

No. 862,078.

PATENTED JULY 30, 1907.

S. L. KNEASS.
INJECTOR.

APPLICATION FILED OCT. 31, 1906.

2 SHEETS—SHEET 1.

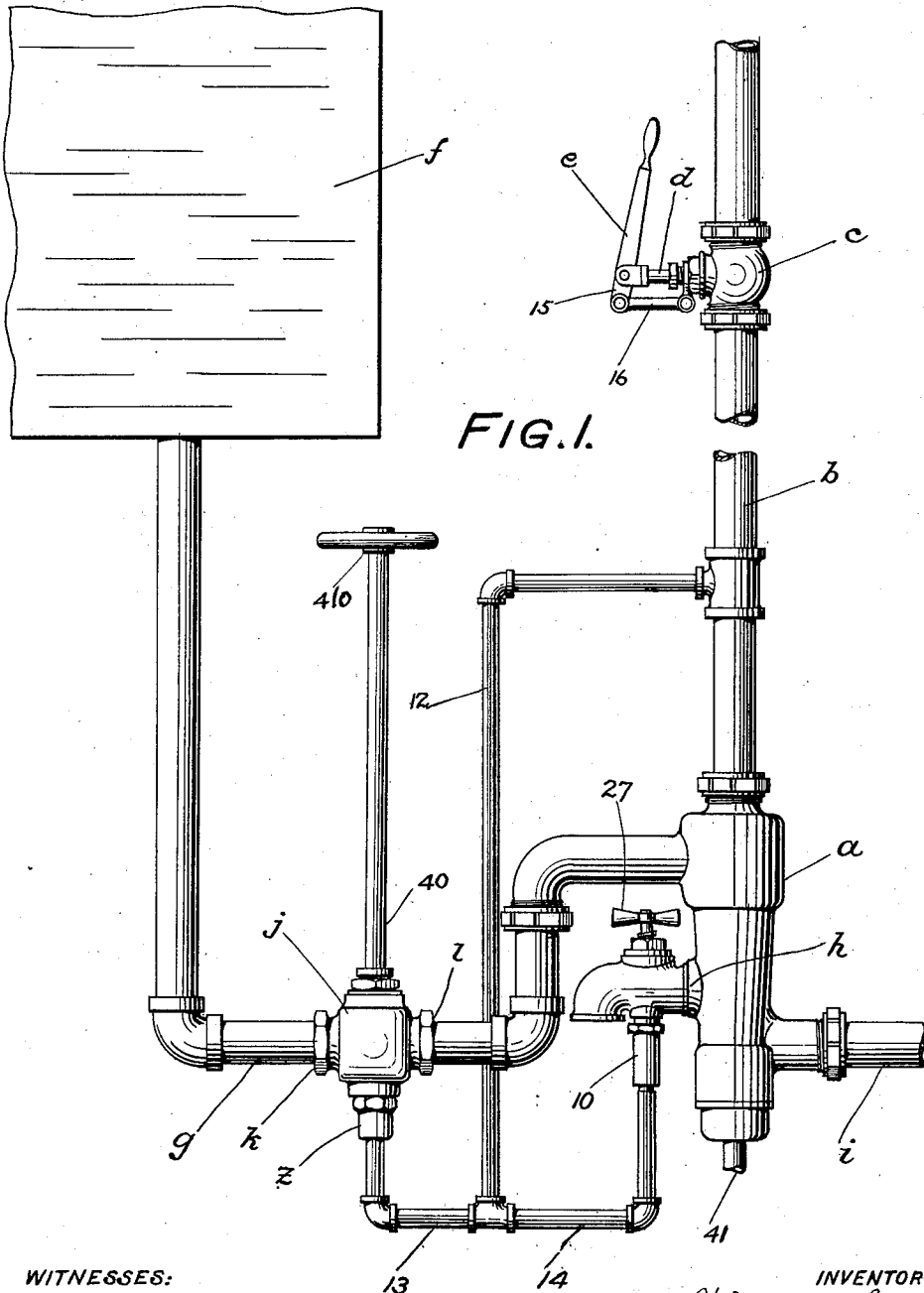


FIG. 1.

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2 SHEETS—SHEET 2.

FIG. 2.

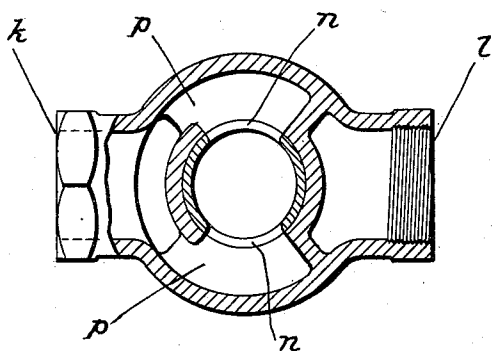


FIG. 3.

