

(Model.)

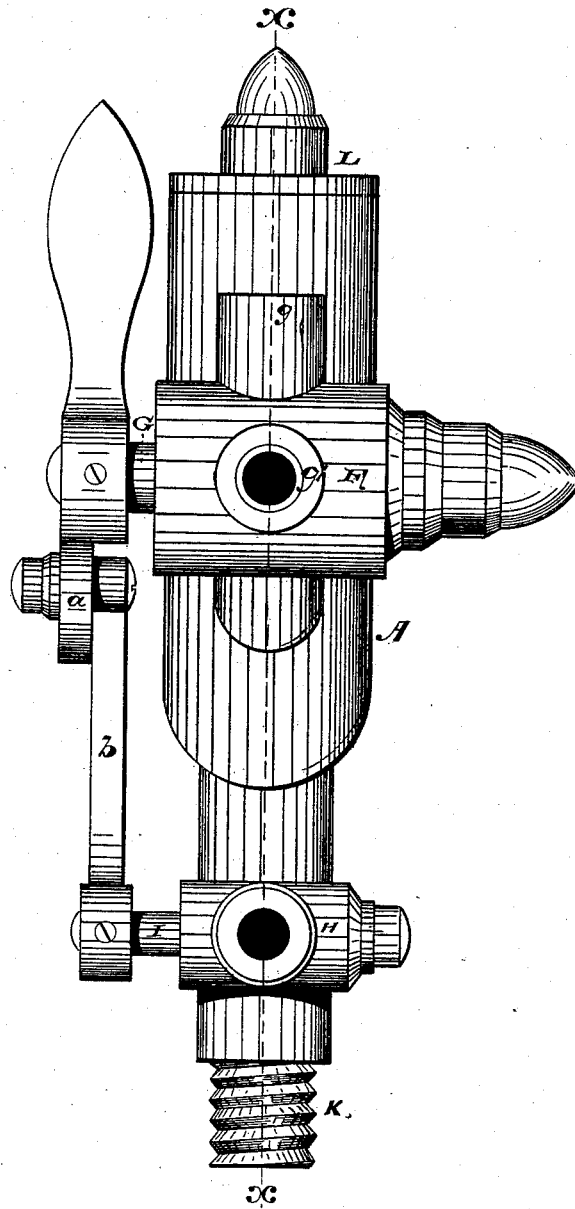
W. P. BRACHMANN.

3 Sheets—Sheet 1.

INJECTOR.

No. 347,566.

Patented Aug. 17, 1886.



*Fig. 1.*

WITNESSES:

INVENTOR:

*Fredk. F. Campbell.*  
*Nathan Harper*

*William P. Brachmann,*  
BY *Drake & Co.,* ATTYS.

(Model.)

W. P. BRACHMANN.

3 Sheets—Sheet 2.

INJECTOR.

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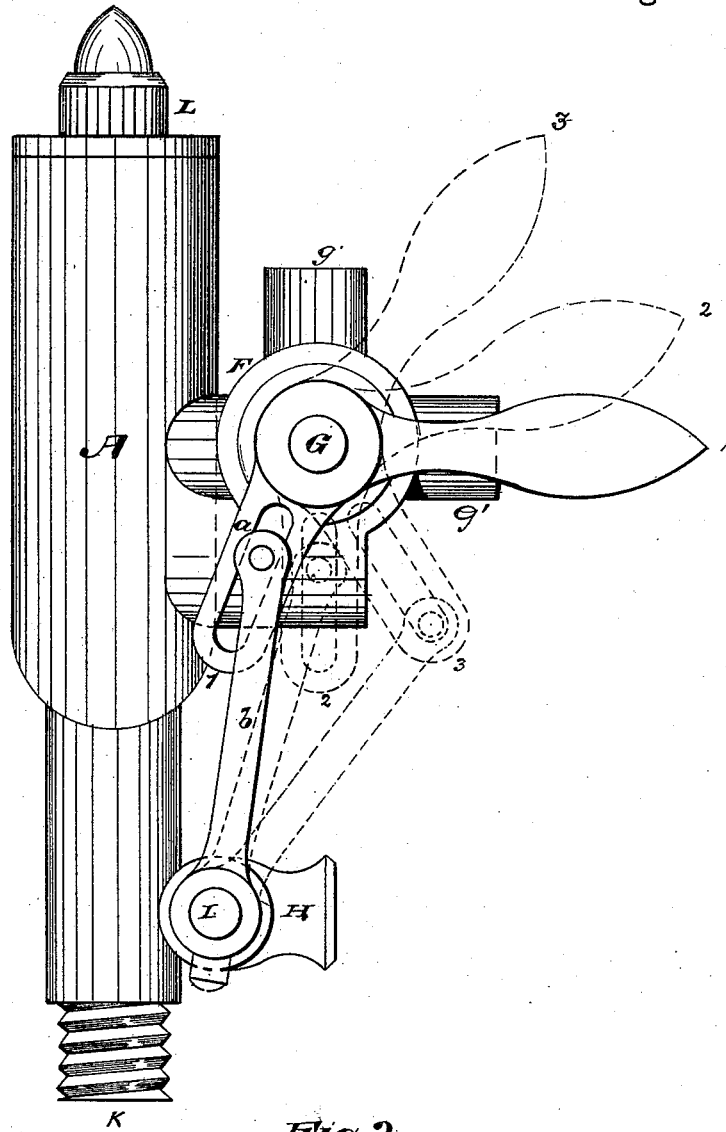


Fig. 2.

