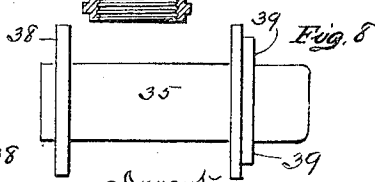
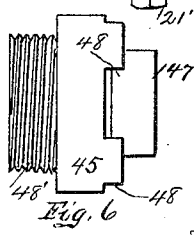
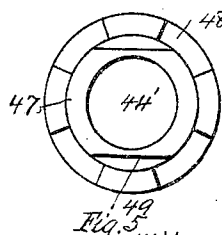
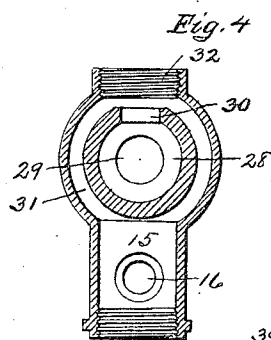
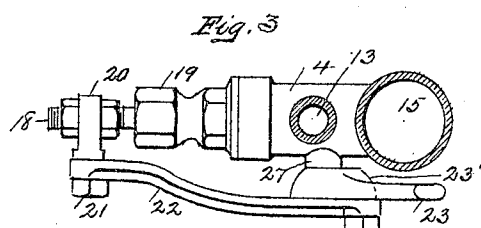
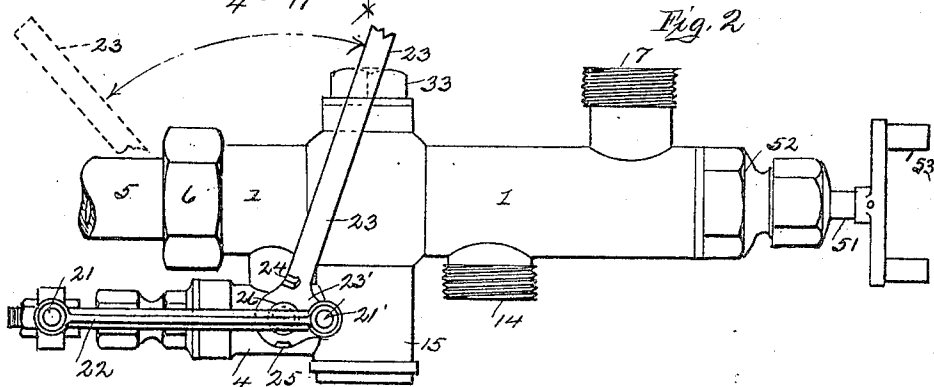
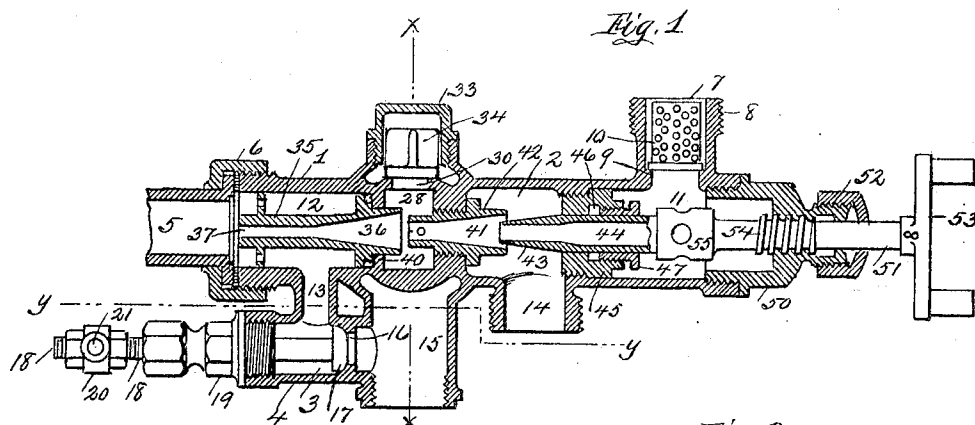


No. 807,759.

PATENTED DEC. 19, 1905.

G. W. MASON.  
INJECTOR.

APPLICATION FILED MAY 10, 1905.



WITNESSES:

Nathaniel A. Murray  
Frank B. Burr

Inventor.  
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# UNITED STATES PATENT OFFICE.

GEORGE W. MASON, OF SHARON, PENNSYLVANIA.

## INJECTOR.

No. 807,759.

Specification of Letters Patent.

Patented Dec. 19, 1905.

Application filed May 10, 1905. Serial No. 259,673.

