

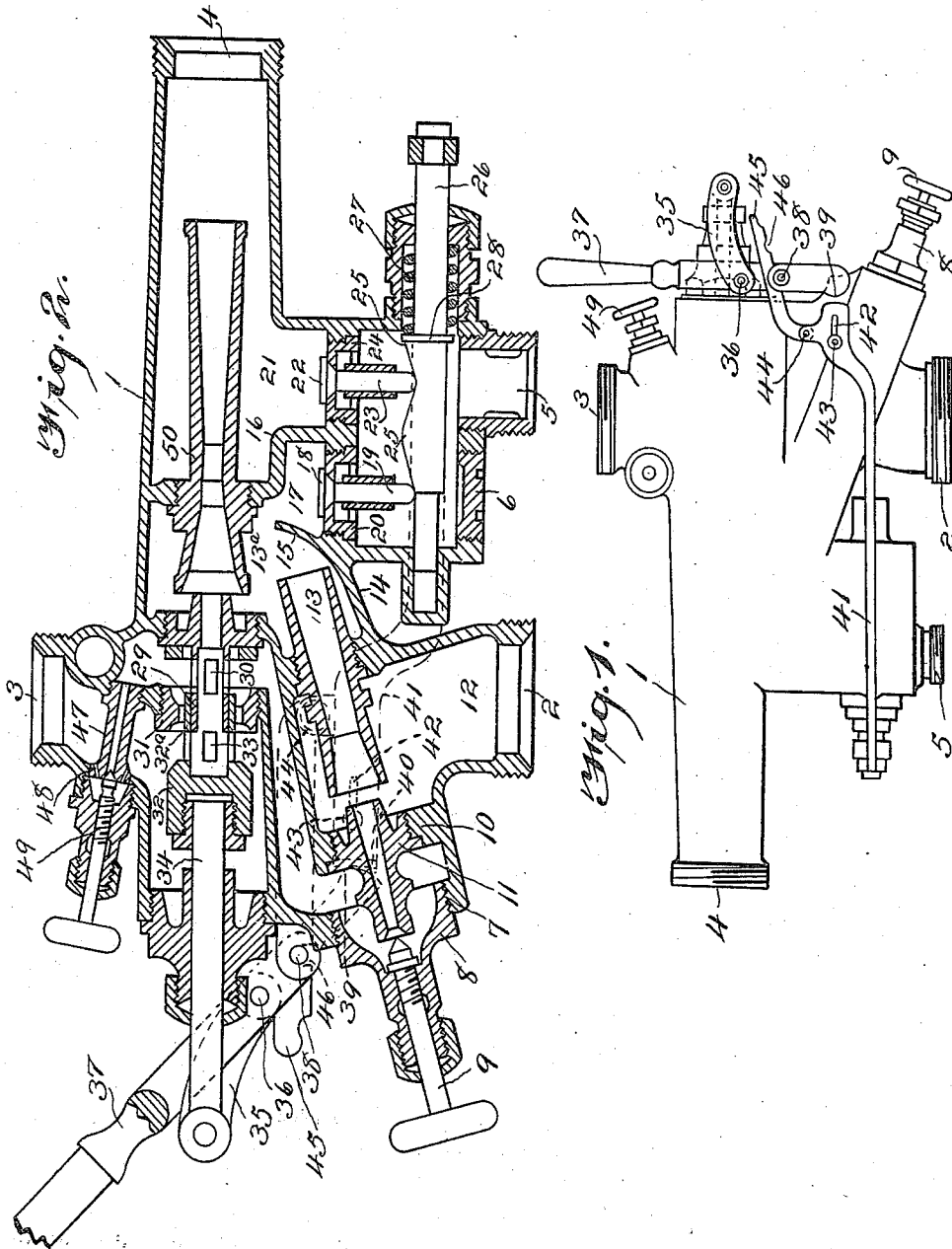
W. H. STIRLING.

INJECTOR.

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987,769.

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UNITED STATES PATENT OFFICE.

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INJECTOR.

987,769.

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To all whom it may concern:

Be it known that I, WILLIAM HENRY STIRLING, a subject of the King of England, residing at St. John, in the Province of New Brunswick, Dominion of Canada, have made certain new and useful Improvements in Injectors, of which the following is a specification.

My invention relates to injectors for locomotives.

An object of my invention is to provide an injector which may easily be taken apart and the parts replaced, without having to take the injector casing from the engine to repair the valve seats.

A further object is to provide a construction in which the lifting overflow valve is held closed by a water lock, so that air is prevented from entering the intermediate chamber and the injector is kept from breaking in its operation.

