Jan. 2, 1923. 1,440,753.

R. H. WAGER.

AIR SUPPLY WALL FOR FURNACES.

FILED OCT. 24, 1918. 6 SHEETS—SHEET 1.

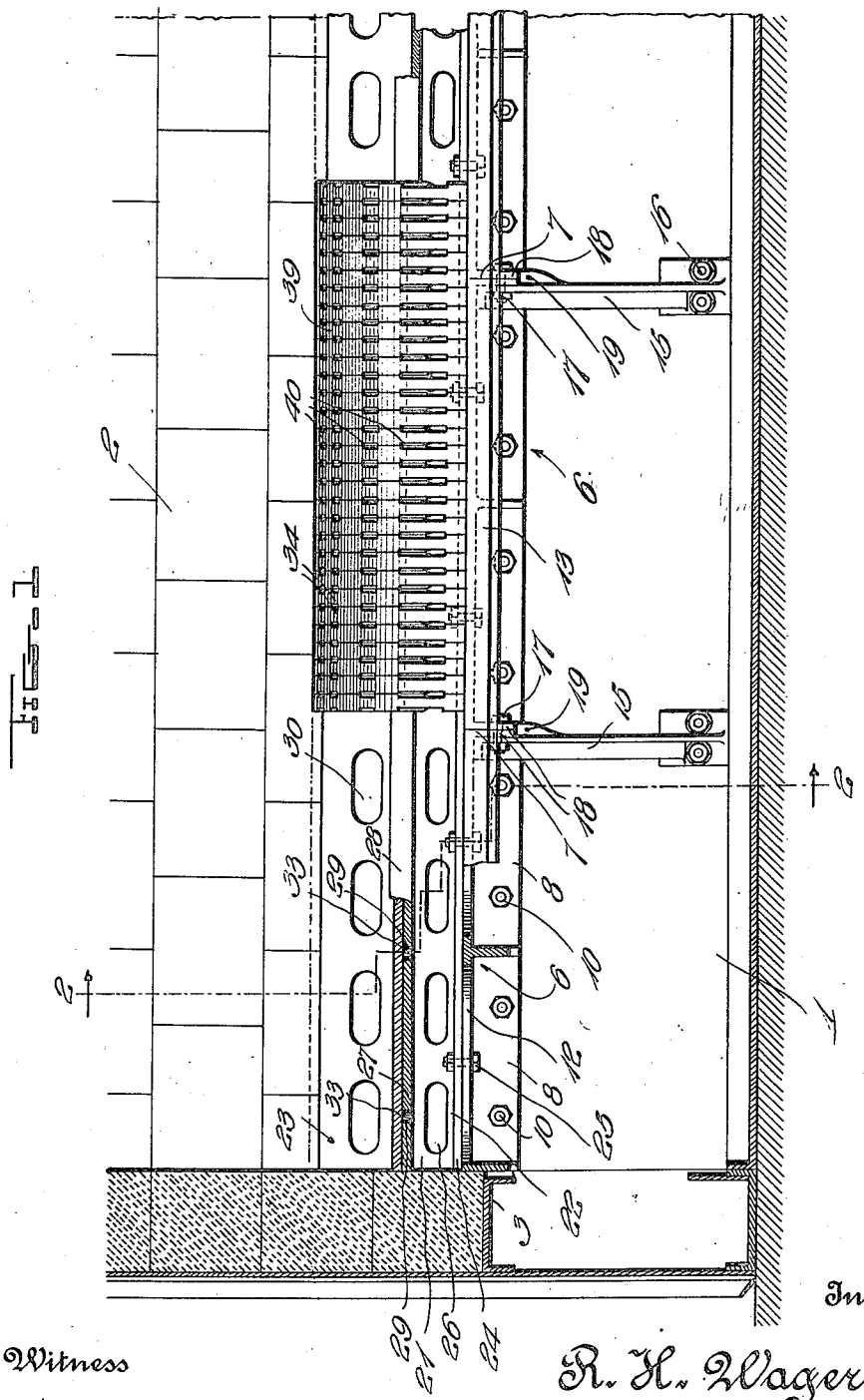

Fig. 1.

