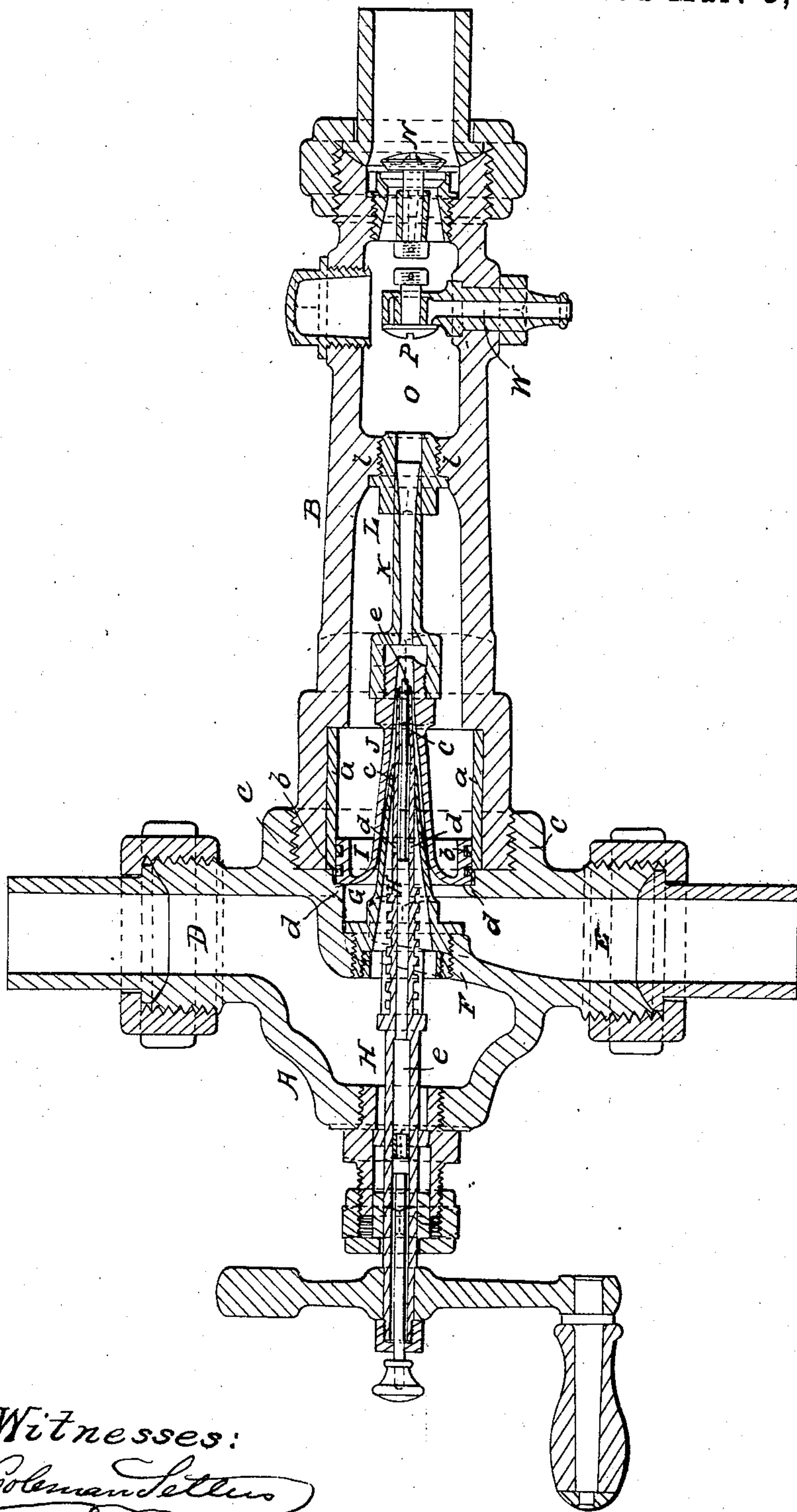


W. SELLERS.  
INJECTOR FOR FEEDING BOILERS.

No. 75,059.

Patented Mar. 3, 1868.



Witnesses:  
*Coleman Sellers*  
*W. Howard.*

*Wm. Sellers*



# UNITED STATES PATENT OFFICE.

WILLIAM SELLERS, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN INJECTORS FOR FEEDING BOILERS.

Specification forming part of Letters Patent No. 75,059, dated March 3, 1868.

*To all whom it may concern:*

Be it known that I, WILLIAM SELLERS, of the city of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in the Giffard Injector, whereby this instrument is rendered more efficient, and is simplified in construction; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing, and to the letters of reference marked thereon.

One portion of these improvements is only applicable to the self-adjusting injector patented by me August 15, 1865; but as all are applicable to this form the drawings represent this construction.

