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AUTOMATIC VALVE FOR LOCOMOTIVE SANDERS

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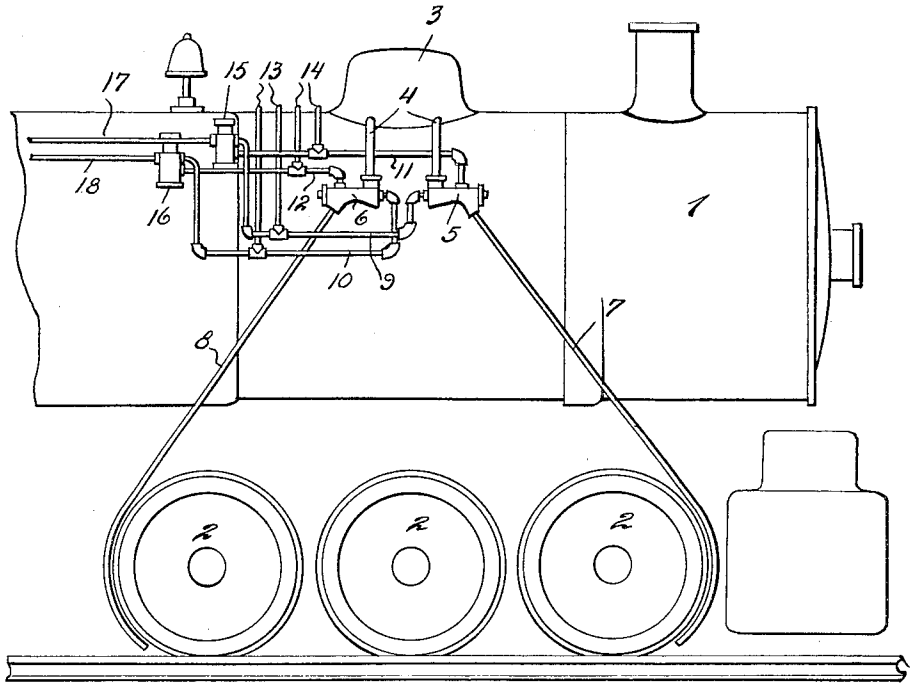


Fig. 1.

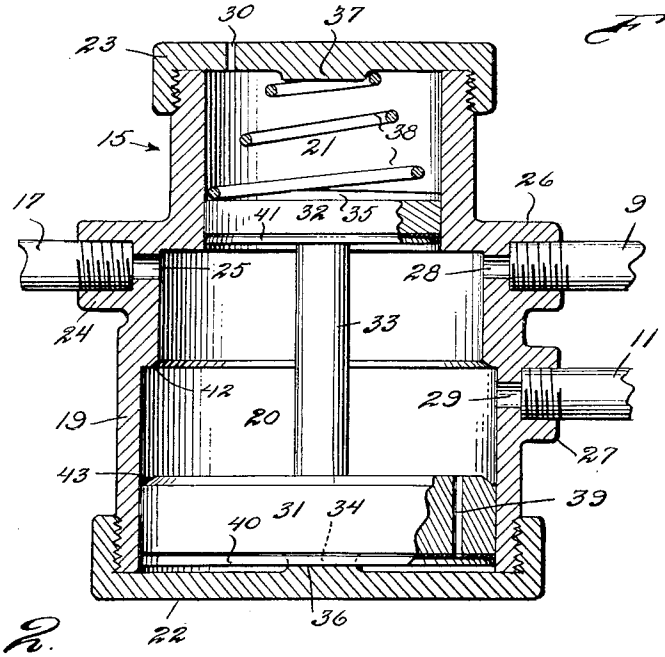


Fig. 2.

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AUTOMATIC VALVE FOR LOCOMOTIVE SANDERS

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12 Claims. (Cl. 291—16)

The invention relates to means for applying sand to the rails beneath the traction wheels of locomotives or the like, and the present application embodies improvements on the structure disclosed in the co-pending application of William L. Ranson for patent for Valves for locomotive sanders, filed July 2, 1930, and given Serial No. 465,407.