Witness

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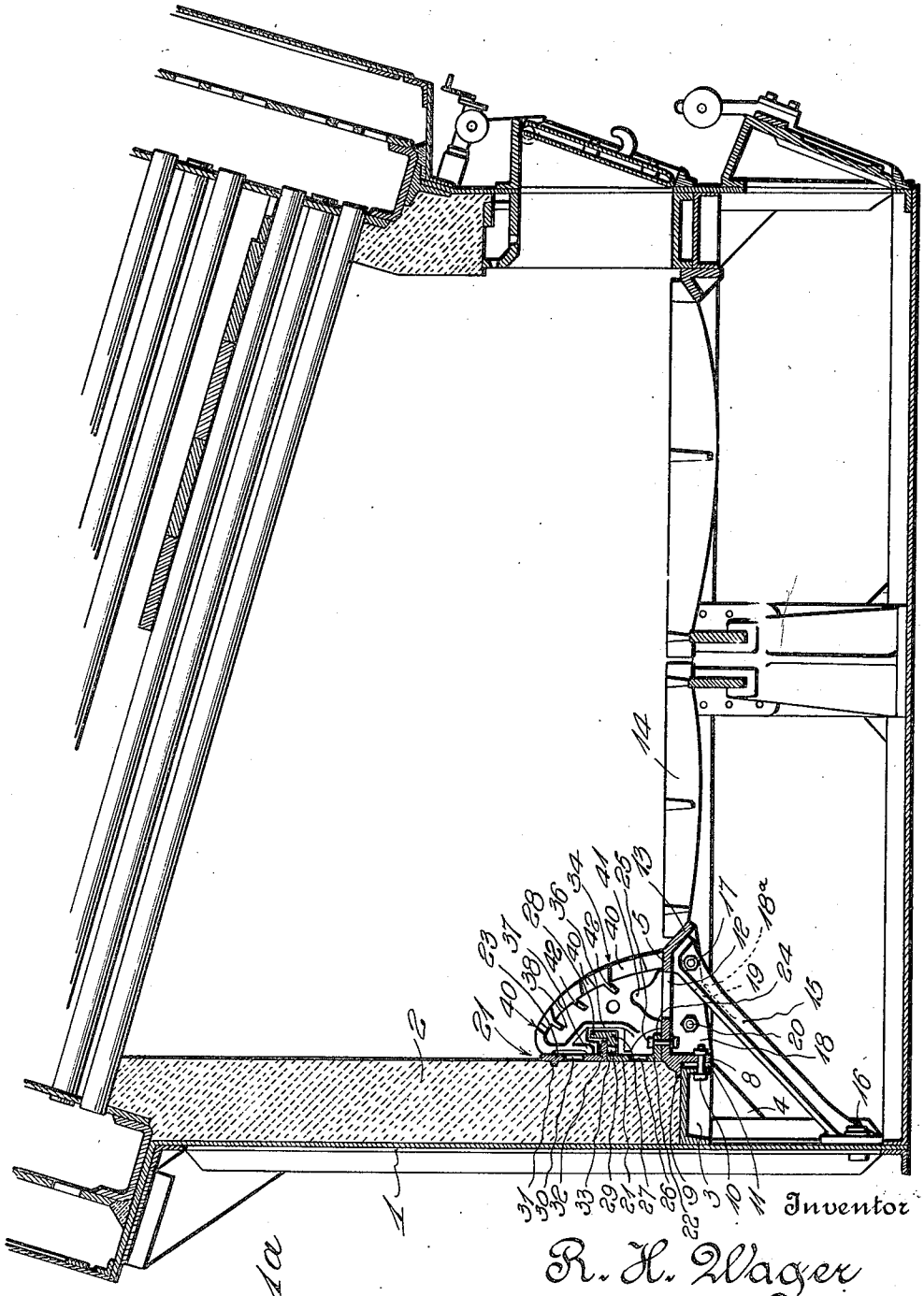