In the instrument therein described it will be observed that the fluid-jet is discharged laterally from the pipe J and J', in which it is formed, so as to permit an arrangement which will prevent the boiler-pressure from producing any movement of this pipe. To accomplish this object the pipe J and J' is extended beyond the point of discharge, so as to pass through another stuffing-box of the same size as the one above the point of discharge, thereby preventing any pressure in the direction of the axis of the pipe J J'.

The objects of my present improvements are, first, to enable all injectors constructed for feeding steam-boilers to throw a smaller quantity of water than has heretofore been possible, and to accomplish this without in any way affecting their maximum capacity; second, to enable the instrument to draw its supply-water from a lower level without increasing the number of its parts; third, to simplify the construction of the self-adjusting injector; fourth, to enable the self-adjusting injector to lift its supply-water; and, fifth, to make the waste-orifice of the self-adjusting injector self-closing.

The nature of my invention consists in the arrangement of the steam-discharge nozzles of all injectors constructed for feeding steam-boilers so that they may be elongated at the same time that the discharge-opening is being contracted; and it also consists in the construction of the divergent tube or pipe which delivers the water from the self-adjusting injector to the boiler, so that the boiler-pressure can exert but a very slight influence upon the

end exposed to it, the internal construction of this pipe conforming as near as possible to that which the jet would assume when forced into a fluid at rest, in which case no lateral strain would be exerted upon the pipe, and the only pressure that could produce a longitudinal movement would be that exerted upon the edge where the parallel outside meets the divergent inside; and it also consists in the means for limiting the movement of the self-adjusting piston, so as to obtain an effective vacuum, and in closing the waste-orifice of the self-adjusting injector by the action of the injector itself, all of which is more fully explained by referring to the drawing herewith.

The outer shell or case of the injector I make in two parts, A and B, united by a screw-thread at C. The part A is provided with two nozzles D for the admission of steam, and E for the admission of the water—the two being separated by the plate F. In the center of the plate F I provide a nozzle, G, for the steam-jet, the amount of steam that can be discharged from the nozzle being regulated by the tapered plug H, which may be operated by a screw, lever, or other convenient device. The interior of the case B from the end where it is joined to the part A is bored out for a short distance, and fitted with a cylindrical brass lining, *a a*, which is turned out to receive the packing *b b* in the piston I, and this piston must play freely longitudinally therein. This piston forms the upper or receiving end of the converging pipe J, which I denominate the combining-tube, and this tube is united at its smaller end with the divergent tube K, which I call the discharging-tube, the axis of both tubes being in the same line, and in the line of the axis of the steam-nozzle G. The exterior of the discharging-tube K is cylindrical, and supported in the brass bushing L, which is screwed into the plate *l l*, cast with the outer shell or case B. This bushing must be of sufficient length to prevent the escape of water in any important quantity when the discharging-tube K is fitted so as to play freely through it. The combining and discharging tubes J and K must have sufficient movement longitudinally to admit the maximum amount of water required between the exterior of the steam-nozzle G and the interior of the combining-tube, and to enable the



instrument to lift water from a lower level there must be a stop provided which will prevent the combining-tube from moving so far toward the nozzle G as to close the opening for water entirely. In this case the piston I will strike a small flange, *d d*, in the upper case before the surfaces referred to can come in contact.

It is well known that the nozzles in the Giffard injector, although well arranged for forcing water, are not so well adapted to produce a vacuum for the purpose of lifting the supply to the instrument. To remedy this defect I make the plug H much longer than is customary with the ordinary injector, and drill a hole, *c c*, from its small end far enough to communicate, by a cross-hole, *d' d'*, with the steam-space in the nozzle G after the plug H has closed the tapered end of the nozzle G. The size of this hole should be about one-half that of the smallest end of the divergent tube, if intended to lift only; but to obtain the smallest possible minimum delivery of water it will be necessary to make this hole somewhat larger, in which case a movable plug, *e e*, must be provided to diminish the quantity of steam when it is desired to raise the supply-water.

It is evident this improvement is applicable to all injectors constructed for feeding boilers in which the steam-jet is regulated by a tapered plug.

To make the waste-orifice self-closing, the

opening W must be of such a size that the water which can be discharged by the injector when in full action will not pass through it without creating a pressure in the chamber O greater than that in the boiler to which the injector supplies the water. The inner end of this orifice is closed by a check-valve, P, arranged with reference to the main valve N, so that when the main valve N is closed the waste-valve P must be open. In starting the injector the water will be discharged through the valve P and opening W until the quantity is increased, so as to produce a pressure in the chamber O greater than that in the boiler. This will open the main check and permit the valve P to close, shutting off the waste and compelling all the water to pass into the boilers.

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

1. The hole *c* in the end of the plug, which plug regulates the discharge of steam in the injector, substantially as herein set forth.
2. The flange *d d*, substantially as set forth.
3. The discharging-tube K, constructed substantially as described.
4. The arrangement of the waste-orifice W, substantially as specified.

WM. SELLERS.

Witnesses:

COLEMAN SELLERS,  
W. HOWARD.