In Patent No. 1,263,722 granted to William H. White on April 23rd, 1918, there is disclosed a locomotive sanding device embodying a sand box or dome from which lead sand pipes connected with sand traps having discharge pipes leading therefrom to points in advance of the driving wheels of the locomotive. The sand is forced out by compressed air controlled by a suitable valve means within the locomotive cab. In this particular device and in others of a more or less similar nature, the sand trap has therein a nozzle from which compressed air discharges for forcing the sand through the delivery pipes. These devices also include cleaning means generally consisting of a port located opposite the entrance to the delivery pipe and receiving compressed air from a separate pipe, the purpose being to prevent clogging of the delivery pipe. In devices of this nature it is customary to provide a valve for controlling the flow of compressed air successively to the cleaning pipe and discharge jet, the valve being manually operable to control the flow of pressure.

The present invention has for its principal object the provision of a valve interposed between the engineer's control valve and the sanding and cleaning means, the valve being so constructed and arranged as to permit the passage of compressed air for a short period of time to the cleaning port and then automatically closing so that the air will be supplied to the sanding jet only.

An important object of the invention is to provide a valve of this character which requires no manual control whatsoever but which operates entirely by compressed air whenever the manual valve in the cab is opened.

Another object of the invention is to provide in a sanding device a valve of this type which will remain open for a predetermined period to insure the proper flow of compressed air to the cleaning pipe or port and which will then close by the building up of air pressure within it to cut off the supply of air to the cleaning port and direct it entirely to the sanding mechanism.

Another object of the invention is to provide a valve of this type which will return automatically to normal position when the compressed air supply is cut off by means of the control valve in the cab, so as to be ready for subsequent operation whenever necessary.

A more specific object of the invention is to provide a valve of this type embodying differential pistons and which may therefore operate automatically by air pressure, the pistons being provided with a novel arrangement of packing means for positively preventing undesired leakage, and the valve body being moreover provided interiorly with a positive seat for cooperation with one of the piston elements for preventing passage of air to the cleaning pipe when the valve is at one limit of its movement.

An additional object of the invention is to provide a valve of this character which will be simple and inexpensive to manufacture, easy to install, positive and automatic in action, efficient and durable in service, and a general improvement in the art.

To the attainment of the foregoing and other objects and advantages, the invention preferably consists in the details of construction and the arrangement and combination of parts to be hereinafter more fully described and claimed, and illustrated in the accompanying drawing in which:

Figure 1 is a fragmentary and rather diagrammatic side elevation of a locomotive equipped with a sanding mechanism embodying my novel valve, and

Figure 2 is a vertical longitudinal section through the valve alone showing the movable part thereof at one limit of its movement.

Referring more particularly to the drawing, the numeral 1 designates, generally, a portion of a locomotive having the usual driving wheels 2. The numeral 3 designates a sand box or dome which is mounted on top of the boiler as is customary and which contains sand conducted through the sand pipes 4 to sand traps 5 and 6 from which lead delivery pipes 7 and 8, the former being provided for the purpose of conducting or delivering sand in advance of the driving wheels and the latter being for the purpose of conducting sand to the rear thereof when the locomotive is operated in reverse. The sand traps, sand pipes and delivery pipes are provided at both sides of the locomotive as will of course be readily understood and it is naturally intended that the action will be the same at both sides whether the locomotive be running forwardly or rearwardly. In view of the disclosure in Patent No. 1,263,722 granted April 23rd, 1918 to William

H. White it is thought unnecessary to illustrate the construction of the sand traps as a full understanding in regard thereto may be had by inspecting said patent. It is thought sufficient for present purposes to state that compressed air is supplied to the discharge jets within the traps 5 and 6 through pipes 9 and 10 respectively, and that compressed air is supplied to the cleaning ports through pipes 11 and 12 respectively. The discharge pipes 9 and 10 at each side of the locomotive are connected by transverse pipes 13 and the cleaning pipes 11 and 12 at each side are similarly connected by pipes 14. As mentioned above, the usual practice is to provide manually operated valve means for controlling flow of compressed air to the pipes 11 or 12, and 9 or 10, successively, this depending upon the direction of movement of the locomotive. The objection to manual means of this type, such as disclosed in the above mentioned White Patent No. 1,263,722, is that the engineer may permit compressed air to pass to the cleaning pipes and ports for either too long or too short a time. If the time is too short the delivery pipes may not be properly unclogged and if the time is too long there is a waste of compressed air. As a matter of fact I have not shown any manual valves for controlling the passage of compressed air to the sanding devices as this is a detail immaterial in the present combination.