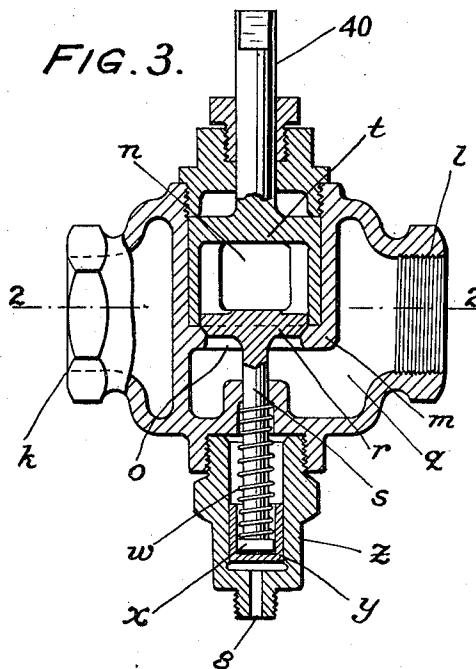


FIG. 5.

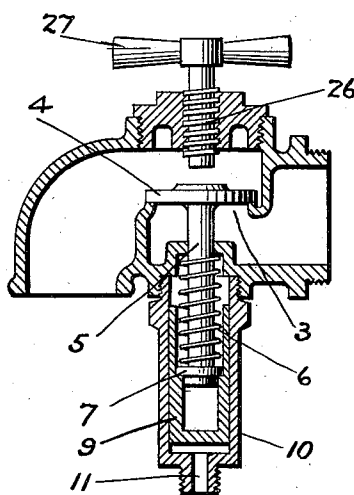
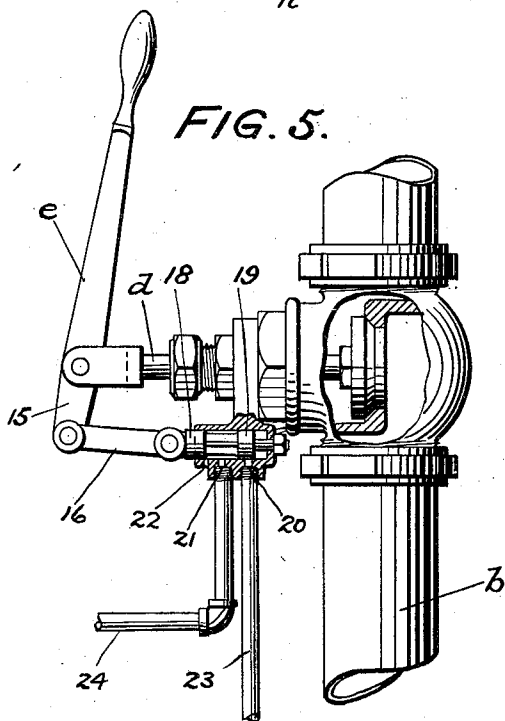


FIG. 4.

WITNESSES:

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UNITED STATES PATENT OFFICE.

STRICKLAND L. KNEASS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO WILLIAM SELLERS AND COMPANY, INCORPORATED, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

INJECTOR.

No. 862,078.

Specification of Letters Patent.

Patented July 30, 1907.

Application filed October 31, 1906. Serial No. 341,398.

To all whom it may concern:

Be it known that I, STRICKLAND L. KNEASS, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Injectors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates particularly to the case of injectors known as non-lifting, in which the water supply is received under a head of water.

Injectors of all classes are provided with an overflow opening through which the water escapes during the operation of starting. With non-lifting injectors, where the water supply is received under a head, provision must be made to prevent the escape, and thus loss of water, when the steam supply is cut off. In practice this is now usually accomplished by means of a hand operated valve, either controlling the supply to the injector or the overflow therefrom. This method requires an additional operation after the steam supply is closed so that all flow of water to the injector may be stopped. In practice it has often been found that an appreciable amount of time may elapse after the closing of the steam valve before the water supply is shut off, causing considerable waste of water. In the case of locomotives, where the water supply must be carried, this loss is very appreciable. Further the operator may omit to close the outlets from the water supply, and the tank from which the injector is supplied is drained, which may result in disaster to the boiler and its operator on account of the lack of boiler feed.

It is an object of my invention to render the closing of the water supply automatic, certain and practically simultaneous with cutting off the steam, or shutting the steam supply valve and to render the opening of said supply certain, automatic, and practically simultaneous with the application of steam to the injector.

