

UNITED STATES PATENT OFFICE.

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SMOKE-DESTROYING AND FUEL-ECONOMIZING APPARATUS FOR BOILER-FURNACES.

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To all whom it may concern:

Be it known that we, CHARLES H. MALONEY and THOMAS J. MORRIS, citizens of the United States of America, and residents of Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Smoke-Destroying and Fuel-Economizing Apparatuses for Boiler-Furnaces, of which the following is a full, clear, and exact description.

This invention relates to that class of smoke-destroying and fuel-economizing apparatuses for boiler-furnaces in which there is employed means for introducing into the combustion-chamber steam and air.

The present invention relates to improved constructions and appliances for rendering the apparatus more cheaply and expeditiously applied and more conveniently employed; and the invention consists in the constructions and combinations of parts, all substantially as hereinafter fully described, and set forth in the claims.

Reference is to be had to the accompanying drawings, in which the present improvements are illustrated in relation to so much of a boiler-furnace as to show its applicability thereto, and in which—

Figure 1 is a front elevation. Fig. 2 is a vertical sectional view taken on the line $x x$, Fig. 1. Fig. 3 is a vertical sectional view of a portion of the appliances as taken on the same plane of Fig. 2, but showing the same on a somewhat larger scale. Fig. 4 is a plan view of a combined steam-pipe valve and air-valve or regulating-slide employed in the improved apparatus, and Fig. 5 is a front or face view of a portion of the slide.

Similar characters of reference indicate corresponding parts in all of the views.

We do not of course claim, broadly, a boiler or other furnace having appliances for the injection of steam or steam and air thereinto, but will describe in detail the appliances and arrangements which constitute our invention.

In and through the front wall A of the furnace B, below the boiler C, but well above the grate-bars a , is set a metallic sleeve or

bushing D, the same having a considerable diameter, and the forward end thereof protrudes forwardly beyond the front face of the furnace-wall and is externally screw-threaded, as indicated at b . This sleeve may have its position immovably retained and assured by the employment of plaster or cement or in any suitable manner. In practice two or more of the said sleeves D and the fittings combined therewith are employed, as indicated in the drawings. Screw-threading upon the outer protruding extremity of each of said sleeve-fittings is an annular section E, preferably of cast-iron, its inner end portion being screw-tapped for a thread engagement at b . The said section E has cast as an integral portion thereof a depending boss d and thereabove the hollow angular member or elbow f , which is located within the passage axially through the said casting or section E, the angular passage through the said elbow being continued downwardly through the said boss d , and the casting is constructed or provided with screw-threads internally at the inwardly-directed end of the elbow member f and within the lower end of the boss d . The said annular section E is cast with a narrow slot g horizontally and transversely through it forward of the elbow f , through which slot may freely slide the metallic plate or strip F, which has the circular hole h , corresponding to each transversely-slotted annular section, through which it is engaged for a free sliding motion and with the opening through which section E the opening h may register or be out of registry as occasion requires.

The internally-screw-tapped orifice of the inwardly or rearwardly turned end portion of the elbow-section f , which is integrally cast as a part of the section E, receives connection therein of the tube-section i , which extends axially inwardly or rearwardly within the passage constituted by the combined bushing D and cast-iron section E, the inward extension of the nozzle or pipe section i , the diameter of which is much less than the diameter in which it is located, being but partially through toward the rear of the passage which is in and through the said parts E D.

Screw-threading into each depending integrally-cast boss *d* is a short pipe-section *j*, the lower screw-threaded end thereof having connection with the coupling *k*, provided to the pipe *G*, which is understood as having a steam-supplying connection either directly with the boiler or with a conduit therewith connected. In the portion of the said steam-pipe *G* adjacent which the stem *m* of the air slide-valve *F* is extended is a steam-valve, as indicated at *J*, with the stem *n* of which is engaged the lever *M*, said lever being fulcrumed to the bracket *o*, formed on or affixed to the body of the valve *J*, and said lever is also engaged with the rod or stem of the air valve or stop *F*, so that the swinging motion of the single lever *M* in one direction will close both the steam-valve *J* and the air-valve or stop-slide *F* in relation to the passage through the united tubular parts *E D*, while the swinging motion of the lever in the opposite direction will open the steam-valve *J* and the air slide-valve *F* or partially open them.

