June 20, 1933. N. BEDARD 1,914,476

SMOKE CONSUMER AND FUEL ECONOMIZER

Filed May 22, 1931 2 Sheets-Sheet 1

Fig. 1.

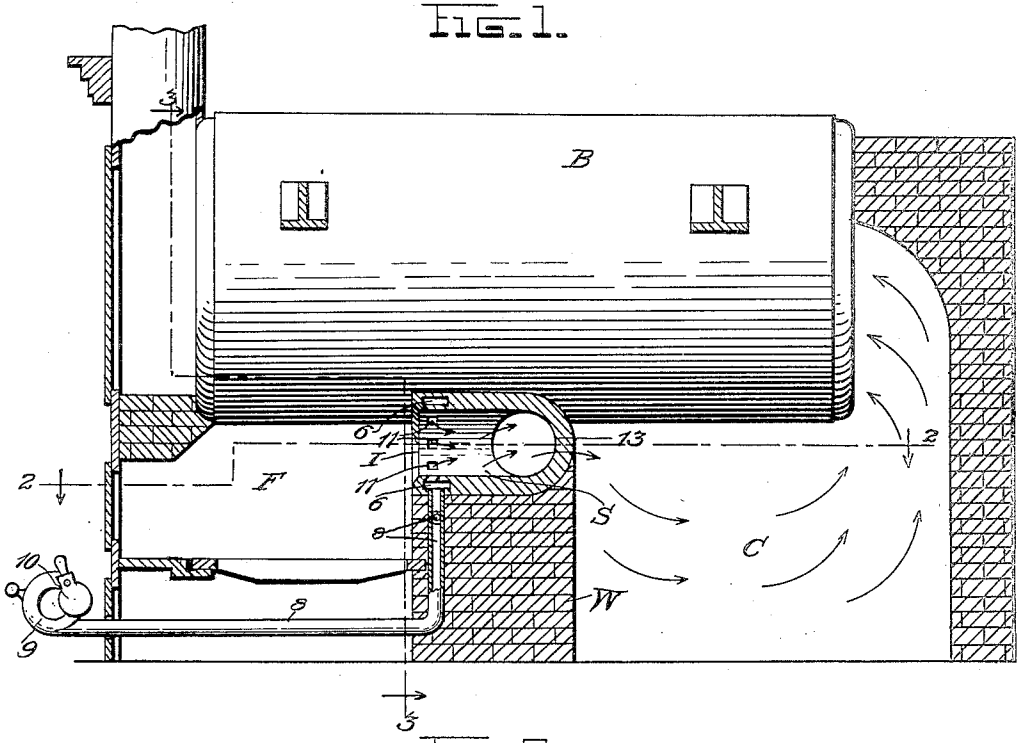
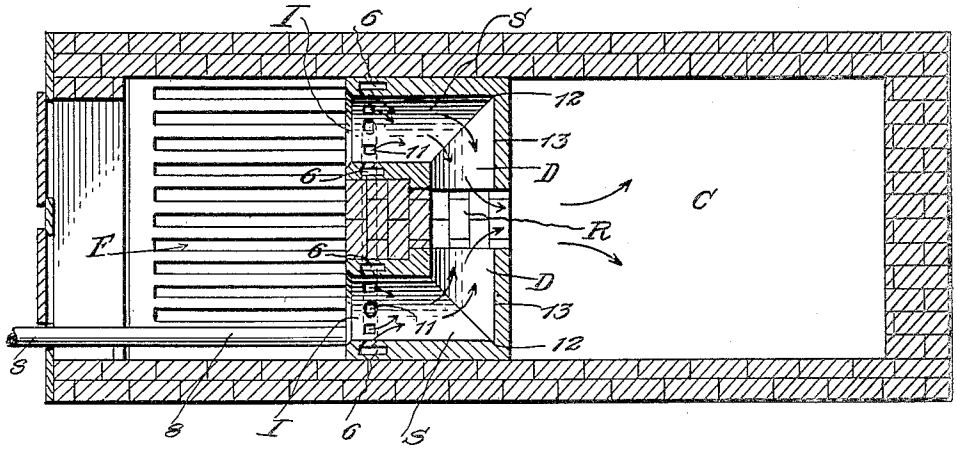


Fig. 2



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Fig. 3.

