I. W. HEDGES.

AUTOMATIC TRAIN CONTROL DEVICE.

APPLICATION FILED APR. 22, 1918.

1,289,757. Patented Dec. 31, 1918.

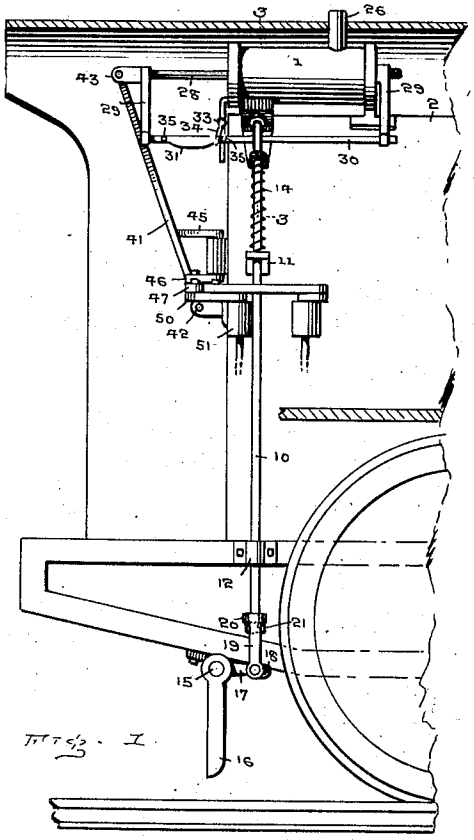

Fig. 1.

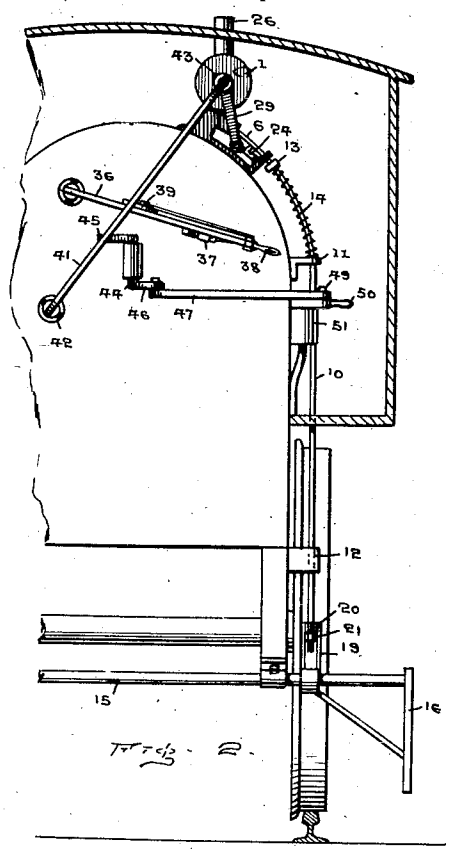

Fig. 2.

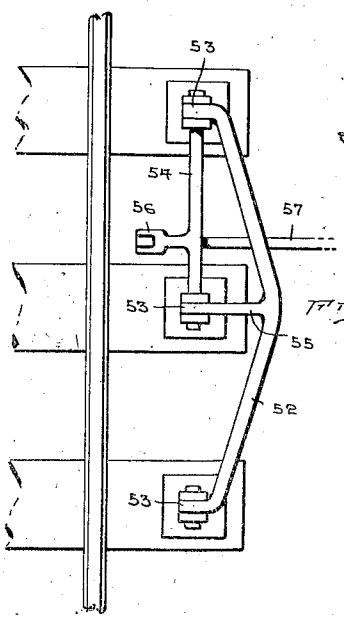

Fig. 4.

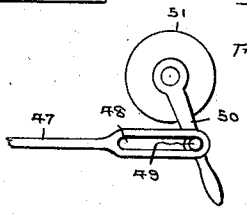

Fig. 5.