WITNESSES:

INVENTOR:

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(Model.)

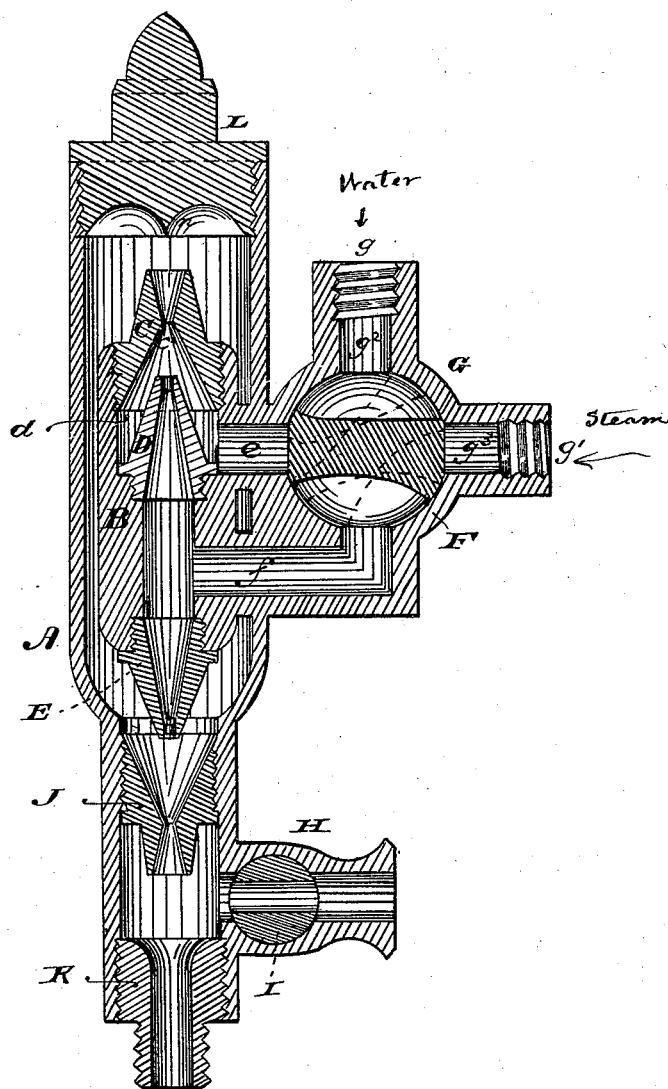
3 Sheets—Sheet 3.

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INJECTOR.

No. 347,566.

Patented Aug. 17, 1886.



*Fig. 3.*

WITNESSES:

INVENTOR:

*Frank F. Campbell.* *William P. Brachmann,*  
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# UNITED STATES PATENT OFFICE.

WILLIAM P. BRACHMANN, OF NEWARK, NEW JERSEY.

## INJECTOR.

SPECIFICATION forming part of Letters Patent No. 347,566, dated August 17, 1886.

Application filed March 16, 1886. Serial No. 195,406. (Model.)

*To all whom it may concern:*

Be it known that I, WILLIAM P. BRACHMANN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Injectors or Ejectors; and I do hereby 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 letters of reference marked thereon, which form a part of this specification.

The object of this invention is to reduce the cost of construction, to facilitate the process of manufacture, and to secure a device of increased simplicity, effectiveness, and convenience.

The invention consists in the construction and combination of parts substantially as will be hereinafter set forth and finally embodied in the clauses of the claims.

Referring to the accompanying drawings, in which like letters indicate corresponding parts in each of the figures, Figure 1, Sheet 1, is a front elevation of the improved injector or ejector. Fig. 2, Sheet 2, is a side elevation of the same; and Fig. 3, Sheet 3, is a sectional view taken through line *x*.

In said drawings, A is an outside case cast in resemblance to a tube or cylinder, and having formed longitudinally therein and preferably integral therewith an inner cylinder or cylindrical portion, B, having passages or ways therein, a space being allowed to remain between the inner wall of the outer case and the outer wall of the inner cylinder, as indicated in Fig. 3. The two cylinders provide seats or bearings for several conical tubes or funnel-like plugs, which are threaded to be easily secured to corresponding threads of the said seats. Upon the outside of the outer case, A, is therein a head, F, having passages or ways therein which connect with or are continuations of those of the inner cylinder. Said head F is preferably integral with the cylinder or tube-like portions A, to obviate the use of joints which are liable to leak, and to secure greater durability and strength. Said head is provided with coupling or attaching bearings,

the one marked *g* connecting with a water-supply pipe, and that marked *g'* with a steam-supply pipe connecting with the boiler. Said head F also provides bearing for a spigot, G, which forms with said head a four-way valve, adapted to cut off or allow communication between the interior of the injector and the sources of steam and water.