In a form of my invention I provide that the closure and opening of the water supply valve or overflow valve shall be dependent upon the operation of cutting off steam from and admitting steam to the injector. Where the valve controls the supply to the injector the opening of said valve should preferably be slightly in advance of the admission of steam in order to insure water in the injector when steam is admitted, and my invention includes means to produce this result. The automatic control of the admission to and cutting off the flow of water from the injector, may be through a valve between the supply and the entrance to the combining tube or on the final waste outlet from the injector.

I carry out my invention, by providing a controlling valve between the water supply and the final waste

outlet which is automatically opened when steam is admitted to the injector or in the act of admitting steam to the injector, and automatically closed when steam is cut off from the injector, or in the cutting off of steam from the injector.

My invention further consists in providing such automatic closing valve when controlling the water admission with a regulating device which can be operated independently of the automatic action of the valve and in means whereby the action of such valve is made positive under a large range of service conditions.

I will now describe the embodiments of my invention shown in the accompanying drawings and then point out the invention in the claims:

In the drawings, Figure 1 is a general view in elevation of an injector provided with my invention. Fig. 2 is a section on 2—2, Fig. 3, showing valve on inlet pipe. Fig. 3 is a vertical section of same valve. Fig. 4 is a detail section of valve on overflow pipe. Fig. 5 is a detail view of steam inlet valve and operating mechanism, and valve to control inlet pipe valve.

a is the injector, *b* the steam pipe to injector, leading from a source of steam supply, not shown, *c* is the valve for admitting and cutting off steam to the injector, *d* is the rod for controlling said valve and *e* is the lever for controlling the rod.

f is the water supply tank, *g* is the inlet pipe from the water supply tank to the injector.

h is the overflow pipe, and *i* the pipe from injector to the boiler.

Upon the pipe *g* is the valve shown in detail in Figs. 2 and 3. This valve comprises the casing *j* having the inlet *k* and outlet *l*. Separating this inlet and outlet is the annular internal septum *m*, having the side ports *n* and the vertical port *o*, the ports *n* being connected by passages *p* with inlet *k* and port *o* by passages *q* with outlet *l*. Seated on this casing is a check valve *r*, connected to the stem *s* and seated so as to be movable vertically. This valve *r* controls port *o*.

Mounted in the casing so as to rotate is the regulating valve *t* having side openings adapted to completely register with the openings *n* in the open position of the valve and when said valve is turned it more or less or entirely closes said openings *n*. This valve is connected to rod or stem 40 having a hand wheel 410, (Fig. 1), by which it may be turned. The valve *r* is brought to its seat and normally held on its seat with port *o* closed by means of the head or pressure of the water supply, supplemented by the spring *w*, surrounding the stem *s* and confined between a collar *x* on the stem *s* and the valve casing. The stem *s* is acted on by a piston or plunger *y* in a cylinder *z* having an inlet 8.

When the piston is lifted the stem *s* is lifted, elevating the valve and opening port *o*. This action compresses the spring and, when pressure is released from the piston, the pressure of the water supply, assisted by the spring, returns the valve to its seat. On the overflow pipe *h* I place the valve shown in Fig. 4 in which the casing is provided with a seat 3 for a lifting or check valve 4 connected to a stem 5. This valve is moved to its seat by a spring 6 surrounding this stem and confined between a collar 7 loose on the stem and a fixed portion of the casing acting on the head 40 of the stem. A piston 9 is in cylinder 10, said piston contacting with collar 7 and said cylinder having inlet 11. When the piston is raised it acts on collar 7, compressing spring 6 and relieving the spring pressure against head 40, and the water will lift the valve thus freed and have free outlet. The valve is now in such relation to spring that its movement is not affected by the spring and then will seat automatically during the normal action of the injector. When pressure on piston 9 is released, due to closing of steam inlet valve, the spring 6 again acts to hold valve 4 in place closed against the head of the water supply to raise the piston its full stroke. The screw 26 working in a threaded orifice in the valve cap of the valve casing and operated by the handle 27, may be used to hold the valve fixedly to its seat when such action is required. To the steam inlet pipe *b* a pipe 12 is connected. This pipe has a branch 13 connecting to inlet 8 in cylinder *z* and it may also have the branch 14 connecting to the inlet 11 in cylinder 10. As may be seen with this arrangement whenever steam is admitted to pipe *b* it is admitted to pipe 12 and hence to cylinder *z* and the valve controlled by the piston therein is opened and water admitted to the injector. If the branch 14 be used, steam is, under above condition, admitted to cylinder 10 and its spring released from the valve 4, which valve 4 may then open, permitting flow of water. This continues as long as the pressure of the steam in the cylinder *z* or the cylinder 10 is sufficient. When it is cut off therefrom the spring and the head of water in one case and the spring in the other automatically return the valves to their seats and the water supply cannot flow through the injector. Thus automatically, when the injector goes into operation, flow of water is permitted and, automatically prevented, the moment the injector goes out of operation. I can, if I desire, take the pressure for controlling the water supply from beyond the delivery tube of the injector, the pipe 41 (Fig. 1) being shown for that purpose.