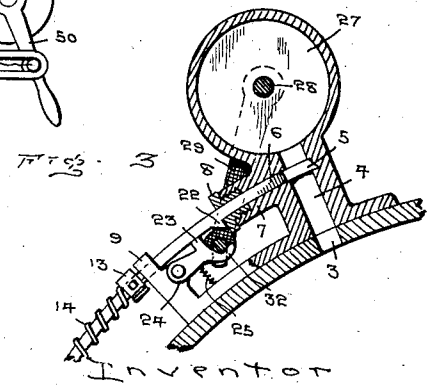

Fig. 3.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC TRAIN-CONTROL DEVICE.

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Application filed April 22, 1918. Serial No. 229,979.

To all whom it may concern:

Be it known that I, ISAAC W. HEDGES, a citizen of the United States, residing at Quincy, in the county of Logan and State of Ohio, have invented certain new and useful Improvements in Automatic Train-Control Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to new and useful improvements in automatic train control devices and has for its principal object to provide a device of the above-stated character which embodies train carried mechanism adapted to be automatically operated by suitable track tripping means operated in connection with the semaphore arms of the block signaling system arranged at opposite sides of a block tower and this track tripping means is adapted to be set by an operator within the block tower to automatically actuate the train carried mechanism to stop the train should the engineer for some unknown reason run past a danger displayed semaphore arm.

A further object of the invention is to provide train carried mechanism embodying means for automatically releasing and actuating the throttle valve and the air brake valve to cut off the motive force of the engine and apply the brakes to the train.

A still further object of the invention is to improve and simplify devices of the above-stated character so as to be cheap and inexpensive to manufacture, reliable and efficient in use under the various changing conditions of the weather throughout the different seasons of the year.

With these and other objects in view as will appear as the description proceeds, the invention comprises the various novel features of construction, combination and arrangement of parts as will be more fully described hereinafter and set forth with particularity in the appended claims.

Referring to the drawings,

Figure 1 is a vertical sectional view through the rear end portion of a locomotive showing the mechanism for automatically releasing and actuating the throttle valve and the air brake valve.

Fig. 2 is a vertical transverse sectional view through the rear end of the locomotive cab.

Fig. 3 is a vertical transverse sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a plan view of the track tripping means arranged in inoperative position, and

Fig. 5 is a detail plan view of one end of the actuating link of the air brake valve and its connection with the latter.

Similar characters of reference are used to denote corresponding parts throughout the accompanying drawings and the following description.

Referring more particularly to the drawings, the reference numeral 1 represents a fluid pressure cylinder which in this instance is designed to be operated by steam taken from the steam boiler 2 of the locomotive. The boiler 2 is provided with an outlet opening 3 which communicates with an inlet opening 4 communicating with the interior of the fluid pressure cylinder at one end thereof, this inlet port 4 being controlled by a slide valve 5 which has connected to it an actuating stem 6 that is slidably disposed through a boss or extension 7, the outer end of this boss being provided with a packing gland 8 to prevent leakage of steam or fluid pressure. The inner end of the valve 5 is beveled to fit a corresponding recess in the inner wall of the port 4 and when the valve is engaged within this recess, it will prevent leakage of the fluid pressure past it.

The outer end of the stem 6 is slidably mounted through a guide 9 and has connected to it an actuating rod 10 that is slidably mounted through bearings 11 and 12. A collar 13 is adjustably mounted upon the valve rod 10 and arranged upon the valve rod between this adjusting collar and the bracket 11 is an expansion spring 14, which normally exerts its tension against the collar 13 to hold and maintain the valve 5 in closed position.

Mounted transversely of the engine frame at a suitable point is a rock shaft 15 to the outer end of which is fixed a trip arm 16, while fixed upon the shaft 15 innermost of the trip arm 16 is a laterally projecting arm 17 which has its outer end slotted, as indicated by the numeral 18. A connecting link 19 has its lower end pivotally connected to the arm 17 and through the slot 18, while the upper end is provided with a lateral apertured extension 20 for the reception of the lower end of the valve actuating rod 10,

and this valve rod 10 is provided with a retaining nut 21 which normally bears against the under surface of the lateral extension 20. By the provision of this connection between the valve rod 10 and the link 19, it will be apparent that should the engine back up and the trip arm 16 be actuated so as to move the link 19 upwardly, the latter will simply slide upwardly upon the valve rod 10 and in no way affect the actuation of the valve 5. However, when the trip arm 16 is actuated while the train is moving forward, the link 19 will bear against the nut 21 and pull the valve rod 10 downwardly and open the valve 5.

