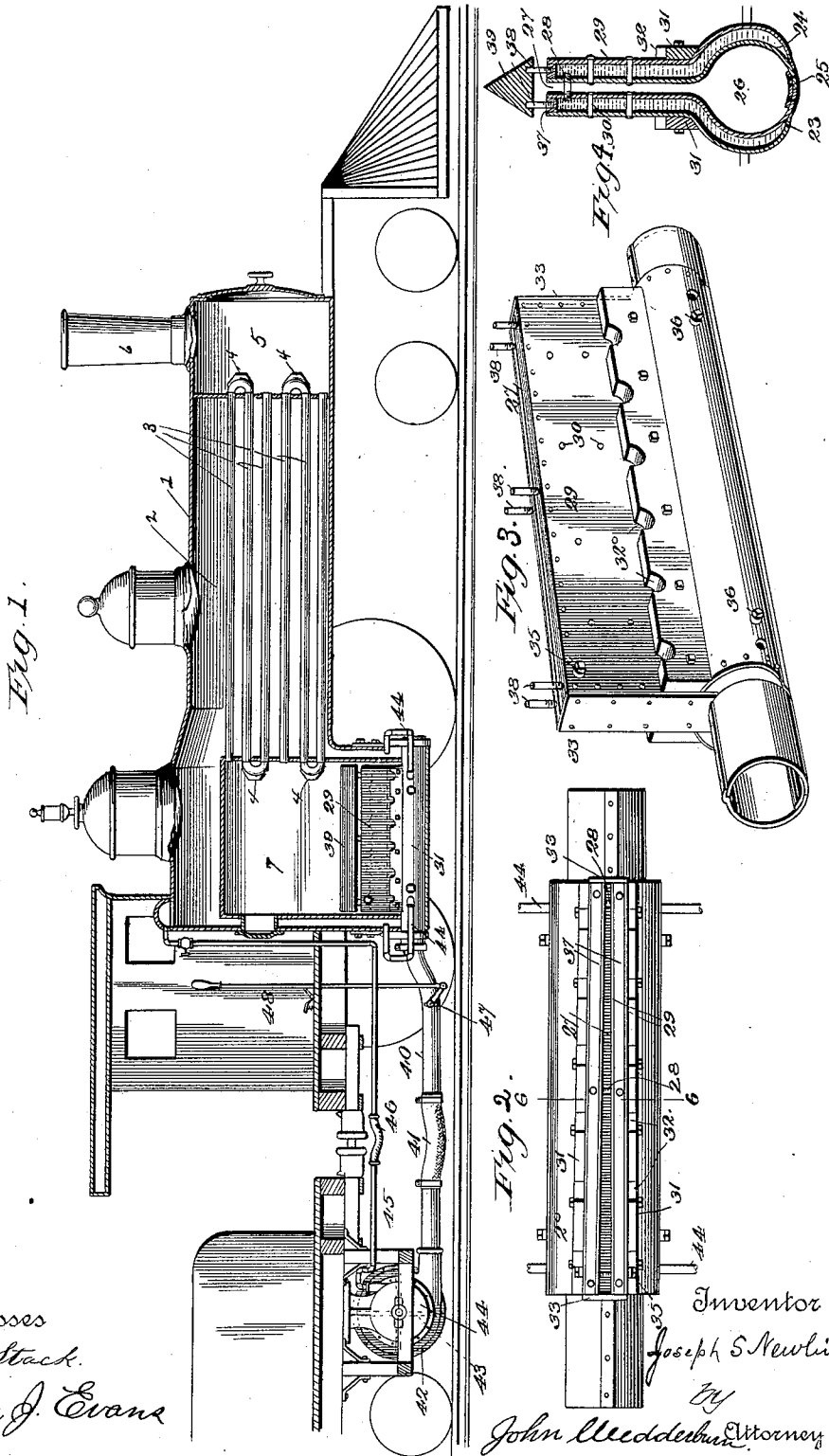


(No Model.)

