No. 806,393. PATENTED DEC. 5, 1905.

W. J. CARLIN.

FUEL BURNING APPARATUS.

APPLICATION FILED JULY 31, 1905.

Fig. 1.

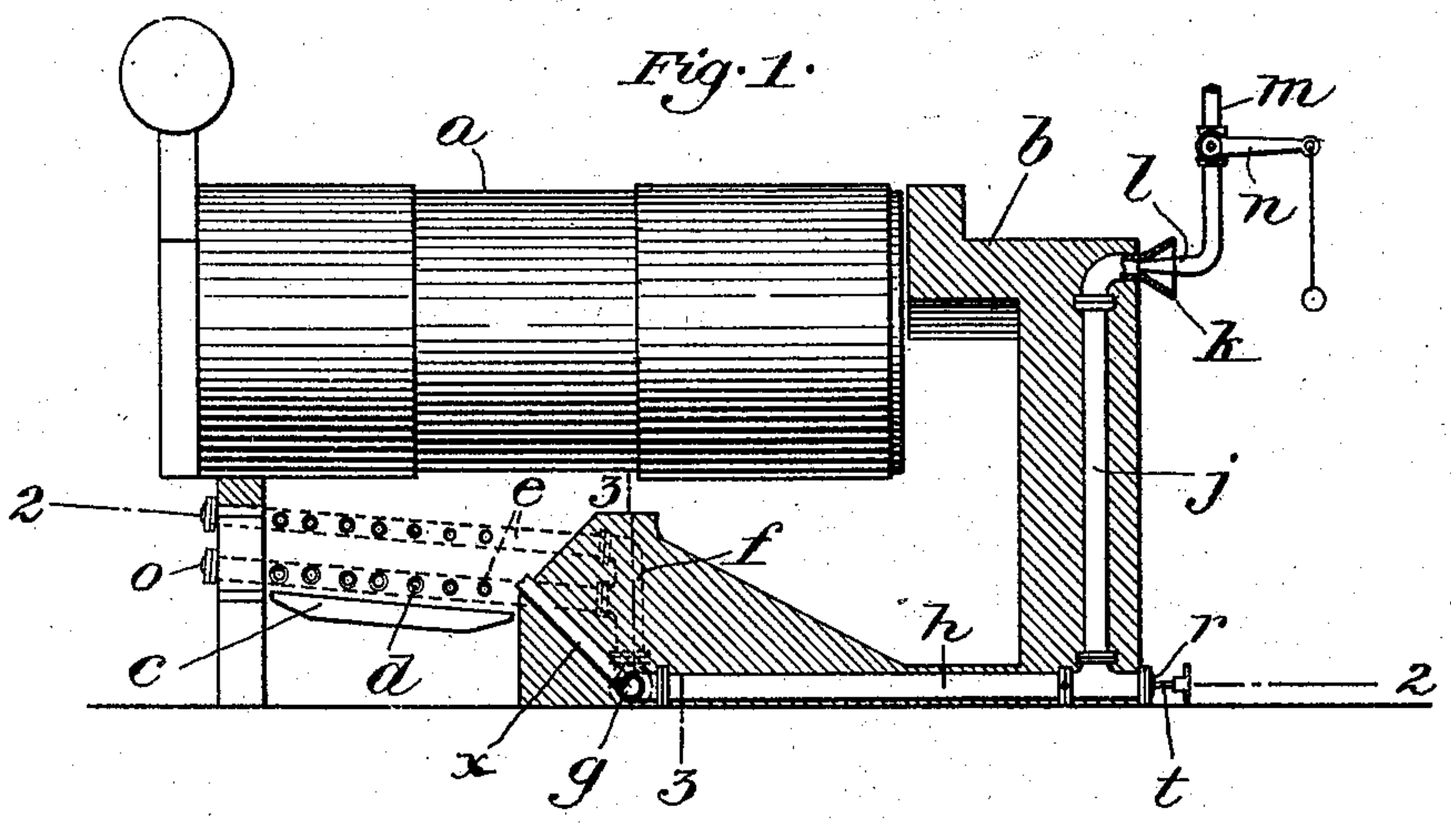

Fig. 2.