Fig. 1a

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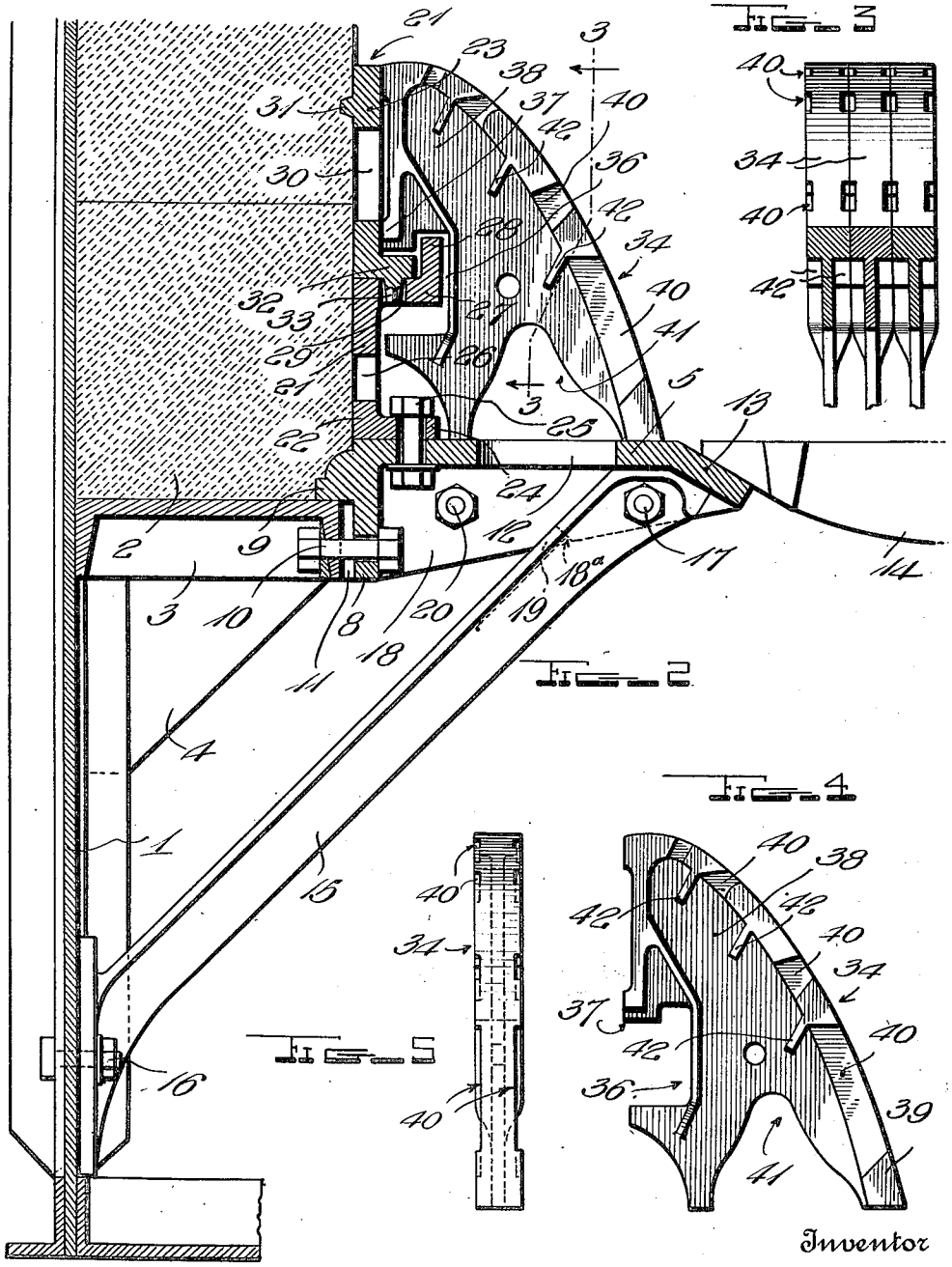

FIG. 2

FIG. 3

FIG. 5

FIG. 4

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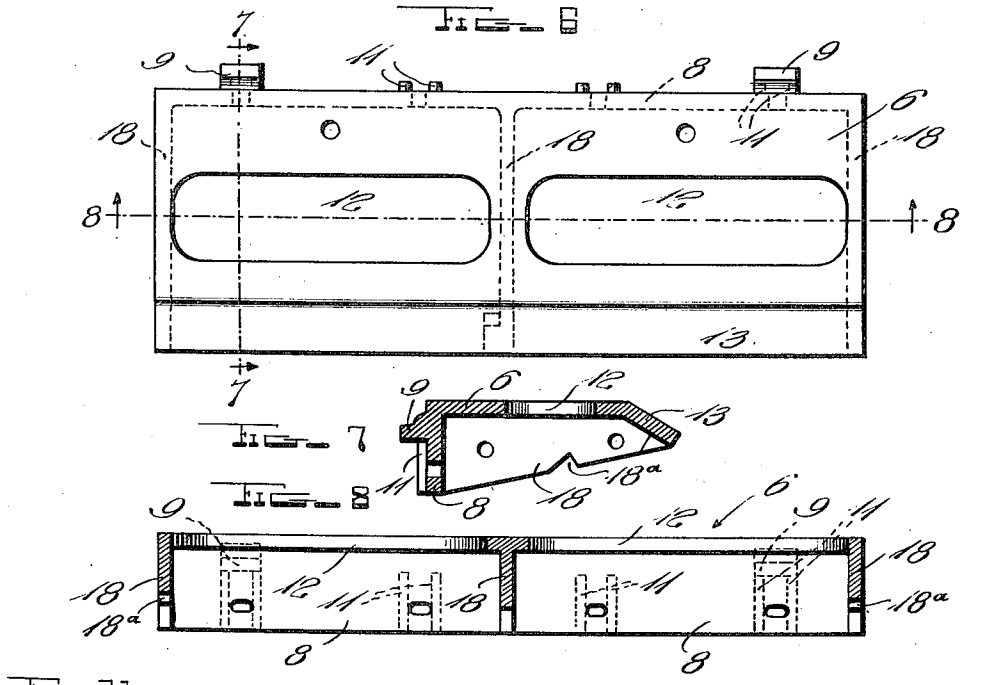

