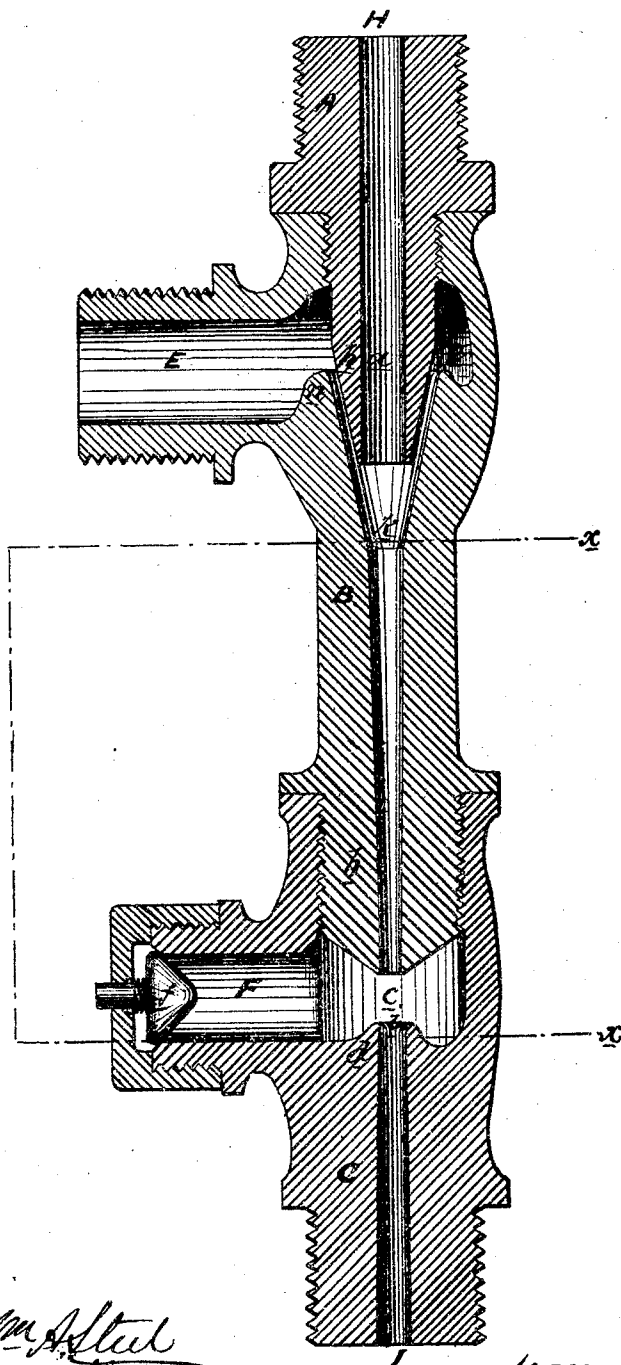


[72.]

WILLIAM B. MACK.
Injector for Steam Boilers.

No. 118,734.

Patented Sep. 5. 1871.



Witnesses *Wm. A. Steel*
Thos. McQuinn

Wm. B. Mack
by his Atty
Howson and Son

UNITED STATES PATENT OFFICE.

WILLIAM B. MACK, OF MANCHESTER, ENGLAND.

IMPROVEMENT IN INJECTORS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. 118,734, dated September 5, 1871.

To all whom it may concern:

Be it known that I, WILLIAM B. MACK, of Manchester, England, have invented an Improved Injector, of which the following is a specification:

My invention consists of an injector in which the length and diameter of the steam and steam-and-water channels are proportioned, as described hereafter, so as to render the injector available under many circumstances where an injector having the ordinary proportions could not be employed. My invention also consists of other improvements in injectors, too fully described hereafter to need preliminary explanation.

The drawing shows a longitudinal section of my improved injector.

The instrument consists, in the present instance, of three parts or sections, A B C, screwed together so as to form a continuous casing with two hollow branches, E and F. In the section A is a central tapering passage or channel, *a*, and the conical end *h* of this section extends through a chamber, *e*, in the section B, and into the flaring mouth of a tapering channel, *k*, in the said section, forming an annular tapering passage, *e'*, at the mouth of which is an annular rib, *n*. The chamber *e* communicates with the hollow branch E in the manner shown in the drawing. The lower end of the section B is beveled or cone-shaped, and projects into a chamber, *c*, which communicates with the hollow branch F, the latter having a seat, against which a valve, *f*, is pressed by a suitable spring. In the center of the section C is a channel, *l*, which is in a line with the channels *a* and *k*, but has a taper the reverse of that of the latter channel, and round the mouth of the channel in the chamber C extends an annular lip, *i*.

The steam passes through the channel *a* and carries with it the water (admitted through the branch E, chamber *e*, and tapering space *e'*) into the channel *k*, and along the latter across the chamber *c* into the channel *l*.

The annular lip *n* insures the distribution of the water uniformly round the tapering end of

the section A, and prevents it from being drawn directly downward at one side of the same, as in injectors of the ordinary description.

Ordinary injectors are impracticable as a means of forcing water into a boiler until the pressure in the latter is about fifteen pounds per square inch. Ordinary injectors, moreover, will not operate if they are in a heated state, or if the feed-water exceeds 50° Fahrenheit.

After repeated and long-continued experiments I have discovered that, by imparting to the channels through which the water and steam flow a proper taper, and by duly proportioning the length of the main channel in respect to the size of its contracted mouth, the efficacy of the instrument may be very greatly increased, and the objections above enumerated entirely overcome. As demonstrated by my experiments, the channels should taper uniformly in both directions from the chamber *c* (from which point the said channels increase in diameter) to the opposite ends of the instrument, and the nearer this taper approaches a quarter of an inch to a foot the more perfect will be the performance of the instrument. I have ascertained, too, that the best results are attained by making the channel between the points *x x* twenty times the diameter of the orifice *i*.

With an injector constructed as described I am enabled to feed the boiler (without the escape of water through the overflow-branch F) at any pressure greater than three pounds per square inch, and with water at any temperature below 120°, and water at 200° may be used; but in this case there will be a slight escape of water from the overflow.

It is not necessary in using my injector that there should be a greater "head" of water than is sufficient to insure its steady flow into the instrument.

Instead of making the injector in sections screwed together, it may be cast in one piece. I prefer, however, to make it in two or three sections, for convenience of manufacture and accuracy of adjustment.

Without confining myself to the precise construction and arrangement of the parts shown, I claim—

1. An injector in which the channels have the within-described taper in contrary directions from the chamber *c*.

2. An injector in which the length of the channel between the points *x x'* is proportioned as herein described.

3. The rib or lip *n* arranged in the chamber *e* at the flaring mouth of the channel *k*, for the purpose set forth.

WILLIAM B. MACK.

Witnesses:

C. H. BRUNSCOMB,
SAM. HALLAM.