I have shown and described means for controlling both the inlet pipe and the overflow pipe. In many cases it is very advantageous to control the overflow as it insures water in the injector at the time steam is admitted. If, however, the arrangement which I will now describe, where the water inlet valve is opened just before the steam is admitted, and water will be in the injector, when the steam is admitted to be used, a valve on the injector is preferable.

In the construction shown in Fig. 5, the extension 15 of lever *e* (Fig. 1) is connected to a link 16 which is connected to the stem of a valve provided with heads or enlarged portions 18 and 19. This valve is in a casing which is provided with openings 20, 21 and 22, opening 20 connecting by pipe 23 with a source of pressure sup-

ply, preferably air. Opening 21 connects by pipe 24 with cylinder *z*, while opening 22 is an exhaust opening. In the movement of this valve in one position the casing connects opening 20 with opening 21, which occurs when the lever *e* is operated to admit steam to the injector. In the reverse movement of the levers *e* the opening 21 is connected by casing *z* with exhaust opening 22. The arrangement of this valve is such that it opens in advance of the opening of valve controlling admission of steam to injector and hence the valve in the water inlet pipe opens before steam is admitted to the injector and thus water is flowing through the injector substantially at the time of the admission of the steam.

While I have described several constructions for opening the water supply controlling valve or valves when the steam is admitted to the injector and for closing the same when steam is cut off, I do not intend, unless specifically claimed, to limit myself to these or any particular means or construction. Nor, unless specifically claimed, do I intend to limit myself to the specific construction or constructions of controlling valve shown or to any particular construction thereof. Nor do I intend to limit myself to position shown of the valve *j* as it may be placed at any point between the source of supply and the entrance to the combining tube.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

1. In an injector, in combination, means to admit steam to the injector, a valve, operated by fluid pressure, controlling the flow of water through the injector, and means, in the initial operation of the steam admitting means to admit steam to the injector, to admit fluid pressure to the valve.
2. In an injector, in combination, means to admit steam to the injector, a valve, operated by fluid pressure, controlling the flow of water through the injector, and means, in the initial operation of the steam admitting means to admit steam to the injector, to admit said steam to the valve.
3. In an injector, in combination, means to admit steam to the injector, a valve, operated by fluid pressure, controlling the flow of water through the injector, and means, in the initial operation of the steam admitting means to admit steam to the injector, to admit fluid pressure to the valve, and means tending to close the valve, and closing said valve on the release of said fluid pressure.
4. In an injector, in combination, means to admit steam to the injector, a valve, operated by fluid pressure, controlling the flow of water through the injector, and means, in the initial operation of the steam admitting means to admit steam to the injector, to admit said steam to the valve, and means tending to close the valve, and closing said valve on the release of said steam.
5. In an injector, in combination, means to admit steam to the injector, a valve controlling the flow of water through the injector, fluid pressure means, adapted to open the valve, and means to admit fluid pressure in advance of the admission of steam to the injector to open the valve.
6. In an injector, in combination, means to admit steam to the injector, a valve controlling the flow of water through the injector, fluid pressure means, adapted to open the valve, and means to admit fluid pressure to open the valve in the operation of the steam admitting means to admit steam to the injector, and to admit said fluid pressure in advance of the admission of steam to the injector.
7. In an injector, a steam inlet to the injector, a valve controlling said inlet, a valve controlling the flow of water through the injector, fluid pressure means, adapted to open the water controlling valve, and a passage between the water controlling valve and the steam inlet, between the steam inlet valve and the injector.

8. In an injector, a casing and valve therein having a vertical movement and closing against the flow of water, and a valve superimposed thereon, having a rotating movement, each controlling a port or ports.

5 9. In an injector, a water supply valve casing having a check valve therein, normally closed against the flow of water and opened by fluid pressure, and a superimposed rotating valve.

10 10. In an injector, in combination with a valve having a vertical movement, and a valve having a rotating movement, each controlling a port or ports, means to lift said

valve to open its port in the operation of admitting steam to the injector, and means to cause said valve to descend and close the port in the operation to cut off steam to the injector.

In testimony of which invention, I have hereunto set my hand, at Philadelphia, on this 29th day of October, 1906.

STRICKLAND L. KNEASS.

Witnesses:

FRANK G. GRIER,
HARRY J. KELLY.

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