(Model.)

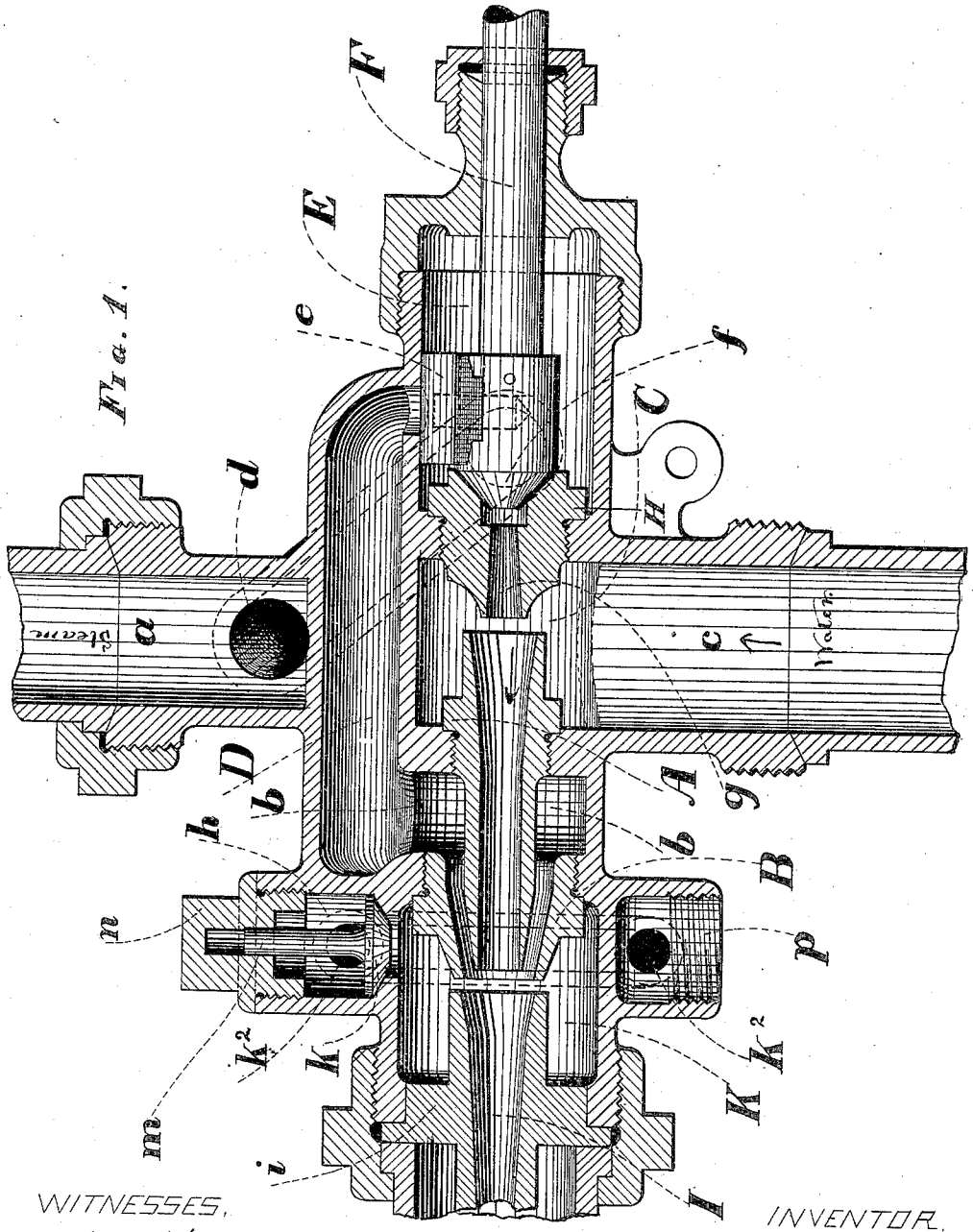
2 Sheets—Sheet 1.

J. DESMOND.

STEAM BOILER INJECTOR.

No. 330,302. Patented Nov. 10, 1885.

Fig. 1.



WITNESSES,
A. S. Armstrong
Jno. G. Hall.

INVENTOR.
John Desmond.
By Thos. B. Hall
atty

N. PETERS, Photo-Lithographer, Washington, D. C.

(Model.)

2 Sheets—Sheet 2.

J. DESMOND.

STEAM BOILER INJECTOR.

No. 330,302. Patented Nov. 10, 1885.

FIG. 2.