J. S. NEWLIN.
AIR FEEDING APPARATUS FOR BOILERS.

No. 606,072.

Patented June 21, 1898.



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JOSEPH SIDNEY NEWLIN, OF CROCKETVILLE, SOUTH CAROLINA.

AIR-FEEDING APPARATUS FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 606,072, dated June 21, 1898.

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To all whom it may concern:

Be it known that I, JOSEPH SIDNEY NEWLIN, residing at Crocketville, in the county of Hampton and State of South Carolina, have
5 invented certain new and useful Improvements in Air-Feeding Apparatus for Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in
10 the art to which it appertains to make and use the same.

Before proceeding to a description of the embodiment of my invention which I at this time deem preferable it may be well to enter
15 into a short discussion of the object of this invention considered in its broadest aspect. It is a fact established scientifically beyond controversion that in the ordinary method of generating steam only a comparatively insignificant proportion of the energy developed
20 by combustion is converted into kinetic power by the production of the extensive fluid or steam. The exact proportion of waste is undetermined and is greater or less in various
25 forms of heat-generating and power-transmitting devices; but it is known that from two-thirds to four-fifths of the caloric is projected as waste force in boilers of the ordinary well-known forms.

30 The object of the present invention is to maintain a constant vitalization of the atmosphere within the fire-box for the purpose of producing an absolutely perfect combustion by supplying an amount of oxygen which
35 will permit the maintenance of a temperature sufficiently high to effectually consume the smoke and gases which ordinarily constitute what are known as the "waste products of combustion" and the generating power of the
40 combustion of which is lost under ordinary circumstances by the escape of such gases through the stack of the boiler. Subordinate to this generic object is the production of a device by means of which a blast of, we will
45 say, oxygen-laden fluid—as for instance, air—is projected in a thin unbroken sheet immediately over the upper surface of the fuel, which will serve to present the vitalized atmosphere in contact with the incandescent surfaces of
50 the fuel and will force the products of combustion arising from the burning mass to pass

through a vitalized atmosphere, which will produce the complete combustion of such escaping gases. Under ordinary circumstances the heat generated is so intense that its entire
55 energy cannot possibly be absorbed during its passage through the ordinary boiler-flues, and in order that the entire force or steam-generating capacity of the combustion may be utilized I employ in connection with the
60 structural features of my present invention a peculiar form of return-flue described in United States Patent No. 489,827, granted to me, these flues being so arranged that the products of combustion will pass through the
65 boiler and will be returned to the fire-box and partially reheated before passing again along the entire length of the boiler and out through the stack. Elbows of peculiar construction are provided at the ends or bends
70 of the flues and designed to absorb a large percentage of heat, which serves to reheat or superheat the return-current of hot air after a portion of its caloric has been expended by
75 absorption, it being observed that these elbows, which are not necessary to be described in detail herein, are made of comparatively heavy metal and project into the fire-box over the fuel and into the smoke-drum at the
80 opposite end of the boiler.

In addition to the several objects heretofore enumerated my invention comprehends the regulation of both the force of the air-blast and the thickness or body of the sheet
85 of air which is projected over the surface of the fuel in the manner and for the purpose hereinabove mentioned.

To the accomplishment of the foregoing objects my invention consists in providing an air-conduit, preferably located below the
90 grate-bars, with a blast-nozzle of the desired form, projecting sufficiently above the grate-bars to bring its upper edge immediately above the bed of fuel contained in the fire-box, and, further, in the location of an adjustable regulator or deflector supported above
95 the nozzle and designed to be adjusted with respect thereto for the purpose of regulating the blast and for determining the thickness or body of the sheet of air to be projected
100 horizontally by coming in contact with the lower surface of said deflector over the entire

bed of coals to force the products of combustion to pass through this vitalized atmosphere immediately after their liberation.

