

L. METESSER.
FURNACE.

No. 305,461.

Patented Sept. 23, 1884.

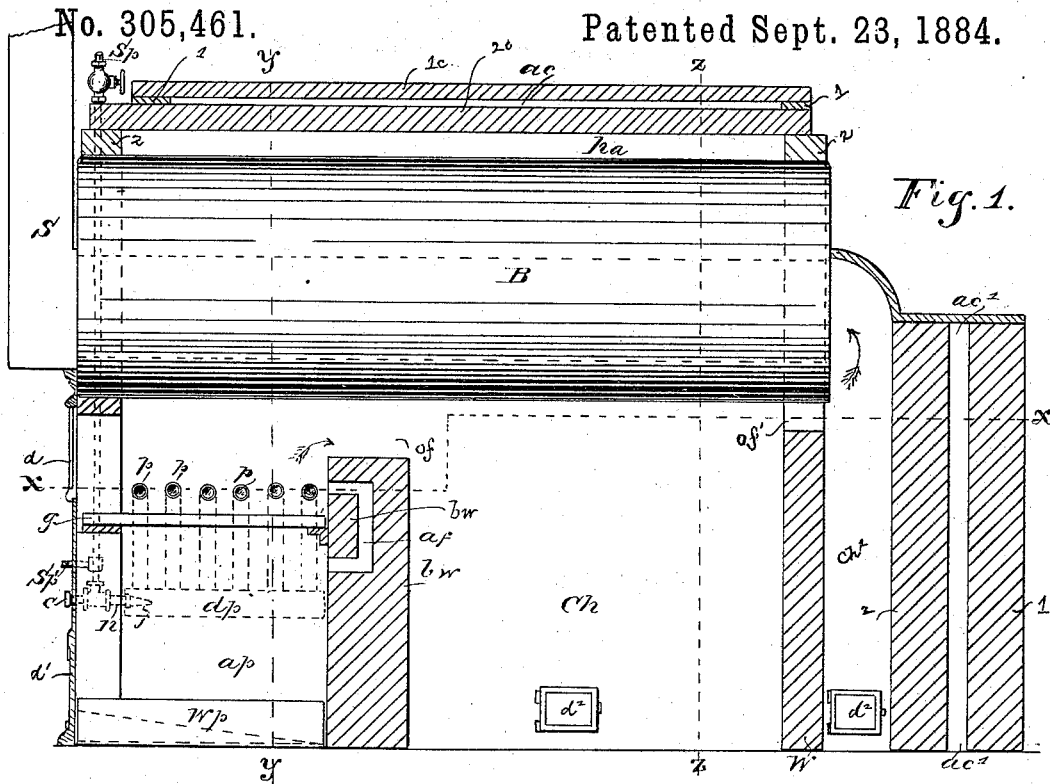
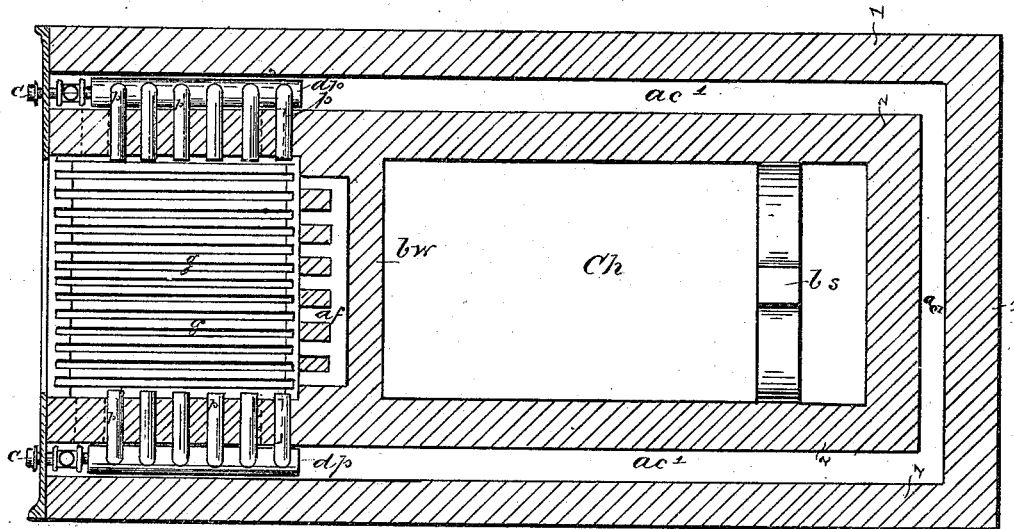


Fig. 2.



WITNESSES.

