No. 741,858. PATENTED OCT. 20, 1903.

H. O. WESTMARK.

TRAIN SIGNALING AND CONTROLLING SYSTEM.

APPLICATION FILED JUNE 13, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

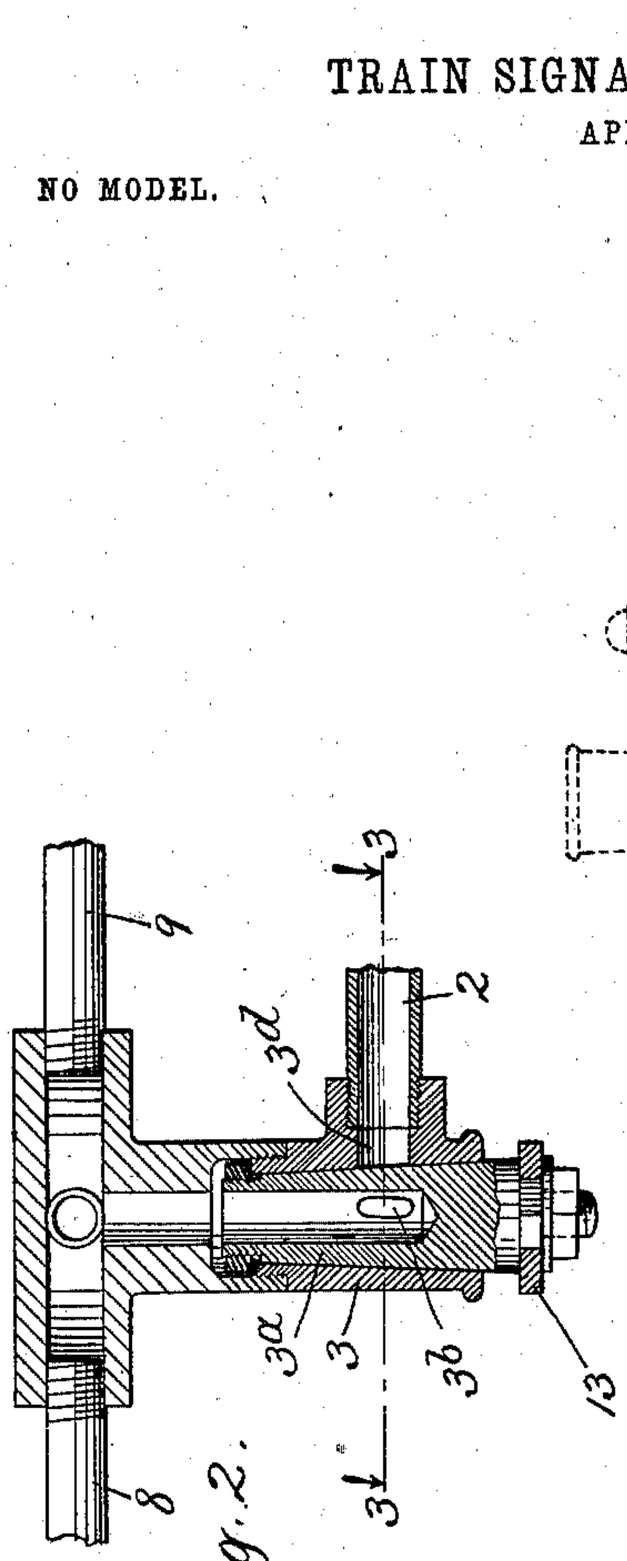


Fig. 2.

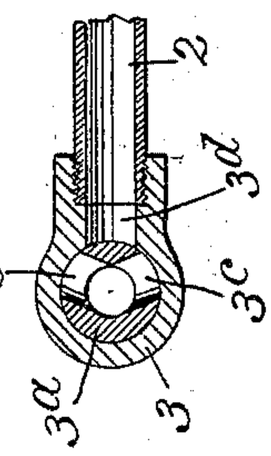


Fig. 3.