In accordance with the invention I provide automatic valves indicated generally at 15 and 16 connected wtih supply pipes 17 and 18 which extend to the cab and which are equipped thereat with any suitable control valves, not shown. The valve 15 has connected therewith the pipes 9 and 11 which lead to the forward sand trap 5, while the valve 16 has connected therewith the pipes 10 and 12 which connect with or lead to the rear sand trap 6. As the valves 15 and 16 are identical in construction a description of one will suffice.

Each of the valves 15 and 16 is shown as comprising a body 19 preferably of general cylindrical shape and formed to provide a relatively large chamber 20 and a relatively small chamber 21, the outer ends of the respective chambers being normally closed by caps 22 and 23 here represented as screwed in place though it is to be understood that they may be fastened in any desired manner as this is an immaterial detail. At one side, the body 19 is provided with a boss 24 within which is a port 25 communicating with the chamber 20, and the pipe 17 or 18 as the case may be is screwed into this boss. At the opposite side the body is formed with two bosses 26 and 27 within which are ports 28 and 29 leading into the chamber 20. The pipes 9 and 11, or 10 and 12 as the case may be, are screwed into these bosses 26 and 27 respectively. The chamber 20 of course communicates through the ports 25, 28 and 29 with the pipes 17, 9 and 11, or 18, 10 and 12, as the case may be, at certain periods in the operation, while the chamber 21 is open to the atmosphere through a bleed port 30.

Slidably mounted within the body 19 is a piston comprising differential heads 31 and 32 located within the respective chambers 20 and 21. The heads 31 and 32 are connected by a reduced stem 33 and may be provided at their outer faces or ends with projections 34 and 35 adapted to engage against abutments 36 and 37 on the inner faces of the caps 22 and 23 respectively when the entire piston reaches the ends of its movements in opposite directions. The piston is normally urged in one direction, that is to say into its normay position, as by means of a spring 38 which is preferably of the conical type so as to occupy the minimum space when compressed. The piston head 31 is formed with a bleed port 39 which may be of relatively small diameter and which extends therethrough for permitting passage of air from above to below this piston head for a reason to be explained.

An important feature of the present invention is the provision of novel packing means which will prevent leakage around the pistons of the valve without having the pistons themselves fit so closely that there may be danger of sticking, as for instance under severe temperature changes, gumming of any lubricant which may be used within the valve device or as the result of any other possible condition or contingency. Accordingly, I provide the underneath sides of the piston heads 31 and 32 with cupped washers or gaskets 40 and 41 respectively. These washers may very conveniently be formed of leather though it is easily conceivable that some other substance may be satisfactory. Any desired means whatsoever, none being shown in this instance, may be utilized for securing these washers or gaskets in place. It will be noted that the washers have their outer edges cupped downwardly so that when air pressure is applied at the gasketed side of either piston head the edge portion of the gasket or washer will be forced outwardly into close engagement with the wall of the chamber within which the piston head moves so that leakage will be prevented. By providing such washers it will be readily understood that the piston heads themselves may have a reasonably loose fit within the valve body so as to move freely therein and without any danger of binding under any circumstances. Naturally the gasket 40 will either be provided with a hole registering with the port 39 or must be of ring form so as to avoid covering the port, this being a minor detail.

Instead of having the diameter of the chamber 20 uniform throughout, I have found it preferable to make the lower end of slightly larger diameter than the upper end so as to define a circumferential or annular seat 42 of beveled form adapted to be engaged by the beveled edge 43 of the piston head 31, the coaction of the seat with this beveled edge not only serving to limit the upward movement of the valve but also acting to make a seal for positively preventing any leakage of air around the piston head 31 which, it will be remembered, may be sufficiently loose within the valve body that leakage about it might result unless this seat be provided.

The valve 15 is installed connected between the pipe 17 and the pipes 9 and 11, while the valve 16 is installed between the pipe 18 and the pipes 10 and 12. Normally, that is to say when there is no sanding of the rails needed the piston in the valve is at the lowermost position as shown in Figure 2 of the drawing. Whenever it is desired to feed sand onto the track in advance of the driving wheels 2, the engineer opens whatever control pipe is provided in the pipe 17 whereupon compressed air flows through the pipe 17 into the valve 15, the air entering the chamber 20 and passing out through the pipes 9 and 11. However, a certain amount of air will pass through the port 39 in the head 31 and build up pressure beneath this head. This is possible owing to the difference in the diameters of the heads 31 and

