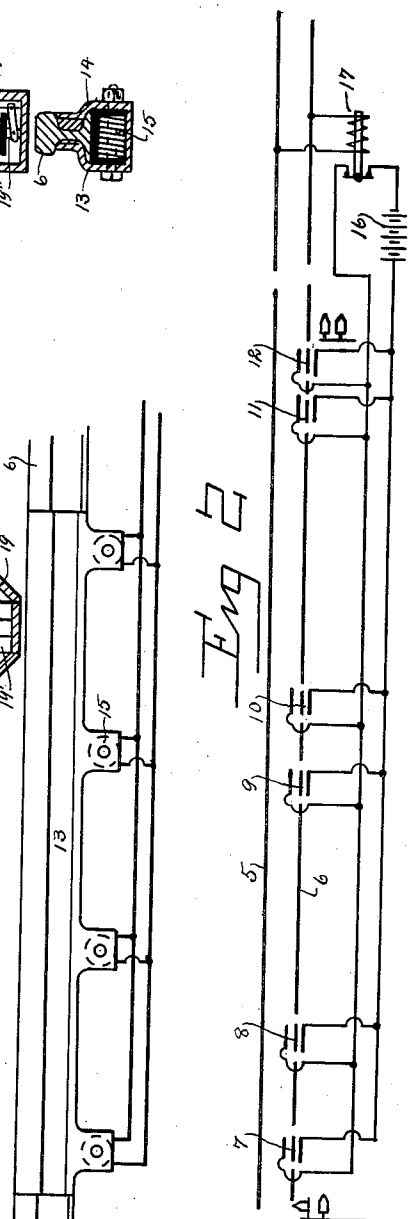

Fig 2

WITNESSES

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LAWRENCE WESLEY HORNE, OF BROOKLYN, AND WARREN NOBLE CRANE, OF NEW YORK, N. Y.

TRAIN SPEED-CONTROL AND STOPPING DEVICE.

1,213,198. Specification of Letters Patent. Patented Jan. 23, 1917.

Application filed March 4, 1914. Serial No. 822,301.

To all whom it may concern:

Be it known that we, LAWRENCE WESLEY HORNE, a citizen of the United States, and resident of the borough of Brooklyn, county of Kings, city and State of New York, and WARREN NOBLE CRANE, a citizen of the United States, and resident of the borough of Bronx, county of Bronx, city and State of New York, have invented certain new and useful Improvements in Train Speed-Control and Stopping Devices, of which the following is a specification.

The device, the subject of this invention utilizes a complete train circuit having contained therein certain magnetically operated valves and subsequently operated pistons and a magnetic member included in the circuit and suspended from the train or locomotive at any convenient point, together with an ordinary railroad track into which has been interposed and at definite and convenient points non-magnetic sections of rail each adapted to be included in a magnetic field whenever occasion requires.

The principal objects of the invention are to provide a means for obtaining a predetermined operative speed of the locomotive and train attached, for reducing the speed under certain conditions and for completely stopping the train when it shall be required to do so.

This device operates in combination with or in addition to the ordinary signal system and the construction and the means of operation will be fully set forth as the specification progresses.

The following is what we consider the best means of carrying out this invention.

The accompanying drawings form a part of this specification, in which:

Figure 1 shows in elevation, partly in diagram and partly in section a portion of the track together with the locomotive devices and the wiring therefor. Fig. 2 is a diagram of the track connection. Fig. 3 shows in side elevation partly in section certain of the mechanisms shown in Fig. 1.

Similar reference numerals indicate like parts in all the figures where they appear.

In the operation of this device we utilize a train line air pipe as shown at 1, and a discharge therefrom as indicated at 2, and between the air pipe 1, and the discharge 2 we interpose a magnetically operated valve 3 which normally closes the air pipe preventing the escape of air therefrom. It is this valve 3 and the action thereof that we control in such a manner as to obtain a selective operation of the valve or an opening thereof only when it is necessary to automatically set the brakes of a train to prevent accident.