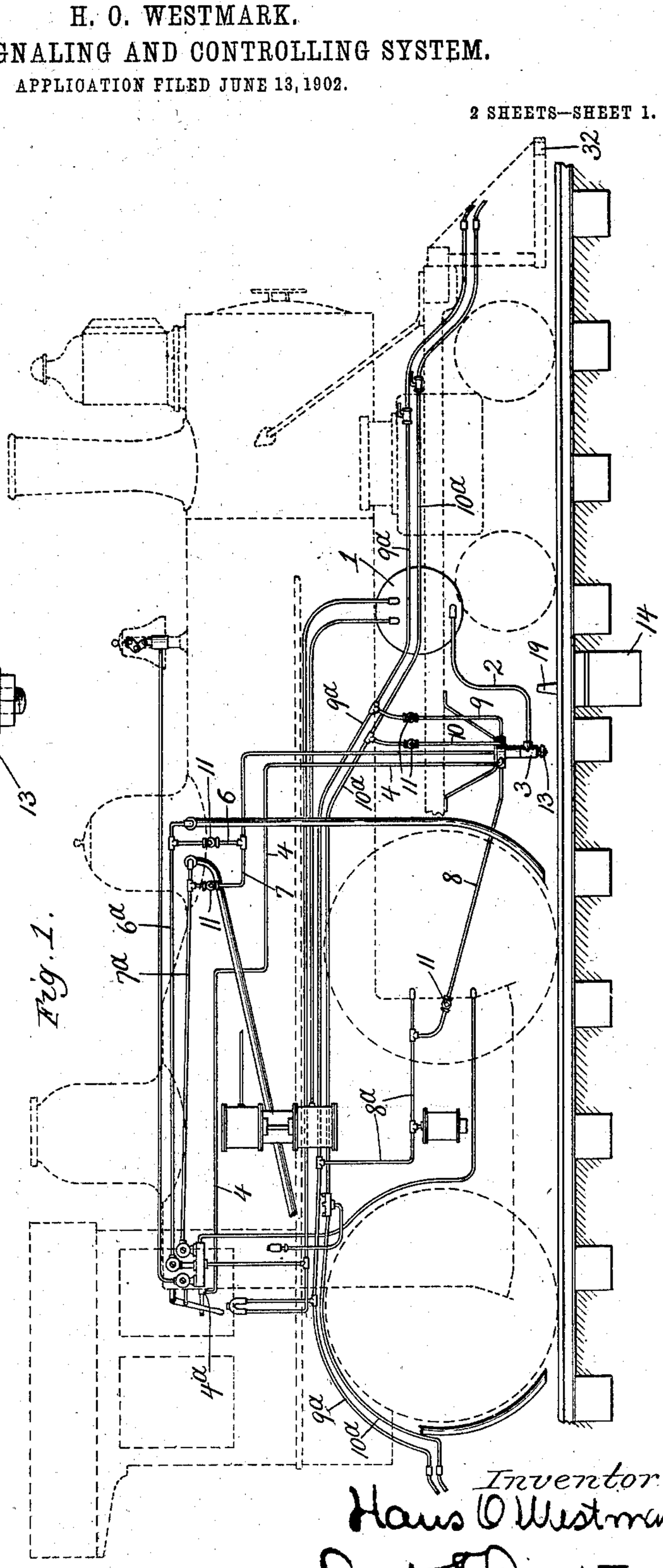


Fig. 1.

Witnesses.
Edward T. Wray.
Weston B. Lazear.

Inventor.
Hans O Westmark
by Burton Burton
his Atty's

No. 741,858. PATENTED OCT. 20, 1903.

H. O. WESTMARK.

TRAIN SIGNALING AND CONTROLLING SYSTEM.

APPLICATION FILED JUNE 13, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 6.