Jacob W. Cooper
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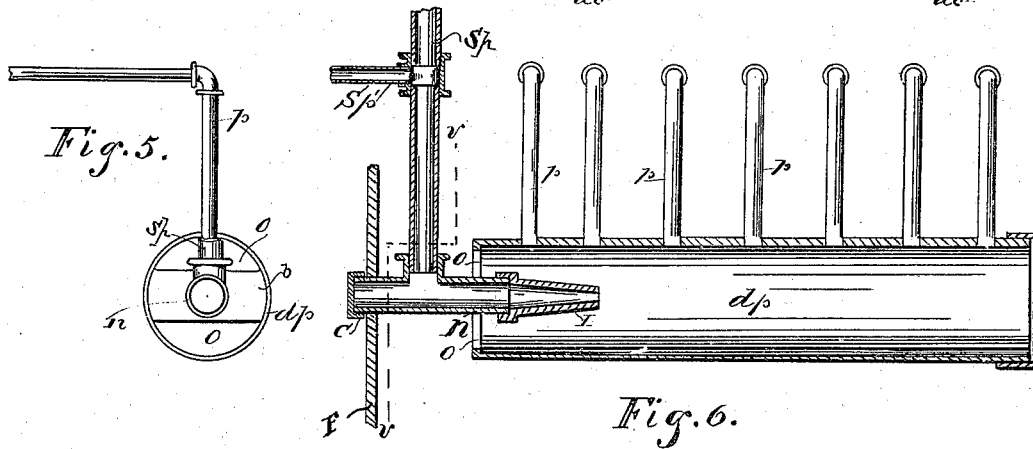
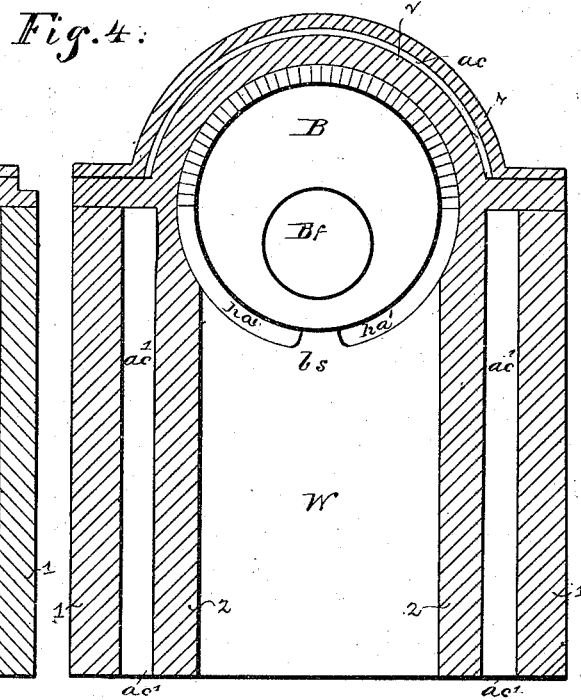
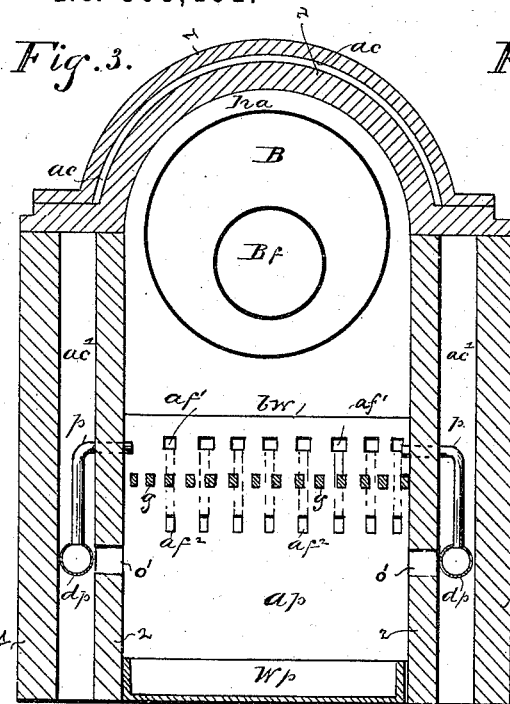
INVENTOR.

Lewis Metesser
By C. F. Jacobs
Att'y.

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Atty.

UNITED STATES PATENT OFFICE.

LEWIS METESSER, OF INDIANAPOLIS, INDIANA.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 305,461, dated September 23, 1884.

Application filed September 10, 1883. (No model.)