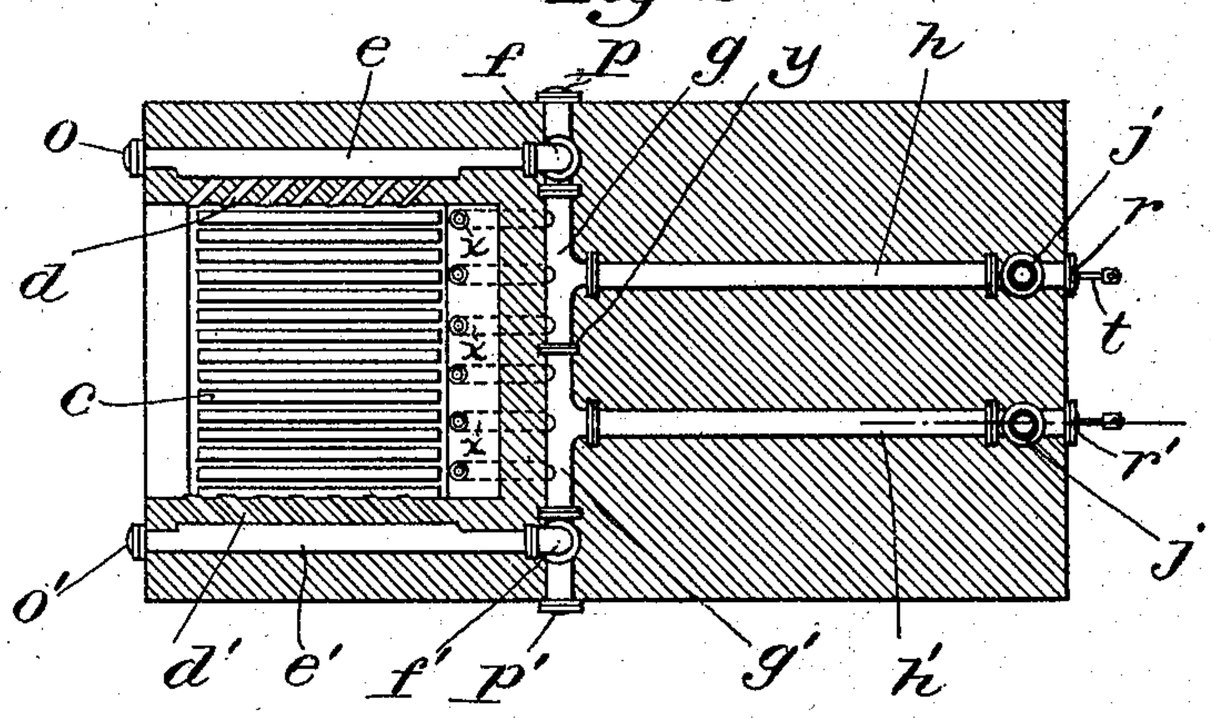

Fig. 3.

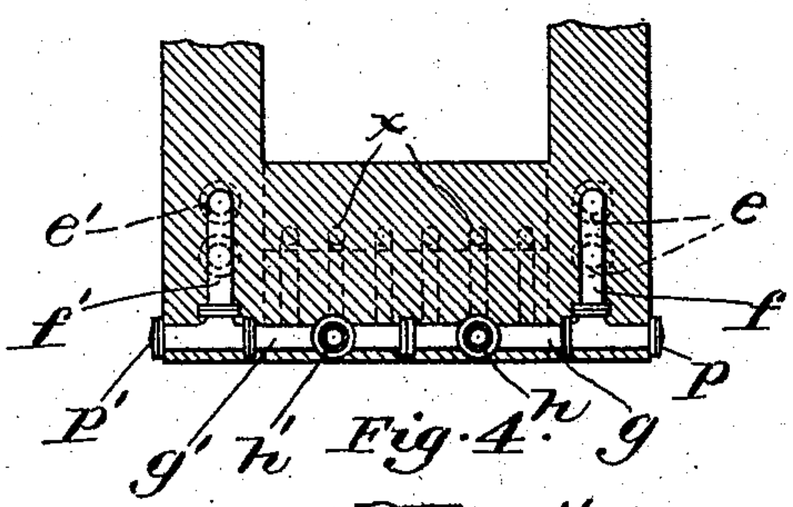

Fig. 4.

