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LOCOMOTIVE THROTTLE VALVE CONTROLLING MECHANISM

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Fig. 2.

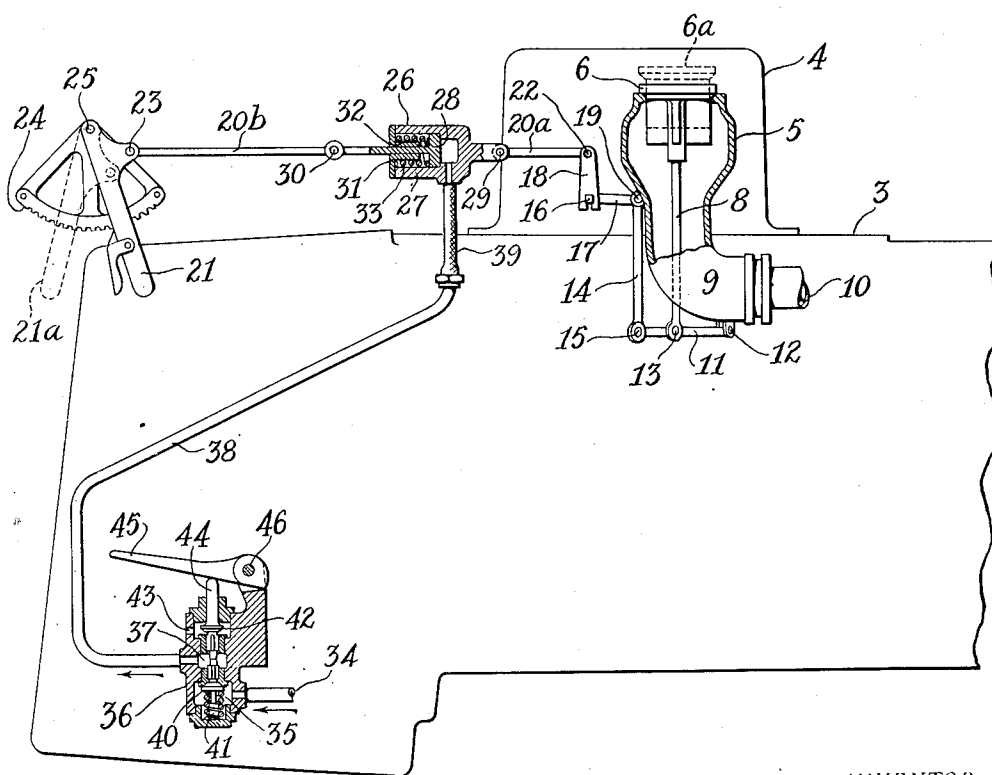
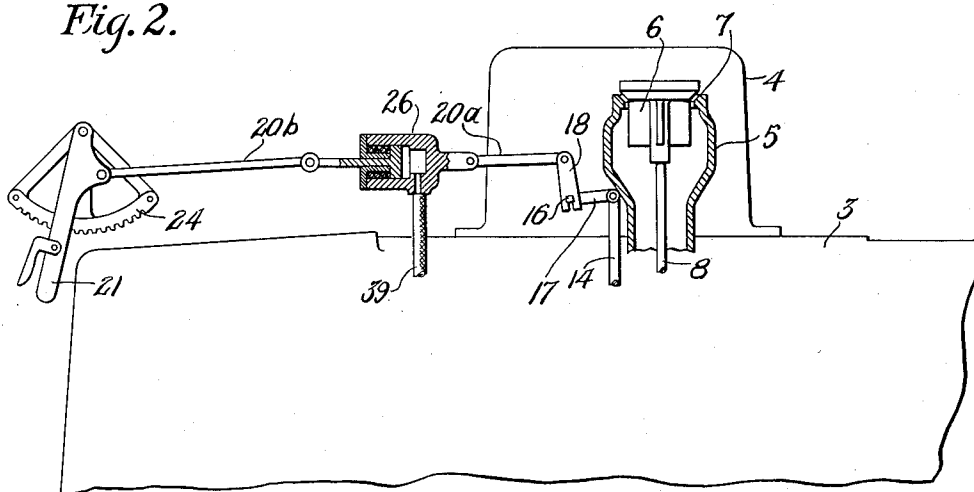


Fig. 1.

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LOCOMOTIVE THROTTLE VALVE CONTROLLING MECHANISM

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5 Claims. (Cl. 137—139)

This invention relates to locomotives and is especially concerned with a novel means for stopping or correcting slipping of the locomotive driving wheels.

