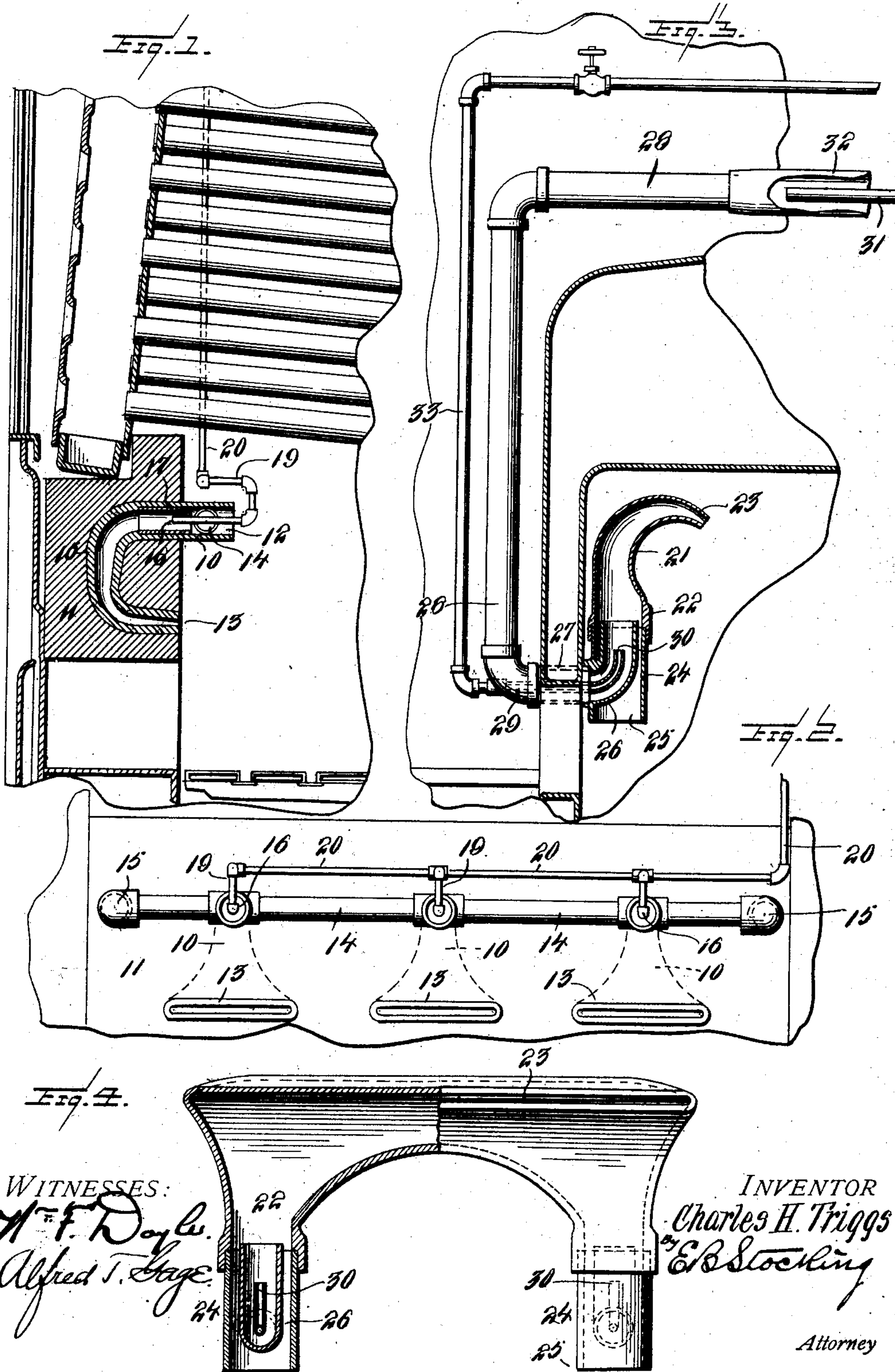


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SMOKE CONSUMER.
APPLICATION FILED JUNE 22, 1908.

906,967.

Patented Dec. 15, 1908.



WITNESSES:

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SMOKE-CONSUMER.

No. 906,967.

Specification of Letters Patent.

Patented Dec. 15, 1908.

Application filed June 22, 1908. Serial No. 439,824.

To all whom it may concern:

Be it known that I, CHARLES H. TRIGGS, a citizen of the United States, residing at Wilmington, county of Newcastle, and State of Delaware, have invented certain new and useful Improvements in Smoke-Consumers, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to a smoke consumer and particularly to a construction whereby steam and highly heated air may be injected into the fire box beneath a boiler or other furnace.

The invention has for an object to provide a nozzle member having both its inlet and outlet openings communicating with the fire box, and an injector inserted within the inlet of said nozzle so that the heated products of combustion within the fire box are drawn into the nozzle and there combined with steam and air to superheat the latter so that when again discharged into the fire box it produces a thorough combustion of the gases therein preventing the emission of smoke and increasing the heating capacity of the fuel so as to reduce the consumption thereof and increase the temperature of the fire box to a very high degree.

Other and further objects and advantages of the invention will be hereinafter fully set forth and the novel features thereof defined by the appended claims.

