No. 747,006. PATENTED DEC. 15, 1903.

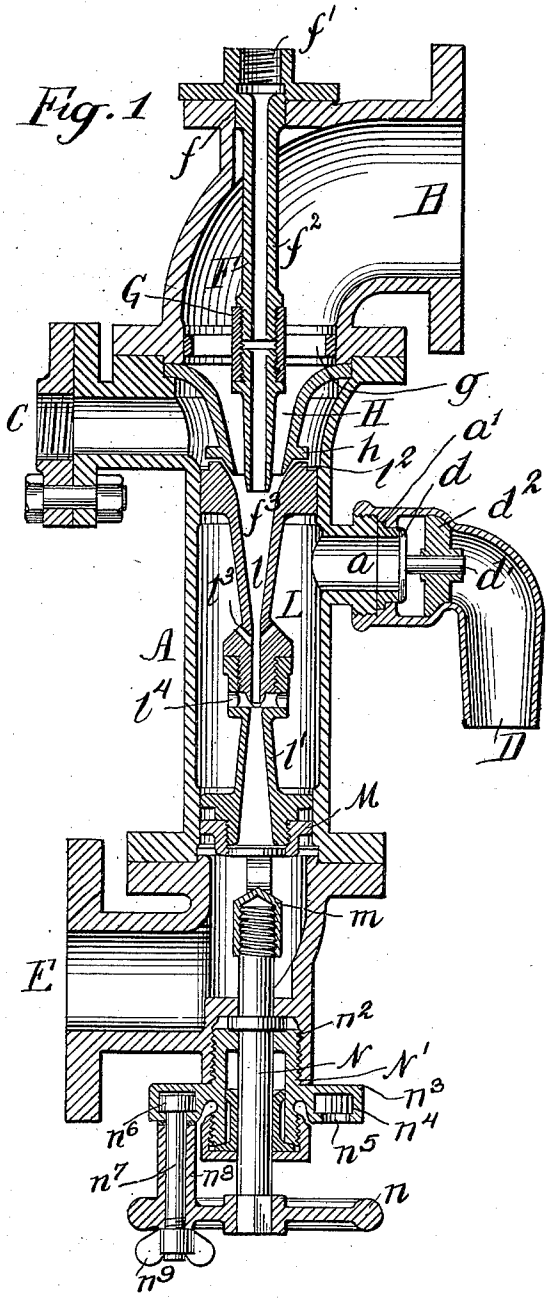
A. SIMPSON & M. SPEICHER.

INJECTOR.

APPLICATION FILED JUNE 15, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1



WITNESSES:

L. McIntosh

R. Beach Pennhead

INVENTORS

Alexander Simpson

Mathias Speicher

BY

J. T. Edmonds

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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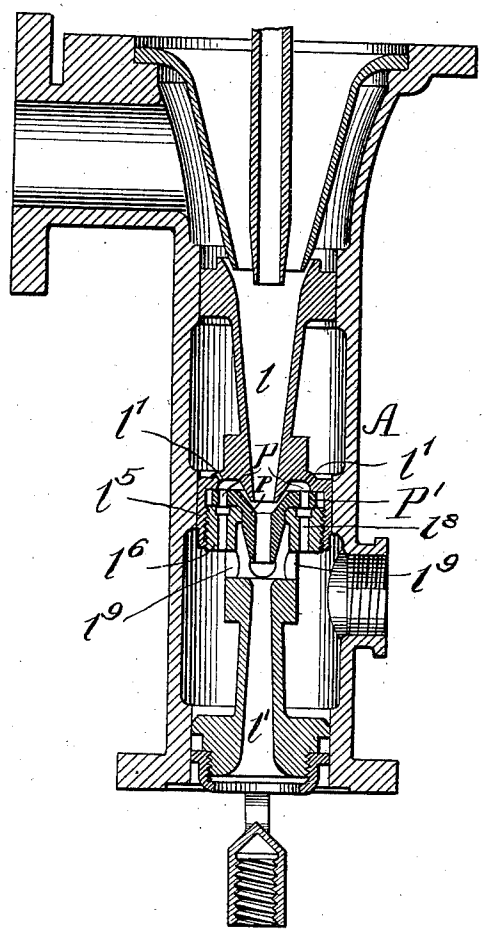
A. SIMPSON & M. SPEICHER.