According to prior practice, it has been customary, in case the driving wheels slip, in making a difficult start, to substantially or completely close the main throttle valve and thus shut off the supply of steam to the cylinders until such time as the slipping has stopped, then the throttle is again partially opened so that the driving power is resumed. This practice has resulted in very considerable waste of steam and power. To reduce the power and steam losses to a minimum it is necessary, at least under many conditions, to stop the slipping before the locomotive has lost all its forward speed, but in order to accomplish this in accordance with prior practice, extremely accurate and careful manipulation of the throttle lever is necessary.

Thus, at best, the practice of the prior art with regard to slipping has been rather haphazard, and with the foregoing in mind this invention contemplates the use of novel means preferably associated with the throttle valve controlling lever or connections in order to provide for at least a partial closure of the throttle valve independently of the main throttle lever.

In the preferred form of the invention, the slip control means is so arranged as to provide for only a partial closure of the main throttle valve by the actuation of a supplementary slip control valve, and the mechanism is further preferably constructed to close the throttle valve to a positively predetermined point for any given setting of the main throttle lever.

The general nature of the invention as well as the above and other objects and advantages will be more apparent from a consideration of the following description making reference to the accompanying drawing, in which

Figure 1 is a somewhat diagrammatic side view of rear portions of a locomotive, including a showing of the main throttle valve in vertical section and the apparatus of the present invention associated therewith for purposes of slip control; and

Figure 2 is a view of certain parts shown in Figure 1 although the parts as here shown occupy somewhat different positions as compared to the showing of Figure 1.

Referring now to the drawing in detail, it will be observed that the boiler of the locomotive is indicated by the reference numeral 3, this

boiler being provided with a steam dome 4 in which the throttle valve casing 5 is mounted.

The throttle valve 6 is arranged to open and close the seat 7 at the upper end of the casing 5, and for purposes of actuation, the valve is equipped with a depending stem 8 extending through the elbow 9. The elbow 9, of course, is coupled with the supply pipe 10 which may be extended to the driving cylinders.

The connections for actuating the valve 6 include a lever member 11 pivoted as at 12 to any suitable fixed point. The stem 8 is also pivotally connected with the lever 11 as at 13 and a link 14 is pivotally coupled as at 15 with the lever 11 at the end thereof remote from the pivot point 12. An additional pivot shaft 16 carries two levers or arms 17 and 18 which move together about the pivot point 16. The former of these levers (17) is connected with the upper end of the link 14 as at 19, while the latter is connected, through the throttle rod 20a—20b, with the throttle lever 21. The portion of the rod 20a is pivotally coupled to the arm 18 as at 22 and the connection of the portion 20b to the lever 21 also includes a pivot 23. A notched quadrant 24 is provided for the lever 21 in order to retain it in any desired position about the lever fulcrum 25.

In accordance with prior practice, the connection between the lever 21 and the arm 18 would be substantially direct or continuous, but in applying the structure of this invention I prefer to break the throttle rod into two parts as above indicated (parts 20a and 20b) and also to interpose the fluid pressure device, generally indicated at 26, between these two parts.

The fluid pressure device includes a cylinder 27 and a piston 28 working in the cylinder, and while I have shown the cylinder 27 as being connected as at 29 to the throttle rod 20a and the piston 28 connected with the rod 20b as at 30, it should be understood that these parts may be inverted or reversed in position. The cylinder 27, furthermore, is equipped with a closure or cap member 31 having a stop 32 against which the head of the piston may abut when the cylinder and piston are relatively separated. A coil spring 33 serves to exert a force on the piston in a direction to move it into the cylinder.

Fluid pressure may conveniently be supplied to the device 26 from the fluid pressure or air line 34, this line being arranged to deliver into a chamber 35 in the valve device 36. An additional chamber 37 in this device communicates with the pipe 38 which is extended for connection, pref-

erably through a flexible tube 39, to the head end of the cylinder 27.

Communication between chambers 35 and 37 in the valve device 36 may be had only upon unseating of the valve member 40, this valve member normally being held in closed position by means of spring 41. An additional and normally open valve member 42 is also provided in the device 36 to control communication between the chamber 37 and the exhaust passage 43. The stem 44 of the upper valve member 42 is extended to project exteriorly of the device 36 so that it may be engaged by the hand lever 45, the latter being pivoted as at 46.

To consider the operation of the device, it should first be assumed that the throttle lever 21 is moved to the position 21a (see Figure 1) in order to open the throttle. The corresponding position of the throttle valve is indicated in dotted lines in Figure 1 at 6a. With respect to this movement it is further observed that the force or pressure of spring 33 in the device 26 is preferably sufficient to prevent compression thereof and thus to permit normal opening movement of the throttle valve in the manner described.