To all whom it may concern:

Be it known that I, LEWIS METESSER, a resident of Indianapolis, Marion county, Indiana, have made certain new and useful Improvements in Furnaces, a description of which is set forth in the following specification, reference being made to the accompanying drawings, in the several figures of which like letters indicate like parts.

My invention relates to the construction of furnaces for steam-boilers, and has for its object the prevention of smoke, the equal and uniform diffusion of the heat along the boiler, and the increase of heat from a given quantity of fuel, and will be understood from the following explanation and description.

In the drawings, Figure 1 represents a longitudinal section of the walls and the interior pipes, showing the arrangement of parts with the boiler in place. Fig. 2 is a longitudinal section on the line *x x*, Fig. 1. Fig. 3 is a vertical section on the line *y y*, Fig. 1, looking toward the rear. Fig. 4 is a vertical section on the line *z z*, Fig. 1, looking from the front of the boiler. Fig. 5 is a front view, enlarged, showing the detail on the line *v v*, Fig. 6, the steam-pipe *sp* being cut off, and the nipple *n* being in section. Fig. 6 is a longitudinal section of the supply and distributing pipes and nipple, showing the connections of the parts enlarged.

In detail, B is the boiler and S is the stack. 1 1 are the outer inclosing-walls, of brick.

2 2 are the fire-walls, which are carried up over the boiler, as shown in Fig. 4, at each end, and a covering, 2c, Fig. 1, is carried over the top of the boiler, connecting the ends of the walls 2, forming an expansion and heating chamber, *ha*, between the cover and the boiler, this chamber *ha* extending down the sides of the boiler and connecting with the combustion-chamber *ch*. The outer walls, 1, are also carried up over the boiler at each end, as shown in Fig. 4, and a cover 1c, Fig. 2, is carried up over the top of the boiler, resting at each end on wall 1, forming a dead-air chamber, *ac*, between the two covers, to prevent radiation of heat. The outer cover, 1c, may be made of any suitable material.

ch is an expansion and combustion chamber, connected with the front combustion-chamber by opening *of*, and by *of'* with a secondary

expansion-chamber, *ch'*, between which and *ch* is a rear bridge-wall, W, the top of chamber *ch'* being covered over, and the chamber itself opening directly into the flues Bf of the boiler B.

ac' is a continuous air-space, between the outer and fire walls, as shown in Fig. 2. An opening is formed in the fire-walls 2 on either side, the ash-pit connecting the latter with the air-space *ac'*, so as to supply air from the ash-pit to the pipe *dp*. These openings are shown at *o'* in Fig. 3.

bs is the boiler-support, built up from wall W, central under the boiler, so as to stop the direct passage of the heated gases and deflect them into the open spaces *ha'* on either side the support *bs*, as shown in Fig. 4. The impact against *bs* is followed by a rebound of the heated gases, which tend to return again to the expansion-chamber *ch*, and assist in maintaining therein a uniform degree of heat, as hereinafter described.

Between the combustion-chamber proper and the expansion-chamber *ch* is a front bridge-wall, *bw*, extending from the bottom to within a suitable distance of the boiler, leaving the opening *of* as a means of communication between the two chambers. In the center of the wall *bw* is formed an air-flue, *af*, constructed as shown in Figs. 1 and 3. The air enters from the ash-pit, under the grate-bars *g*, through openings *af'*, into the space *af* behind the front part of the wall *bw*, which, being next the fire, is hot, and therefore heats the current of air passing behind it through the space *af*, and this air thus heated passes out into the fire-chamber through upper openings, *af'*, which are preferably made smaller in area than the lower openings, *af'*, to increase the force of the air-current.

In order to supply more air to the furnace than would be drawn through the grate-bars in the ordinary way, I provide distributing-pipes *dp*, which are placed in the air-spaces *ac'*, Fig. 2, one on either side the fire-chamber, the forward ends of which are open, except a bridge, *b*, Fig. 5, across the center, leaving openings *o* above and below it, for the free admission of air from the air-space *ac'*. In the center of the bridge *b* is an opening through which a smaller pipe or nipple, *n*, is passed, having an injecting-nozzle, I, on the

inner end. This small pipe *n* passes through the furnace-front *F* a short distance, and is covered with an ordinary screw-cap, *C*.

From the distributing-pipe *dp* extend upward at suitable distances apart a series of smaller pipes, *p p p*, which are bent at right angles and pass through the fire-walls 2 a short distance above the grate-bars, so as to discharge air into the fire-chamber above the burning mass of fuel. A steam-pipe, *sp*, is connected by a *T* with the pipe *n*, for forcing the air through the pipe *dp* and pipes *p* into the fire-chamber when desired.

sp' is a branch connecting the pipe *sp* with any other distributing-pipe.

ap is the ash-pit, and *wp* is an inclined water-pan at the bottom, for keeping the ash-pit cool, constructed so that the water at the rear is deeper than in front, as shown by dotted line in Fig. 1. The rear end of the distributing-pipe *dp* is closed by a screw-cap, as shown in Fig. 6.

d is the fire-door; *d'*, the ash-pit door, and *d'* doors for cleaning the chambers *ch ch'*.

