Jan. 2, 1923. 1,440,595.

J. W. GRANTLAND.

EJECTOR.

FILED FEB. 27, 1919.

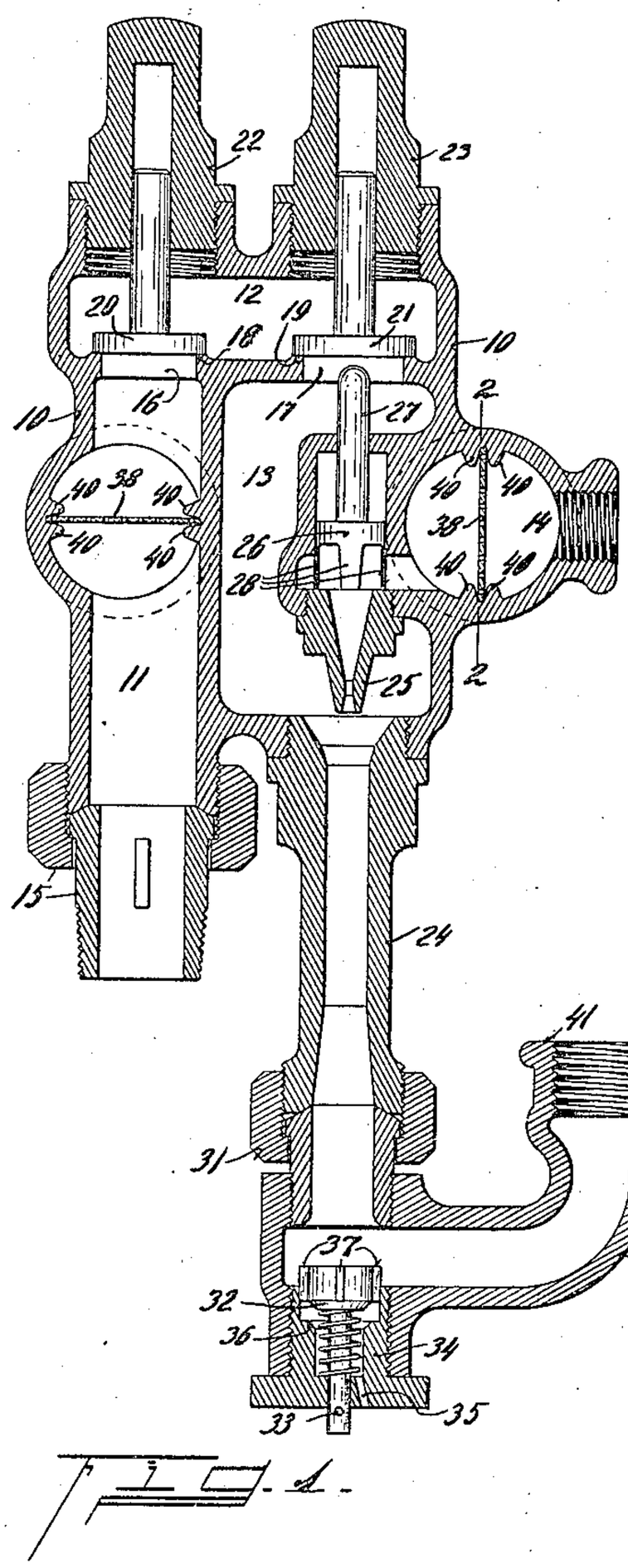

Fig. 1.

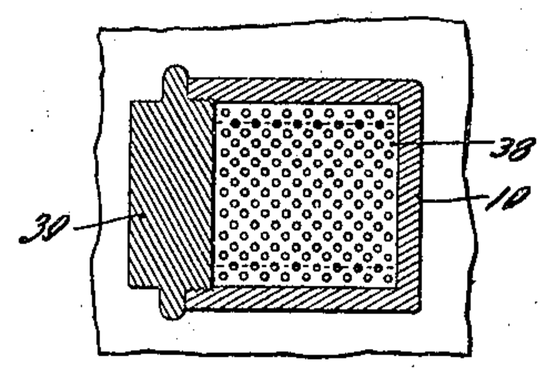

Fig. 2.