In case the driving wheels slip, as above brought out, the prior practice would call for a closure of the throttle valve by suitable manipulation of the throttle lever 21. In accordance with this invention, however, the engineer need only momentarily depress the lever 45 of the slip control valve and as a result, the fluid pressure admitted through the connections 34, 38 and 39 will cause relative movement of cylinder and piston 27 and 28 from the position shown in Figure 1 to the position illustrated in Figure 2. This, in turn, will cause a movement of the throttle valve itself from the dotted position 6a in Figure 1 to the partially closed position illustrated in Figure 2. Movement of the throttle lever 21 under the action of the device 26, of course, is prevented by virtue of the engagement of the throttle lever with its quadrant. Thus, the throttle valve is automatically closed to a predetermined point, this point being such that the power of the cylinders will be reduced sufficiently to stop slipping, without, however, completely shutting off the supply of steam. The danger of losing all forward speed which has been acquired is, therefore, reduced to a minimum.

One very decided advantage of this arrangement is involved in the fact that the manipulation of the lever 45 need not be accurately performed and it is much more convenient for the engineer merely to quickly depress the lever 45 than to disengage the throttle lever 21 from its quadrant 24 and then accurately re-adjust its position.

Upon release of the lever 45 steam pressure is quickly exhausted through the connections 39 and 38, chamber 37 and exhaust port 43, and it will be observed that here, again, the movement of the throttle valve to open position is accomplished very quickly and accurately without the necessity for careful manipulation of the throttle lever.

What I claim is:—

1. In a locomotive, a throttle valve, means for actuating the throttle valve including a manually operable member and operating connections extending therefrom to the valve, said connections including a fluid pressure cylinder and piston device, means normally maintaining said piston and cylinder in predetermined relative positions, whereby, upon movement of the manually opera-

ble member to actuate the throttle, the said piston and cylinder device moves therewith and means for admitting fluid pressure to and exhausting fluid pressure from said piston and cylinder device to effect changes in the relative position of said piston and said cylinder, whereby the connections are altered in length to provide for different settings or adjustments of the valve with a given setting or adjustment of said manually operable member.

2. In a locomotive, a throttle valve, means for actuating the throttle valve including a manually operable member and operating connections extending therefrom to the valve, said connections including a fluid pressure cylinder and piston device, means normally maintaining said piston and cylinder in predetermined relative positions, whereby, upon movement of the manually operable member to actuate the throttle the said piston and cylinder device moves therewith, and a manually operable device for admitting fluid pressure to and exhausting fluid pressure from said piston and cylinder device to effect changes in the relative position of said piston and said cylinder, whereby the connections are altered in length to provide for different settings or adjustments of the valve with a given setting or adjustment of said manually operable member.

3. In a locomotive, a main throttle, a manually operable throttle control member, a throttle rod connection extended between said member and the throttle valve, said connection including a fluid pressure cylinder and piston device whereby the throttle rod connection may be altered in length by relative movement of said piston and cylinder, and a manually operable device for admitting fluid pressure to and exhausting fluid pressure from said cylinder, the throttle rod connection being of such length and the piston and cylinder having relative travel such that with said operating member in position to give a relatively wide opening to the throttle valve such as is required for starting the locomotive, actuation of said manually operable device serves to alter the effective length of the throttle rod connection in a manner to effect closing movement of the throttle valve.

4. In a locomotive, a main throttle, a manually operable throttle control member, a throttle rod connection extended between said member and the throttle valve, said connection including a fluid pressure cylinder and piston device whereby the throttle rod connection may be altered in length by relative movement of said piston and cylinder, and a manually operable device for admitting fluid pressure to and exhausting fluid pressure from said cylinder, the throttle rod connection being of such length and the piston and cylinder having relative travel such that with said operating member in position to give a relatively wide opening to the throttle valve such as is required for starting the locomotive, actuation of said manually operable device serves to alter the effective length of the throttle rod connection in a manner to effect closing movement of the throttle valve, the alteration in length of the throttle rod connection, with the manually operable member in the position aforesaid, being sufficient only partially to close said throttle valve.

5. In a locomotive, a throttle valve, means for actuating the throttle valve including a manually operable member and operating connections extended therefrom to the valve, said connections including a fluid pressure cylinder and piston device, means normally maintaining said piston

and cylinder in predetermined relative positions, whereby, upon movement of the manually operable member to actuate the throttle, the said piston and cylinder device moves therewith, and
5 mechanism for admitting fluid pressure to and exhausting fluid pressure from said piston and cylinder device to effect changes in the relative position of said piston and said cylinder, the said connections further being of such length and
10 the piston and cylinder having relative travel such that with said operating member in position to give a relatively wide opening to the throttle valve such as is required for starting the locomotive, operation of said mechanism serves to alter the effective length of the connections in a manner to effect closing movement of the
5 throttle valve, the alteration in length, with the manually operable member in the position aforesaid, being sufficient only partially to close said throttle valve.

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