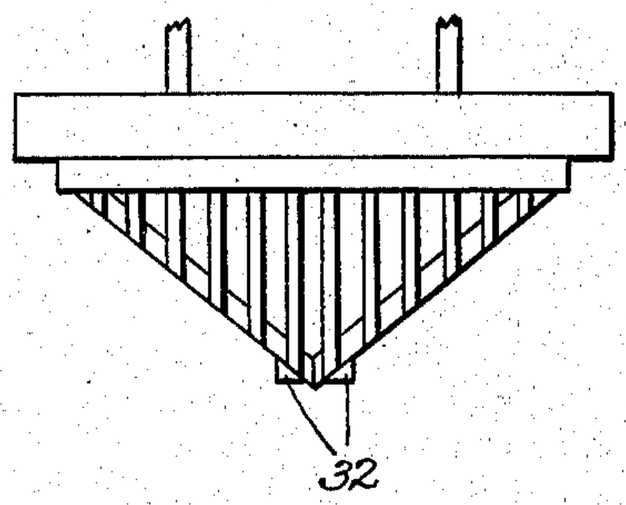
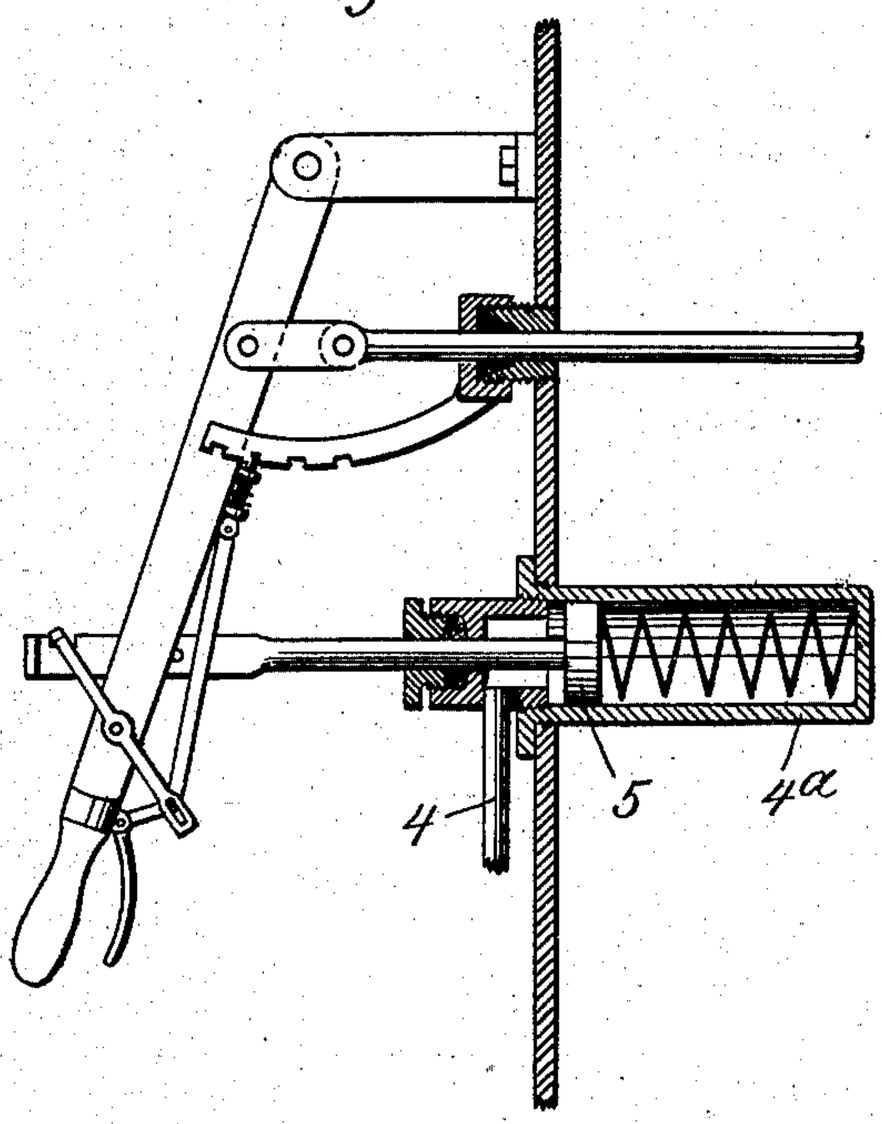


Fig. 5.