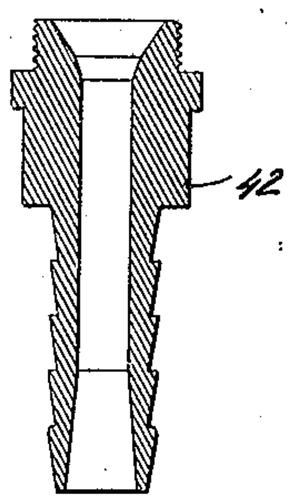

Fig. 3.

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Patented Jan. 2, 1923. 1,440,595

UNITED STATES PATENT OFFICE.

JOHN W. GRANTLAND, OF CINCINNATI, OHIO.

EJECTOR.

Application filed February 27, 1919. Serial No. 279,513.

To all whom it may concern:

Be it known that I, JOHN W. GRANTLAND, a citizen of the United States, and residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Ejectors, of which the following specification is a full disclosure.

This invention relates to an ejector and more particularly to a device of this type as a part of a steam locomotive engine equipment serving as a sprinkler hose for sprinkling fuel and for other purposes.

The principle employed, utilizes the velocity of a steam jet to propel a body of water through a combining tube, to create a suction against the water supply and impart velocity to the delivered water.

The object of the invention is to provide an ejector having a pair of normally closed independent water controlling check valves, one serving as a back pressure check valve and the other as a water supply valve automatically operated by the pressure of the steam line.

Another object is to provide an automatic steam operated water supply valve actuator.

A further object is to provide removable strainers in the water and steam conduits to obviate a fouling of the valves.

A further object is to provide means for draining the ejector.

The features of the invention will be more fully set forth in the description of the accompanying drawings forming a part of this specification, in which:

Fig. 1 is a vertical section of the ejector as arranged for installation below the supply level as a non-lifter.

Fig. 2 is a detail section on line 2, 2, Fig. 1.

Fig. 3 is a detail section of a form of combining tube, interchangeable with that shown in Fig. 1, when the ejector is installed above the supply water level as a lifter.

Referring to Fig. 1, the body portion 10 is divided to form a water supply conduit or chamber 11, a valve chamber 12, a suction chamber 13 and a steam conduit 14; the valve chamber 12 connecting the supply and suction chambers through valve controlled ports. A suitable union coupling 15 is provided for connecting with the water tank of the engine tender. The lower wall of the valve chamber 12 is formed with ports 16, 17, defining valve seats 18, 19. These ports are normally closed by gravity valves 20, 21, each having a valve stem slidable within guide plugs 22, 23, screw threaded into the upper portion of the body 10. A combining tube 24 is screw-threaded into the lower wall of the suction chamber 13 and a steam nozzle 25 is screw threaded into the wall of the steam conduit in axial alignment with the combining tube, with its lower discharge end positioned in close proximity to the entrance throat thereof.

Slidably mounted within a bore, extending upwardly from the steam conduit, is a valve actuator 26, having a stem 27 projecting into the suction chamber in axial alignment with the water supply valve 21, and the lower end of said actuator is provided with depending legs 28 to limit its downward movement and cooperating with the stem 27 to guide the actuator.

In Fig. 1, the ejector is fitted for installation below the tank water line, and, in this instance, it is desirable to provide means for draining the ejector after use. Therefore, I provide a drain fitting 30 connected to the combining tube 24 by a union 31 and provided with an automatic drain valve 32 normally spring-pressed to open position, as shown, and limited in its opening position by a cross-pin 33 passing through the valve stem and contacting with the valve plug 34. The plug 34 has a drain port 35 and the valve cooperates in a closing operation with the valve seat 36. The valve head is axially guided by radial ribs 37.

The water and steam conduits are provided with strainer elements 38 for the purpose of preventing sediment or other foreign matter entering the ejector. These strainers are shown in the form of a perforated plate, but it is obvious that they may be formed of wire screen or other suitable straining material. These strainers are inserted transversely across the water and steam conduits respectively through openings in the body 10. Each opening is closed by a screw

threaded plug 39, 39, the strainers being retained in position between pairs of the lugs 40, 40, projecting from the conduit walls. Each strainer is positioned in an enlarged portion of its respective conduit and the perforations therein have a combined area substantially equal to the area of said conduits, so as not to retard the flow of water or steam therethrough.