The stem 6 attached to the valve 5 is provided with a shoulder 22 which, when the valve 5 is opened, is adapted to automatically engage behind the shoulder 23 of the pivotally mounted latch 24, which latter is pressed upwardly and held in engagement with the shoulder 22 through the medium of a spring 25. From this construction, it will be apparent that when the valve 5 is opened, it will be automatically retained in this position until tripped or released by mechanism which will be presently described.

The fluid pressure cylinder 1 is provided adjacent the opposite end containing the inlet port with an exhaust port 26, and arranged within the cylinder 1 is a piston head 27 fixed upon a piston rod 28 slidably disposed through the opposite ends of the cylinder, and fixed to the opposite ends of the piston rod are arms 29 which support a valve trip rod 30 and which has an enlargement or cam adjacent one end, as indicated by the numeral 31. The trip rod 30 is embraced by the finger 32 of the spring latch 24 and slidably mounted therein.

When fluid is admitted to the cylinder 1 and the piston head 27 moved toward the opposite end of the cylinder, the cam 31 will come into engagement with the finger 32 and release the shoulder 23 from the shoulder 22, thus allowing the tension spring 14 to close the valve 5, cutting off the fluid pressure and subsequently allowing the same to exhaust through the port 26.

After the valve actuating mechanism has been once operated and it is desired to reset the mechanism, I provide means for releasing the air lock which would necessarily occur between the piston head 27 and the rear end of the cylinder 1. In order to release this air lock, I tap a relief valve 33 into the end of the cylinder 1 and which will not only release the air lock but will also provide means for the escape of any water due to the condensation of the steam or fluid pressure within the cylinder. This release valve 33 is provided with a handle 34 which is adapted to be engaged by lugs 35 projecting laterally from one side of the trip rod 30.

Immediately after the valve 5 has been closed and the fluid pressure exhausted through the port 26, the lug 35 adjacent the rear end of the trip rod 30 will come into contact with the handle 34 and open the valve 33, thus relieving the dead air lock and permitting of the escape of the condensed steam that may happen to be present. After the device has been operated and is manually moved back to its normal position, the lug 35 nearest the forward end of the trip rod 30 will engage the handle 34 and close the relief valve 33, thus permitting the device to be effectively operated again should occasion require.

The numeral 36 represents the throttle valve lever of the engine and embodies the usual latch 37 operated manually from the hand grip 38. A substantially right angular bell crank lever 39 is pivotally mounted upon the throttle lever 36 and has one end connected to the hand grip 38 through the medium of a link 40.

A throttle lever actuating bar 41 has its lower end pivotally connected to a fixed support 42 and its upper end pivotally connected to the rear end of the piston rod 28, as indicated by the numeral 43. One arm of the bell crank lever 39 is disposed in the path of movement of the bar 41 so that when the piston rod 28 moves forwardly through the cylinder 1, the bar 41 will engage and rock the bell crank 39 so as to move the rod 40 outwardly of the throttle lever and in turn release the latch 37, after which upon a further inward movement of the bar 41, the throttle lever will be moved inwardly to a closed position, thus cutting off the motive force of the engine.

It is not only desirable to cut off the motive force of the engine but also to subsequently apply the brakes to the train and to accomplish this I provide a pivotally mounted crank 44 embodying oppositely disposed crank arms 45 and 46, the crank arm 45 being disposed in the path of movement of the bar 41 while the arm 46 is pivotally connected to a link 47. The outer end of this link 47 is provided with an elongated slot 48 for the reception of the vertically disposed portion 49 of the air brake valve handle 50 carried by the air brake valve 51. By the provision of the slot 48, the engineer will be able to freely operate the air brake valve handle independent of the present mechanism. The crank arms 45 and 46 are so constructed and positioned that when the bar 41 moves inwardly to close the throttle valve lever 36, it will also operate against the arm 45 to move the link 47 laterally until the air brake valve handle is moved to a position to set the brakes upon the train.