The invention consists, further, in the provision of a water-jacket surrounding the conduit and the blast-nozzle where my device is designed for use upon a locomotive or other apparatus in which the temperature is necessarily raised to a point which without the provision of the water-jacket might serve to endanger the integrity of the parts, as by scaling or charring the metal from which the nozzle and conduit are formed.

Referring to the drawings, Figure 1 is a central longitudinal sectional view of a locomotive or so much thereof as is necessary to illustrate my invention, showing my devices applied thereto in full lines. Fig. 2 is a top plan view of a discharge-nozzle constructed according to my invention and its connecting parts. Fig. 3 is a perspective view of the devices shown in Fig. 2, and Fig. 4 is a transverse section taken on the line 4 4 in Fig. 2.

Referring to the numerals on the drawings, 1 indicates the shell of an ordinary locomotive-boiler provided with a water-space 2, through which extend the hot-air flues 3, provided with elbows having thickened heads 4, and in front of the water-space with a smoke-drum 5 and a stack 6, the usual fire-box 7 and grate-bars being located in the ordinary manner. These elements are well known and may be of various forms, as they are simply illustrated for the purpose of illustrating the application of my invention.

Proceeding to a description of the invention proper, (most clearly illustrated in Figs. 2, 3, and 4,) 26 indicates a conduit, consisting of a pair of plates of sheet metal forming two sections 23 and 24, which are joined at their lower meeting edges by a longitudinal plate 25, suitably bolted to the said sections, which latter are formed along their lower portions into semicylindrical elements, designed when brought together to form the cylindrical conduit 26, the upper edges of a portion of the sections 23 and 24 being extended upwardly to form a vertically-disposed and longitudinally-extended discharge-nozzle 27, preferably extending from the front to the rear wall of the fire-box, or in case of stationary engines from the front wall to the bridge-wall thereof.

The object attained by me has been sought heretofore by the introduction of an air-blast to the interior of the fire-box above the fuel, usually in the form of numerous sprays or jets directed into the fire-box at various points, but never, so far as my investigation has been able to disclose, immediately above the surface of the fuel. In order to produce this peculiar blast in this particular location, I provide what I will term an adjustable blast-regulator or air-deflector 39, consisting in this form of a prismatic solid metal body having one of its flat sides adjustably supported upon bolts or standards 38 above the mouth

of the discharge-nozzle 27, as seen most clearly in Fig. 4. It will thus be seen that as the regulator or deflector 39 is adjusted toward or from the end of the vertical nozzle a sheet of air of the desired body and force will be projected horizontally from the said nozzle immediately over the surface of the fuel at the point of initial combustion, as distinguished from the injection of this vitalized atmosphere at various points within the fire-box, where they would merely serve to raise the temperature by adding to the supply of oxygen, but where they would not absolutely insure the combustion of the entire products of combustion liberated from the fuel. It will be apparent, however, to those skilled in the art that a blast of air injected with considerable head into the conduit will escape from the elongated discharge-nozzle 27 with unequal pressure, diminishing from the front end of the nozzle to an almost imperceptible current at the rear end, when the said nozzle is formed of the same width throughout, and to effect proper regulation of the blast to insure its issuance from the nozzle at the same pressure throughout its length I provide nozzle-adjusting mechanism consisting, preferably, though not essentially, of adjusting-bolts 28, provided with oppositely-screw-threaded extremities designed to engage oppositely-threaded bolt-apertures in the sides of the nozzle, said bolts being preferably located one at each end and one at the center of the nozzle 27, in order to permit the width of the nozzle to be varied as desired by the rotation of any or all of the adjustment-bolts in the desired direction, as by the application of the ordinary alligator-wrench.