INJECTOR.

APPLICATION FILED JUNE 15, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2



WITNESSES:

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No. 747,006. Patented December 15, 1903.

UNITED STATES PATENT OFFICE.

ALEXANDER SIMPSON, OF SCRANTON, AND MATHIAS SPEICHER, OF ARCHBALD, PENNSYLVANIA, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO SAID SPEICHER, WILLARD B. CULVER, OF CARBONDALE, PENNSYLVANIA, AND ELLIS R. SIMPSON, OF SCRANTON, PENNSYLVANIA.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 747,006, dated December 15, 1903.

Application filed June 15, 1903. Serial No. 161,475. (No model.)

To all whom it may concern:

Be it known that we, ALEXANDER SIMPSON, residing at Scranton, and MATHIAS SPEICHER, residing at Archbald, in the county of Lackawanna and State of Pennsylvania, both citizens of the United States, have invented a certain new and useful Improvement in Injectors, of which the following is a description.

This invention is designed as an improvement upon the mechanism illustrated and described in Letters Patent Nos. 490,590 and 516,231, heretofore granted to us for improvements in injectors.

The object is to desirably simplify said mechanism and to obtain increased efficiency in several respects, hereinafter alluded to.

In apparatus constructed as illustrated in said patents there is a constant overflow even while steam is being passed through the injector, such overflow involving unnecessary waste. Again, injectors so constructed are undesirably slow at starting, it being necessary to create suction in the combining-tube by the passage of steam before the water is deflected from its course around such combining-tube and forced to pass therethrough. Again, the means for controlling the passage of water to the combining-tube is not entirely satisfactory, ideal provision for this requiring, in our belief, direct positive controlling mechanism. The objections realized in the use of the apparatus described in said former patents have been entirely eliminated in the manner hereinafter described.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section illustrating our improved mechanism, and Fig. 2 is a similar view illustrating a modification.

Referring to the drawings, in which similar letters denote corresponding parts, it will first be noted that the casing or shell of the injector is, generally considered, the same as that disclosed in said previous patents, comprising the body A, the flanged exhaust-steam opening B, the similarly-flanged water-supply opening C, the overflow-nozzle D, and the delivery-opening E. The upper end of the casing is provided with an orifice f, through which extends the dividing-spindle F, which, as here shown, is tubular and provided at its end with the screw-threaded socket f', by means of which connection may be made to a source of steam-supply. The dividing-spindle F is formed in two parts—the body f^2 and nozzle f^3. The lower end of the former and the upper end of the latter are exteriorly-screw-threaded for engagement with a hub G, carried by an annulus g, the periphery whereof is in snug frictional contact with the interior of the casing. This construction serves a dual purpose—first, in that expansion and contraction of the dividing-spindle are provided for, sufficient latitude being permitted in the vertical movement of the annulus g, and, second, in that the nozzle f^3 may be readily removed when worn out and a new one substituted.

H designates the steam jet or tube, here shown as conical, and the upper annular edge whereof is for simplicity of construction clamped between the exhaust-steam-orifice casting B and the body A of the casing. Near its lower end the steam-jet is provided with an annular rib h, the office whereof will presently appear.

L designates the combining-tube. This has vertical movement under the influence of the adjusting mechanism, hereinafter described, in the body A of the casing and is here shown as constructed in two parts, the lower end of the upper portion l and the upper end of the lower portion l' being screw-threaded for secure attachment, as clearly illustrated in the drawings. The upper portion is provided with a conical opening, into which the dividing-spindle after passing through the steam-tube H extends. The upper end of this part l is in snug frictional contact with the interior of the casing A and is provided with an annulus l^2, which when the combining-tube is in its uppermost (and inoperative) position makes contact with the annulus h on the steam-tube H. When such contact is made, similar contact is also made between the lower end of

said steam-tube H and the outwardly-flaring opening in the end of the upper member l of the combining-tube L.