The operation of the ejector is as follows:

In the installation of the ejector, shown in Fig. 1, below the tank water level, the water conduit 11 and the valve chamber 12 will be filled with water. The steam is turned on and will raise the actuator 26 to open the water supply valve 21 and jetting into the combining tube 24 will create a suction in the suction chamber 13 and also in the valve chamber 12, this suction lifting the back pressure valve 20 and drawing water from the supply tank, the steam jet combining with the water in the combining tube 24 and imparting velocity to the discharge. Immediately the ejector is in operation, the drain valve is automatically closed by the pressure of the discharge.

The sprinkling line is connected to the threaded end 41 of the drain fitting 30.

Whenever the valve on the sprinkling hose nozzle is shut off, previous to the shutting off of the steam to the ejector, a back pressure would be created in the ejector and the steam would blow back into the supply tank, were it not for the back-pressure valve 20, which acts as a check valve to prevent this action.

When the ejector is installed above the supply tank water level, no means for draining need be provided, and for such installation, I provide a modified form of combining tube 42, as shown in Fig. 3, which is interchangeable with the tube 24 and drain fitting 30, shown in Fig. 1, with the sprinkling hose directly attached over the combining tube 42.

In this instance, previous to the first operation, the valve chamber is empty and the suction created by the steam jet will raise the back pressure valve 20 and draw water from the supply tank. After the first operation, the water in the valve chamber is retained and serves as a priming medium for subsequent operations.

Having described my invention, I claim:

1. An ejector comprising a hollow body interiorly divided providing a water inlet conduit, a suction chamber, and a cross chamber connecting said inlet conduit and suction chamber, a check valve controlling the communication between said inlet and cross chamber, and from the latter, a second check valve controlling communication between said suction and cross chambers, and from the latter, a combining and delivery tube connecting with said suction chamber, a piston chamber having a nozzle for discharging steam toward the mouth of said combining and delivery tube, and a steam actuated piston in said piston chamber, operating for opening said second check valve.

2. An ejector comprising a body providing a water supply conduit, having an enlarged portion for receiving a strainer, a steam conduit having an enlarged portion for receiving a strainer, a suction chamber connecting with said water supply conduit, a check valve controlling the flow of water to the suction chamber and open against the pressure of the in-coming water, a combining tube, a steam nozzle and a steam-actuated member for opening said check valve, removable strainers transversely positioned across the supply and steam conduits at their respective enlarged portions.

3. An ejector comprising a body providing a water supply conduit, a steam conduit and a suction chamber, a supply valve controlling the flow of water to the suction chamber, a combining tube, a steam nozzle, and a steam operated supply valve actuator having a piston-head portion, a stem portion and spaced depending legs projecting from the head portion providing an extended guide surface and limiting the movement of the actuator in one direction.

4. In an ejector, a casing providing adjacent water inlet, water suction and piston chambers, and a valve chamber connecting said water inlet and suction chamber, check valves for controlling the inlet and outlet ports of said valve chamber, sealing against discharge from said valve chamber in relatively opposing directions, a steam nozzle connecting with said piston chamber and leading into the suction chamber, a piston in said piston chamber for operating the valve covering the outlet port of said valve chamber, a steam inlet communicating with said piston chamber and steam nozzle, having a strainer chamber and transversely removable strainer within said steam strainer chamber non-obstructive of steam inlet capacity.

5. In an ejector, a casing providing adjacent water inlet, water suction and piston chambers, said inlet chamber having an enlarged strainer receiving portion, a removable strainer transversely within said enlarged portion of an area non-obstructive of the normal capacity of said inlet chamber, and a valve chamber connecting said water inlet and suction chambers, check valves for controlling the inlet and outlet ports of said valve chamber, sealing against discharge from said valve chamber in relatively opposing directions, a steam nozzle connecting with said piston chamber and leading into the suction chamber, a piston in said piston

chamber for operating the valve covering the outlet port of said valve chamber, a steam inlet communicating with said piston chamber and steam nozzle, having a strainer chamber and transversely removable strainer within said steam strainer chamber non-obstructive of steam inlet capacity.

In witness whereof, I hereunto subscribe my name, as attested by the two subscribing witnesses.

JOHN W. GRANTLAND.

Witnesses:

CLARENCE B. FOSTER,

L. A. BECK.