In Fig. 4 the letter *W* is intended to represent the wall *W* between the chambers *ch ch'*.

By my device I accomplish the following results: All the air in the ash-pit that cannot get up through the grate-bars is carried through the openings *af'* into the air-flue *af*, there heated and carried into the fire-chamber through the upper openings, *af'*, thus providing an additional quantity of oxygen to produce perfect combustion. Another supply of air for this purpose is provided by the pipes *p* on either side, the latter being capable of regulation, more or less, by the man in charge, while the supply through *af* is constant.

The spaces *ha'*, as will be observed, are preferably circular in shape and are limited by such a construction of the wall *W* that their total area is less than that of the boiler-flues. The object of this is to delay the passage of the products of combustion from the combustion-chambers, so that a greater per cent. of the gases will be consumed than is ordinarily the case, and at the same time equalize the heat throughout the combustion-chambers.

The continuous air-chamber *ac'* between the fire-walls and outer walls prevents an unequal expansion of the fire-walls and acts as a non-conductor, preventing radiation from within to the outside, and at the same time keeps the cold air out.

I am aware that air-spaces between outer and inner walls are not new; but I believe that no continuous air-space like mine has been heretofore known or used. Where the outer and inner walls are connected in sections, the unequal expansion of the inner or fire wall is not prevented.

The pipe *u* is extended through front *F*, for facility in cleaning it, and is capped to prevent the steam from coming out.

The draft through openings *o* in pipe *dp*, Fig. 5, carries up with it all foul gases in the

continuous air-space *ac'*, and keeps them from passing out through the walls or in any other way. They are thus carried to the fire and burned up.

What I claim, and desire to secure by Letters Patent, is the following:

1. The distributing-pipe *dp*, with supply-pipes *p* connected therewith and adapted to discharge air into the fire-chamber, inclosed in air-space *ac'*, the latter communicating with the ash-pit through fire-wall through openings *O'*, all combined substantially as described.

2. The distributing-pipe *dp*, with supply-pipes connected therewith and adapted to discharge air into the fire-chamber, the steam-pipe *sp*, with means for connecting the same with pipe *dp*, the air-space *ac'*, communicating with the ash-pit through openings *O'* in the wall between them, all combined substantially as described.

3. The nipple *n*, connected with the steam-pipe *sp*, and provided with nozzle *I*, the latter entering the distributing-pipe *dp*, the front end of the pipe *u* passing through the front *F*, with means for closing such end, all combined substantially as described.

4. In a furnace for steam-boilers, the front fire-chamber, the bridge-wall *bw*, provided with air-flue *af'*, the chamber *ch*, the wall *W*, the secondary chamber *ch'*, the boiler *B*, and stack *S*, all combined substantially as described.

5. In a furnace for steam-boilers, the outer wall, 1, inner wall, 2, with continuous air-space *ac'* between, front fire-chamber, wall *bw*, expansion-chamber *ch*, wall *W*, chamber *ch'*, boiler *B*, and stack *S*, all combined substantially as described.

6. In a furnace for steam-boilers, inner wall, 2, having top *2c*, with space *ha* between it and the boiler, outer wall, 1, cover *1c*, having space *ac* between it and wall 2, with continuous space *ac'* between walls 1 and 2 on sides and rear end, front combustion-chamber, wall *bw* with air-flue *af'* and its receiving and discharging ports, chamber *ch*, wall *W*, chamber *ch'*, boiler *B*, and stack *S*, all combined substantially as described.

7. In a furnace for steam-boilers, a front fire-chamber inclosed in outer and inner walls, with air-space *ac'* between, and backed by a bridge-wall, *ba*, provided with air-flue *af*, having receiving and discharging ports above and below the grate-bars, the pipes *dp* for distributing, and pipes *p* for supplying, air to the fire-chamber, the steam-pipe *sp*, with its connections, for forcing a current of air through pipes *dp* and *p*, the chamber *ch*, wall *W*, chamber *ch'*, boiler *B*, and stack *S*, all combined substantially as described.

In witness whereof I have hereto set my hand this 6th day of September, 1883.

LEWIS METESSER.

Witnesses:

C. P. JACOBS,
F. J. VAN VORHIS.