J. W. STILLWELL.

STEAM NOZZLE.

APPLICATION FILED OCT. 5, 1908.

958,444. **Patented May 17, 1910.**

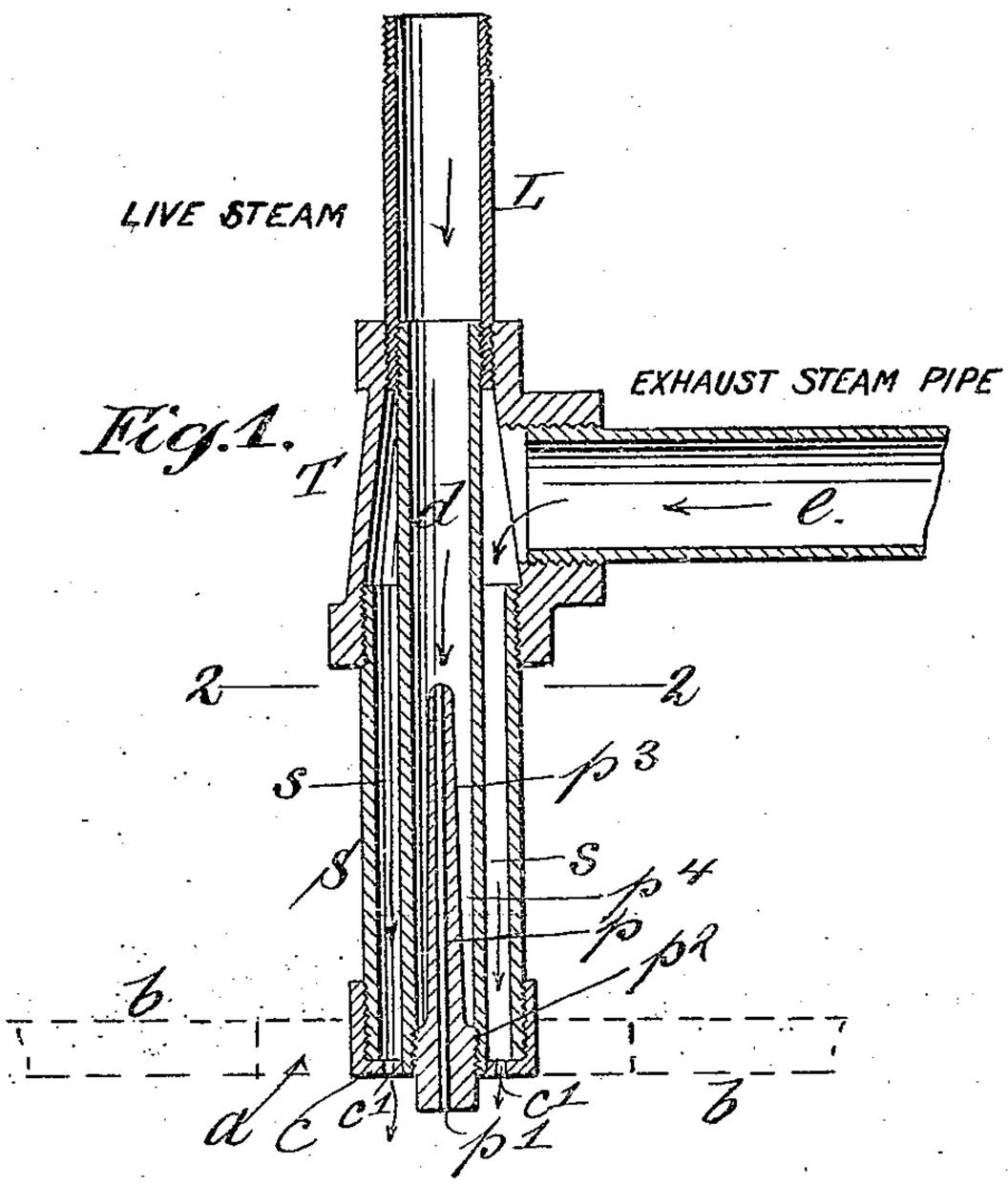


Fig. 1.