A further object is to provide a main steam valve which will permit the maximum flow of steam and at the same time to simplify the construction over the state of the art, so that only one seat is necessary.

A further object is to provide a construction in which the heater valve may be left open, whether the device is used as an injector or as a heater.

A further object is to provide means for automatically permitting the overflow valves to remain closed when the lever is operated to close the main steam valves.

A further object is to provide a spring actuated means for opening the overflow valves after the main steam valve lever is thrown forward and the steam shut off.

A further object is to provide a main steam valve so constructed that practically all of the forcing steam passes through the valve and not over a single valve seat, in order to prevent wear on the seat.

A further object is to provide a construction in which the steam to the forcing side of the injector may be regulated without changing the volume of steam to the lifting side.

A further object is to provide an injector with a pair of water locked overflow valves working into a pressureless chamber, and to provide an opening means for the valves which is not positively connected thereto, in order that the valves may easily be removed, repaired and replaced in the casing.

The art relating to injectors being well worked up and the main portions of the construction illustrated being well known it may be broadly stated as the object of my invention is to provide an injector which in its details may easily be repaired and assembled and the cost of maintenance of which is very low.

In the accompanying drawings, forming part of this application, I have illustrated a form of embodiment of my invention, in which drawings similar reference characters designate corresponding parts, and in which:

Figure 1 is a side elevation, showing the operating lever in closed position; and, Fig. 2 is a longitudinal, vertical section, showing the operating lever and connecting parts in open position, the overflow valves being shown closed and the actuating means therefor unreleased.

Referring to the drawings, 1 designates the casing as a whole, 2 the water supply pipe, 3 the steam pipe, 4 the boiler pipe, 5 the overflow pipe and 6 the screw cap for admittance to the inside of the casing 1 from its under side, all of which is of common construction.

The front of the casing 1 is provided with a screw-threaded opening 7 to receive the bonnet 8, carrying the valve-stem 9. A wall 10 is formed in the casing 1 adjacent the opening 7 to carry the lifting steam nozzle 11, which extends to the chamber 12. The combining lifting nozzle 13 extends from the chamber 12 at a point adjacent the inner end of the lifting nozzle to the intermediate chamber 13^a.

The bottom wall 14 of the intermediate chamber 13^a is provided with a lip 15, which with the dividing wall 16 between the lifting and forcing chambers forms a well 17 into which works the lifting overflow valve 18. The object of this well is to retain a body of water over the overflow valve, so that when the volume of water taken up by the lifting end of the valve is lessened and the steam pressure correspondingly increased by changing the position of the valve 9, the valve 18 will not be lifted from its seat. In other words, the water lock on valve 18 permits the use of a minimum pressure through the lifting nozzle 11, at the same time permitting the maximum pressure to be used by the forcing side of the injector,

without lifting the overflow valve 18, and thus preventing the breaking of the operation of the injector.

The valve 18 is provided with a stem 19, and is seated on a screw-threaded seat 20, which is disposed immediately over the cap 6 in the bottom of the casing 1, so that access to the valve is easy for the purposes of repair and removal.

The forcing chamber 21 is formed by the wall 16 and the front wall of the casing 1. A valve 22 controls the overflow from the chamber 21 and is provided with a seat 24, which is screw-threaded into position and is located directly over the overflow pipe 5, so that access to the same is easy.

Disposed beneath the lower ends of the valve stems 19 and 23 are cams 25, on a rod 26, by means of which the valves may be raised. The rod 26 is kept normally retracted by means of a spring 27 which forces the cams beneath the valves to open them, one end of the spring bearing against a fixed part of the casing 1 and the other end bearing against a collar or shoulder 28 on the rod 26. The rod 26 is operated against the pressure of the spring as hereinafter described to permit the closing of the valves.

The steam forcing nozzle 29 is screw-threaded into place within the upper portion of the casing and is provided with a plurality of openings 30 in its wall intermediate of its ends. The main steam valve seat 31 is screw-threaded into position so as to surround the rear end of the forcing nozzle and is of a slightly larger dimension so as to permit the passage of a small volume of steam downward through the casing to the lifting nozzle 11. The main steam valve 32 is provided with a projecting sleeve 32^a arranged to slide over the forcing nozzle 29 and close the same. The sleeve 32^a is provided with openings 33 to permit the passage of steam to the forcing nozzle 29, so that the steam does not have to pass over the valve seat 31. This prevents wear on the valve seat and thus reduces the cost of maintenance. The construction presents a double tube construction, with a single main steam valve seat, so that the number of parts is reduced to a minimum.

