

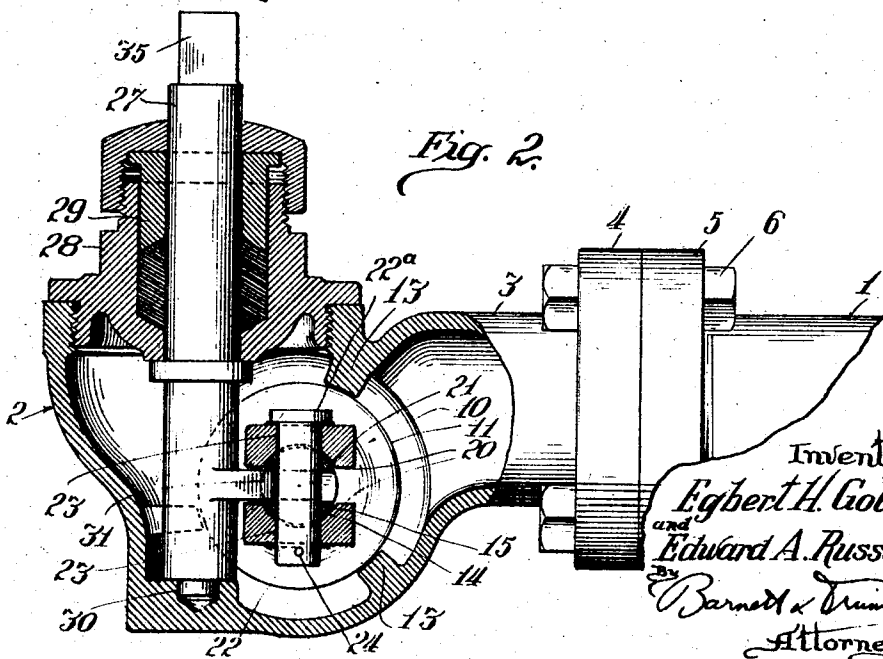
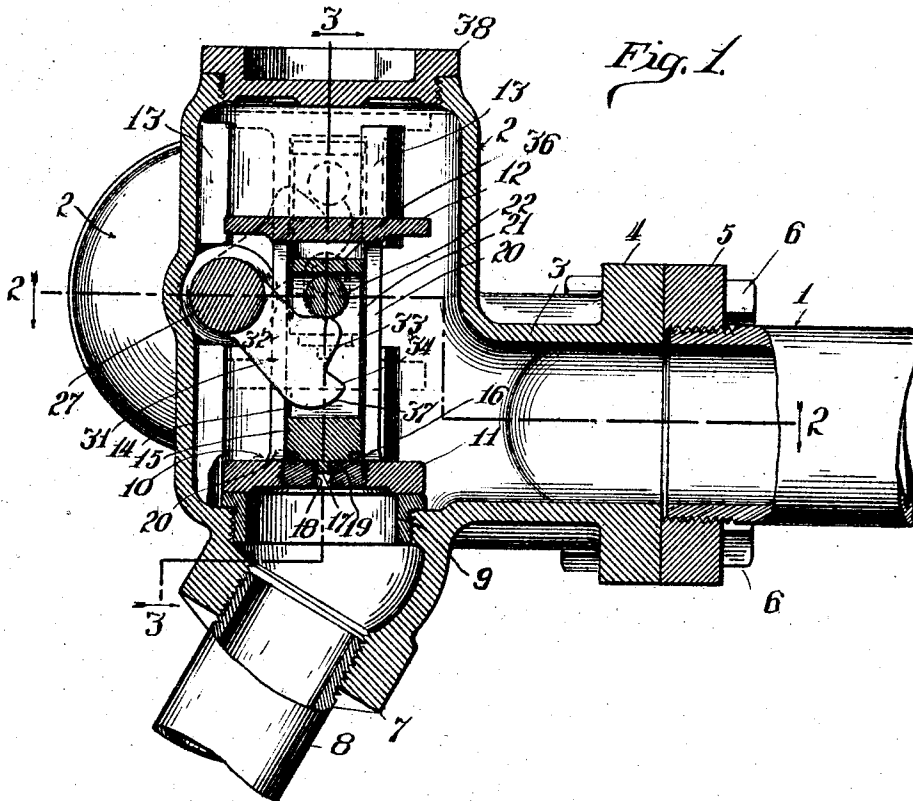
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E. H. GOLD ET AL
END TRAIN PIPE VALVE