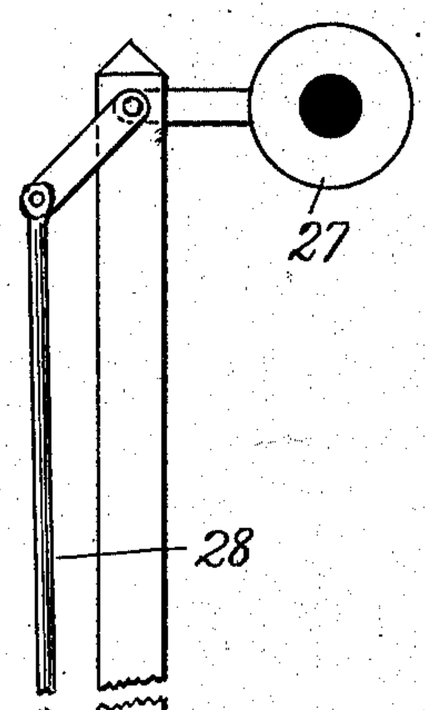
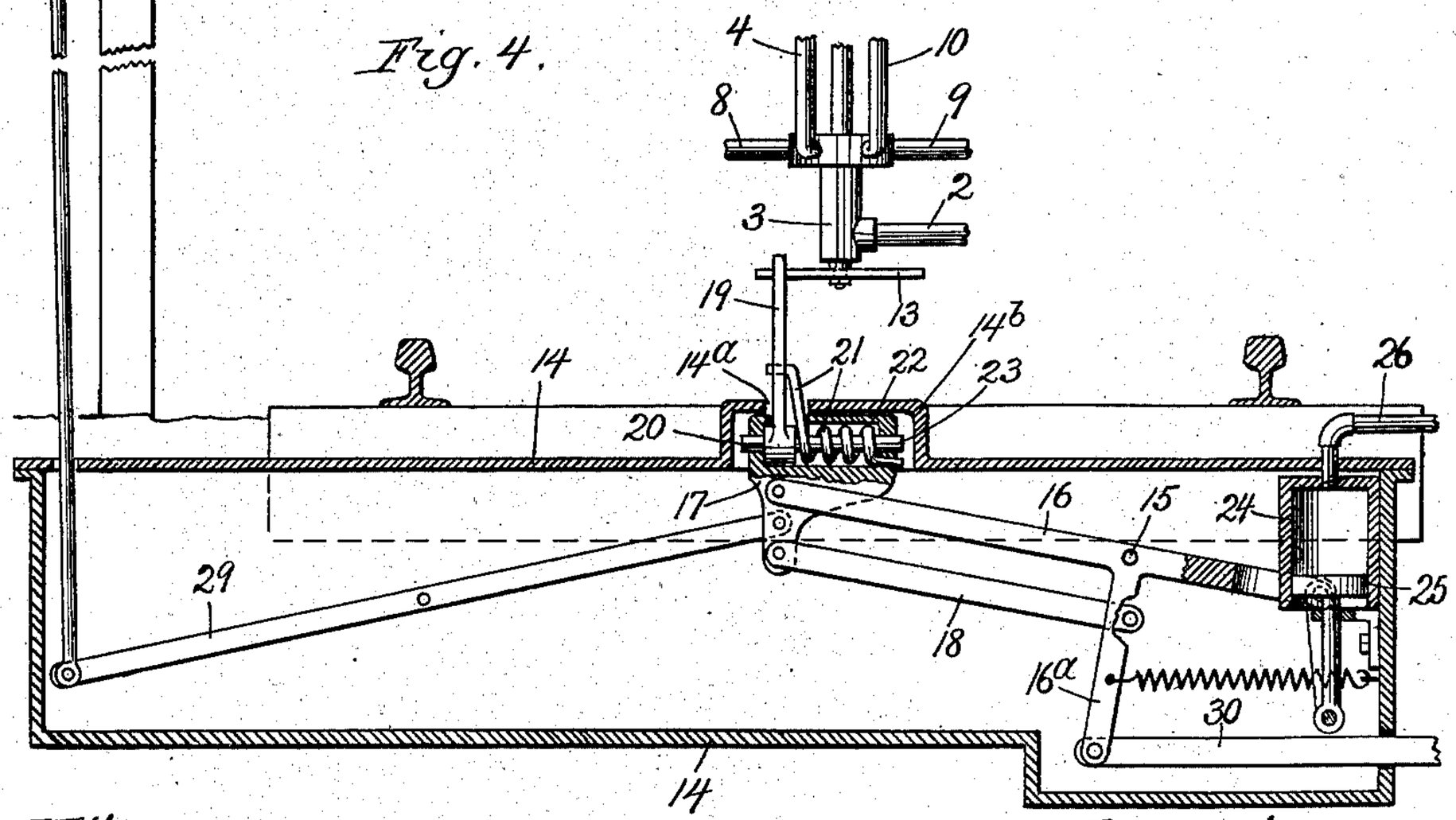