The main steam valve 32 is operated by a stem 34 extending outside of the casing 1. A curved link 35 has one end pivotally connected to the outer end of the stem 34 and its other end pivotally connected to a boss 36 on a bifurcated lever 37. A corresponding link is connected up in the same way to the other side of the lever. A pin 38 serves to form the pivotal connection between the lower end of the lever and the casing 1. A cam 39 is secured to the lower end of the lever 37 and arranged to engage a lug 40 on a slide rod 41. The rod 41 is slidably maintained in place by means of a slot 42 therein

and a pin 43 working therethrough and into the side of the casing. The forward end of the rod 41 is connected with the rod 26, so that the tension of the spring 27 may be overcome and the rod 26 forced forward to permit the valves 18 and 22 to close when the main steam valve 32 is being opened.

A pin 44 is carried on the slide rod 41 and forms a pivot for a latch 45 provided with a recess 46, with the wall of which engages pin 38 connecting the lever 37 and the casing 1. A heater valve tube 47 is screw-threaded into the upper part of the interior of the casing 1 and extends backward with its free end adjacent the rear wall thereof, and loosely fitted into an opening therein. The rear end of the heater valve tube is provided with ports 48 and the bore of the valve tube 47 is controlled by a valve 49, mounted in the usual way on the casing 1. The object of the ports 48 is to permit only a small body of steam to bear against the end of the valve. The combining and forcing nozzle 50 is mounted in the casing 1 in the usual way.

The injector being used to the boiler with the parts in the position shown in Fig. 2 of the drawings, and it is desired to use the injector solely as a heater, the main steam valve lever 37 is thrown forward, but the rod 26 is retained in its position by the latch 45 and the heater valve 49 being previously opened. The injector will then work simply as a heater as the overflow valves are closed. To again use the injector as an injector to the boiler, latch 45 is released from its engagement with the pin 38, so that the valves 18 and 22 are automatically thrown open by the tension of the spring 27 working on the rod 26. The lever 37 is then thrown back and opens the main steam valve and the injector works to the boiler.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In an injector comprising a casing containing lifting and forcing means and an intermediate chamber 13^a, the combination of the well 17 formed by the lip 15 with a valve 18 and its stem 19 guided and seated in a removable seat 20.

2. In an injector comprising a casing containing lifting and forcing means, an intermediate chamber therein, an intermediate well in said chamber, an over-flow valve therein, said well being formed in part by an upstanding lip in said chamber, a main valve seat, a nozzle having spaced apart series of slots or ports and alining said main valve seat, said nozzle extending back beyond said valve seat, and a sleeve encompassing said nozzle and having a plurality of slots or ports coöperating with corresponding slots or ports in said nozzle.

3. In combination with an injector having a casing provided with water and steam forcing means, a heater valve comprising a tubular member having one end fixed in the casing and the opposite end loosely fitted in the wall of the casing and provided with ports, and a valve arranged to close the tubular member.

4. In an injector comprising a casing containing lifting and forcing means, an intermediate chamber therein, an intermediate well formed in part by an upstanding lip in said chamber, an over-flow valve in said well, a main valve and its seat, a nozzle having spaced apart series of slots or ports and alining the main valve-seat, said nozzle extending back beyond said main valve-seat, a sleeve encompassing said nozzle and having a plurality of slots or ports registering with corresponding slots or ports in said nozzle, means for actuating said main-valve, and means coöperating with said main valve actuating means for actuating said over-flow valve.

5. In an injector comprising a casing containing lifting and forcing means, an intermediate chamber therein, an intermediate well formed in part by an upstanding lip in said chamber, an over-flow valve in said well, a main-valve and its seat, a nozzle having spaced apart series of slots or ports and

extending back beyond said main valve-seat, a sleeve forming an extension of said main valve and having a plurality of slots or ports and encompassing said nozzle, the slots or ports of said sleeve registering with a series of the slots of said nozzle, a manually operated lever for actuating said main valve, a cam-like member adapted to engage and operate said over-flow valve, a resilient member for automatically imparting a retractile movement to said cam-like member and a latch member adapted to effect connection between said lever and said cam-like member.

6. An injector comprising lifting and forcing means, an intermediate chamber including an intermediate well formed in part by an upstanding lip in said chamber, an overflow valve for said well and an additional overflow valve arranged in a forcing chamber communicating with the aforesaid chamber and well, said additional overflow valve having its stem guided and seated in a removable seat.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

WILLIAM HENRY STIRLING.

Witnesses:

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