32. When the air pressure beneath the piston head 31 builds up, as it will very shortly, the pressure against the underside of the head 31 will cause the piston as a whole to move upwardly, the head 31 then riding over and closing the port 29 which communicates with the pipe 11 leading to the cleaning port. The air entering the chamber 20 then passes out only through the port 28 and pipe 9 to the sand trap 5 where sand is ejected into and through the pipe 7 in advance of the forward driver. Of course it should be understood that the sanding mechanism is the same at both sides of the locomotive and will operate simultaneously at both sides owing to the provision of the transverse pipes 13 and 14. As the piston rises air in advance of the head 32 escapes through the bleed port 30 so that there will be no pressure built up in advance of the head 32. Of course the spring 38 becomes compressed but as it may be a very light spring it will not in any way seriously oppose movement of the piston. When the sanding is completed the operator of course cuts off his control valve in the pipe line 17 and as the pressure within the chamber 20 reduces by virtue of the escape of the air through the port 28 the spring 38 will expand and force the piston down to its original or normal position.

In case the locomotive is backed and it is desired to apply sand to the rails behind the rear drivers 2, the control valve in the pipe 18 is opened to actuate the valve 16 in exactly the same manner as above described so that sand will be ejected through the sand pipes 8 at the opposite sides of the locomotive.

From the foregoing description and a study of the drawing it will be apparent that I have thus provided a very simple valve device which will operate automatically to permit flow of compressed air through the cleaning pipes and ports of the sand traps and then cut off the cleaning blast so that air will be supplied only to the sanding mechanism. A distinct advantage of this is that it will be impossible for the engineer, through carelessness or any other reason, to waste compressed air by permitting it to pass for an excessive length of time through the cleaning ports. A short sharp blast through the cleaning pipe and port should be sufficient and consequently it is of particular advantage to provide an automatic means for accomplishing this so that the major portion of the air may be utilized for sanding. Another feature of advantage is that after actuation of the sanding mechanism, that is to say after the engineer closes the valve in the supply line the automatic valve will return to its normal or initial position, ready for repeated action when necessary. The invention is marked by extreme simplicity especially as there is but one moving part. Furthermore, lubrication is a simple matter as any necessary oil may be readily injected through the bleed port in the top cap. There should be no great degree of wear and as a consequence the mechanism should have a remarkably long life. It is believed from the foregoing that the construction, operation and advantages should be readily apparent to one skilled in the art without further explanation.

While I have shown and described the preferred embodiment of the invention, it should be understood that the disclosure is merely an exemplification of the principles involved as the right is reserved to make all such changes in the details of construction as will widen the field of utility and increase the adaptability of the device provided such changes constitute no departure from the spirit of the invention or the scope of the claims hereunto appended.

Having thus described the invention, I claim:

1. In a mechanism of the character described, a control valve comprising a body having an inlet and a pair of spaced outlets, a piston slidable within the body and having differential heads normally in non-obstructing relation to the outlets, the larger head having a port therethrough permitting passage of fluid pressure to build up beneath the same for moving the piston into position with the larger head closing one outlet, said heads having a relatively loose fit within the body to prevent sticking, and packing means carried by the heads and cooperating with the body to prevent air leakage about the heads.

2. In a mechanism of the character described, a control valve comprising a body having an inlet and a pair of spaced outlets, a piston slidable within the body and having differential heads normally in non-obstructing relation to the outlets, the larger head having a port therethrough permitting passage of fluid pressure to build up beneath the same for moving the piston into position with the larger head closing one outlet, said heads having a relatively loose fit within the body to prevent sticking, and packing means carried by the heads and cooperating with the body to prevent air leakage about the heads, said packing means comprising cupped gaskets on the undersides of the heads having downturned marginal edges bearing against the periphery of the body.

3. In a mechanism of the character described, a control valve comprising a body formed with chambers of different diameters and having an inlet and a pair of spaced outlets, a piston valve slidable within the body and having differential heads located within the respective chambers and normally in non-obstructing relation to the outlets, the larger head having a port therethrough permitting passage of fluid pressure to build up beneath the same for moving the piston valve into position with the larger head closing one outlet, and a seat carried by the wall of the larger chamber engageable by the larger head to form a seal when the latter is in closing relation to one outlet.