Fig. 2.

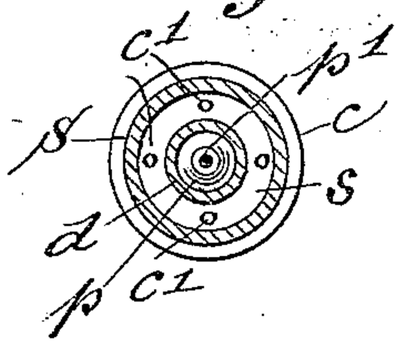


Fig. 3.

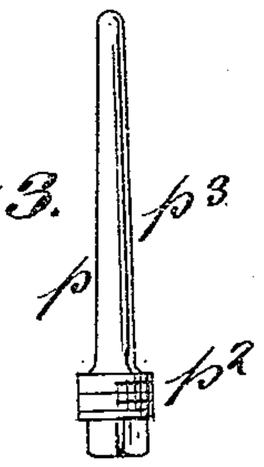
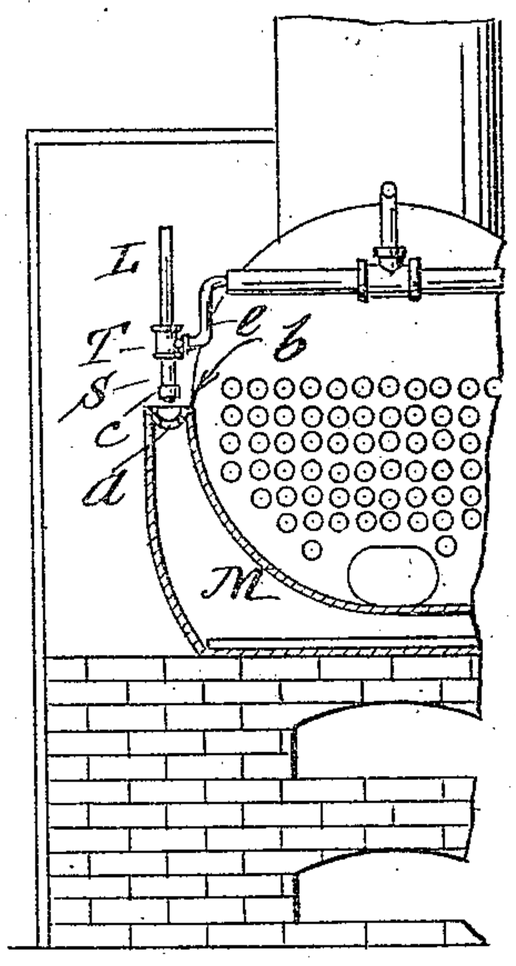


Fig. 4.



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UNITED STATES PATENT OFFICE.

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STEAM-NOZZLE.

958,444. Specification of Letters Patent. Patented May 17, 1910.

Application filed October 5, 1908. Serial No. 456,129.

To all whom it may concern:

Be it known that I, JOSEPH W. STILLWELL, a citizen of the United States, residing in the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Steam-Nozzles, of which the following is a specification.

My invention relates to nozzles used as steam injectors for various purposes, and is designed more particularly for use in smoke-consuming furnaces and like situations, where the parts are subjected to high degrees of temperature,—the object being to prevent the clogging of the comparatively small steam discharge outlet by scale or sediment, and to adapt the jet for use in conjunction with an auxiliary supply of live or exhaust steam, or compressed air, as hereinafter described.

In the accompanying drawings, Figure 1, is a central longitudinal section of my improved nozzle; Fig. 2, a transverse section thereof, taken on plane of line 2—2— Fig. 2; Fig. 3, is an elevation of my steam outlet plug. Fig. 4, is a sectional elevation illustrating the use of my improved nozzle as part of means for preventing the formation of smoke in steam boiler furnaces, as set forth in my concurrent application No. 456,923, filed October 9, 1908.