1,618,756

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2 Sheets-Sheet 1



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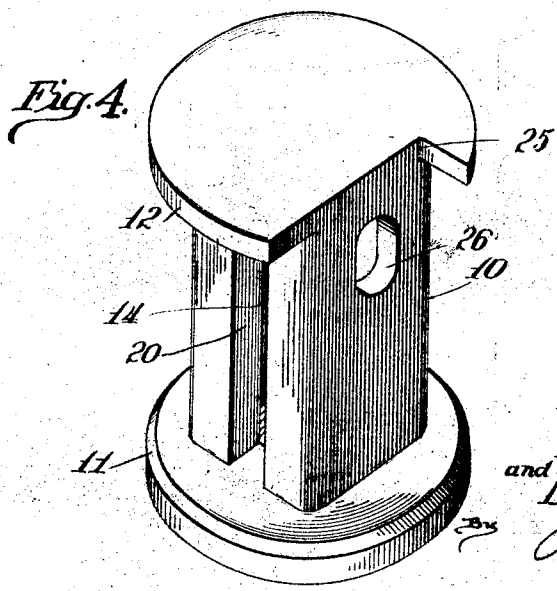
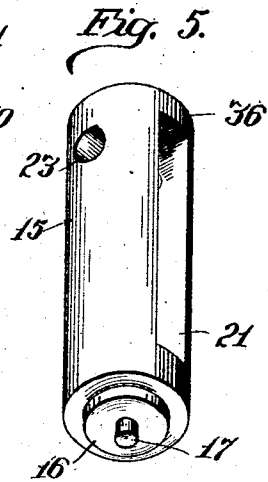
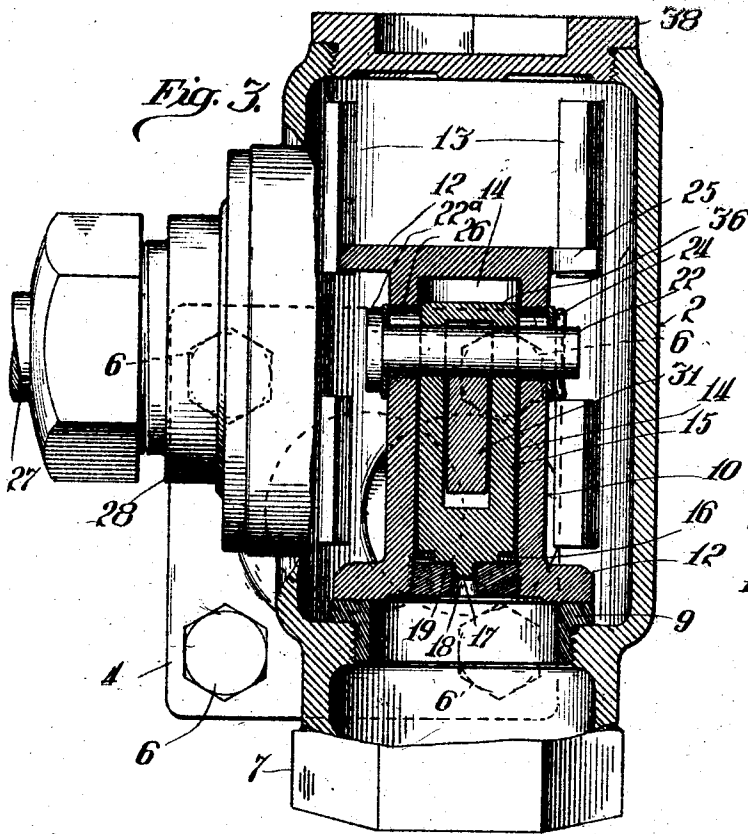
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UNITED STATES PATENT OFFICE.