4. In a mechanism of the character described, a control valve comprising a body formed with chambers of different diameters and having an inlet and a pair of spaced outlets, a piston valve slidable within the body and having differential heads located within the respective chambers and normally in non-obstructing relation to the outlets, the larger head having a port therethrough permitting passage of fluid pressure to build up beneath the same for moving the piston valve into position with the larger head closing one outlet, and a seat carried by the wall of the larger chamber engageable by the larger head to form a seal when the latter is in closing relation to one outlet, said seat being beveled and the coacting edge of the larger head being similarly beveled.

5. In a mechanism of the character described, a control valve comprising a body formed with chambers of different diameters and having an inlet and a pair of spaced outlets, a piston valve slidable within the body and having differential heads located within the respective chambers and normally in non-obstructing relation to the outlets, the larger head having a port therethrough permitting passage of fluid pressure to build up

beneath the same for moving the piston valve into position with the larger head closing one outlet, the heads having a relatively loose fit within the chambers to prevent sticking, yieldable packing means carried by one side of the heads for preventing air leakage, and a seat within the larger chamber engageable by the other side of the larger head for preventing leakage about the larger head when the same is in position closing one of the outlets.

6. In a mechanism of the character described, a control valve comprising a body formed with chambers of different diameters and having an inlet and a pair of spaced outlets, a piston valve slidable within the body and having differential heads located within the respective chambers and normally in non-obstructing relation to the outlets, the larger head having a port therethrough permitting passage of fluid pressure to build up beneath the same for moving the piston valve into position with the larger head closing one outlet, the undersides of the heads being provided with cupped washers constituting packing means, and the larger chamber being provided with an annular seat engageable by the top of the larger head to form a seal thereabout when said larger head is in position closing one of the outlets.

7. In a locomotive sanding mechanism, a valve comprising a body having an inlet and a pair of outlets, a piston valve mounted for sliding movement longitudinally within the body and including heads in spaced relation and normally in non-obstructing relation to the outlets, the space between said heads being in constant communication with the inlet and one outlet, means in one head permitting passage of fluid pressure therethrough whereby the pressure may build up for moving the piston valve into position closing one outlet, the heads having a free fit within the body, and packing means carried by the heads and expansible under the influence of fluid pressure contacting closely with the wall of the body and preventing leakage of fluid pressure.

8. In a locomotive sanding mechanism, a valve comprising a body having an inlet and a pair of outlets, a piston valve mounted for sliding movement longitudinally within the body and including heads in spaced relation and normally in non-obstructing relation to the outlets, the space between said heads being in constant communication with the inlet and one outlet, means in one head permitting passage of fluid pressure therethrough whereby the pressure may build up for moving the piston valve into position closing one outlet, the heads having a free fit within the body, packing means carried by the heads and expansible under the influence of fluid pressure contacting closely with the wall of the body and preventing leakage of fluid pressure, and a seat on the inner wall of the body between the outlets and engageable by one head at the side thereof unprovided with said packing means and acting to prevent leakage of fluid pressure.

9. In a mechanism of the character described, a control valve comprising a body having an inlet and a pair of spaced outlets, a piston slidable within the body and having differential heads normally in non-obstructing relation to both outlets, means permitting fluid pressure to build up beneath the larger head for moving the piston into position with the larger head closing one outlet, said heads having a relatively loose fit within the body to prevent sticking, and packing means carried by the heads and cooperating with the body to prevent air leakage about the heads.

10. In a mechanism of the character described, a control valve comprising a body having an inlet and a pair of spaced outlets, a piston slidable within the body and having differential heads normally in non-obstructing relation to the outlets, means for enabling fluid pressure to build up beneath the larger head for moving the piston into position with the larger head closing one outlet, said heads having a relatively loose fit within the body to prevent sticking, and gaskets on said heads cooperating with the body to prevent air leakage about the heads.

11. In a mechanism of the character described, a control valve comprising a body having an inlet and a pair of spaced outlets, a piston slidable within the body and having differential heads normally in non-obstructing relation to the outlets, means permitting fluid pressure to build up beneath the larger head for moving the piston into position with the larger head closing one outlet, and a seat located between the outlets and engageable by the larger head when the valve is in position with the larger head closing one of the outlets.

12. In a mechanism of the character described, a control valve comprising a body having an inlet and a plurality of outlets, a piston slidable within the body and having heads normally in non-obstructing relation to the outlets, means enabling fluid pressure to build up beneath one head for moving the piston into position with one head closing one outlet, and a seat on the wall of the body engageable by one head to form a seal when said head is in closing relation to one outlet.

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