In the drawing:—Figure 1 is a vertical section showing the application of the invention to a stationary boiler; Fig. 2 is an elevation showing the inlets and discharges for the nozzle members; Fig. 3 is a vertical section of a portion of a locomotive boiler showing the application of a modified form of the invention; Fig. 4 is an elevation with parts in section of the form of nozzle shown in Fig. 3.

Like numerals refer to like parts in the several views of the drawing.

The invention is herein shown applied to two different forms of boiler furnaces, but it is applicable to any form of furnace or boiler fire box. In the form shown in Fig. 1, the nozzle member 10 is substantially U-shaped and embedded in the front wall 11 of the fire box. The inlet 12 of this member is substantially circular and is open for communication with the upper portion of the fire box, while the outlet end 13 thereof is elongated to form a sheet or spray directed

against the fuel. Communicating with the inlet of the nozzle member is the air pipe 14 which extends between the series of nozzles, as shown in Fig. 2, and at each end is coupled to an intake 15 extending to the front of the furnace, as shown by dotted lines in Fig. 2. By this means the necessary amount of atmospheric air is introduced into the nozzle members. Communicating with each of these members is a steam injector 16 extending for a distance within the inlet 12 of the nozzle so as to discharge therein beyond the air pipe 14. If so desired a sleeve or collar 17 of refractory material may be inserted within the nozzle at this communicating point to resist the high temperature at this point. The steam pipe 16 is connected by means of coupling 19 to a pipe 20 leading from any suitable source of steam supply.

The invention when applied to the fire box of a locomotive or similar boiler furnace is of substantially the same construction although changed in position and in details. In the form shown in Figs. 3 and 4, the nozzle member 21 extends for the width of the fire box and is provided at opposite ends with the coupling members 22, while its upper portion is formed with an elongated spray or sheet opening 23, preferably directed downward, as shown in Fig. 3, so as to discharge upon the fuel in the fire box. This form of arch nozzle may be used in place of the series of nozzles, as shown in Fig. 2. The nozzle is mounted upon the coupling 24 which is provided with an inlet opening 25 communicating with the fire box and with the air pipe 26. This coupling member is provided with a sleeve 27 by which connection is effected with the air feed pipe 28. Extending through this feed pipe and terminating within the air pipe 26 is a steam inlet 29 curved upward at its inner end so as to be disposed within the air pipe and discharge into the nozzle causing an injection of air and of gases. If desired the steam may be injected into the air pipe 28 at a point removed from the furnace, as, for instance, by means of the steam pipe 31 entering the air pipe at the injector portion 32 so that the steam and air are first mixed before introduced into the nozzle. This is convenient when used in a locomotive when running as exhaust steam can in that manner be utilized, while if the engine be at rest the steam may be supplied for that purpose

through the feed pipe 33 extending to any point of boiler connection or steam supply.

It will be seen that in each form of the invention the steam jet causes the injection
5 of air which is heated in its passage to the nozzle member, and when introduced therein causes a suction through the nozzle member drawing in the highly heated smoke and gases in the fire box and delivering them
10 above the fuel so as to cause a complete combustion thereof and a very high temperature within the fire box owing to the presence of the oxygen carried in by the air and steam which being superheated by the products of
15 combustion themselves is introduced to the fire box at such a high temperature as to prevent any deadening effect and also to increase the combustion of the gases above the fuel thus preventing the emission of smoke
20 through the stack and economizing in fuel by increasing the temperature of the fire box to a high degree through the combustion of the smoke and gases therein. In the form of the invention shown in Figs. 1 and 2 the
25 air pipe extends within the fire box and the air is thus highly heated before the steam is introduced therein so that the superheating through the nozzle member is readily effected before delivering to the fuel through the
30 spray or sheet nozzles. In the form shown in Figs. 3 and 4 the air is effectually heated by the steam injection therein before its introduction into the nozzle member.

Having thus described my invention and
35 set forth its merits, what I claim and desire to secure by Letters Patent is:—

1. In a smoke consumer, a nozzle member having an inlet opening communicating with a fire box and an outlet opening also com-

municating therewith, an injector disposed 40 within said fire box at the inlet opening of said nozzle and directed toward the discharge therefrom, and an air intake at said inlet and within the fire box to communicate with said injector. 45

2. In a smoke consumer, a nozzle member having inlet and outlet openings both communicating with a fire box, an air pipe communicating with the inlet portion of said nozzle and disposed within said fire 50 box, and a steam pipe disposed within the inlet of said nozzle at a point beyond the air pipe connection therewith.

3. In a smoke consumer, a series of nozzle members embedded in the front wall of the 55 fire box and having inlet and outlet openings disposed in parallel horizontal planes and both communicating with a fire box, an air pipe within the fire box connecting the inlet portions of said nozzles, and a steam 60 pipe provided with a series of injectors disposed in said nozzles.

4. In a smoke consumer, a nozzle member comprising a circular inlet opening and an elongated discharge opening both in com- 65 munication with a fire box, an air pipe communicating with the inlet portion of said nozzle within said fire box, a steam injector disposed within said inlet portion beyond the air pipe, and a sleeve mounted thereon to 70 surround the entrance of said injector.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES H. TRIGGS.

Witnesses:

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WALTER P. LEWIS.