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END-TRAIN-PIPE VALVE.

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This invention relates to improvements in end train pipe valves for steam-car heating systems.

Systems of car-heating using steam from the engine are constructed with a train line or main supply pipe extending from the boiler head in the engine cab, to the rear of the train. This train line is connected by steam couplers between the cars and is provided with branch steam connections to the heating pipes in each car. Each end of the train pipe on each car is provided with an end train pipe valve, these valves at the adjacent ends of two cars being normally open when the cars are included in a train and the steam couplings are in place. Only the end train pipe valve at the rear end of the train will be closed.

As the entire train line and connections are exposed to the weather, it naturally follows that it contains considerable condensation, most of which can only escape at the rear of the train line. This condensation, if it is not allowed to discharge at the rear as fast as it collects, will quickly freeze up and cause very serious trouble, in cold weather. However, if the steam pressure is maintained on the train line all the way to the rear and the rear train pipe valve allowed to "bleed" a little steam through the rear hose, that is, allow a small stream of steam to continuously escape, this common trouble will be avoided.

When the steam couplings between adjacent cars are connected, the workman standing adjacent the valves may move them to open position. However, it is sometimes desirable to open these valves from the car platform above, for example, when steam is to be cut off from the entire train line, at which time the rear train pipe valve is opened wide to blow out the train line and allow all steam to escape.

The object of this invention is to provide an improved form of end train pipe valve adapted to perform in a more satisfactory manner, the functions noted hereinabove.

An object of the invention is to provide in connection with a valve member that will automatically close by gravity, means for opening the valve which automatically locks the valve in open position. The valve is automatically unlocked, and permitted to close by reverse movement of the opening means.

Another object is to provide in connection with such a valve, a bleeding valve, or auxiliary valve, which is opened and closed by a small preliminary movement of the same means which operates the main valve.

In the form here shown, the main valve member is guided for vertical sliding movement toward and from a fixed seat in the valve casing. The auxiliary valve is housed within the main valve, and shares its movement, and in addition has a limited sliding movement of its own toward and from an auxiliary valve in the main valve member. An oscillating cam means engages a portion of the auxiliary valve member, whereby the initial movement of this cam means opens the auxiliary or bleeding valve, and continued movement opens the main valve. Movement of the cam means to extreme position automatically locks the valves in open position. Reverse movement of the cam means first automatically unlocks the valves and then moves them to closed position, assisted by gravity.

Another object of this invention is to provide a valve of this type which is compact and simple, and easily assembled.

Another object is to provide an improved connecting means between the valve and the end of the train pipe, whereby the valve is easily removed and replaced.

Other objects and advantages of this invention will be apparent from the following detailed description of one approved form of the apparatus.

In the accompanying drawings:

Fig. 1 is a vertical section through the valve.

Fig. 2 is a horizontal section, taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is a vertical section taken substantially on the line 3—3 of Fig. 1.

Fig. 4 is a perspective view of the main movable valve member.

Fig. 5 is a perspective view of the auxiliary, or "bleeding" valve member.

Referring now to the drawings, at 1 is shown the end of the train steam pipe, supported in the usual manner beneath the car. The main casing 2 of the end train pipe valve is formed at the rear thereof with a pipe extension 3 forming in effect an extension of the train pipe 1. This extension 3 is formed at its end with an integral col-

lar 4, and a similar collar 5 is removably and adjustably secured on the end of the train pipe 1, preferably by being screwed thereon as shown in the drawings. The collars or plates 4 and 5 are preferably rectangular in outline, and are adapted to be secured together in steam tight position by bolts 6 extending through apertures near the corners of the plates. The bolts 6 are easily accessible for removal, after which the entire valve body can be removed for repairs or replacement. The casing 2 has a second, downwardly extending pipe connection 7, in which is secured the end 8 of the coupling through which connection is made with the adjacent car.