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FUEL-BURNING APPARATUS.

No. 806,393. Specification of Letters Patent. Patented Dec. 5, 1905.

Application filed July 31, 1905. Serial No. 271,916.

To all whom it may concern:

Be it known that I, WILLIAM J. CARLIN, a citizen of the United States, residing at Boston, in the county of Suffolk, Commonwealth of Massachusetts, have invented an Improvement in Fuel-Burning Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to fuel-burning apparatus, and more particularly to means for insuring the complete combustion of fuel and the required supply of oxygen to the fuel in a boiler-furnace.

My invention will be best understood by reference to the following description when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

Of the drawings, Figure 1 is a sectional elevation showing one form of my invention applied to a boiler and boiler-setting of ordinary construction. Fig. 2 is a plan in section on the line 2 2 in Fig. 1. Fig. 3 is a section in elevation on the line 3 3 in Fig. 1 looking toward the front of the boiler, and Fig. 4 is a detail showing the air-damper.

For the purpose of illustrating my invention I have shown in the drawings a fire-tube boiler *a* of ordinary type having the ordinary form of brick setting and fire-grate *c*. Obviously other types of boilers and constructions of boiler-setting may be used; but the illustrated construction will sufficiently illustrate the principles of my invention.

In addition to the ordinary air-supply, which enters the furnace through the usual dampers and beneath the bars of the grate, I provide for a distributed auxiliary supply of air which is fed to the combustion-chamber beneath the boiler and over the grate through a plurality of air-discharge conduits *d*, a set of air-conduits being provided at each side of the chamber and providing for a distributed supply of air throughout the entire space above the grate. Each set of conduits communicates with one or more lateral feed-pipes *e*, these feed-pipes connected by the vertical pipe-section *f* and the horizontal pipe-section *g*, both of which are embedded within the bridge-wall of the boiler, with the rearwardly-extending supply-pipe *h*, which is located within the setting, but beneath the heated space at the rear of the bridge-wall. The lateral feed-pipes *e'* on the opposite side of the bridge-wall communicate in a similar way with the supply-pipe *h'*. The construction of the air-supply system for one side of the furnace being substantially the same as that for the other side, description of the connections to the pipe *e* only will be necessary, it being understood that the same are or may be duplicated on the opposite side.

The supply-pipe *h* is connected to the vertical stand-pipe *j*, contained in the rear wall of the setting and terminating in the open mouth *k*, through which air is received and carried to the air-conduits projecting into the fire-space.

In order to force the air through the air-supply conduits into the furnace under any desired pressure, I preferably make use of the steam-injection nozzle *l*, connected to the supply-pipe *m* and controlled by means of the valve *n*. By varying the amount of steam supplied to the injection device the amount of air forced through the conduits may be varied as desired. While other means for forcing the air into the furnace may be employed, I find that the use of steam injection is accompanied by a beneficial effect, which appears to result from the mixture of steam and air, these two gases being highly heated in their passage through the conduits contained in the heated walls of the boiler. The air might be taken from near the floor-level, if desired; but by carrying the stand-pipe to the top of the setting the air is received at a higher temperature, and consequently less heat is required to be abstracted from the boiler in raising it to the temperature of the combustion-chamber. In order to better distribute the air throughout the combustion-chamber, I preferably apply it at numerous points and in small quantities where it can be mingled with and be assimilated by the gases of the chamber, and for this purpose I preferably provide a plurality—herein two—tiers or rows of conduits, the conduits of the lower row being preferably of slightly greater diameter than those of the upper tier, so that the greatest quantity of air may be discharged in closest proximity to the fuel upon the grate. It is also preferable, although not necessary, to provide conduits of graduated size, as indicated, the conduits increasing in size from the rear to the front of the fire-box, so that the delivery of air near the

front of the chamber will be as great or greater than the delivery thereof at the rear of the chamber.