We have stated that the valve 3 is a magnetically operated valve. It is in fact an electromagnet that we employ and for its operation we provide a battery or source of current supply 4 arranged upon and carried by the locomotive or train. We desire a selective operation of the valve 3 and an operation that will be timed in such a manner that it will be effected only under predetermined conditions and to this end we interpose between the valve 3 and the battery or current supply 4 certain other mechanical and electrical devices that we will now fully describe.

At 5, we show an ordinary steel running rail the construction of which is too familiar to require detailing and at 6 we show the opposite rail which we prefer shall be the right hand rail of the pair. Into the rail 6 we insert certain short lengths of manganese rail at the points indicated at 7, 8, 9, 10, 11, and 12, spacing these sections at varying intervals apart; the sections first met by an approaching train being farther from each other than those at the end of the block. We may however desire that even these manganese sections should be magnetic or rather contained in a magnetic field and to accomplish this we arrange iron plates 13 and 14 one upon each side of the rail and between these plates and under the rail we place a coil 15. We may provide a plurality of coils adjacent to each section of the manganese rail so that a full magnetic field may be obtained and retained when desired. We then connect all of these coils within a single signal block in multiple with a track battery 16, and we arrange a relay 17 in the circuit of the track battery in such a manner that when the next succeeding block is occupied the solenoid will open the circuit through the track battery and the coils 15 just described. It will be appreciated that when the circuit is closed through the coils and track battery the manganese sections are magnetic sections as fully as are the other

sections of the steel rail, but when the circuit is open the manganese sections will be non-magnetic and will not be subjected to nor attracted to a magnetic field that may pass over them.

At 18, we have shown a casing that may be of brass and which is supported by a locomotive or train and in line with the traction wheels, the lower end of this casing should be arranged closely adjacent to the upper surface of the rail. Within the casing is an electromagnet 19 having a rigid pole 19′ and a movable core or plunger 19″. This core is retained down by its magnetic attraction for the steel rail but when passing over a manganese section which is not included in a magnetic field the core will be lifted by the spring 20, the upward motion of the core interrupts the circuit between the contacts 21 and 22 cutting them out of the battery circuit into which they have been incorporated by reason of the contact 23 which is so arranged that the current may pass downward through the spring 20 and arm 24. The interrupting of this circuit deënergizes an electromagnetically controlled valve 25.

The valve 25 controls the passage of air from an air pipe 26, which may be connected with a suitable reservoir through a pipe 27 into a cylinder 18. When the valve 25 opens air passes through the pipe 27 and through the leak groove 28 over a piston 29 and the piston is slowly started on its way downward. The downward motion of the piston continues until the larger opening or passage 30 is uncovered when the speed of the piston 29 will be increased. It then continues downward until the port 31 is uncovered which allows the air to leave the cylinder 18 and pass into the cylinder 32, there to depress the piston 33 against the spring pressure 34. The time taken for the piston 29 to pass and uncover the port 31 is such that the contacts 21 and 22 will again be made by the passage of the electromagnet 19 over a steel rail before the air enters the cylinder 32. The reestablishing of the circuit through the contacts 21 and 22 will not however close the valve 25 as the circuit through this valve is interrupted by the dropping of the contact disk 25^a of this valve 25.

The cylinder 32 may be termed the main timing cylinder and the compressed air therein depresses the piston 32 and opens a circuit through the contacts 35 and 36 continuing on its travel it causes the disk 37 to close the circuit through the contacts 38 and 39 reëstablishing the circuit through the electromagnetic valve 25 and closing the valve. As no more air can then enter the timing cylinder the spring therein will cause the air to be slowly exhausted through the port 40 in the cylinder 18, and the piston will again return completing the circuit through the contacts 35 and 36. From the opening of the circuit at contacts 21 and 22 to the final closing of the circuit through the contacts 35 and 36 a certain definite period of time will elapse, a period that shall in every instance be predetermined, and it will be seen that the spacing of the manganese sections 7 and 8 may be such that the circuit opened by reason of the manganese section 7 will be fully reëstablished and closed before the section 8 is reached. Should the train be running faster than a predetermined speed between the sections 7 and 8, the piston would not have returned to an extent sufficient to close the circuit through the contacts 35 and 36, and the second impulse or interruption of the circuit through the contacts 21 and 22 would deenergize the magnet of the valve 3 with the result that the pressure of the train line air pipe 1 would be exhausted, resulting in an application of the train brakes.