Fig. 4.



Witnesses.
Edward T. Wray.
Weston B. Lazear

Inventor.
Hans O. Westmark
by Burton Burton
his Atty's

No. 741,858. Patented October 20, 1903.

UNITED STATES PATENT OFFICE.

HANS O. WESTMARK, OF AURORA, ILLINOIS, ASSIGNOR OF FORTY-NINE ONE-HUNDREDTHS TO J. FRANKLIN ROGERS, OF AURORA, ILLINOIS.

TRAIN SIGNALING AND CONTROLLING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 741,858, dated October 20, 1903.

Application filed June 13, 1902. Serial No. 111,441. (No model.)

To all whom it may concern:

Be it known that I, HANS O. WESTMARK, a citizen of the United States, having residence at Aurora, Illinois, have invented certain new and useful Improvements in Train Signaling and Controlling Systems, of which the following is a specification, reference being made to the accompanying drawings, forming a part hereof.

The purpose of this invention is to provide improved means by which the signal operator or train-despatcher or other person intrusted with the duty of setting signals for the government of trains in a block system or other system having similar purposes may not only set the signals by which the trainmen shall be guided as to entering a section of a track, but also shall be able to pivotally control the train to prevent it from entering a section of the track from which it should be debarred by the signal if the signal were set, and in connection with this purpose it is especially designed to serve as a means of locating the responsibility for accidents which may happen by reason of a train entering any portion of the track where another train is or where there are obstructions which should prevent it from entering, so that it may be known whether the fault was due to failure to set or operate the signal or to failure to obey the signal. It consists in the features of construction which are specified in the claims.

In the drawings, Figure 1 is a side elevation of a locomotive having appliances embodying my invention. Fig. 2 is an axial section of the valve and immediate pipe connections for controlling pneumatic devices on the locomotive according to my invention. Fig. 3 is a section at the line 3 3 on Fig. 2. Fig. 4 is a transverse section of the road-bed and a case set therein containing the track devices for controlling the valve, which is also shown in elevation in operative relation to the track devices. Fig. 5 is a partly-sectional side elevation of the devices for operating the throttle-lever, section being made in a vertical plane containing the axis of the air-cylinder pertaining to these devices. Fig. 6 is a detail plan of the pilot of the locomotive, showing an abutment for striking the trip-finger in the track squarely to prevent deflecting it.

