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LOCOMOTIVE MAIN-TURRET VALVE.

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To all whom it may concern:

Be it known that I, GEORGE HENRY BOX, a subject of the King of Great Britain, and a resident of the city of Stratford, in the county of Perth, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Locomotive Main-Turret Valves, of which the following is the specification.

My invention relates to improvements in locomotive main turret valves, and the object of the invention is to prevent injury to the engineer or fireman by scalding by steam through the steam pipe becoming broken and through the inaccessibility of the handle of the shut-off valve, and it consists essentially of the arrangement and construction of parts hereinafter more particularly explained.

Fig. 1 is a side elevation of a portion of a locomotive cab broken away to exhibit my turret valve and its connection to a blind turret and to the exhaust outlet pipe.

Fig. 2 is a front sectional elevation through a portion of the cab, such as is illustrated in Fig. 1 showing the location of my turret valve and the arrangement of the exhaust pipes leading therefrom.

Fig. 3 is an enlarged sectional detail through my turret valve.

Fig. 4 is an enlarged detail of my automatic shut-off valve.

Fig. 5 is a sectional view through Fig. 4, line 5-5.

Fig. 6 is an enlarged sectional view through the spindle valve for controlling the steam to operate the turret valve to return it to normal position.

In the drawings like characters of reference indicate corresponding parts in each figure.

1 indicates a portion of a locomotive cab, 2 the roof provided with an opening 3 therein.

4 is the floor of the cab provided with openings 5 and 6. 7 indicates the boiler of the locomotive provided with the usual fire doors 8 leading to the fire box located beneath the boiler.

9 are blind turrets into which the steam is fed from the main turret valve and from which pipes 10 lead to operate the various mechanisms of the locomotive.

11 is my turret valve. The turret valve 11 comprises a base pedestal 12 which is

preferably flanged at 13 for securing the same to the top of the boiler 7.

14 is a horizontal cylindrical portion extending longitudinally of the boiler 7 and supported by the pedestal 12 preferably formed integral therewith and provided at its rearward end with an enlargement 15 which is flanged at 16 at its outer end, to which flange is secured a closure 17 provided with an orifice 18 from which extends an exhaust steam pipe 19 which extends downward to the front of the boiler at the top, its depending end being provided with a T connection 20, from which extend branch pipes 21 and 22, which follow the top edge of the boiler, curving downward as indicated clearly in Fig. 2, the depending ends 21* and 22* extending through the openings 5 and 6 of the floor 4 into proximity to the ground.

23 and 24 are valves by which the exhaust pipes 21 and 22 are opened and closed.

25 is a piston rod which extends longitudinally through the cylindrical portion 14 and at its rear end into the cylindrical portion 15, projecting outwardly at its opposite end from the forward end of the portion 14.

26 is a steam inlet extending vertically through the pedestal 12 so as to connect at its upper end with the cylindrical portion 14 and at its lower end with an orifice 7* formed in the top of the boiler 7.

27 is a steam supply pipe leading from the steam dome of the boiler in the usual manner, the opposite end of the pipe extending into the steam inlet 26 and being secured therein by suitable means.

28 and 29 are steam outlet pipes leading from the orifices 14* of the cylindrical portion 14 and connecting respectively with the blind turrets 9 located at each side of the boiler at their opposite ends.

30 is a piston secured to the piston rod 25 and normally located within the cylindrical portion 14 to the rear of the orifices 14*.

31 is a piston also secured to the piston rod 25 and located within the cylindrical portion 14 normally just in front of the steam inlet 26.

32 is a piston also secured to the piston rod 25 in front of the piston 31 and spaced apart therefrom at a distance equal to the length of travel of the piston rod 25 and of the pistons 30 and 31.

33 is a large piston secured to the rear

end of the piston rod 25 within the cylindrical portion 15.

34 is a steam duct extending horizontally rearwardly from the steam inlet 26 to the rear end of the pedestal extension 12*.

35, 36 and 37 are branch ducts extending upwardly from the duct 34, the duct 35 entering the cylinder 5 forward of the normal position of the piston 33, the branch duct 36 just rearward of the rear face of the piston 33 when in normal position, and the duct 37 to the rear of the piston position 33 after it has completed its operating stroke.

The lower ends of the ducts 35, 36 and 37 are closed by plugs 38, 39 and 40.

41 is a needle valve seat located in the duct 34 between the branch ducts 36 and 37.

42 is a needle valve coacting with the seat 41 to admit steam to the branch duct 37 and into the rear end of the cylindrical portion 15.