l^3 l^3 designate ports extending through the shell of the upper member l of the combining-tube L and communicating with the interior thereof. l^4 l^4 designate similar ports formed in the upper portion of the lower member l' of the combining-tube and also communicating with the interior of said tube. The opening through said lower member l' is also preferably conical in form, and the lower end of this member has sliding contact with the interior of the casing. It is exteriorly-screw-threaded for engagement with the head M, formed integral with which is the interiorly-threaded spider m. With the latter engages an adjusting-screw N, here shown as having a hand-wheel n, by means whereof said adjusting-screw N is operated to adjust the combining-tube L in a vertical plane. The lower end of the casing is provided with an interiorly-screw-threaded orifice n', with which engages an exteriorly-threaded boss n^2 on the under side of an annulus n^3. The latter is provided with an annular recess n^4, having an opening n^5, also annular but of less width. Within the annular recess n^4 operates the head n^6 of the locking mechanism for the adjusting-screw N. Secured to or formed integral with the head n^6 is the shank n^7, passing through a tubular casing n^8, preferably secured to or formed integral with the hand-wheel n, said shank being provided at its lower and screw-theaded end with a jam-nut n^9. It will readily be seen that after the adjusting-screw N has been operated to adjust the combining-tube L to its proper position the jam-nut n^9 may be turned upon the shank n^7, thereby locking the screw in this position of adjustment.

The overflow-nozzle D may be connected in any suitable manner with the casing A—as, for instance, by means of screw-threads, as shown in the drawings. Within the same is a valve mechanism, here shown as comprising the valve proper, d, having spindle d' mounted in a spider d^2. The valve d may seat itself directly against the end of the flanged overflow-orifice a or against an annulus a', interposed between said orifice and the nozzle D and which may, if desired, be of leather, rubber, or other suitable material.

In operation the conducting-pipes connecting with the exhaust-steam orifice B, the live-steam orifice f', and the water-supply orifice C will be provided with suitable cocks. The water entering the injector at the orifice C passes around the steam-tube H into the combining-tube L through the ports l^3 and l^4 into the chamber in the body of the casing A. From this chamber the surplus water may be passed off through the overflow D. Due to the provision of the ports l^3 l^4, however, such water is also passed to the interior of the combining-tube L, being prevented from passing therethrough and out by way of the delivery-orifice E by the boiler-pressure. Consequently the moment steam (either live or exhaust) is fed into the combining-tube L the injector rises to full efficiency. After the steam has been turned on the flow of water through the orifice C may be readily and positively regulated and controlled by means of the adjusting-screw N, whereby the combining-tube may be lowered or raised within the casing A. When the injector is in operation, the suction in the combining-tube chamber will draw the valve d to its seat, whereby further overflow and waste of water are avoided.

In Fig. 2 we have illustrated a modification of the improved device which is essentially the same as that hereinabove described, the difference being largely one in the detail of the combining-tube. Here the upper member l is provided with an enlarged head l^5 in snug frictional contact with the interior of the casing A. The interior of this head l^5 is screw-threaded, and with it engages the exteriorly-threaded head l^6 at the upper end of the lower member l' of the combining-tube. The head l^5 is provided with ports l^7, and the head l^6 is provided with the vertical ports l^8 and horizontal ports l^9. Between the heads l^5 and l^6 is an intermediate member of the combining-tube, comprising the central tubular portion P (the orifice whereof is practically a continuation of the orifice through the upper and lower members l l' of the combining-tube) and the outwardly-flanged annular portion P', the latter being clamped between the heads l^5 and l^6. The annular portion P' of this member is provided with ports p, here shown as in line with the ports l^8 in the head l^6 of the lower member l' of the combining-tube.

In the modified construction shown in Fig. 2 the overflow-orifice is below the junction of the upper and lower members of the combining-tube; but where this construction is employed a gooseneck connection is made with the overflow-orifice, so that the water-level when the injector is not in use shall be above the ports in the combining-tube, as in the construction illustrated in Fig. 1. Such a gooseneck connection, being well understood, is not illustrated herein. The water passes from the inlet-orifice through the upper member l of the combining-tube and thence by two routes to the chamber below—*i. e.*, by way of the ports p and l^8 and by way of the ports l^9. In either event there will be sufficient water within the combining-tube to enable the injector to reach maximum efficiency immediately upon turning on the steam either through the exhaust-steam orifice or through the orifice in the dividing-spindle.