At the lower end of the case A is formed another projection or head, H. This provides bearings for a one-way valve-spigot, I, and may connect with a pipe to receive the overflow of water.

The two valve-spigots are linked or coupled together substantially as indicated in Figs. 1 and 2, the valve-spigot G or the handle thereof having a slotted arm, *a*, on which works an arm, *b*, of the lower spigot, so that when the handle of the upper spigot is turned the lower one turns with it and the valves are operated simultaneously by one exertion of the engineer.

The lower portion of the tubular outer case, where it connects with or where it carries the lower head, is somewhat contracted in diameter, and into it, just above the said head, is screwed a funnel-like plug, J, the small end of which extends downward. Below said head, into the extremity of the case, is secured a threaded collar, K, by which the injector is connected with the discharge-pipe leading to the boiler. The upper extremity of the case A is closed by a plug, L. The vertical passage in the inner cylinder is enlarged toward its upper extremity, and into the same is screwed, first, a funnel-like plug, D, and then an upper funnel-like or conical plug, C. Between the two plugs is formed a chamber, *d*, which connects with and receives water from a passage, *e*, of the four-way valve. Below the funnel-like plug D the smaller portion of the chamber in the inner cylinder connects with a lower passage, *f*, of the said four-way valve, and below said passage the lower extremity of the inner cylinder is provided with the funnel-like plug E. The spigot G of the four-way valve is so formed as to close communication between the passages *g'* *e* and *g'* *f*, and thus cut off the flow of both water and steam, the spigot and its handle then being in

the positions shown at 1, Fig. 2. It is also adapted by its construction to allow water from the water-way  $g^2$  to flow to the passage  $e$  and out through the overflow H, while the steamway  $g^2$  is still closed, and to thus enable the engineer to know that the water is free to flow into the boiler. This is accomplished by turning the handle to the position marked 2. The valve H I is simultaneously opened to allow the outflow of this water, so that the engineer can see it. By moving the handle to the position marked 3, the valve H I is closed, and both the steam and water are turned on to flow freely. The water entering through  $g^2$  passes through the passages  $e$  into the chamber  $d$ , where it is forced upward by the steam entering from  $g^2$  through the spigot opening and passage  $f$  and plug D. As it is forced upward through the contracted passage  $e'$  in the plug C, it strikes the point  $n$  on the under side of the plug L, and is turned in its course and caused to descend through the chamber or passage between the walls of the two cylinders, and to fall into the funnel of the plug J, where it again comes into contact with live steam, flowing from the passage  $f$  through the plug E, and by said steam it is given increased impetus, and passes into the boiler against the pressure of the steam therein.

By the arrangement of parts above described, should the injector get clogged by sand, &c., the same may be readily cleaned by simply unscrewing the cap L and inserting a wire, all the several contracted passages of the plugs of the two cylinders being in line, so that said wire has a straight course to the discharge end of the injector.

All the several operations are performed with the one hand-piece, so that the device is more conveniently operated and the mode of operation more easily understood.

Having thus described the invention, what I claim as new is--

1. The injector herein described, combining therein the inner and outer cylinders, the cap or plug L, the four-way valve, and overflow-valve, all said parts being arranged and adapted to operate substantially as and for the purposes set forth.

2. In combination, the case A, having the inner cylinder, and head F, formed integral therewith, said head having water and steam ways and a spigot therein, the water-way lying above the steamway, and both ways leading to a vertical passage in the inner cylinder, said inner cylinder being open at both ends and the outer cylinder or case being closed at its upper end, and the valves G and H, all substantially as and for the purposes set forth.

3. In combination, the case A, having an inner cylinder, B, and head F connected therewith, and having the ways  $e f$  and chamber  $d$ , the plugs C, D, E, and J, all in line, the plug L, to close the end of case, and the spigots G and I, all said parts being arranged and adapted to operate substantially as set forth.

4. In an injector, the combination, with the case A, of a four-way-valve, G, adapted and arranged to close the flow of both water and steam to the injector, to allow the flow of water to the overflow while the steam is yet cut off, and to allow the inflow of both steam and water, all substantially as and for the purposes set forth.

5. In an injector, the combination of the inner and outer cylinders, the overflow-valve, and the four-way valve, the two said valves being coupled together to work simultaneously, substantially as and for the purposes set forth.

6. In combination, the case A, closed at its upper end and having therein an inner cylinder or tube provided with conical plugs C D E, and having passages  $e$  and  $f$ , leading to a four-way valve on the outside of said case, and said four-way valve, all said parts being arranged and adapted to operate substantially as and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 10th day of March, 1886.

WM. P. BRACHMANN.

Witnesses:

CHARLES H. PELL,  
OSCAR A. MICHEL.