L, represents the live steam pipe communicating with the discharge pipe *d*, the outer end of which is provided with the conduit plug *p*, which is formed with a longitudinal axial steam outlet passage *p'*. The head p^2, of the conduit plug *p*, is threaded externally for engagement with a corresponding screw thread formed for its reception in the end of the discharge pipe *d*. The head p^2, is shouldered in any suitable or desired way to afford means for engagement with a wrench, key or other mechanical expedient for screwing the head into or unscrewing it from the end of the discharge pipe *d*.

The inner side of the discharge plug or conduit *p*, is formed with a conical or otherwise convergent extension p^3, through the apex of which the steam outlet *p'*, extends. This convergent inward extension p^3, of the steam discharge plug *p*, need not necessarily be as long as shown in the drawings,—the essential feature in this respect being the inclination of the external walls of the extension away from the inner end of the steam outlet passages *p'*, so as to form an annular pocket p^4, around said extension p^3, to collect and store any scale or sediment that might otherwise collect and clog the entrance to the discharge outlet *p'*. In so far as this feature of my invention is concerned it is applicable to steam nozzles or discharge pipes generally. The plug may be unscrewed whenever deemed expedient to effect the removal of any scale in the annular space p^4.

S is a sleeve surrounding the outer end of the steam discharge pipe *d*, and connected by a reducing tee T with the live steam pipe L. Into the lateral extension of this tee is screwed the pipe *e*, for the introduction of exhaust steam, or compressed air into the annular chamber *s*, between the sleeve S and the discharge pipe *d*. The outer end of the sleeve S is closed by means of a cap *c*, having a plurality of perforations *c'*, *c'*.

It is to be understood that these nozzles are to be used as injectors to not only force steam into a compartment or space, but also to draw therein products of combustion for the purpose of effecting the reduction of carbon and inflammable gases contained therein,—the injection being effected, for instance, through an aperture *a*, in a partition *b*, indicated by dotted lines in Fig. 1 and in solid lines in Fig. 4, in which latter view the nozzle is shown as arranged to inject into a mixing chamber M, as set forth in my concurrent application for patent hereinbefore referred to. Ordinarily exhaust steam is introduced through the sleeve S, but during the firing of the furnace live steam may be thus introduced through the sleeve L as well as through the pipe *d*; or in certain contingencies compressed air may be substituted for the exhaust steam, as in the case of oil furnaces.

By my invention I not only afford an anti-clogging device, but also attain simplicity and cheapness of construction. Furthermore the parts can be readily assembled or taken apart, and substitution made when necessary, although the only part liable to wear is the discharge plug which may be readily removed and another replaced without disturbing the other parts.

What I claim as my invention and desire to secure by Letters Patent is,

1. In a nozzle of the character described, the combination of a central live steam pipe, a conical discharge plug in the end thereof,

a sleeve surrounding the outer end of said central live steam pipe, a cap on the outer end of said sleeve formed with a central aperture through which the central steam pipe extends and with a plurality of discharge openings, and an auxiliary pipe communicating with the interior of said sleeve through the medium of a suitable tee coupling, together with said tee coupling, for the purpose described.

2. In a nozzle of the character described, the combination of a central live steam pipe, a conical discharge plug in the end thereof formed with an inwardly projecting portion in the apex of which is the entrance to the steam discharge conduit, said inward projection being of greater length than the diameter of the steam pipe so as to form a relatively deep annular pocket around the discharge passage, a sleeve surrounding the outer end of said central live steam pipe, a cap on the outer end of said sleeve formed with a central aperture through which the central steam pipe extends and with a plurality of discharge openings, and an auxiliary pipe communicating with the interior of said sleeve through the medium of a suitable tee coupling, together with said tee coupling, for the purpose described.

JOSEPH W. STILLWELL.

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