The main valve seat 9, preferably in the form of a removable annular member screwed into the casing 2, is located directly above the outlet 7. The main slidable valve member comprises a rectangular body portion 10, having a cylindrical valve disk 11 of larger diameter formed at its lower end, this valve disk 11 cooperating with the valve seat 9 to close the steam outlet through passage 7. A guide disk 12 of similar size and configuration to the valve disk 11, is formed at the upper end of valve body 10, and the two disks 11 and 12 are adapted to slide vertically between a plurality of guide flanges 13 extending inwardly from the walls of casing 2. The main valve body 10 is formed with an inner vertical, preferably cylindrical chamber 14, within which is housed the similarly formed auxiliary valve member 15. Auxiliary valve member 15 is formed at its lower end with a valve plate 16 and stud 17 adapted to cooperate with the valve opening 18 in the valve seat 19 secured in the main valve plate 11. Preferably the valve seat 19 is in the form of a removable cylindrical plug of substantially the same diameter as that of chamber 14, to permit the insertion or removal of the auxiliary valve member 15. Valve member 15 is somewhat shorter than the vertical height of chamber 14, whereby a limited longitudinal sliding movement of member 15 within chamber 14 is permitted to open and close the "bleeding" valve 18. A transverse vertical slot 20 is formed through the main valve body 10, and a similar slot 21 is formed in the auxiliary valve body 15 to permit the insertion and movement of the valve operating lever or cam hereinafter described. A pin 22 extends transversely through similarly shaped openings 23 near the top of valve member 15, and also through the upper portion of slot 21. Pin 22 is preferably formed with an integral head 22^a at one end, and is removably held in place by a cotter pin 24 inserted through its other projecting end portion. The upper guide disk 12 may be partially cut away as at 25 to permit access to cotter pin 24 when assembling or dismantling the valve. The

end portions of pin 22, between the head 23 and cotter pin 24 and the auxiliary valve body 15, project through vertically elongated openings 26 in the sides of valve body 10. These permit a vertical movement of the pin 22 corresponding to the vertical movement permitted auxiliary valve body 15 within the main valve body 10.

A horizontal rock shaft 27 is mounted in bearings within a plug member 28, screwed into one side of casing 2 and forming a part thereof. A packing box or gasket 29 within member 28 prevents the escape of steam about the rock-shaft 27. A stud 30 on the inner end of the rock-shaft also has a bearing in the opposite wall of casing 2. A crank or lever extension 31 extends laterally from rock-shaft 27 into the slots 20 and 21 of the valve members, and forms a cam means adapted to cooperate with pin 22 in raising the valve members from their seats. The lever 31 is formed with a cam surface 32 adapted to cooperate with the lower portion of pin 22 in opening the valves. Beyond the cam surface 32 is a locking shoulder 33, the base of which is struck substantially on an arc about the center of rock-shaft 27. Beyond shoulder 33 is a second shoulder 34 at substantially right angles thereto, the shoulder 34 being adapted to engage the pin 22 to limit the swinging movement of lever 31 in the valve opening direction, as shown in dotted lines in Fig. 1. Any suitable connections may be attached to the projecting end 35 of rock-shaft 27 to operate the valves.

