GOVERNOR CONTROLLED DRIFTING VALVES FOR LOCOMOTIVES

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Charles Stern
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Inventor
Charles Stern

Fig. 11.

Fig. 12.

Fig. 13.
The present invention relates to improvements in Governor-controlled drifting valves for locomotives, and has for an object to provide a drifting valve that will be more certain and efficient in action and will contain certain emergency features whereby the opening of the drifting valve, which permits the supply of steam to the locomotive steam chests, may be regulated to prevent its casual or automatic opening.

In cases where the drifting valve opens when the locomotive is standing the locomotive is apt to "walk off" doing serious damage to persons and property about terminal and round houses, and it is the purpose of the invention to make it impracticable for drifting valves to cause locomotives to move.

The invention contemplates the provision of a positive operating means controlled and actuated by the steam chest pressure and a mechanically operated governing device driven at all times by the locomotive when in motion, which two agencies will combine together to control the action of the drifting valve.

The invention also has for a further object to provide a simplified control for drifting valves and a positive operating mechanism, whereby greater dependence may be placed upon the action of the drifting valve which is very important in breaking the vacuum, supplying the moisture and lubricant to the steam chests and cylinders of the locomotive and for other reasons well known in this art.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views.

Figure 1 is a diagrammatic side view of a locomotive equipped with a drifting valve and control mechanism constructed in accordance with the present invention.

Figure 2 is a diagrammatic front view of the same with parts removed for clearness.

Figure 3 is a diagram of the operating mechanism and governor showing the position of the parts when the locomotive is standing still.

Figure 4 is a similar view showing the position of the parts when the locomotive is moving at low speed under steam pressure and before the same has gathered momentum.

Figure 5 is a view similar to Figures 3 and 4 showing the parts in a position where the locomotive is operating under steam pressure and after it has gained sufficient momentum to place the governor in a potential position for operating the valve mechanism.

Figure 6 is also a diagram showing the drifting position of the parts when the throttle steam is cut off from the locomotive steam chests.

Figure 7 is a top plan view, taken on an enlarged scale, of the operating and governor mechanism with the cover removed.

Figure 8 is a vertical section taken on the line 8—8 in Figure 7.

Figure 9 is a view similar to Figure 8 but with the parts in a subsequent position.

Figure 10 is a vertical cross section taken on the line 10—10 in Figure 9.

Figure 11 is a longitudinal horizontal section taken on the line 11—11 in Figure 9.

Figure 12 is a vertical cross section taken on the line 12—12, also in Figure 9.

Figure 13 is a front view of the operating and governor mechanisms with parts broken away and parts shown in section.

Figure 14 is a side view, with parts broken away and parts shown in section, of the drifting valve.

Figure 15 is a similar view taken on the line 15—15 in Figure 14, and

Figure 16 is a top plan view of the same with the pipe connections broken away.

Referring more particularly to the drawings, in Figures 1 and 2 is shown generally a locomotive 17 having steam pipes 18 and steam chests 19. Cylinder cocks are shown at 20 as being coupled to an air line 21 passing through the cab and in communication with the main air reservoir. Within the cab is an air valve 22 for controlling the supply of the compressed air to the cylinder cocks 20. This valve may be manually actuated by the engineer.

The cylinder cocks 20 are preferably constructed in accordance with Patent No. 1,901,605, granted March 14, 1933, in which the cylinder cocks are kept closed by the pressure of air from the reservoir; on the other hand the cylinder cocks open automatically when the cab valve 22 is closed to shut off the supply of compressed air from said cylinder cocks.