As before noted, the heat generated within the fire-box of a locomotive or similar apparatus is so great that there would be some liability of the disintegration of the nozzle, and I therefore provide a water-jacket 29, extending along the outer surfaces of the sections 23 and 24, extending nearly to the meeting edges thereof, the jacket being secured, as by suitable bolts 30, and supporting in any suitable manner grate-supporting bars 31, provided along their upper edges with bar-rests 32, the ends of the water-jacket and nozzle being closed by suitable end plates 33, of any desired material, secured by screw-bolts having their heads countersunk in order to present smooth surfaces upon the ends of the nozzle, designed to facilitate its introduction into or its withdrawal from the fire-boxes for purposes of adjustment, repair, &c.

The water-jacket may be supplied with water in any suitable manner, but I prefer to lead a water-pipe 44 from the interior of the water-space to the water-jacket adjacent to its opposite ends, and in order to permit the escape of air from the jacket when the water is introduced initially I provide air-plugs 35 adjacent to the upper edges of the jacket, and mud-plugs 36 are preferably provided at the bottom edges of the jacket to permit the

draining off of water and sediment at predetermined intervals.

37 indicates spacing-plates secured between the upper edges of the nozzle and water-jacket, and from which project upwardly a series of deflector-supporting standards 38, screwed into the plates and designed to be vertically adjusted to adjust the deflector or regulator 39, supported by the standard, the apertures in the under surface of the deflector 39 being slightly elongated where necessary to permit the lateral movement of the standards when the nozzle is adjusted. Instead of employing the standards supported by the nozzle for sustaining the regulator it may be desirable in some instances to suspend the latter from one or more stems, and, in fact, where this would be practicable it would be preferable, for the reason that the sheet of air projected from the nozzle would be absolutely unbroken.

Any suitable means may be employed for supplying the air to the conduit 26—as, for instance, the ordinary hose-pipe 40, provided with a flexible section or coupling 41 between the locomotive and its tender and communicating with a fan-casing 42, the fan 43 within which is preferably rotated by a small rotary engine 44, fed with steam through a steam-pipe 45. Suitable means, such as jointed rods 48, (shown in Fig. 1,) are provided in the pipe 40 and likewise in the horizontal portion 10 of the conduit 9, suitable means—as, for instance, a handle or a lever and connection—being provided for actuating the valve to regulate the supply of air from the fan and located within easy reach of the fireman or other operator.

It will be observed from the foregoing that I have devised an apparatus by means of which perfect combustion is produced within the fire-box of a boiler or other similar apparatus and a maximum energy is generated by a minimum consumption of fuel; but while the embodiments of my invention illustrated and described appear at this time to comprehend preferable constructions I do not desire to limit myself to the structural details set out, but reserve the right to change, modify, or

vary them at will within the scope of my invention.

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

1. The combination with a conduit and an elongated blast-nozzle, of a series of nozzle-adjusting bolts designed to adjust the relative width of the nozzle to equalize the pressure of the blast from end to end of said nozzle, substantially as specified.

2. The combination with a conduit, and an elongated blast-nozzle, of a deflector supported above said nozzle upon a series of independently-adjustable bolts adapted to adjust the relative distance of the deflector from the blast-nozzle to equalize the pressure of the blast from end to end of said nozzle, substantially as described.

3. The combination with a conduit and an elongated blast-nozzle having a series of independently-adjustable bolts adapted to adjust the width of the nozzle; of a deflector supported above said nozzle upon a series of independently-adjustable bolts adapted to allow of the adjustment of the distance between said deflector and said nozzle, substantially as described.

4. In an apparatus of the character described, the combination with a blast-nozzle extending into the furnace from beneath, of a water-jacket inclosing said blast-nozzle, and means for adjusting the width of said nozzle, substantially as described.

5. In an apparatus of the character described, the combination with an elongated blast-nozzle extending into the furnace through the grate-bars thereof; of a water-jacket inclosing said blast-nozzle; and an adjustable deflector mounted over the mouth of said nozzle, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOSEPH SIDNEY NEWLIN.

Witnesses:

LOUIS G. JULIHN,
WM. L. FORD.