It will be noted, as shown in full lines, Fig. 1, that when in closed positions both movable valve members 11 and 15 will be held against their respective seats by gravity, assisted by the steam pressure within the casing 2. When it is desired to open the auxiliary valve 18, to permit the steam to bleed through the valve, the rock-shaft 27 is rotated slightly in a counter clockwise direction (Fig. 1), whereupon cam surface 32 engages the pin 22 to lift the movable valve member 15 the desired amount. The opening of valve 18 may be regulated to some extent by varying the distance through which valve 15 is raised. The friction of the valve operating connections, and of rock-shaft 27 in its bearings, will ordinarily be sufficient to hold the auxiliary valve body 15 in its adjusted position. When it is desired to open the main valve, a continuous counter clockwise rotation is imparted to rock-shaft 27 and cam lever 31. The head 36 of valve member 15 will now engage the under surface of guide plate 12 at the upper end of the main valve body, and will elevate this valve body lifting the valve plate 11 from its seat and opening the main passage through outlet 7. When the valve has reached its extreme open position, the pin

22 will pass over the end of cam surface 32 and further movement of lever 31 will move the locking shoulder 33 beneath the pin. This position of the valve parts is shown in dotted lines, Fig. 1. All of these valves, with the exception of the one at the extreme rear end of the train, will normally be in this open position when in service, and it will be noted that these valves are effectually locked in open position so that it will be impossible for the jolting of the cars to cause the gravity actuated valve members to fall to their lowered positions and close the valve. One component of the weight of the valve-members will rest against shoulder 33, radially of shaft 27, and hold the lever 31 in raised position, unless it is positively rotated by a force applied to the shaft 27. When it is desired to close one of the valves, the rock-shaft 27 is rotated in a reverse or clockwise direction, the first part of this movement removing the locking shoulder 33 from beneath the pin 22, thus permitting the valve members 10 and 15 to fall to closed position by gravity. This movement will be positively assisted by the engagement of the lower cam surface 37 on the lever 31 with the bottom of slot 21 in member 15.

It will be noted that at the time the preliminary movement of lever 31 has been completed to completely open the auxiliary or bleeding valve, and the head 36 of member 15 engages guide disk 12 so that further movement of the lever will open the main valve, the engaging surfaces on cam 32 and pin 22 will be in the horizontal plane extending through the center of rock-shaft 27. In other words, the lever or crank arm of member 31 will then be at its shortest so that the most effective leverage is available at this time for initiating the opening movement of the main valve, when it is most needed.

When permitted by the proper positioning of the operating lever, both movable valve members are freely movable by a vertical sliding movement to their closed positions, so that they will be effectively held closed by the action of gravity supplemented by the steam pressure upon their upper faces. On the other hand, they are effectively locked in open position by the operating lever 31, when the shoulder 33 has been moved beneath the pin 22. The valve parts are simple, sturdy, and durable, and are easily removed from or replaced in casing 2, after the removal of plugs 38 and 28 in the top and sides of the casing 2 respectively.

Valves of this type have ordinarily been connected with the train pipe 1 by means of a double, right and left hand threaded screw collar, which is difficult to position, and necessitates a considerable endwise movement of the valve body. Since the space within

which these valves are mounted is limited, and not very accessible, the connecting means, comprising the collars 4 and 5 and the connecting bolts 6, forms a much more convenient means for mounting and removing the valve. Also, when collar 5 has once been properly positioned on the end of train pipe 1, the valve body may be removed and replaced without disturbing its alignment with the valve operating connections.

We claim:

1. An end train pipe valve, comprising a casing having inlet and outlet ports and a passage therebetween, a main valve seat surrounding said passage, a valve member movable to or from said seat, a bleeding port extending through said valve member for permitting free flow of fluid in a relatively small stream from the inlet port to the outlet port, an auxiliary valve seat at the inner end of said bleeding port, an auxiliary valve member housed within the first valve member and movable therein to close or open the bleeding port and means to move the auxiliary valve to open position, and hold it open, without disturbing the main valve.

2. An end train pipe valve, comprising a casing having inlet and outlet ports and a passage therebetween, a main valve seat surrounding said passage, a valve member movable to or from said seat and adapted to close by gravity, a bleeding port through said valve member for permitting free flow of fluid in a relatively small stream from the inlet port to the outlet port, an auxiliary valve seat at the upper end of said bleeding port, and an auxiliary valve member housed within the first valve member and movable therein by gravity to close the bleeding port and means for lifting and supporting said auxiliary valve, while the main valve remains seated.