The particular type of drifting valve employed being made the subject matter of a continuation-in-part application filed July 24, 1934, Serial No. 796,751, and which is shown more particularly in Figures 14, 15 and 16 in which the valve itself is indicated at 26 and is adapted to close against and seat in a bushing 27 of appropriate material, for instance non-rust or chromium plated substance.
The valve stem 28 may be of the same variety of material and it extends down into the bellows chamber, being connected with the bellows 29. The chamber above the driving valve 26 is in communication with the dome 31 of the locomotive or with some other source of steam supply. As shown in Figure 2, the pipe 30 contains a valve 30°. This valve is opened and closed by an emergency extension handle shown in Figure 1 as extending into the cab for operation by the engineer. This emergency extension handle is turned normally so as to maintain the valve 30° in an open position whereby steam may flow freely from the dome 31 to the chamber above the driving valve 26. Should the driving valve or any of its mechanism be injured or put out of order, then the emergency extension handle is turned so as to close valve 30° and prevent the leakage of steam through any part that might be damaged to this extent. The steam pressure tends to close the valve 26 and in this it is aided by the coil spring 31. Where the driving valve is open steam may flow out through the pipe 32 down to the steam chests 19. The pipe 32 will preferably have an automatic drain valve 33; and as shown in Figure 1 such pipe 32 connects with the bottom of the steam chamber of the bellows 29. In this cross pipe 34 are check valves 35 which open toward the steam chests.

The interior of the bellows 39 connects by an air supply pipe 36 with the governor device, such governor device being in communication by an air pipe 37 with the air supply pipe 21 to the cylinder cocks. In this way the supply of air to the governor device, and consequently to the bellows chamber of the driving valve, is dependent upon the valve 23 in the cab. In Figures 8 and 9, having a cross connecting passage 39. The flow of air from the supply pipe 37 to the outlet pipe 36 is controlled by an air supply valve 40 adapted to close against a seat 41 and having a stem 42 extending outwardly of the piston 43 of the air valve. The stem is being positioned for free engagement with a lug 43 on the valve actuating lever 44, which lever is provided with the depending longer lug 46, the face of which bears against the stem 47 of the drain valve 48. This drain valve closes 47 to the right in Figure 9. The lever 44 is fulcrumed at 48 upon a saddle 49. The weighted part of the lever is adapted to carry the shoulder 50 thereof down into engagement with the saddle 49 which is located to this side of the lever and thus the lever ordinarily rests in the position shown in Figure 8 where the faces of the lugs 43 and 46 which contact with the stem 50 are in a substantial vertical position, hence when the saddle is lifted the lugs will have no effect upon the valves. The lifting of the saddle is accomplished by means of the piston rod 51 which carries the saddle and which is connected at its lower end to a piston or plunger 52 operating in the cylinder 53.

The lower part of this cylinder is placed, by a pipe 54, in communication with the steam chest preceding the valve 55. This steam chest is preferably of a continuous metallic or other rim 56 engaging about weights which radiate from a shaft 57. This shaft is preferably square as shown in Figures 8 to 11 inclusive. As shown in Figure 10 the shaft has rounded trunnions where it is mounted in the bearings 58 and 59 carried by the casing 60 which may house the entire governing unit if desired. The removable cover for the casing is represented at 61. In Figures 10, 11 and 13 there is illustrated a pulley 62 upon the outer extended end of the shaft and in Figure 1 this pulley is shown as engaged by a belt 63 driven by the drive axle 64 of the locomotive.

Referring more particularly to Figures 7 to 13, the square shaft 57 is provided with rows of studs 65 and 66 at spaced points thereon, such studs being threaded or otherwise secured into the shaft and acting as guides for the weights 67. These weights are formed with fixed flanges 68 and removable flanges 69 forming troughs therebetween to loosely receive the rim 56, and thereby the rim is held in place against lateral escape. Each weight is provided with lateral lugs 70 perforated to slide radially upon studs and to also receive thereagainst the inner ends of coil springs 71 wound about the studs and acting to urge the weights to an inner collapsed condition as shown in Figure 8. Centrifugal force is adapted to throw the weights out to the condition shown in Figure 9. The weights are formed with outer arcuate faces and with inner seating webs 72 for engaging upon the flat faces of the shaft 57 at crutch pipe 34 running to both of the steam chests 19. In this cross pipe 34 are check valves 35 which open toward the steam chests.