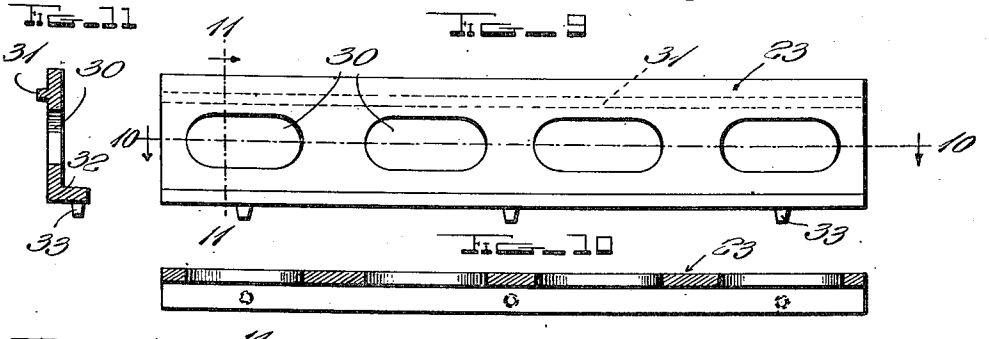

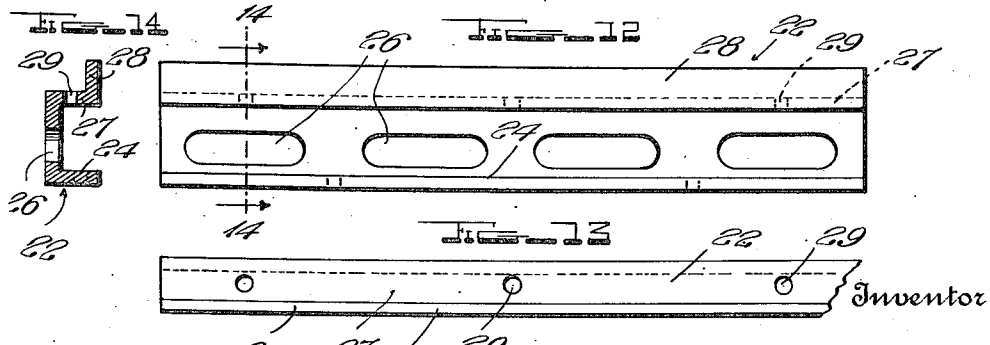

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AIR SUPPLY WALL FOR FURNACES.

FILED OCT. 24, 1918. 6 SHEETS—SHEET 5.