In order to make the discharge-conduits *d* accessible for the purpose of cleaning, as well as to obtain the benefits resulting from the better mixture of the discharger-air with the gases of the fire-box, the discharge-conduits are preferably inclined toward the front of the combustion-chamber, so that the air or discharge will be counter to the natural draft of the furnace.

In addition to the air-conduits entering the chamber from the side thereof I preferably provide a plurality of supply-conduits *x*, entering the chamber through the bridge-wall. In the present instance these later branch from the horizontal pipe portion *g*, being inclined upwardly and forwardly to throw the discharged air into the midst of the combustion. The conduits *g* and *g'* are extended toward each other to afford connections for a suitable number of these bridge-wall conduits and may be united, if desired, at *y*.

One feature of my invention lies in the fact that the system of the air-supply conduits employed can be readily cleaned. For this purpose the lateral feed-pipe *c* is extended to the front of the furnace and provided with a removable cap *o*. The conduit *g* is likewise carried to the exterior and provided with a cap *p*, and the extended end of the conduit *h* is provided with the removable cap *r*. Each of the horizontal conduits therefore employed in the system is readily accessible for the purpose of cleaning.

In addition to controlling means for the steam-injector it is desirable to have additional means for controlling the quantity of air supplied through the conduit, and for this purpose there is provided at some suitable point—such, for example, as near the end of the horizontal supply-pipe *h*, Fig. 4—the swinging damper *s*, the position of which may be controlled by the sliding rod *t*, extending through the end of the cap *r*, and the damper *s* thereby opened or closed or placed in an any intermediate position for insuring the required quantity of air.

While I have herein shown and disclosed one form of my invention for the purpose of illustrating the same, it is to be understood that it is not limited to the details or form or arrangement of parts disclosed, but that extensive modifications therein may be made without departing from the spirit or scope of my invention.

I claim—

1. In a fuel-burning device, the combination with a boiler having a combustion-chamber and a bridge-wall at the rear thereof, of a boiler-setting and means for taking air at the rear of said setting and conducting it through the walls of the same to the side of the combustion-chamber, an air-feeding conduit arranged at each side of the combustion-chamber, and a plurality of air-discharge conduits entering said chamber from the lateral supply-conduits, said discharge-conduits being inclined forwardly toward the front of said chamber and away from said bridge-wall in a direction opposed to the natural draft of the chamber.

2. In a fuel-burning device, the combination with a boiler, a boiler-setting therefor, an air-supply conduit having an inlet-opening into the upper part of the setting and at the rear thereof, a steam-injection nozzle operatively located in said opening for the discharge of steam therein, thereby to force air into said conduit and to carry the intermingled steam and air through the conduit, the latter passing downwardly and beneath the setting and out of direct contact with the products of combustion from the chamber, and then upward through the bridge-wall and along the side of the combustion-chamber, and a plurality of feeding-conduits for taking the intermingled air and steam from said supply-conduct to the interior of said combustion-chamber, both at the sides thereof and through the bridge-wall.

3. In a fuel-burning device, the combination with a boiler having a combustion-chamber, of a boiler-setting, an air-feed conduit extending lengthwise the combustion-chamber and at each side thereof, discharge-conduits entering said chamber from said lateral feeding-conduits, a removable closure for the front of each of said conduits to permit the cleaning thereof, a longitudinally-arranged conduit back of said combustion-chamber and beneath the boiler-setting, and connecting with one of said lateral conduits, a downwardly-leading conduit at the back of the boiler-setting to conduct air from above down to said longitudinal conduit, and a removable closure for the latter at the rear of the boiler-setting.

4. In a fuel-burning device, the combination with a boiler, of a combustion-chamber therefor, a boiler-setting, a bridge-wall at the rear of the combustion-chamber, means for taking air at the rear of the boiler-setting and conducting it through the walls of the same to the side of the combustion-chamber, an air-feed conduit arranged at each side of the combustion-chamber, and a plurality of air-discharge conduits entering said combustion-chamber from said lateral supply-conduits, said discharge-conduits being of graduated size.

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

WILLIAM J. CARLIN.

Witnesses:
ALICE R. BROWN,
THOMAS B. BOOTH.