It will be noted that the timing mechanism is operated at each non-magnetic section of rail but as the circuit through the valve 3 is reëstablished through the contacts 21 and 22 the connecting wire 41, the contacts 42 and 43, and the main line wire 44 before the contact is broken at 35 and 36, no operation of the valve 3 will take place unless the circuit through the contacts 21 and 22 is again broken before the piston 33 has returned to its full extent.

When the timing operation has been completed and the air is exhausted from the cylinder 32 the disk 37 closes the circuit with the contacts 55 and 56 energizing and closing the magnetically controlled valve 3. The device can however be used without this release feature by omitting the contacts 55 and 56 and disk 37, and any other means may be used to close the circuit across 55 and 56 to release the brake.

As this device operates on the closed circuit principle the failure of the batteries or any other interruption to the current flow will cause a setting of the brakes. In Fig. 3, we show that certain of the wires may be run in cables and we provide a circuit breaker 54 and certain resistances 51, 52, 53, etc., at the contact points. The crossing of any of the wires in the cable or at any other point would cut out the resistance and throw an overload upon the circuit breaker 54 which would then automatically open the battery circuit causing an application of the brakes.

Having carefully and fully described our invention what we claim and desire to secure by Letters Patent is:—

1. A train stop comprising a magnetic track having non-magnetic sections, a magnetic circuit interrupting means retained by the track, a valve operated by the release of said retaining means and a piston oper-

ated by air passing through said valve and adapted to reëstablish the circuit through said valve.

2. A train speed controlling device, including magnetic rails and non-magnetic sections having controllable magnetic fields adjacent thereto, a circuit opening device maintained closed by said magnetic track and field, a magnetically operated and normally closed air valve opened by the interruption of said circuit maintaining device, and a duplex cylinder and plurality of pistons operable therein for reëstablishing the circuit through said air valve.

3. A device of the character described having a magnetically controlled circuit maintaining means and a magnetically operated air valve electrically connected therewith and operated thereby, a main cylinder and piston operable therein and adapted to reëstablish a circuit through said valve and an auxiliary cylinder and piston therein adapted to control the passage of air from said valve to said main piston.

4. A magnetically operated circuit maintaining means adapted to be operated by an interruption of a magnetic field an air valve operated by an operation of said maintaining means, a piston operated by the passage of air through said air valve and operating means for reëstablishing a circuit through said air valve by a depression of said piston and a second air valve operated by an interruption of said maintaining means during the movement of said piston.

5. A train speed controlling device which includes a magnetic rail having a plurality of non-magnetic sections each provided with an electromagnetic field and a magnetic circuit retaining means adapted to be passed over said magnetic rail and to be operated by the deënergizing of the electromagnetic fields adjacent to the non-magnetic sections, an electromagnetically operated air valve adapted to be opened by the operation of said maintaining means, a cylinder and piston operated therein and connected to said air valve and controlled thereby, means upon said piston for reëstablishing a circuit to close said air valve and a second air valve connected to a train line air pipe and means operable with said piston for maintaining said second air valve closed during an initial interruption through said maintaining means and means for operating said second air valve upon an interruption of said maintaining means during the movement of said piston.

Signed at New York city, in the county and State of New York this 26 day of February, 1914.

LAWRENCE WESLEY HORNE.
WARREN NOBLE CRANE.

Witnesses:
G. E. STERRITTE,
ARTHUR PHELPS MARR.