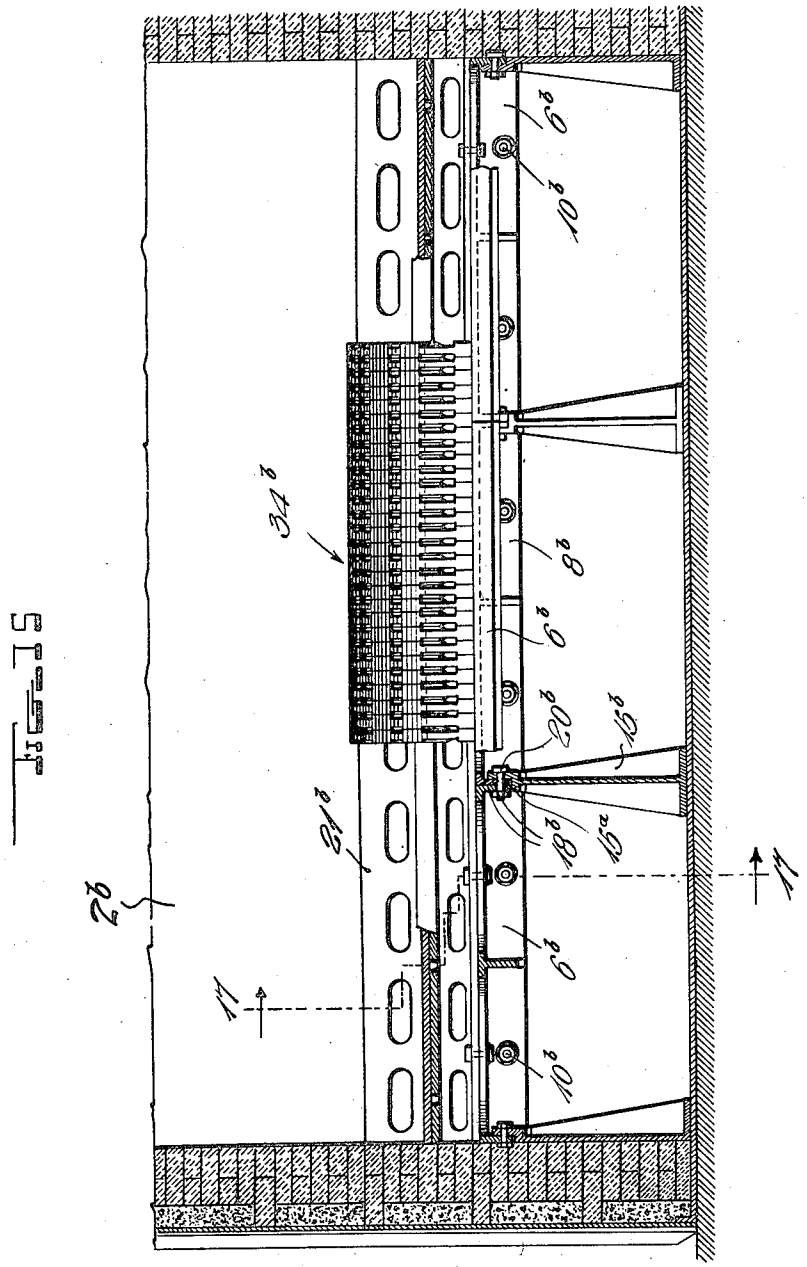

FIG. 15

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AIR SUPPLY WALL FOR FURNACES.

FILED OCT. 24, 1918. 6 SHEETS—SHEET 6.

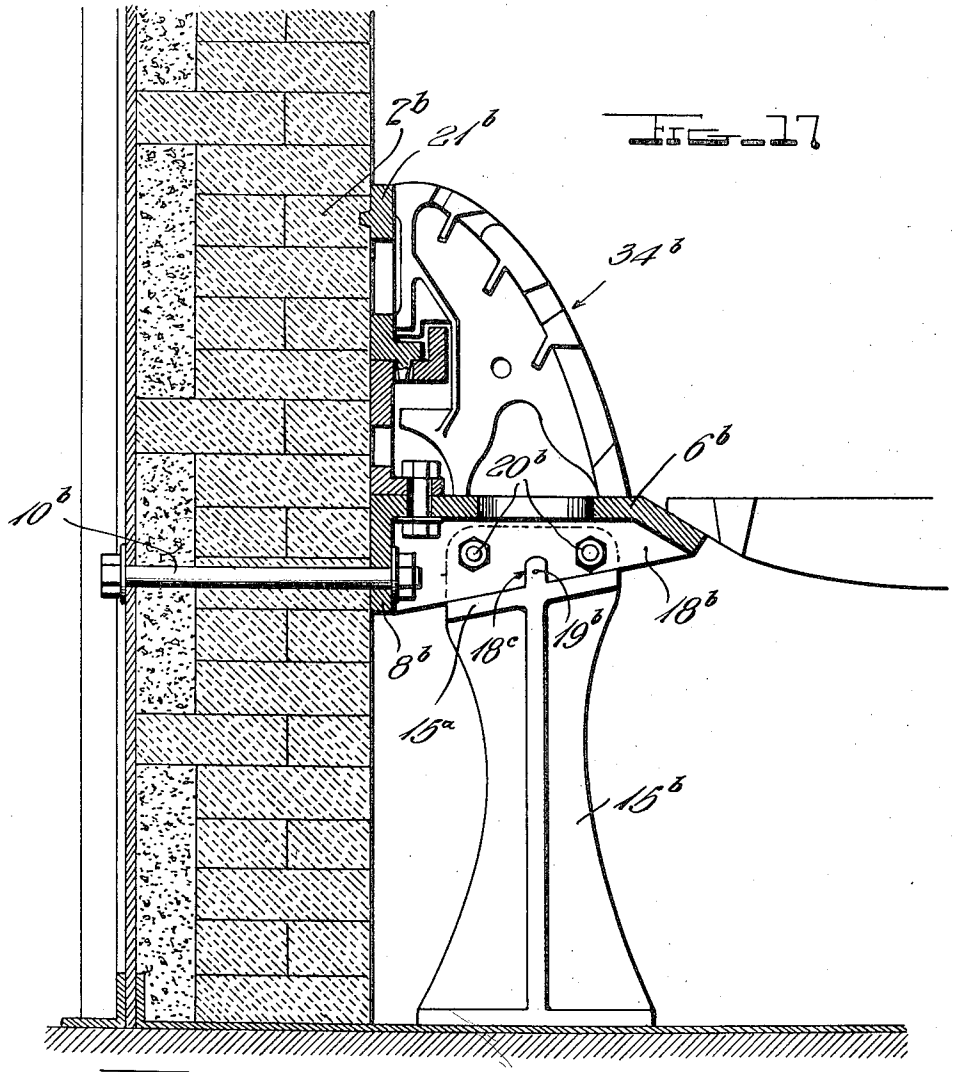

FIG. 17

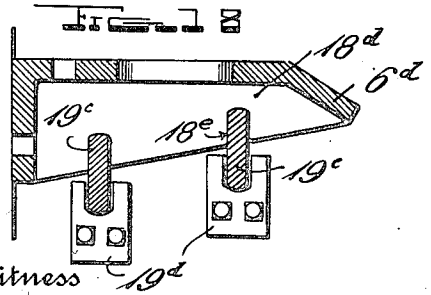

FIG. 18

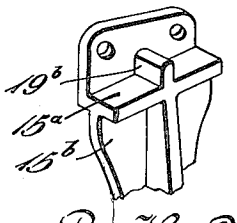

FIG. 16

Witness

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Patented Jan. 2, 1923. 1,440,753

UNITED STATES PATENT OFFICE.