In the practice of my invention I take advantage of the presence on the locomotive of a main air-reservoir, in which is stored compressed or rarefied air for operating the various train-arresting devices on the locomotive. From such main air-reservoir 1 I extend a pipe 2 to a valve 3, more particularly described hereinafter, and from such valve I extend pipe connections as follows: pipe 4, leading to a cylinder 4^a, in which there is a piston 5, constituting an air-meter for operating the throttle-lever; pipes 6 and 7, leading to the air-pipes 6^a and 7^a, for operating the sanders for the front and rear drivers, respectively; a pipe 8, leading into the air-pipe 8^a, for supplying air for operating the driver-brakes; a pipe 9, leading into the pipe 9^a, which supplies compressed air for operating the train-brakes. Each or any car in the train may have a signal operated by the air from the signal-pipe 10^a, or in case of freight the brake-operating pipe 9^a, for informing the train crew that the stopping is caused by the track devices. On each of the pipes except that which leads to the cylinder 4^a, for operating the throttle-lever, there is interposed a check-valve 11, so that when the ordinary pipes for connecting the air to operate any of said several devices are operated by the engineer for the ordinary purpose there shall not be thereby effected a back connection of the air with the other devices through the medium of the pipe which pertains to my invention.

The valve 3 has a hollow plug 3^a, which is provided with two ports 3^b and 3^c in position to register with the body-port 3^d, at which the pipe 2 is connected to the valve-body. At the normal or closed position of the plug the two ports 3^b and 3^c are equally distant at opposite sides of the port 3^d, so that the valve will be operated by moving it either way from that position. The air admitted when the valve is opened passes through the hollow plug and is delivered to the several pipes from the end of the plug, any suitable form of fitting being employed to supply the pipes most simply and consistently and make the process of connecting up the apparatus as easy as possible. The valve is mounted with its axis vertical, and the plug emerging from the lower end of the body is provided with a

cross-head or operating-lever 13, which normally at the closed position of the valve extends crosswise of the track, the valve being substantially at the center of the width of the track.

In the road-bed underneath the track I provide means for operating the valve 3, as follows: A suitable cast-iron case or shell 14 is lodged under the road-bed, and in said case there is fulcrumed at 15 a lever 16, having connected to it at one end a trip-finger 17, which is arranged to protrude through the case and stand erect from the road-bed when the lever is operated for that purpose. In order that the lever may thrust the finger out and withdraw it while maintaining it in vertical position throughout the movement, a controlling-link 18 may be pivoted at one end to the case and at the other end to the lower end of the trip-arm, said link and the lever 16 constituting virtually a pair of parallel links, so that all positions of the trip-arm as it is thrust up and withdrawn are parallel with each other, or sufficiently so to cause it to be thrust through the aperture 14^a, which is formed in the upper plate of the case 14 for that purpose. The trip-arm is in two parts, having a protruding or terminal portion 19, hereinafter referred to as a "trip-finger," jointed to the lower portion at 20 above the pivotal connection on the arm to the lever 16, and a spring 21 is provided operating about the joint and reacting between the two parts, which are pivoted together, with a tendency to uphold the finger in erect position and yieldingly resist its deflection fore or aft from that position. The particular construction adopted is seen in Fig. 4, the lower member of the jointed trip-arm having a cylinder-housing 22 extending transversely with respect to the track, the finger 19 being connected to the lower member at the housing 22 by the pivot-bolt 23. The spring 21 is coiled about the bolt within the housing, having one end engaged with the housing and the other end with the trip-finger 19, as seen in the drawings. The case 14 has an upwardly-protruding hollow boss 14^b, which accommodates the joint comprising the housing 22, and this boss is slotted fore and aft at 14^a to permit the trip-finger to tilt back or forward down to horizontal position. The purpose of this construction will hereinafter appear. The position of the trip-finger and the slot through which it is protruded is sufficiently one side of the center of the track so that the finger when upstanding stands in the path of one or the other end of the cross-head or lever-arm 13 of the valve 3, so that the advance of the train while the finger is thus protruded will cause the lever-arm of the valve to collide with the finger and the valve to be brought to open position from whichever direction the collision comes and whichever arm of the lever is encountered. The lever-arm 16 is fulcrumed so as to be tilted to thrust up and withdraw the trip-finger, and for this purpose it may be connected by any suitable means mechanically with the operating devices in the signal-tower or at the switch. Such mechanical expedients as would be suitable for the purpose are familiar. I have shown, however, as a preferred means of connection for operating it from the signal-tower a pneumatic connection consisting of a cylinder 24, having playing in it a piston 25, the stem of which is connected to a lever 16 at the end opposite that at which the trip-finger is carried, an air-duct 26 being provided leading into the cylinder from a compressed-air reservoir (not shown) located at any convenient point, the admission of air from the reservoir to the duct and thence to the piston-cylinder being controlled by the operator in the signal-tower. 27 is a signal connected by suitable means, as the lever 28 and link 29, with the lever 16, so as to be operated by the movement of said lever simultaneously with the protrusion and withdrawal of the trip-finger, being set at position to indicate "safety" when the trip-finger is withdrawn and at position prohibiting the advance of the train when the trip-finger is protruded.