It will be noted that the branch duct 34 inclines slightly downward towards the steam inlet 26 so as to drain any moisture which may accumulate into the steam inlet.

43 is an annular ring which is secured within the cylindrical portion 14 at its extreme rear end.

44 is a collar which is secured to the piston rod 25 in proximity to its rear end, and 45 is a buffer spring surrounding the piston rod 25 and located between the collar 44 and the ring 43.

46 is an automatically controlled valve located in the pipe 19, such valve being preferably in the form of a tapered casing 47 provided with a steam outlet 48 at one end and a closure 49 at the opposite end having a central orifice 50.

51 is a taper plug of the valve fitting within the casing and provided at its large end with a control spindle 52 extending through the orifice 50.

53 is a steam duct extending diametrically through the plug 51.

54 is a steam duct extending radially through the valve plug to the centre thereof from which extends a longitudinally extending duct 55 registering with the central orifice 48 of the valve casing.

56 is a handle by which the valve spindle 52 is controlled.

57 is a rod pivotally connected at its lower end to the outer end of the valve handle 56 and extending at its upper end through the orifice 3 of the cab roof 2.

58 is a cross pin extending through that portion of the rod projecting above the cab roof.

Having described the principal parts involved in my invention, I will now briefly describe the operation of the same.

Normally the steam passes from the boiler through the pipe 27 upward through the

steam inlet 26 and into that portion of the cylindrical portion 14 located between the pistons 30 and 31, passing from thence through the pipes 28 and 29 to the blind turrets 9, from which the usual mechanism controlled by the steam is supplied. Also simultaneously the steam passes through the steam duct 34 and through the branch ducts 35 and 36 into the cylindrical portion 15 to each side of the large piston 33, thereby providing equal pressure on each side of the piston so as to balance it and hold it from movement either in one direction or the other.

If it is desired to cut off the steam from passing to the blind turrets 9, the valves 23 or 24 are opened permitting the steam to exhaust from the rear end of the cylindrical portion 15 and from the rear side of the piston 33 through the pipe 19.

By this means the pressure upon the rear face of the piston 33 is relieved, the piston being then unbalanced and moved rearward, as indicated by arrow in Fig. 3 by the steam pressure operating against the forward face of the piston 33.

By this movement the piston 33 is carried to the position indicated by dotted lines in Fig. 3, also carrying the piston 30 from the forward side of the orifices 14* to the rearward side, and simultaneously the pistons 31 from the forward side of the steam inlet 26 to the rearward side, also the piston 32 is carried rearward to the normal position of the piston 31.

By this means it will be seen that the steam entering from the inlet 26 will be trapped between the pistons 31 and 32 when in the dotted position, and any steam is absolutely prevented from passing through the orifices 14* by means of the piston 31 in its dotted position, cutting off the steam from the inlet 26, and the piston 30 cutting off the steam from the forward end of the cylindrical portion 14. If an accident occurs whereby the exhaust pipe 19 is broken, such break forms a steam outlet permitting steam to exhaust through the pipe 19 from the rear end of the cylinder 15 relieving the pressure upon the rear face of the piston 33, permitting the parts to operate as above described: also the same operation is effected should such an accident occur as to cause the locomotive cab to be carried horizontally in relation to the locomotive boiler. The cross pin 58 engages with the top of the locomotive cab roof and draws the rod 57 and handle 56 into longitudinal alignment so as to turn the valve plug 51 and thereby bring the duct 54 of the valve plug into the registering position with the pipe 19.

It will of course be understood that in the construction shown, the peripheral openings of the ducts 53 and 54 are so arranged as to be capable of being brought alternately into

registering position with the steam pipe 19. When the valve plug 51 is turned, as above described, the steam passes from the rearward end of the cylinder 15 through the pipe 19 into the radial duct 54 and from thence through the duct 55 to the exhaust outlet 48, thereby relieving the pressure on the rearward side of the piston 33, permitting the turret valve to operate as previously described.

The spring 45 serves to limit the movement of the piston 33 and coacting parts also preventing any noise due to the stop collar 45 striking the end of the cylindrical portion 14. When it is desired to return the turret valve to its normal position, the needle valve 42 is opened, permitting the steam to pass from the duct 34 into the rear end of the cylinder 15 and against the rear face of the piston 33 when in the dotted position. It will thus be seen that the steam pressure on each side of the piston 33 will again become balanced, the steam pressure against each side of the pistons 30 and 31 being also balanced, the steam pressure against the piston 32 being only against the rear face thereof, thereby causing it to be unbalanced. This being the only unbalanced piston, causes the piston rod 25 to move in the opposite direction to arrow and thereby carry the parts back to their normal position. The needle valve 42 is then again closed.