ROBERT H. WAGER, OF JERSEY CITY, NEW JERSEY.

AIR-SUPPLY WALL FOR FURNACES.

Application filed October 24, 1918. Serial No. 259,501.

To all whom it may concern:

Be it known that I, ROBERT H. WAGER, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Air-Supply Walls for Furnaces; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates in general to an air supply wall formed of vertical sections disposed side by side and provided with means for feeding air or other fluid to the rear of the fire to increase combustion in the fire box and lessen the tardy combustion and generation of heat formerly taking place in the smoke stack. For walls of this character, a horizontal plate and a preferably vertical back plate are employed to support the wall sections in the required manner, and it has been found that a one piece back plate is subject to great warping from the heat. Furthermore, it has been extremely arduous to install such a one piece device, due to its weight and the cramped quarters in which the work must be done.

One object of my invention is to construct both the horizontal and vertical plates of a plurality of sections which may easily be handled and installed, and at the same time to so connect the sections as to reduce the liability of warping the back plate.

A further object is to provide a connecting means for the sections of the back plate which will assist in anchoring the wall sections and which will be held in place by the weight of the latter.

Yet another object is the provision of a novel arrangement for mounting and bracing the horizontal wall supporting plate.

With the foregoing objects in view, the invention resides in the novel features of construction and unique association of parts hereinafter fully described and claimed, and shown in the accompanying drawings.

Figure 1 is a transverse section of a furnace fire box, looking toward the rear wall thereof and showing the invention applied, parts being removed, broken away, and in section.

Fig. 1ª is a longitudinal sectional view through the lower portion of a well known form of water tube boiler furnace, showing the application of my air supply wall thereto, in the angle between the furnace grate and the back wall of the furnace.

Fig. 2 is a vertical section on the planes indicated by the line 2—2 of Fig. 1.

Fig. 3 is a detail vertical section on the plane indicated by the line 3—3 of Fig. 2.

Fig. 4 is a side elevation of one of the wall sections.

Fig. 5 is an edge view of the wall section shown in Fig. 4.

Fig. 6 is a top plan view of one section of the horizontal wall supporting plate.

Fig. 7 is a transverse section on the plane of the line 7—7 of Fig. 6.

Fig. 8 is a longitudinal section on the plane of the line 8—8 of Fig. 6.

Fig. 9 is a front elevation of one of the upper sections of the back plate.

Figs. 10 and 11 are respectively longitudinal and transverse sections on the planes indicated by the lines 10—10 and 11—11 respectively of Fig. 9.

Fig. 12 is a front elevation of one of the lower sections of the back plate.

Fig. 13 is an upper edge view of the back plate section shown in Fig. 12.

Fig. 14 is a transverse section of Fig. 12 on the plane of the line 14—14 thereof.

Fig. 15 is a view similar to Fig. 1 but illustrating different supporting means for the sectional horizontal plate upon which the wall is mounted.

Fig. 16 is a fragmentary perspective view of one of the supports shown in Fig. 15.

Fig. 17 is a vertical section on the plane of the line 17—17 of Fig. 15.

Fig. 18 is a detail section similar to a portion of Fig. 17 but showing a still further form of support for the plate upon which the wall is mounted.

In Figures 1 to 14 of the drawings above briefly described, the numeral 1 designates the back of the furnace of a water tube boiler, the inner side of said back being provided with a wall 2 of fire-brick and clay or the like resting upon a channel iron beam or other suitable support 3, which beam is braced as seen at 4. All of this construction is common and well known and is merely illustrated to disclose the application of the present invention.

A horizontal supporting plate 5 is provided for the air supply wall, said plate being formed of a plurality of elongated sections 6 abutting at their ends as seen at 7 in Figure 1, the rear edge of each section

6 being provided with a depending vertical flange 8 and with a plurality of rearwardly extending lugs 9 which are preferably cast on said flange. The lugs 9 are inset in the lower end of the wall 2 by chipping the latter away sufficiently and said lugs rest upon the beam 3 to support the greater part of the weight of the plate sections, said sections being secured in place by means of bolts 10 passing through the flanges 8 and through the adjacent flange of said beam. It often happens that the beam 3 is of more or less irregular formation and in order that the plate sections 6 may be securely fastened to the same nevertheless, it is highly desirable to provide the rear side of the flanges 8 with vertical ribs 11 (see more particularly Figs. 2, 6, 7 and 8). These ribs are adapted to be chipped away by a cold chisel or the like when the plate sections 6 are installed and thus any irregularities in the beam 3 may be compensated for by removing more or less of the ribs where required.