The advantageous effects of introducing a jet of steam into the furnace-chamber and therewith an induced current of air for partially destroying and for bleaching the smoke and for perfecting the combustion is well known in apparatuses employed in conjunction with the furnace of the type to which this invention pertains; but it will be appreciated that with the furnace built or provided with the endwise-open sleeves, one or more, and the provision of the annular sections cast with the crosswise slots *g* and the hollow elbows *f*, requiring for machine-work only screw-tapping, the setting up or assemblage of the equipments and connections may be performed most easily, quickly, and in a practical manner.

The sleeve-section *D* and annular casting *E*, together with the nozzle, are shown as placed with a slant or "pitch" downwardly and inwardly, so as to have a direction of projection of the steam-jet and air-current about in line to the bridge-wall, the degree of this pitch being fixed more or less as the judgment of the constructor may dictate as conducive to the best practical results.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In an apparatus of the class described, the combination with the wall of the furnace-chamber having the endwise-open bushing or sleeve set therein and extended therethrough, and having its forward protruding end screw-threaded, of the annular cast-metal section *E* screw-connected with the outer threaded extremity of the sleeve, and having the integral, internally-located, rearwardly-directed, hollow, elbow member, the passage through which opens transversely to the exterior of the said section, a pipe-section screw-engaged in

the rearwardly-directed end of the elbow, and a steam-pipe connected at the externally-opening end of the said elbow-passage, substantially as described.

2. In an apparatus of the class described, the combination with the furnace-wall having the endwise-opening bushing or sleeve set therein and extended therethrough, of the annular section *E* connected in axial alignment with the outer extremity of the sleeve, and constructed with the integral internally-located rearwardly-directed hollow elbow member, and with the slot transversely therethrough forward of the elbow, a pipe-section screw-engaged in the rearwardly-directed portion of the elbow, a steam-supply conduit connected at the externally-opening end of the elbow, and an apertured plate having a support and sliding connection in and through the said transverse slot in the said section *E*, substantially as described.

3. In an apparatus of the character described, the combination with an annular endwise-open metallic fitting supported by, and extended through, the furnace-wall, and protruding both inwardly and outwardly beyond the faces of said wall, and said fitting having the hollow elbow member provided with the internal rearwardly-directed portion provided with a nozzle extension, and having the transverse slot through its opposite walls forward of the said elbow, of the apertured slide-valve playing crosswise through said slot, a steam-supplying pipe connected with the said elbow, and having a steam-valve, and a valve-operating device in common with and connected with both the steam-pipe valve and the sliding apertured air-valve, substantially as described.

4. The improved fitting for the purpose substantially as described, consisting of the annular cast-metal section *E* having the integral, internally-located, rearwardly-directed, hollow, elbow member, the passage through which opens transversely to the exterior of the said annular section, and constructed with the transverse slot *g* through its opposite walls, forwardly of the location of the elbow.

5. In an apparatus of the character described, in combination, the sleeve-section *D* supported in and extended through the wall of the furnace-chamber, the annular section *E* screw-connected with the outer protruding end of the sleeve-section *D*, the same comprising as an integral portion thereof the hollow elbow member *f*, the inner end portion of which is centrally and rearwardly directed within said section *E*, and said section being constructed with the transverse slot *g*, the pipe-section *i* screw-engaged in the inner end portion of the elbow, the pipe-section *j*, screw-engaged with the said annular section *E*, and having connection with the outer end portion

of the elbow-passage, the steam-pipe G with which said section *j* is coupled, the steam-valve J provided to the steam-pipe, and having the stem *n*, the apertured slide-plate F
5 playing through the transverse slot of section E, the lever M pivotally mounted and having operating connection both with the steam-valve stem and with a portion of the air slide-valve F which is extended in proximity there-

to, all substantially as described and for the purposes set forth.

Signed by us at Springfield, Massachusetts,
this 23d day of May, 1901.

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Witnesses:

WM. S. BELLOWS,

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