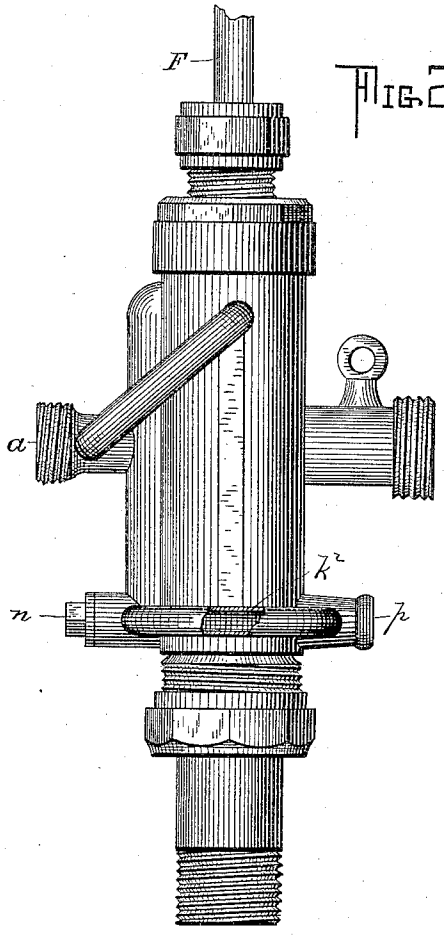


FIG. 3.

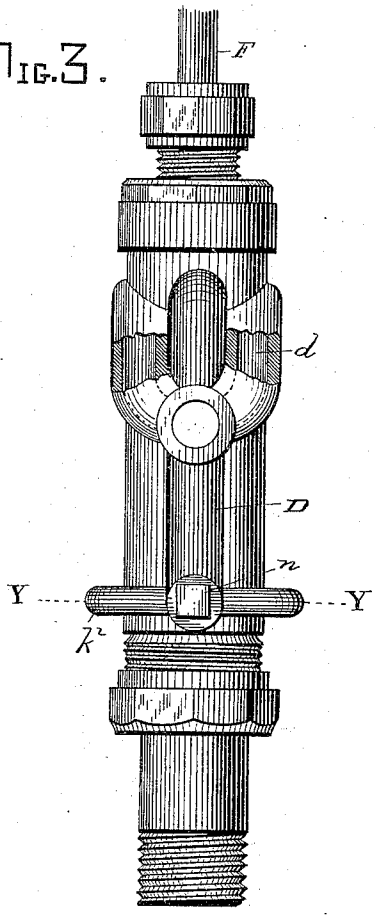


FIG. 4.

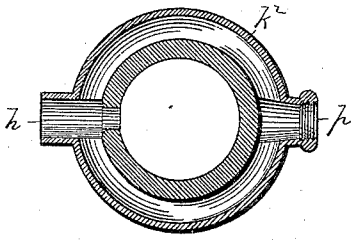


FIG. 5.

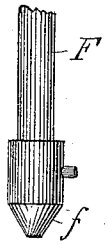
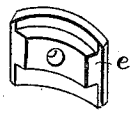


FIG. 6.



WITNESSES

W. M. Rheem.

Van Buren Hillyard

INVENTOR

John Desmond

By R. S. & A. P. Lacey

Attorneys

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

JOHN DESMOND, OF CLEVELAND, ASSIGNOR TO ALONZO NOTEMAN, OF TOLEDO, OHIO.

STEAM-BOILER INJECTOR.

SPECIFICATION forming part of Letters Patent No. 330,302, dated November 10, 1885.

Application filed October 24, 1884. Serial No. 146,353. (Model.)

To all whom it may concern:

Be it known that I, JOHN DESMOND, a citizen of the United States, residing at Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Steam-Boiler Injectors; and I do hereby declare the following to be a description of the same, and of the manner of constructing and using the invention, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it appertains to construct and use the same, reference being had to the accompanying drawings, forming a part of the specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to injectors used to supply steam-boilers with water. The special feature of said invention consists in the peculiar arrangement of the jets in regard to each other, as herein further described and shown. Within the nozzle that conducts the steam-jet toward the combining-tube, and from which it is thrown into said pipe, is located an inner and smaller nozzle that throws the water-jet toward and into said combining-tube, the water-jet being thus surrounded by the steam-jet as said jets pass into the boiler.

Figure 1 represents a longitudinal central sectional view of an injector constructed according to my invention. Fig. 2 is a side view with a portion of one of the overflow-ducts broken away. Fig. 3 is a plan view with a portion of the steam-ducts broken away. Fig. 4 is a section on the line *y y* of Fig. 3, the internal tubes being removed. Fig. 5 is a detail view of the forward portion of the plunger-rod provided with the valve-head. Fig. 6 is a detail perspective view of the slide-valve, which latter is loosely connected to the valve-head of the plunger-rod.

A is the nozzle conveying and throwing the water-jet.

B is the nozzle conveying and throwing the steam-jet.

C is a water-chamber connected with the water-supply pipe *c*.