In connection with the train carried mechanism, I employ track tripping means which, by reference to Fig. 4, will be seen to consist of a trip rail 52 pivotally mounted

at its opposite ends and at suitable intermediate places upon the ties of the track, as indicated by the numeral 53. This trip rail inclines upwardly from its opposite ends to a point intermediate its ends so as to form a gradual upward incline from each end of the device toward its center. A rock shaft 54 is rotatably mounted in the bearing indicated at 53 and is fixed to one end of the trip rail and to the intermediate supporting arm 55. This rock shaft 54 is provided with an extension arm 56 to which is pivotally connected a pull rod 57, this pull rod being connected through suitable connections to the pull rod ordinarily used between a block tower and the semaphore arms adjacent either side of it.

Therefore, it is to be understood that when the man in the block tower sets the semaphore arm at either side of the block tower at danger, he will also simultaneously swing the trip rail 52 upwardly to a vertical operative position so that should an engineer drive his train past the semaphore arm without paying any attention to the danger signal, the trip arm 16 will come into engagement with the trip rail and thus actuate the hereinbefore described mechanism to automatically release and actuate the throttle valve and the air brake valve to cut off the engine motive force and apply the brakes to the train, thus bringing it to a stop.

It is also to be understood that the trip rail 52 is so connected to the pull rods operating the semaphore arms that when the semaphore arms are set to caution, the trip rail will not be moved to a vertical position but will be simply moved upwardly approximately 45 degrees, from which it will be apparent that the trip rail would in no way interfere with any of the hanging parts of the train while the latter is passing.

From the foregoing description taken in connection with the accompanying drawings, the advantages of construction and the method of operation will be readily apparent to those skilled in the art to which the invention relates and while I have described the principle of operation of the invention, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that such changes in construction and arrangement of parts may be made if desired as are within the scope of the appended claims.

I claim:—

1. An automatic train control device comprising throttle valve actuating mechanism, air brake valve actuating mechanism, means connecting said mechanisms for simultaneous operation, a fluid pressure cylinder, a track operated trip carrying at its upper end an intake valve for said cylinder, and means connecting said cylinder with the actuating mechanisms for the throttle and air brake valves.

2. An automatic train control device comprising throttle valve actuating mechanism, air brake valve actuating mechanism, means connecting said mechanisms for simultaneous operation, a fluid pressure cylinder, a track operated trip provided with an intake valve for said cylinder, means connecting said cylinder with the actuating mechanisms for the throttle and air brake valves, tension means mounted to normally close said valve, a latch adapted to retain said valve in open position, and means actuated from the piston of the fluid pressure cylinder for releasing said latch.

3. An automatic train control device comprising throttle valve actuating mechanism, air brake valve actuating mechanism, means connecting said mechanisms for simultaneous operation, a fluid pressure cylinder, a track operated trip provided with an intake valve for said cylinder, means connecting said cylinder with the actuating mechanisms for the throttle and air brake valves, tension means mounted to normally close said valve, a latch adapted to retain said valve in open position, and a rod actuated by the piston of said cylinder and provided with a cam to release said latch.

4. In an automatic train control device, engine carried mechanism comprising a fluid pressure cylinder having an inlet and outlet port adjacent its opposite ends, means for establishing communication between said cylinder and the engine boiler, a controlling valve for said inlet port, means for opening said valve, means for retaining said valve in open position, a piston rod disposed through said fluid cylinder, and means connected to said piston rod adapted to release said valve holding means when the piston rod has reached the limit of its forward movement.

5. In an automatic train control device, engine carried mechanism comprising a fluid pressure cylinder having an inlet and outlet port, means for establishing communication between said cylinder and the engine boiler, a valve for controlling communication between the engine boiler and said cylinder, a piston arranged within said fluid cylinder, means for opening and closing said valve to actuate said piston in one direction, and a chronic lever actuating bar connected to said piston and adapted to release and close the engine throttle valve lever when said piston is actuated in one direction.