Between their edges, the sections 6 are provided with elongated openings 12 adapted to supply air to the sectional wall yet to be described, and at their front edges of said sections turn downwardly or are otherwise suitably shaped at 13 to support the rear end of the grate 14. Suitable braces 15 are secured at 16 to the furnace back 1 and the upper ends of these braces fit snugly in the angle between the horizontal portions of the plate sections 6 and the down-turned edges 13 thereof, thus relieving strain from the bolts 17 which are employed to anchor the upper ends of said braces. The abutting ends of the plate sections 6 are provided with depending flanges 18 and the bolts 17 pass through these flanges and through the braces 15. Each of these braces is provided with a lateral shoulder 19 underlying both of the adjacent flanges 18 and received in notches 18a in said flanges to assist in supporting the weight of the connected ends of the plate sections. In addition to the connection between the plate sections afforded by the bolts 17, additional bolts 20 are preferably passed through the flanges 18.

Rising from the rear edge of the sectional plate 5 and resting against the wall 2, is a back plate 21 which is formed of a plurality of lower sections 22 detailed in Figs. 12, 13 and 14, and a plurality of upper sections 23 which are featured in Figs. 9, 10 and 11. The several sections 22 abut each other at their ends and each of said sections is provided along its lower edge with a lateral flange 24 adapted to be secured by bolts 25 to the plate 5, the intermediate portions of said sections having a plurality of longitudinal slots 26 to decrease weight and permit expansion and contraction of the plate sections without warping and consequently diminish warping. The slots 26 also permit any air rising in rear of the back plate to return to the air supply wall. The upper edges of the sections 22 are each provided with a forwardly extending flange 27 positioned horizontally and with a vertical flange 28 rising from the front edge of the flange 27, said flange 27 being provided with spaced sockets 29 for a purpose to appear.

Each of the upper sections 23 is in the form of a flat plate having slots 30 for the same purpose as the slots 26, the upper portion of each section having a rib 31 on its rear side inset in a groove which is chipped in the wall 2, whereby to form an air seal, while the lower edge of each section is provided with a forwardly extending horizontal flange 32 having depending studs 33 cast thereon. The flanges 27 and 28 of the lower sections 22 form a seat for the lower edges of the upper sections 23 and the studs 33 are received in the sockets 29 to prevent any great amount of shifting between the upper and lower sections, while permitting slight loose movement thereof under changes in temperature. The manner in which the upper and lower sections of the plate 21 engage each other is best illustrated in Fig. 2.

The air supply wall is composed of a plurality of substantially flat vertical sections 34 which are shown applied in Figs. 1 and 2 and are detailed in Figs. 3, 4 and 5. Each section 34 is provided in its rear edge with a notch 36 and at the upper end of said notch with a hook 37, the notch receiving the flanges 27 and 28 while the hook passes over the latter and rests immediately above the flange 32. By this arrangement, it will be seen that the flange 28 and the hooks 37 will anchor the sections 34 until they are first shifted upwardly, and in addition it may be pointed out that the weight of the sections 34 will retain the studs 33 properly received in the sockets 29, due to the disposition of the hooks 37. The weight of the fire bed resting on the wall also assists in this operation.

The sides of the sections 34 are provided with shallow recesses 38 and with ribs 39, the latter being located along the front edge portions of the sections and having notches 40 of various lengths and disposition to supply air from the recesses 38 just above the fire bed, the notches being of the requisite size and location to produce the best results. The air rises through the openings 12 into a longitudinal channel formed in the wall by registering notches 41 in the lower ends of the sections 34, and in order to guide such air through the notches 40 and at the same time to carry heat away from the ribs 39, other ribs 42 extend inwardly from said ribs 39 as shown clearly in Figs. 2, 3 and 4. The ribs 39 may be located to the best advantage

but the arrangement illustrated is preferable.