D is a steam-chamber, supplied from the steam-chamber E through the sliding valve *e*. Chamber D opens into nozzle B at *b*. Chamber E is supplied with steam from pipe *a* through steam-ports *d*.

F is a lever-plunger operating head *f*, said head composing a valve to open and shut the steam-duct *g*. Duct *g* is formed within the casing H, said casing being held in location by adequate screw-adjustments. Nozzles A and B are also held in location by screw-adjustments.

I is the combining-tube, formed within the inclosing-casing *i*.

K is the overflow-chamber, connected by valve *k* with the overflow-port k^2. Said valve operates automatically, being loosely seated in the chamber *h*. Lifted by the force of the overflow, it falls again to its normal seat by its own weight when said force is checked or removed. Said valve is kept in upright position by means of a rigid projecting stem, *m*, which slides upward into a socket in cap *n*. The discharge-duct of the overflow-chamber is shown at *p*. Nozzles A and B both open into the overflow-chamber on vertical planes nearly identical with each other, and at points opposite to the receiving-mouth of combining-tube I.

The practical working of my injector is as follows: The slight drawing outward of plunger F opens a passage into duct *g*, and through said passage a small supply of steam is introduced into chamber C. Said introduction of said steam into said chamber, causes a vacuum therein which sucks in water into the same chamber from the pipe *c* and causes a flow of water through nozzle A into the chamber K. When the flow of water through the said nozzle is sufficient to cause an overflow from chamber K through valve *k*, then a full head of steam is let on through ports *d* into chamber E, and from thence to steam-chamber D. This result is effected by a still further pulling out of plunger F, which opens the slide-valve *e*. From chamber D the let-on steam flows through opening *b* into the receiving-mouth of nozzle B. By the said operation of the plunger F the duct *g* remains open for any steam that may find vent that way. This letting on of a full head of steam aforesaid forces the two

concentric jets of water and steam through their respective nozzles, and hurriedly and powerfully across the overflow-chamber *k*, and into and through the combining-tube I into the boiler, so checking the overflow.

Heretofore, in the simultaneous introduction of steam and water into boilers by an injector, the jet of water has encircled the jet of steam. This arrangement is objectionable, since the surrounding jet of water unfavorably affects the inclosed jet of steam, reducing the capacity of said latter jet, causing the jet of water to break up, and producing unnecessary overflow. A large amount of water-friction also is a feature of the mode of injection referred to.

In my invention these aforesaid difficulties and objections are obviated, as by my arrangement of the jets, by means of the relative location of their respective nozzles, the jet of water passes into the boiler unbroken and with a very much diminished amount of friction; also, the jet of steam is not unfavorably affected by any outward pressure of water, as in the former mode referred to; also, by my device I pass into the boiler a larger amount of water by a less amount of steam; hence one of the advantages of my invention is one of increased economy. The whole construction of the mechanism is comparatively inexpensive, and all parts of it are easily separated and kept in operative order.

I therefore claim—

1. In a steam-boiler injector, the combination, with a combining-tube and two concentric nozzles adapted to throw two concentric jets toward the receiving-mouth of said pipe, of an overflow-chamber lying between the opposite and contiguous extremities of said nozzles and said pipe, a receiving-chamber communicating with said overflow-chamber, an automatically-actuated valve controlling the passage-way between the two chambers, and overflow-ports branching from the receiving-chamber and extending around the overflow-chamber, and united by a common discharge-pipe, substantially as shown and described.

2. The combination, in an injector, of a combining-tube, concentric nozzles, the discharge end of the latter being in nearly the same plane and terminating a short distance from the receiving end of the combining-tube, an overflow-chamber surrounding the contiguous ends of said pipe and nozzles, a steam-chamber surrounding the inner nozzle and communicating with the outer nozzle, a water-chamber surrounding the receiving end of the inner nozzle and leading to the interior thereof, a steam-supply compartment in line with and adapted to discharge steam into the receiving end of the inner nozzle, whereby water is drawn from the surrounding water-chamber and forced through said inner nozzle, a passage communicating with the steam-chamber surrounding the inner nozzle and with said steam-supply chamber, and a valve located in said latter chamber and arranged to control the admission of steam to either the inner or outer nozzle singly or simultaneously, substantially as shown, and for the purposes specified.

3. In an injector having concentric nozzles, the combination of a steam-supplied chamber provided with a discharge-port in axial line with the inner nozzle and terminating at a short distance therefrom, a steam-port leading from the side of said chamber and communicating with the outer nozzle, a plunger-rod provided with a valve to close said discharge-port, and a slide-valve loosely connected with said rod and adapted to close the steam-port leading to the outer nozzle, substantially as and for the purposes set forth.

In testimony that I claim the foregoing to be my invention I have hereunto set my hand this 22d day of September, A. D. 1884.

JOHN DESMOND.

Witnesses:
J. B. FAY,
A. NOTEMAN.