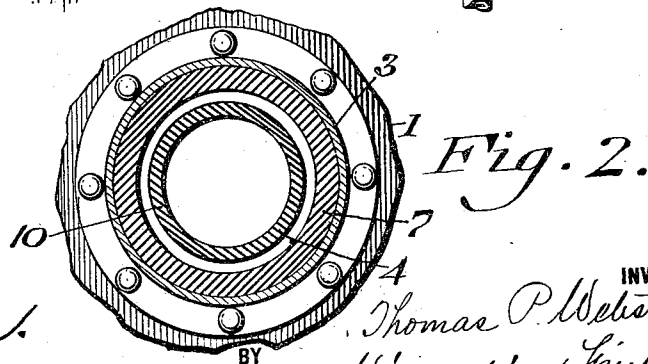
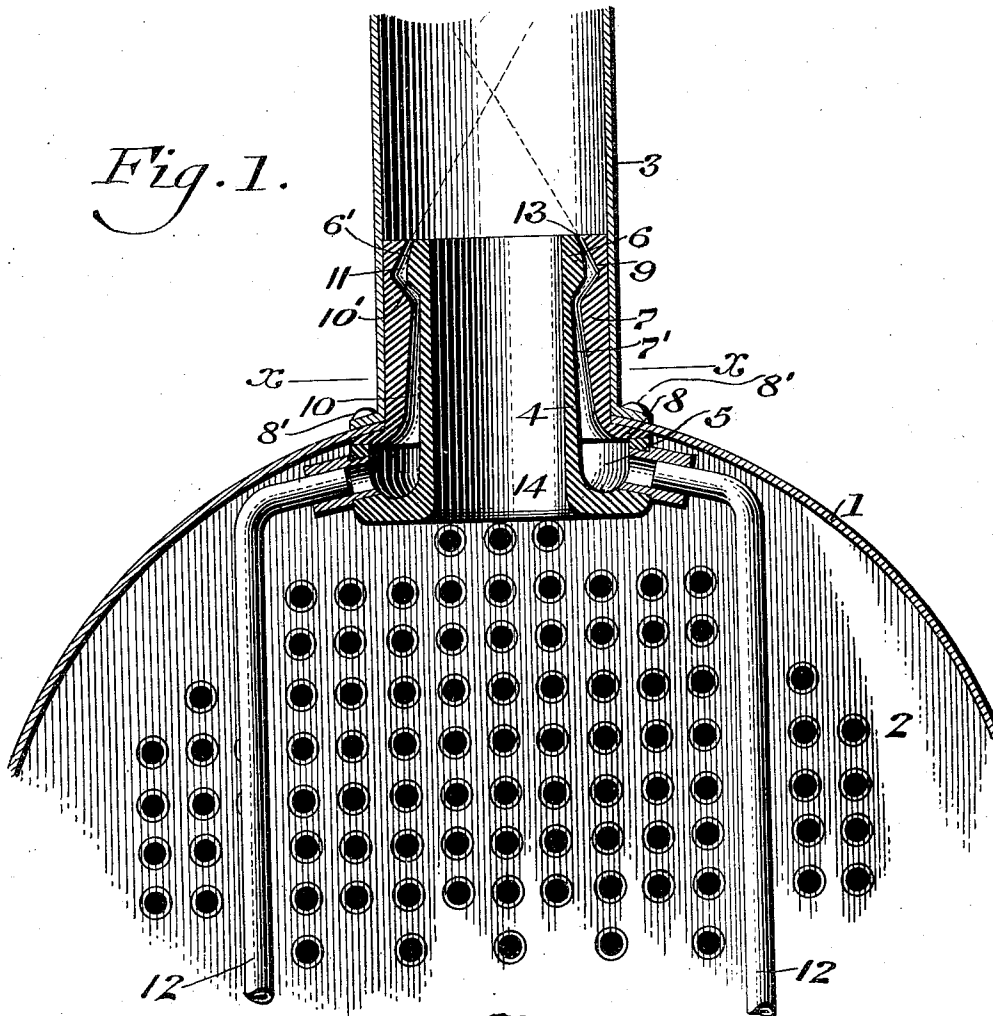


T. P. WEBSTER.
EXHAUST NOZZLE.
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1,031,748.

Patented July 9, 1912.



WITNESSES

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THOMAS P. WEBSTER, OF BRANDYWINE SUMMIT, PENNSYLVANIA.

EXHAUST-NOZZLE.

1,031,748.

Specification of Letters Patent.

Patented July 9, 1912.

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To all whom it may concern:

Be it known that I, THOMAS P. WEBSTER, a citizen of the United States, residing at Brandywine Summit, in the county of Delaware, State of Pennsylvania, have invented a new and useful Exhaust-Nozzle, of which the following is a specification.