It will be understood that the signal and trip-finger may both be connected with the switch-operating devices, so as to be set automatically with the setting of the switch, and such connection may be provided in addition to the pneumatic connections for operating the trip-finger and signal from the tower, comprising, for example, an arm 16^a, projecting down from the lever 16 near the fulcrum, and an operating-rod 30, connected to the lower end of such lever-arm and extended out to the side of the track for any desired operating connection for the switch.

It will be noticed that the valve which controls the air connection on the locomotive is not accessible from the locomotive-cab; but in order to be reached for closing the valve after it has been opened by encounter with the track devices the engineer must leave the cab and operate the valve while the engine stands at rest. This, together with the fact that the train-signaling devices are operated when the track devices encounter the valve-lever upon the valve, makes it impossible to disregard the signal and run the engine past the point at which it is stopped by the track devices without knowledge of that fact on the part of the trainmen other than the engineer, for not only would the train have to be stopped, but the occasion of its stopping—that is, the fact that it is stopped by the automatic action of the track devices—will have been made known by the operation of the train-signals. It will thus be possible to fix the responsibility for any movement of the train past the forbidding signals, and it will always be possible to establish whether or not the signals were so set as to operate in time either to give the warning or to arrest the train.

The reason for pivoting the trip-finger to the upstanding arm on the lever 16 in such manner that it may tilt fore and aft is that since the finger must reach the valve-lever in order to operate it and since the valve-lever must be located high enough to avoid encounter with the ordinary projections or irregularities of the road-bed—that is to say, projections which the pilot can pass — the valve-lever must stand at a higher level than the lower edge of the pilot, and the trip-finger in order to reach the valve-lever at this height must also be arranged to be protruded higher than the lower edge of the pilot and in position, therefore, to be encountered by the pilot. In order that it may be upstanding when it reaches the valve-lever arm and may, nevertheless, be passed by the pilot, it is pivoted, as described, but upheld by a spring strong enough to operate the valve without yielding materially, but adapted to yield in either direction when the finger is encountered by the positively-moving pilot.

The valve lever-arm projects in both directions from the valve-stem, and the valve is adapted to open by movement in either direction, and the trip-finger is set at one side of the center of the track, so that whether the engine is moved backward or forward in either direction along the track the effect of the collision of the trip-finger with the lever-arm of the valve-stem is always the same—to-wit, to open the valve and operate the train-arresting means. Preferably the pilot is provided with an abutment 32 at the forward edge on each side of the center adapted to strike the trip-finger squarely, so that it shall not tend to bend the finger aside, as might happen if the finger were struck by the oblique edge of the pilot.