What we claim as new, and desire to secure by Letters Patent, is as follows:

1. In an injector, the combination with a

casing having steam and water supply orifices, a delivery-orifice and an overflow-orifice, of a dividing-spindle, a steam-tube and a combining-tube, said combining-tube operating in a chamber in said casing and having an opening (such as lateral ports) communicating with said chamber and oblique ports above said opening also communicating with said chamber, substantially as set forth.

2. In an injector, the combination with a casing having steam and water supply orifices, a delivery-orifice and an overflow-orifice, of a dividing-spindle, a steam-tube and a combining-tube, said combining-tube operating in a chamber in said casing and having an opening (such as lateral ports) communicating with said chamber and oblique ports above said opening also communicating with said chamber, both said opening and said ports being below said overflow-orifice, substantially as set forth.

3. In an injector, the combination with a casing having steam and water supply orifices, a delivery-orifice and an overflow-orifice, of a dividing-spindle, a steam-tube and a two-part combining-tube operating in a chamber in said casing, said combining-tube having an opening (such as lateral ports) communicating with said chamber at about the junction between its parts, and, above such opening, ports, also communicating with said chamber and inclined in the direction of the passage of fluid through said combining-tube, substantially as set forth.

4. In an injector, the combination with a casing having steam and water supply orifices, a delivery-orifice and an overflow-orifice, of a dividing-spindle, a steam-tube and a two-part combining-tube operating in a chamber in said casing, said combining-tube having an opening (such as lateral ports) communicating with said chamber at about the junction between its parts, and, above such opening, ports, also communicating with said chamber and inclined in the direction of the passage of fluid through said combining-tube, both said opening and said ports being below said overflow-orifice, substantially as set forth.

5. In an injector, the combination with a casing having steam and water supply orifices, a delivery-orifice and an overflow-orifice, of a combining-tube, a steam-tube, and a dividing-spindle, said spindle being formed in two parts united by means of a hub having vertical movement within said casing, substantially as set forth.

6. In an injector, the combination with a casing having steam and water supply orifices, a delivery-orifice and an overflow-orifice, of a dividing-spindle, a steam-tube, and a combining-tube, and means including a screw, a hand-wheel and locking mechanism for adjusting said combining-tube vertically in said casing, substantially as set forth.

7. In an injector, the combination with a casing having steam and water supply orifices, a delivery-orifice and an overflow-orifice, of a dividing-spindle, a steam-tube, and a combining-tube, and an adjusting-screw, and coöperating hand-wheel and locking mechanism for said combining-tube, substantially as set forth.

8. In an injector, the combination with a casing having steam and water supply orifices, a delivery-orifice and an overflow-orifice, of a dividing-spindle, a steam-tube, and a combining-tube, and adjusting mechanism for said combining-tube, comprising a screw in operative relation thereto, a hand-wheel carrying a jam-nut, and a locking-bolt one end whereof coacts with said jam-nut and the other end with a part rigidly secured to said casing, substantially as set forth.

9. In an injector, the combination with a casing having steam and water supply orifices, a delivery-orifice, and an overflow-orifice, of a dividing-spindle, a steam-tube, and a combining-tube, and adjusting mechanism for said combining-tube, comprising a screw in operative relation thereto, a hand-wheel carrying a jam-nut, and a locking-bolt one end whereof coacts with said jam-nut, its other end being provided with an enlarged head coacting with an annular recess in a part rigidly but detachably secured to said casing, substantially as set forth.

This specification signed and witnessed this 30th day of May, 1903.

ALEX. SIMPSON.
MATHIAS SPEICHER.

Witnesses to the signature of Alexander Simpson:
MYRON KASSON,
M. DUFFY.

Witnesses to the signature of Mathias Speicher:
E. D. BLAKE,
JAMES A. KEARNEY.