As shown in Figure 12, the saddle 49 also has perforated lateral lugs 73 for sliding up and down vertically upon the posts or studs 74 which are mounted in the top portion of the cylinder 53. Coil springs 75 are wound about the lugs and affixed at their upper ends thereto, while bearing at their lower ends upon the lugs 73 for the purpose of urging the piston 52 downward. In operation, Figures 3, 4, 5, and 6 show the various phases of movement of the device. Ordinarily when the locomotive is not moving the parts are in the position shown in Figures 3 and 8; the weights are retracted to their innermost position allowing the ring 56 to drop down and the roller 55 to descend. There being no pressure in the steam chest, the pressure of the cylinder 52 in the lowermost position. In this position, the lug 46 is placed to hold the drain valve 48 open thus preventing any pressure from accumulating in the bellows chamber 29 of the driving valve, and carrying off any pressure that may tend to accumulate in the bellows chamber. In this way the accidental accumulation of pressure sufficient to open the driving valve is avoided and the device introduces a safety factor to this extent. The lug 45 allows the air supply valve 40 to close and the closing of this valve by the automatic pressure by the air in the line, constitutes a second factor of safety. The cab air valve 22 forms a third safety margin because it opens and closes the supply of air not only to the cylinder cock but also to the driving valve and advantage is taken of the instantaneous operation of the cylinder cocks by the engineer.

In other words the air valves 22 and 25 will be closed as soon as the locomotive stops, thus immediately closing off air to the driving valve and preventing the locomotive from "walking off." Now of the lever 44 is shown as carrying a roller 55 for resting upon the governing device. This governor consists of a continuous metallic or other rim 56 engaging about weights which radiate from a shaft 57. This shaft is preferably square as shown in Figures 8 to 11 inclusive. As shown in Figure 10 the shaft has rounded trunnions where it is mounted in the bearings 58 and 59 carried by the casing 60 which may house the entire governing unit if desired. The removable cover for the casing is represented at 61. In Figures 10, 11 and 13 there is illustrated a pulley 62 upon the outer extended end of the shaft and in Figure 1 this pulley is shown as engaged by a belt 63 driven by the drive axle 64 of the locomotive.
line vertically and will not have any effect to change the position of the valves 40 and 48. Thus the drifting valve is still out of operation so long as the engineer has the throttle open and there is pressure in the steam chests. In Figure 4 the roller 56 is shown as carried upwardly above the governor, and in Figure 5 the same position of all of the parts is shown as in Figure 4 except that the rim 56 has attained a position of concentricity with respect to the shaft 57 and the weights, the weights having been thrown out by centrifugal force due to the float 44 of the locomotive and having therefore lifted the rim 56 to a position of engagement or substantial engagement beneath the elevated roller 55.

Figures 6 and 9 show the position of the parts when, after running, the engineer closes the throttle and drifts. Immediately the steam chest pressure falls as does also that in the cylinder 53 enabling the spring 75 to force the plunger 52 downwardly.

The roller 55 is of course maintained in the upper position as the locomotive is still in motion and the governor is driven from lever 44 wherefore it has rotated causing the shoulder 50 to be lifted from the saddle, the lug 43 rotated toward air supply valve 40 opening the same; and the lower lug 46 is retired away from the stem 47 allowing the relief or drain valve 48 to close by virtue of the air pressure obtaining in the passage 39. This air pressure rises through the pipe 36 into the bellows chamber 29, raising the drifting valve 26 and allowing boiler steam to pass down through the connection 32 to the steam chests. In this way the locomotive steam chest valves and cylinders will be kept lubricated and the vacuum broken. All of the advantages of the drifting valve are also had. Should the throttle again be opened the parts will promptly be restored to the position shown in Figure 5, thus cutting off the air and suspending the operation of the drifting valve, thus exhausting air pressure from bellows 29 through the drain valve 48. If from the drifting position, shown in Figure 6, the locomotive should be brought to a stop then the ring 56 will fall and the parts assume the position shown in Figure 3.

Here again the air valve 40 is closed and the operation of the drifting valve suspended. The operation of the device is so coordinated with the operation of the cylinder cocks 20 that the drifting valves will be cut off from access to the air pressure when the locomotive is stopped at a terminal or put in the round house by the simple instinctive act of the engineer in opening the cylinder cocks by shutting off the air supply by valve 22.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims:

What is claimed is:

1. In combination, a drifting valve for locomotives coupled to a source of steam supply and to the locomotive steam chests, a cylinder in communication with the steam chest pressure, a plunger in said cylinder raised by the steam chest pressure, a valve operating lever controlling the drifting valve and movably with said plunger pivotally mounted with respect thereto, a roller on said lever, and a centrifugal governor driven by the locomotive and positioned to cause pivoting movement of the lever.