I claim—

1. A train-controlling system comprising means on the motor for cutting off the motive power, said means including an operating-arm overhanging the road-bed; a trip-arm and supports and connections by which it is lifted into position protruding from the road-bed in the path of said operating-arm to actuate the latter for cutting off the motive power.

2. A train-controlling system comprising means on the motor for applying power to arrest the train, said means including an operating-arm overhanging the road-bed; a trip-arm and supports and connections by which it is lifted into position protruding from the road-bed in the path of said operating-arm to actuate the latter for operating the train-arresting devices.

3. A train-controlling system comprising means on the motor for controlling the train as to movement and stoppage, said means including an operating-arm overhanging the road-bed; a trip-arm and supports and connections by which it is mounted and protruded from the road-bed in the path of said operating-arm, said trip-arm being pivoted and adapted to tilt in either direction, and provided with a spring tending to yieldingly resist its tilting in either direction and to restore to erect position from either direction, the spring being of sufficient strength to uphold the finger upon its encounter with said operating-arm but to yield upon encounter of the pilot.

4. A train-controlling system comprising an air-reservoir on the train, a motor device connected therewith and connections by which it operates the power-controlling lever of the train-motor; a pipe which affords communication between the air-reservoir and the lever-operating motor, a valve in said pipe controlling communication therethrough between the reservoir and the motor, said valve having an operating lever-arm overhanging the road-bed, a trip-arm and supports and connections by which it is mounted and protruded from the road-bed in the path of the valve lever-arm to operate the latter for opening the valve as the train moves past the trip-arm.

5. A train-controlling system comprising an air-reservoir on the train, connections from such reservoir to the train for operating the train-arresting devices; a pipe which affords communication between the reservoir and such train-arresting devices, a valve in said pipe controlling communication therethrough between the reservoir and said arresting devices, said valve having an operating lever-arm overhanging the road-bed; a trip-arm and supports, and connections by which it is mounted and protruded from the road-bed in the path of the valve lever-arm to operate said arm to open the valve when the train passes the trip-arm.

6. A train-controlling system comprising an air-reservoir on the train; train-controlling devices of and carried by the train-motor; pneumatic means for operating said train-controlling devices; a pipe leading from the air-reservoir, and ducts therefrom leading to said pneumatically-operated means respectively; a valve in said pipe controlling communication therethrough from the reservoir to said several pneumatically-operated means, said valve having an operating lever-arm overhanging the road-bed; a trip-arm and supports, and connections by which it is mounted and adapted to be protruded from the road-bed in the path of said lever-arm to operate the same as the train passes.

7. A train-controlling system comprising an air-reservoir on the train, a motor device connected therewith and operating connections therefrom to the power-controlling lever of the train-motor; a duct leading from the air-reservoir and having a branch extending to the lever-operating motor and other branches extending to the pneumatically-operated train-controlling devices; a valve which controls communication from the air-reservoir to all said ducts; means mounted on the road-bed for operating such valve as the train

passes, and a check-valve interposed on each of the ducts leading to the train-arresting devices seating against flow toward the main air-duct controlled by the valve; whereby cross communication from said train-arresting devices to each other and to the lever-operating motor is prevented.

8. In a train-controlling system comprising pneumatically-operated devices on the train-motor for operating its power-controlling and train-arresting devices, an element on the train whose movement controls said pneumatically-operated devices; a tripping device mounted in the road-bed and a spring which holds it normally protruding in the path of said element with sufficient force for operating the latter upon its encounter therewith; said finger being pivoted so as to be rocked by the pilot out of the latter path against the resistance of said spring.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 9th day of June, 1902.

HANS O. WESTMARK.

In presence of—
EDWARD T. WRAY,
J. S. ABBOTT.