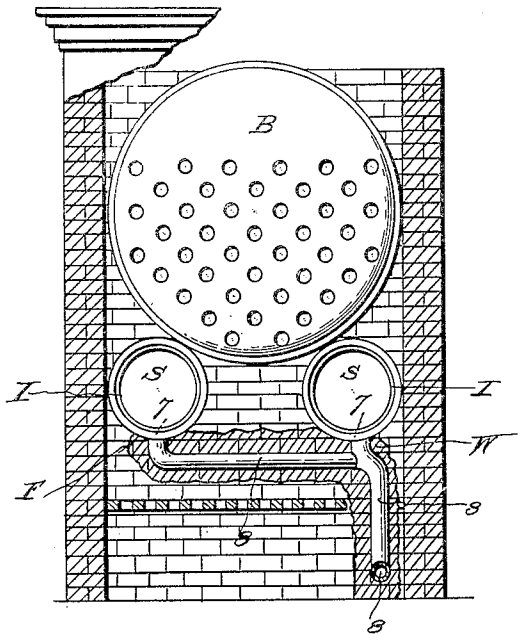


Fig. 4

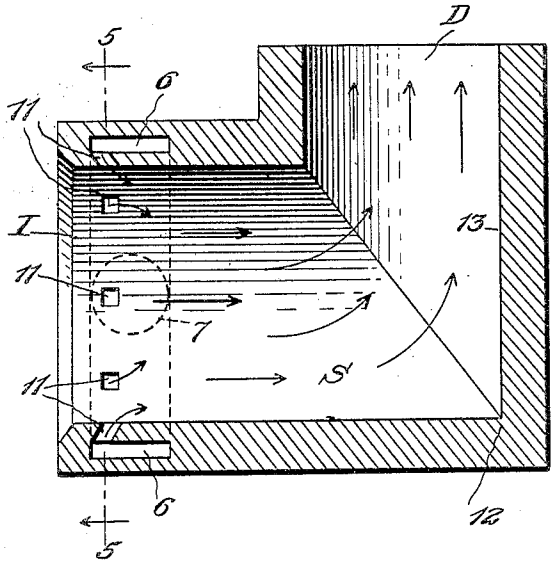
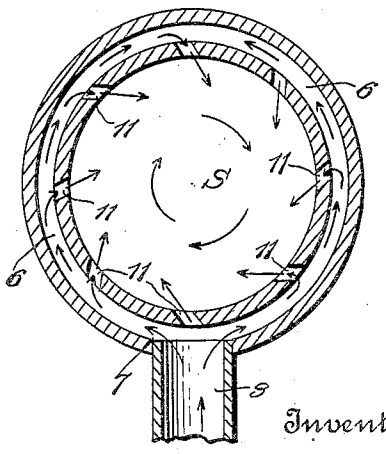


Fig. 5.



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UNITED STATES PATENT OFFICE

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SMOKE CONSUMER AND FUEL ECONOMIZER

Application filed May 22, 1931, Serial No. 539,362, and in Canada December 10, 1931.

The invention aims to provide a new and improved device in the nature of a secondary fire-box for thoroughly mixing air with products of combustion discharged from a primary fire-box and completely burning all unburned fuel units which would otherwise escape, thereby preventing dense smoke and obtaining greater efficiency from the fuel.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Fig. 1 is a vertical longitudinal sectional view partly in elevation showing the invention embodied in the bridge wall of a boiler furnace.

Fig. 2 is a horizontal sectional view on line 2—2 of Fig. 1.

Fig. 3 is a transverse sectional view partly in elevation substantially on line 3—3 of Fig. 1.

Fig. 4 is an enlarged horizontal sectional view through one of the secondary fire-boxes.

Fig. 5 is a vertical transverse sectional view on line 5—5 of Fig. 4.