3. An end train pipe valve, comprising a casing having inlet and outlet ports and a passage therebetween, a main valve seat surrounding said passage, a slidable valve member movable to or from said seat, a smaller passage in said valve member for permitting a restricted flow of fluid between the inlet and outlet ports, an auxiliary valve seat at the inner end of said latter passage, and an auxiliary valve member housed within the first valve member and movable therein to close or open the smaller passage and means engaging the auxiliary valve member for successively moving the valves to open or closed position and for locking the valves in open position.

4. An end train pipe valve, comprising a casing having inlet and outlet ports and a passage therebetween, a main valve seat surrounding said passage, a slidable valve member movable to or from said seat, a smaller passage in said valve member for permitting a restricted flow of fluid between the inlet

- and outlet ports, an auxiliary valve seat at the inner end of said latter passage, and an auxiliary valve member housed within the first valve member and movable therein to close or open the smaller passage, an oscillatable shaft pivoted adjacent the valve members, a cam arm on the shaft projecting into engagement with the auxiliary valve member for moving the valves successively to open or closed positions, said cam having a locking shoulder which engages a portion of the valve member when in extreme open position to prevent closing of the valve except by reverse movement of the cam means.
5. An end train pipe valve, comprising a casing having a valve seat, a valve member vertically movable in the casing toward or from the seat, said member having a transverse slot, a pin extending transversely of the slot, a shaft pivoted in the casing adjacent the valve member, an arm on the shaft projecting into the slot and having a cam surface adapted to engage beneath the pin to lift the valve member, there being a locking shoulder at the end of the cam arm adapted to engage the pin when the valve is completely elevated to hold the valve in open position.
6. An end train pipe valve comprising a casing having a main valve seat, a slidable valve member movable vertically toward or from the seat, said valve member having an auxiliary valve seat, an auxiliary valve member housed within the first valve member and movable therein toward or from the auxiliary valve seat, said auxiliary valve member having a transverse slot, a shaft pivoted in the casing adjacent the valve members, an arm on the shaft projecting into the slot and having a cam surface adapted to engage the auxiliary valve member to successively elevate the valves, there being a locking shoulder at the end of the cam arm which moves beneath a portion of the valve member when completely elevated to hold the valves in open position.
7. An end train pipe valve, comprising a casing having a valve seat, a valve member movable in the casing to or from said seat, and an oscillating cam means within the casing and engaging a portion of the movable member for moving the member to open position, said cam means having a locking shoulder which engages the valve member when in extreme open position to prevent closing of the valve except by reverse movement of the cam means.
8. An end train pipe valve, comprising a casing having a valve seat, a valve member movable in the casing to or from said seat, said valve member having an auxiliary valve seat, an auxiliary valve member carried by the first named movable member and movable therein toward or from the auxiliary valve seat, and an oscillating cam means engaging a portion of the auxiliary valve member for successively moving the valves to open position, said cam means having a locking shoulder for engaging the valve member when in extreme open position to prevent closing of the valves except by reverse movement of the cam means.
9. An end train pipe valve, comprising a casing having a valve seat, a valve member movable in the casing to or from said seat, and an oscillatable operating lever including a cam portion adapted to engage a part of the movable member for moving the member to open position, another portion movable under this part to hold the member in open position and a stop shoulder to prevent movement of the lever past the last mentioned valve-holding position.
10. An end train pipe valve comprising a casing having a main valve seat, a vertically movable valve member adapted to cooperate with this seat to close the valve, an auxiliary valve seat in the main valve member, a vertically movable auxiliary valve member housed within the main valve and cooperating with the auxiliary valve seat, the movable valve members having aligning transverse slots, a horizontal rock-shaft projecting into the casing, a crank extension on this shaft projecting into the slots in the movable members, the crank having a cam surface adapted to engage a portion of the auxiliary valve member to raise the valve members, and a locking surface movable under this valve portion to lock the valves in open position.

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