From this description it will be seen that I have devised a very simple construction of turret valve which is simple in operation, cheap to construct, cannot get out of order, and which will automatically cut off the supply of steam from the blind turrets should an accident occur, and thereby prevent the escape of steam from the steam pipes to scald the engineer or fireman, and at the same time providing means whereby the turret valve exhausts may be manually controlled from the locomotive engineer's or fireman's normal position within the cab so that if it is desired to cut off the steam from the operating parts of the engine, all that it is necessary to do is for the engineer or fireman to reach out his hand and open the valve 23 or 24, thereby obviating the climbing of the engineer or fireman to some inaccessible position which is very often outside the locomotive cab so as to be able to turn off the steam. As is well known during this operation locomotive engineers and firemen very often become badly scalded, and from this cause alone most of the lives are lost in railway wrecks.

What I claim as my invention is:

1. A locomotive turret valve comprising a cylindrical portion having a steam inlet leading from the locomotive boiler and a steam outlet leading to the turrets, a pair of spaced apart pistons located within the cylinder normally at the outer side of the

inlet and outlets, and means operated by the exhaust of steam from one end of the cylinder for moving the pistons longitudinally of the cylinder to a position located at each side of the steam outlet and between the steam inlet and outlet.

2. A locomotive turret valve comprising a cylindrical portion having a steam inlet leading from the locomotive boiler and a steam outlet leading to the turrets, a pair of spaced apart pistons located within the cylinder normally at the outer side of the inlet and outlets, means operated by the exhaust of steam from one end of the cylinder for moving the pistons longitudinally of the cylinder to a position located at each side of the steam outlet and between the steam inlet and outlet, and steam operated means for returning the pistons to their normal position.

3. A locomotive turret valve comprising a cylinder having a steam inlet leading from the locomotive boiler and a steam outlet leading to the blind turrets and having a cylindrical enlargement at one end, a piston rod extending through the cylinder, pistons arranged and spaced apart in the cylinder upon the piston rod in such a position that normally the steam inlet and steam outlet are located between a pair of same, and when the piston rod is moved longitudinally the steam inlet is located at one side of one piston and the steam outlet at the opposite side, a piston secured to the piston rod fitting and operating within the cylindrical enlargement, means for feeding steam from the steam inlet to each side of the large piston, and a valve controlled exhaust pipe leading from the cylindrical enlargement at its rear end.

4. A locomotive turret valve comprising a cylinder having a steam inlet leading from the locomotive boiler and a steam outlet leading to the blind turrets and having a cylindrical enlargement at one end, a piston rod extending through the cylinder, a pair of pistons spaced apart upon the piston rod with the steam inlet and steam outlet normally located therebetween, a supplemental piston also secured to the piston rod within the cylinder in proximity to the forward end thereof and spaced apart from the aforesaid pair of pistons at a distance equal to the distance of their travel, a piston secured to the piston rod fitting and operating within the cylindrical enlargement, means for feeding steam from the steam inlet to each side of the large piston and a valve controlled exhaust pipe leading from the cylindrical enlargement at its rear end.

5. In a locomotive turret valve, the combination with the locomotive boiler and cab, of a turret valve, an exhaust pipe leading therefrom, means operated by the exhaust of steam through the exhaust pipe for clos-

ing the turret valve, a supplemental valve located in the exhaust pipe and normally permitting the passage of steam through the supplemental valve and operated by the
5 relative movement of the cab to the locomotive to open the supplemental exhaust.

6. A locomotive turret valve comprising a cylinder having a peripheral steam inlet and steam outlet, a cylindrical enlargement
10 located at one end of the cylinder, a piston rod extending through the cylinder into the enlargement, a pair of pistons spaced apart so that the steam inlet and steam outlet enter the interspace, a piston also carried by

the piston rod and fitting the enlargement, 15
a steam inlet to the cylindrical enlargement at each side of the large piston, a valve controlled exhaust pipe leading from the outer end of the piston enlargement, a valve controlled inlet for feeding steam into the outer
20 end of the cylindrical enlargement against the face of the large piston when in the valve closing position, and a piston carried at the opposite end of the piston rod within the cylinder coacting with the aforesaid pis-
25 tons for returning the same to normal position.

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