My invention consists of an improved exhaust nozzle for steam-boilers and engines whereby draft is induced and sparks extinguished and formed of an annular passage, the upper or discharge end of which is converging in order that the exhaust steam passes therefrom in a converging annular sheet.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

The annexed drawings and the following description set forth in detail one mechanical form embodying the invention, such detail construction being but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—Figure 1 represents a transverse section of the smoke-box and stack of a steam boiler provided with my improved exhaust-nozzle. Fig. 2 represents a horizontal section on the line $x-x$ in Fig. 1.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, the numeral 1 indicates the shell of the smoke-box of a steam-boiler having a head or tube-sheet, 2, and a smoke-stack, 3. A tubular casting or nozzle, 4, has an annular channel, 5, at its lower end and is secured in the lower end of the smoke-stack to form a smoke-passage 14 and the upper end of said casting is provided with an enlarged head 6 with inwardly curved or tapering walls, 6'. Another annular casting, 7, is secured within the lower end of the smoke-stack to form an annular space between it and the first-mentioned casting, and has a foot-flange, 8, secured to the shell and to the other nozzle-casting by suitable means as by the bolts 8' which may also serve to connect the stack 3 and shell 1 as well as to engage the casting 4 in order that the same fastening means may serve to connect all these parts suitably together. The interior wall of this second casting is tapering as at 7' and is widened and thereupon again contracted at its upper

end, as at 9, to conform to the shape of the head of the nozzle-casting. A gradually contracting annular passage, 10, is formed between the two castings, which is offset at 10' and then converges at its upper end, 11 to form the discharge of said passage. Exhaust pipes, 12, open into the channel 5 at the lower end of the annular nozzle formed by the two castings, said channel being greater in area than the pipes 12 and is also greater than the area of the passage 10.

The products of combustion entering the smoke-box through the flues, pass out through the central opening 14 in the nozzle, and the exhaust steam passes out through the passage in the nozzle in a converging annular sheet. This creates draft in the stack, smoke-box and furnace, but more efficiently than the present centrally located exhaust nozzle does in the existing locomotive boilers. The contraction of the annular passage in the nozzle is at such an angle that the annular or tubular sheet of steam converges at a point slightly above the nozzle and completely intercepts the passage through the smoke-stack. By this provision all sparks and incandescent cinders passing up through the smoke-stack are intercepted and extinguished by the exhaust steam, and there can be no possibility of sparks or cinders igniting inflammable material in the surroundings of the boiler and stack. The annular or tubular sheet of exhaust steam will create an even and better draft through the entire transverse section of the stack, thereby improving combustion in the furnace of the boiler.

It will be apparent that while I have shown my improved construction of exhaust nozzle as made in one embodiment of my invention in two members, that the same may be made, without departing from the spirit of my invention, in a single casting which in some instances I may deem it preferable to employ, and I therefore do not desire to be limited to the exact construction shown in the drawings.

I desire to call special attention to the fact that my exhaust nozzle is located wholly within the upper part of the smoke box in close proximity to the base of the stack, whereby it is unnecessary to make any change in the stack or to prolong the same downwardly into the smoke box, as has been done in numerous constructions with

which I am familiar. By locating my exhaust nozzle wholly in the upper portion of the smoke box, ample room is provided for easy access to the interior or the central portion of the smoke box, which is not the case with other constructions with which I am familiar.

I am aware that it has been proposed to direct a series of jets into the stack of a furnace, and that it has also been proposed to locate a live steam pipe in the stack of the furnace near the top of the smoke box, but my invention differs from these constructions, since I employ the large, lower, annular chamber 5, by which provision a free exhaust is permitted to the engine cylinders, and by reason of the annular conical discharge outlet 13 the exit of the exhaust is unimpeded at all times, so that there is no obstruction afforded to the egress of the exhaust steam, as is the case where a series of jets or perforations are employed. I desire to also call special attention to the location of the annular converging exit 13, since the same is located at a point above the base of the stack and operates in such a way that the converging annular film of exhaust steam, in addition to making a better and more uniform draft, is bound to intercept every portion of the products of combustion and sparks passing into or through the stack.

It will further be apparent that my novel construction of exhaust nozzle can be easily manufactured and being comparatively light in weight will not add greatly to the expense or weight of the parts, while at the same time greatly increasing the efficiency of the apparatus.

It will be apparent that while I have shown and described my invention as being especially adapted to locomotives or stationary engines, it is equally capable of general adaptation and can be readily applied to any boiler or smoke box wherein an appliance is desired for the

purpose of improving or increasing the draft or for use as a spark extinguisher.

It will now be apparent that I have devised a novel and useful construction of exhaust nozzle which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have, in the present instance, shown and described a preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. An exhaust-nozzle comprising a tubular portion formed with an annular channel at its inner end having steam inlet and with an inwardly tapering upper end, and a tubular portion fitted snugly within the lower end of a smoke-stack to surround said former tubular portion to form an annular passage around the same and having its upper end annularly contracted to form a converging annular passage at the upper end.

2. An exhaust-nozzle comprising a tubular portion formed with an annular channel at its inner end having steam inlet and with an enlarged head with an inwardly tapering wall at its outer end, and a tubular portion having its interior wall tapering and then widening and again contracted to form with the tubular portion an annular passage converging at its outer discharge end, said portions being adapted to be secured in the smoke-stack of a boiler, and a steam exhaust pipe connected to the steam-inlet.

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Witnesses:

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