*To all whom it may concern:*

Be it known that I, GEORGE W. MASON, a citizen of the United States, residing at Sharon, in the county of Mercer and State of Pennsylvania, have invented certain new and useful Improvements in Injectors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to an improved injector for lifting and forcing water into steam-boilers; and it consists in the certain details of construction and combination of parts, as will be fully described hereinafter.

In the accompanying drawings, Figure 1 is a side central sectional elevation of my improved injector, the same being constructed and arranged in accordance with my invention. Fig. 2 is an outside elevation of the same. Fig. 3 is a sectional plan view of a portion of the injector, the said section being taken on the line *y y* of Fig. 1. Fig. 4 is a sectional end elevation of the shell of the injector, the section taken on the line *x x* of Fig. 1. Fig. 5 is a full-sized end elevation of the stuffing-box removed from the shell. Fig. 6 is a side elevation of the same. Fig. 7 is an end elevation of the forcing-tube detached from the injector. Fig. 8 is a side elevation of the same.

To construct an injector in accordance with my invention, and thereby provide a means of injecting water into steam-boilers, either under pressure or at rest, I form from cast metal a shell 1 of a suitable size and form of construction, the said shell comprising a main body portion 1, having a central bore, a steam connection or inlet 7, a water-inlet 14, an overflow-passage 15, a cylindrical overflow-chamber 3, communicating by a passage 13 with the bore of the main shell and with an inlet-passage 5 to the boiler. Arranged within the shell 1 are three tubes, the one in line with the other, the middle one, 42, of which is attached by means of a screw-thread and formed with a central tapering bore 41, the entrance of which is located over the water-inlet 14. The steam-forcing tube operating in connection with the stationary tube 42 consists of a tube 44, having a nozzle 43, adapted to be adjusted

toward or away from said stationary tube or project into the mouth of the same. This movement of the tube 44 is accomplished by forming the same with a rearwardly-projecting stem 51, having a handle 53 on its free or exposed end and an intermediate threaded portion 54, operating in a threaded plug 50, and the said plug formed with a stuffing-box 52 to make a steam-tight connection. The forward end of this last-described tube 44 is supported and guided in an internal-arranged stuffing-box consisting of a threaded body portion 45, located at one side of the water-inlet 14, a packing 46, and a threaded gland 47. These two ports forming the stuffing-box form a partition for the steam-chamber 11, the steam entering the tube 44 through openings 55 and are placed or removed by engaging suitable wrenches in end grooves 48 of the outer member and a flattened portion of the inner part, as will be best seen by reference to Figs. 5 and 6 of the drawings. By this construction and arrangement of the tube 44 the same may be adjusted toward or away from the entrance 41 of the stationary tube 42, and thereby afford a means of increasing or diminishing the quantity of water injected through said stationary tube. If the water is supplied to the injector under pressure, the nozzle 43 of the steam-tube is moved into the mouth of the stationary tube 42 to partly close or reduce the area of the opening 41; but if the water is to be lifted the said nozzle 43 is moved back to give a free inlet for the same.

At the front of the stationary tube 42 and in line therewith is a forcing-tube 35, having an enlarged tapering entrance 36 and a reduced cylindrical exit 37, the said forcing-tube being formed with two peripheral flanges 38 and 39, the one having a series of perforations 38' and the other, 39, forming a valve to close direct communication between two chambers 12 and 28, formed by a partition 40, through which the inlet end of the forcing-tube 35 projects. This forcing-tube 35 is capable of being moved in the direction of its length by the action of the water and steam passing through the injector and will automatically regulate the distance between itself and the exit end of the stationary tube 42. The chamber 28 immediately above the overflow-exit 15 is formed integral with the casing 1 and is provided at the top with an opening 30, closed by a check-valve 34, the said valve be-

ing held in position by a screw-cap 33. At each side of the chamber 28 are formed downwardly - extending passages 31, leading to and in communication with the overflow-passage 15.

Arranged within the chamber 3 is a sliding valve-stem 18, the inner end of which is formed with a valve 17, adapted to open or close a passage 16 to the overflow 15, and the said chamber connected by a passage 13 to the chamber 12 above.

Pivoted on a stud 27, formed integral with the shell 1, is a hand-lever 23, having an eccentric portion 23' and formed with integral stops 24 and 25 to limit the movement or throw of said lever in either direction. Attached to the eccentric portion 23' of the lever by means of a stud 21' is a connecting-bar 22, the other end of which is loosely attached to a piece 20, held fast to the free end of the valve-rod 18 by nuts placed at either side in a manner that, by moving the lever 23 to the position shown in dotted lines at Fig. 2, the valve 17 will be moved from its seat 16 to open a passage from the chamber 12 above to the overflow-passage 15.