The general construction shown by the above-described drawings, has proven to be efficient to the maximum, and hence, may be considered as preferred. This construction will be rather specifically described, with the understanding however, that within the scope of the invention as claimed, variations may be made.

The invention is shown in connection with a return tube boiler B but is not restricted to use with such a boiler. Under the boiler B, a bridge wall W has been shown which, with the exception of the conducting means afforded by the two secondary fire-boxes S, entirely segregates the fire-box F from the rear combustion chamber C, said secondary fire-boxes being built in the bridge wall W and having their inlet ends I in direct communication with the fire-box F while their discharge ends D communicate with the chamber C through the instrumentality of a recess R formed in the rear portion of said bridge wall W. Both of the secondary fire-boxes S are of the same construction and hence a description of one will suffice for both.

The secondary fire-box S is in the form of a conduit of any appropriate fire-resisting material, and while said conduit is shown of cylindrical cross section, it may be of any other desired formation. The inlet end I of the conduit is provided between its inner and outer sides with an air manifold 6 having an air inlet 7 which communicates with piping 8 leading from a blower 9, said blower preferably having a shutter or the like 10 either manually or automatically controlled, for regulating the amount of air handled by the blower, as may be required. Air-injecting means provided by openings 11, communicate with the manifold 6 and with the interior of the conduit. These openings are at acute angles to the longitudinal center of the conduit as seen in Fig. 4 and are at acute angles to radii of said conduit as illustrated in Fig. 5, the openings being so positioned that they direct jets of air inwardly toward the center of the conduit and toward the delivery end D of the latter, and serve to violently whirl this air. The air is supplied through the piping 8 at such pressure that the velocity of the jets discharging from the openings 11 is greater than the velocity at which the products of combustion reach the conduit or secondary fire-box. Thus, the gases and the unburned fuel units therein, are accelerated and are so agitated that good initial mixture of air with the combustion products takes place.

Between its inlet and discharge ends I and D respectively, the secondary fire-box or conduit S is provided with an abrupt angle 12, the discharge end D being thus directed laterally from the major portion of said secondary fire-box or conduit. Hence, the portion 13 is transverse to the path along which the unburned fuel units and the air and gases, initially travel. This portion 13 therefore constitutes a baffle in the path of the initially mixed air and combustion products, said baffle being adapted to abruptly change the direction of and to thereby agitate and thoroughly mix the air, the unburned fuel units and the gases, producing such a homogeneous mixture that complete

combustion will take place. The flame from such combustion is blown from the force of the incoming air, through the recess R and into the rear combustion chamber C, some of said flame finding its way through the boiler tubes. The complete combustion of fuel units which would otherwise escape, adds materially to the efficiency obtained from the fuel and also insures that no dense smoke shall escape from the furnace.

The gases and unburned fuel units reach the secondary fire-boxes S at a velocity of from ten to fifteen feet per second. The air from the blower 9 is discharged through the air-injecting openings 11 at a speed ranging from thirty to forty feet per second. The unburned fuel units thus acquire a speed ranging from twenty-five to thirty feet per second. These unburned units possess a density approximately three-hundred times greater than the density of the gas escaping from the fire-box, and they have a tendency to travel straight ahead and hence they impinge with great force upon the baffle 13. An abrupt change in the direction of the air, gases and unburned units which have been initially mixed under the influence of the air jets injected through the openings 11, is thus effected, with consequent agitation which insures such a thorough mixture that complete combustion takes place.

As excellent results are obtainable from the details disclosed, they are preferably followed, but attention is again invited to the fact that within the scope of the invention as claimed, variations may be made.

I claim:—

In combination, a boiler, a bridge wall extending downwardly from said boiler and having a rearwardly opening recess in its upper portion, a fire-box in front of said bridge wall, two conduits formed in said bridge wall with their front ends communicating with said fire-box, said conduits having their rear ends turned laterally inward into communication with said recess, the front portions of said conduits being provided with air-injecting openings directed obliquely rearward, and means for supplying air under pressure to said openings.

In testimony whereof I affix my signature.

NAPOLEON BEDARD.