6. In an automatic train control device, engine carried mechanism comprising a fluid pressure cylinder having an inlet and outlet port, means for establishing communication between said cylinder and the engine boiler,

a controlling valve for said inlet port, means for automatically opening said valve, means for automatically retaining said valve in open position, a piston within said fluid cylinder, and means connected to said piston and adapted to automatically release said valve holding means when the piston has reached the limit of its active stroke.

7. In an automatic train control device, engine carried mechanism consisting of a fluid cylinder having an inlet and outlet port, means for establishing communication between said inlet port and the engine boiler, a controlling valve for said inlet port, a piston arranged within said fluid cylinder, a piston rod projecting from said fluid cylinder, means for automatically opening said controlling valve, means for automatically holding said controlling valve in open position, means connected to said piston rod and adapted to automatically release said holding means when the piston has reached the limit of its active stroke, and means for releasing the air lock between the piston and the end of the fluid cylinder.

8. In an automatic train control device, throttle valve actuating mechanism, a fluid pressure cylinder and piston connected to actuate said mechanism, an intake valve for said cylinder having an extended depending rod, a track actuated lever for reciprocating said rod, a tension spring mounted upon the rod for retaining said valve in closed position, a shoulder upon said valve, a pivoted latch mounted to engage said shoulder, and means for automatically releasing said latch in the movement of the piston within the cylinder.

9. In an automatic train control device, throttle valve actuating mechanism, a fluid pressure cylinder and piston connected to actuate said mechanism, an intake valve for said cylinder having an extended depending rod, a track actuated lever for reciprocating said rod, a tension spring mounted upon the rod for retaining said valve in closed position, a shoulder upon said valve, a pivoted latch mounted to engage said shoulder, a rod carried by the piston rod from said cylinder, and a cam disposed upon said rod to release said latch.

10. In an automatic train control device, throttle valve actuating mechanism, a fluid pressure cylinder and piston connected to actuate said mechanism, an intake valve for said cylinder having an extended depending rod, a track actuated lever for reciprocating said rod, a tension spring mounted upon the rod for retaining said valve in closed position, a shoulder upon said valve, a pivoted latch mounted to engage said shoulder, a rod carried by the piston rod from said cylinder, a cam disposed upon said rod to release said latch, a release valve connected with the inlet end of said cylinder, and means carried by said rod for actuating said valve in its travel.

11. In an automatic train control device, throttle valve actuating mechanism, a fluid pressure cylinder and piston connected to actuate said mechanism, an intake valve for said cylinder having an extended depending rod, a track actuated lever for reciprocating said rod, a tension spring mounted upon the rod for retaining said valve in closed position, a shoulder upon said valve, a pivoted latch mounted to engage said shoulder, a rod carried by the piston rod from said cylinder, a cam disposed upon said rod to release said latch, a release valve connected with the inlet end of said cylinder, a lever extended from said release valve, and pins carried by said rod at opposite sides of said lever to engage the same in the travel of the rod.

12. In an automatic train control device, throttle valve actuating mechanism, a fluid pressure cylinder and piston connected to operate said mechanism, an intake valve for controlling said cylinder, a depending trip rod from said valve provided with a stop at its lower end, a bell-crank trip lever, and an arm from said lever having means to engage the upper surface of said stop to permit reverse action of the trip without actuating said rod.

13. In an automatic train control device, throttle valve mechanism, a lever mounted to engage and actuate said mechanism, a fluid pressure cylinder, a piston therein having its rod connected with one end of said lever, an air brake controlling mechanism, and a crank arm disposed in the path of said lever and connected to said air brake mechanism.

14. In an automatic train control device, throttle valve mechanism, a lever mounted to engage and actuate said mechanism, a fluid pressure cylinder, a piston therein having its rod connected with one end of said lever, an air brake controlling mechanism, a pivoted crank having oppositely disposed arms one of which is located in the path of travel of said lever, an actuating lever for said brake controlling mechanism, and a link extended from the opposite crank arm and provided with a slotted connection with the air brake actuating lever.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ISAAC W. HEDGES.

Witnesses:
J. B. McKay,
E. Loren Miller.