In operation the steam-inlet 7 is connected by a pipe with the steam-dome of the boiler, the said pipe being fitted with a valve to regulate and control the flow of steam there-through, and with an intermediate strainer 10, which I prefer to be cup-shaped, open at the bottom and formed with perforations at the top and sides. The entrance-pipe 5 to the boiler is introduced below the water-level and the water-inlet pipe attached to its proper connection 14.

To start or put the injector in operation, the hand-lever 23 is moved to the left to the position shown in dotted lines, thereby moving the valve 17 from its seat. Steam is now turned on and passing through the strainer 10 into the openings 55 through the tube 44 into the stationary tube 42, creating a vacuum at the point of juncture of said tubes, which will draw or lift the water through the inlet 14 and force the same through the stationary tube 42 into the chamber 28. The pressure of steam in the chamber 28 will lift the check-valve 34 from its seat and permit a portion of said steam to escape through the two passages 31 to the overflow 15, and the balance of steam forced through the forcing-tube 35 into the inlet-pipe 5, where the back pressure of the boiler will return the steam through the perforations 38' to the overflow 15 through the medium of passage 13 and valve-opening 16. This forward pressure of the steam entering the tube 35 will cause the same to move back from the stationary tube 42 to permit a free passage of the water therefrom. When a good flow of water is running from the overflow-passage 15, the hand-lever is thrown back to its former position, closing the valve 17 on its seat, which causes the back pressure of the

boiler to move the forcing-tube 35 to its former position and create a partial vacuum in the chamber 28 and instantly close the check-valve 34. When these two valves are closed, the water is lifted and injected through the tubes 42 and 35 into the boiler.

The above-described injector has been thoroughly tested, and it has been found that it will inject more water into the boiler than any other now on the market. It has worked successfully with steam-pressure as low as ten pounds. It has been tested with water at very high temperatures and gave complete satisfaction and will lift water at rest to a height above twenty feet and will work equally as well under any water-pressure.

Various slight modifications and changes may be made in the details of construction without departing from the spirit of the invention. Therefore I do not wish to confine myself to the exact construction shown and described, but wish to claim all such modified forms as would come properly within the general scope of the invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An injector comprising a shell provided with water and steam inlets, exit and overflow passages, said shell having arranged therein a combined stationary lifting and forcing tube, an adjustable steam-forcing tube at one end and in line therewith, and a self-adjusting forcing-tube having separate overflow-passages leading from either end thereof, also in line with and at the other end of said stationary tube.

2. An injector comprising a shell provided with water and steam inlets, exit and overflow passages, said shell having arranged therein a combined stationary lifting and forcing tube, an adjustable steam-forcing tube at one end and in line therewith, said tube operating through an interior - arranged stuffing-box, whereby steam-tight compartments are formed, and a self-adjusting forcing-tube having separate overflow-passages leading from either end thereof, also in line with and at the other end of said stationary tube.

3. In an injector, the combination comprising the shell having water and steam inlets, exit and overflow passages, said shell having arranged therein a stationary lifting-tube 42 an adjustable steam-forcing tube 44 operating through a stuffing-box, and means for moving the same toward or away from said stationary tube to open or close the entrance, a chamber 28 at the forward end of the stationary tube, an opening from said chamber to the overflow, a check-valve 34 operating to open or close said opening, a self-adjusting forcing-tube communicating with the chamber 28 and exit-pipe 5, and a separate overflow-passage 13 with valve 17, to open or close said passage, as and for the purpose described.

4. In an injector, a self-adjusting forcing-tube having separate overflow-passages leading from either end of said tube.

5. In an injector, a self-adjusting forcing-tube having separate overflow-passages leading from each end thereof, and suitable valves for opening and closing said passages.

10 6. In an injector, a self-adjusting forcing-tube having separate overflow-passages leading from either end thereof, a check-valve for automatically closing one of said passages and a valve under the control of the operator for closing the second passage.

7. In an injector, a self-adjusting forcing-

tube having separate overflow-passages lead- 15  
ing from either end thereof, said tube comprising a cylindrical body portion having an enlarged entrance, a reduced exit and peripheral flanges, one of which is perforated to permit the water to return to one of the over- 20  
flow-passages.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE W. MASON.

Witnesses:

FRANK B. BARR,

KATHERINE A. MURRAY.