2. In combination, a drifting valve for locomotives coupled to a source of steam supply and to the locomotive steam chests, a cylinder in communication with the steam chest pressure, a plunger in said cylinder raised by the steam chest pressure, a valve operating lever controlling the drifting valve and movably with said plunger pivotally mounted with respect thereto, a roller on said lever, and a centrifugal governor having a ring adapted to contact with said roller and having an up and down movement.

3. In combination, a drifting valve for locomotives coupled to a source of steam supply and to the locomotive steam chests, valve operating means controlling the drifting valve mounted movably and subject to the steam chest pressure and including a saddle, a lever pivoted on said saddle and restricted as to downward movement in one direction by said saddle, and a governor adapted to cause pivotal movement of the lever about the saddle.

4. In combination, a drifting valve for locomotives coupled to a source of steam supply and to the locomotive steam chests, an air control valve for controlling the drifting valve, a drain valve for the drifting valve located adjacent the air control valve, valve operating means movably mounted adjacent said valves and being subject to the steam chest pressure, and a mechanical governor driven at all times by the locomotive while in motion for acting upon said means to control the opening and closing movement of the air control and drain valves.

5. In combination, a drifting valve for locomotives coupled to a source of steam supply and to the locomotive steam chests, an air control valve for controlling the drifting valve, a drain valve for the drifting valve located adjacent said air control valve, a saddle, means subject to the steam chest pressure for lifting and lowering said saddle, a lever fulcrummed in said saddle and weighted to a position resting at one side upon the lever, lugs projecting up and down from said lever for acting to open and close said air control and drain valves, and a governor driven by the locomotive at all times while in motion and acting to pivotally lift the lever from engagement with the saddle.

6. In combination, a drifting valve for locomotives coupled to a source of steam supply and to the locomotive steam chests, an air control valve for controlling the drifting valve, a drain valve for draining the air from the drifting valve, a plunger subject to and elevated by the steam chest pressure, means for normally lowering said plunger, a saddle movable up and down with said plunger, a lever pivoted upon said saddle and having a shoulder at one side of its pivot point for encountering the saddle to arrest further downward movement of the lever, lugs on the other side of said lever adapted to open and close said air control and drain valves, and governor means actuated by the movement of the locomotive for encountering the shouldered end of said lever to cause pivoting of the lever in one position.

7. In combination, a drifting valve for locomotives coupled to a source of steam supply and normally closed by the pressure of said steam supply, air pressure actuated means for causing said drifting valve against the steam pressure, a connection between said drifting valve and the locomotive steam chests for supplying steam to the steam chests when the drifting valve is open, an air control valve for admitting, when open, air
under pressure to said air pressure actuated means, a drain valve situated in proximity to said air control valve for evacuating pressure from said air pressure actuated means, a lever pivoted adjacent said valves and having parts for opening and closing said valves alternately in accordance with different angular positions of the lever, superheated steam pressure actuated means in communication with the steam chest pressure for supporting and for raising and lowering said lever, and governor means driven by the engine when in motion for supporting one end of said lever whereby to create rocking movement of the lever when the superheated steam pressure actuated means falls whereby to cause opening of the air control valve and to permit the closing of the drain valve.

8. In combination, a drifting valve in communication with a source of steam pressure supply and with the locomotive steam chests and biased to a closed position by action of the steam supply pressure, air pressure valve opening means for said drifting valve in communication with the locomotive air pressure source, a normally closed air control valve for controlling the supply of air to said valve opening means, a governor driven by movement derived from the movement of the locomotive, movable superheated steam pressure means in communication with the locomotive steam chests and normally held elevated by the superheated steam pressure, and valve actuating means supported by and movable with respect to said superheated steam pressure means and acted on by said governor to move relatively to said superheated steam pressure means whereby to open the air control valve when the superheated steam pressure means falls due to falling of the superheated steam pressure in the locomotive steam chests.

CHARLES STERN.