In the form of the invention shown in Figs. 15, 16 and 17, the supporting plate for the wall 34^b is formed of abutting sections 6^b similar to the sections 6 above described, but the vertical flanges 8^b of the sections 6^b are provided with no lugs 9 or ribs 11. This form of the device is intended to be secured by bolts 10^b to a furnace wall 2^b which is constructed entirely to the floor of the furnace from fire-brick, fire-clay or the like, the bolts 10^b being passed entirely through the wall and through the flange 8^b as shown clearly in Fig. 17. The end flanges 18^b of the sections 6^b are provided in their lower edges with notches 18^c receiving projecting lugs 19^b, said lugs being formed on substantially horizontal flanges 15^a on the upper ends of suitable pedestals or braces 15^b which perform substantially the same functions as the braces 15, that is, supporting a great part of the weight resting upon the supporting plate of the wall 34^b. The pedestals 15^b are vertically disposed and rest upon the bottom of the furnace and their upper ends are secured by bolts 20^b to the flanges 18^b.

When converting the furnace for the use of oil, this may be quickly and easily done by removing the sections of the air supply wall lifting the upper sections of the back plate 21^b from the lower sections thereof, removing the grate, and withdrawing the bolts 10^b and 20^b. Also the air supply wall and its supporting means may be reinstalled with ease.

In Fig. 18 a section 6^d of a wall supporting plate is shown, this section being identical with the sections 6^b above referred to with the exception that its end flanges 18^d are provided with two or more notches 18^e in their lower edges. These notches receive the upper edges of transverse bars 19^c which extend entirely across the furnace and are supported at their ends in suitable brackets 19^d secured to the sides of the furnace. This method of upholding the supporting plate of the air supply wall may in some instances be preferable and it also will permit quick and easy installation and removal of the entire device.

The features not specifically described in connection with Figures 15, 16, 17 and 18, are identical with the corresponding parts of the first described form of the invention and need not therefore be entered into in detail.

From the foregoing, taken in connection with the accompanying drawings, it will be obvious that I have provided a simple arrangement of parts for carrying out the objects of the invention and since probably the best results are obtained from the construction and arrangement disclosed, it is preferably followed. I wish it understood however that within the scope of the invention as claimed, numerous minor changes may well be made.

I claim:

1. The combination with a furnace wall, of a horizontal plate having on one edge a depending flange secured against said wall, the other edge of said supporting plate being adapted to support a grate, a back plate resting against said wall and having on its lower edge a lateral flange detachably secured to said supporting plate, said back plate being formed of upper and lower sections having contacting horizontal flanges on their adjacent edges, means for holding these flanges against excessive relative shifting while permitting slight movement thereof under changes of temperature, and an air supply wall resting on said supporting plate and bearing against said back plate.

2. The combination with a furnace wall, of a support extending from said furnace wall, a back plate rising from and extending along the rear edge of said support, the rear side of said plate resting flat against said wall, said plate being formed of upper and lower sections supported one upon the other, one section having sockets and the other being provided with studs received removably in said sockets, an air supplying wall formed of vertical sections resting on said support and against the front side of the upper section of said back plate, and means for anchoring said wall sections.

3. The combination with a furnace wall, of a support extending from said furnace wall, a back plate rising from and extending along the rear edge of said support, said plate resting against said wall and being formed of upper and lower sections supported one upon the other, the abutting edges of said sections having projecting flanges, one flange being provided with sockets and the other having studs received in said sockets, an air supplying wall resting on said wall support and against said back plate, and means for anchoring said wall.

4. The combination with a furnace wall, of a support extending from said furnace wall, a back plate rising from and extending along the rear edge of said support, said plate resting against said wall and being formed of upper and lower sections supported one upon the other, the upper edge of the lower section having a horizontal flange and a vertical flange rising from said horizontal flange, said flanges forming a seat in which the upper section rests, an air supplying wall resting on said support and against said back plate and means for anchoring said air supplying wall.

5. The combination with a furnace wall, of a support extending from said furnace wall, a back plate rising from and extending along the rear edge of said support, said

plate resting against said wall and being formed of upper and lower sections supported one upon the other, the upper edge of the lower section having a horizontal flange and a vertical flange rising from said horizontal flange, said flanges forming a seat in which the upper section rests, said horizontal flange having sockets and said upper section being provided with studs received in said sockets, an air supplying wall resting on said support and against the back plate, and means for anchoring said air supplying wall.

6. The combination with a furnace wall, of a support extending from said furnace wall, a back plate rising from and extending along the rear edge of said support, said plate resting against said wall and being formed of upper and lower sections supported one upon the other, means loosely connecting said plate sections, an air supplying wall formed of vertical sections resting on said support and against said back plate, and means on said air supplying wall sections coacting with said plate section connecting means to anchor said bridge wall sections.

7. The combination with a furnace wall, of a support extending from said furnace wall, a back plate rising from and extending along the inner edge of said support, said plate resting against said wall and being formed of upper and lower sections supported one upon the other, the upper edge of the lower section having a horizontal flange and a vertical flange rising from said horizontal flange, said flanges forming a seat in which the upper section rests, and an air supplying wall formed of vertical sections resting on said support and against said back plate, said air supplying wall sections having anchoring hooks engaging said vertical flange.

8. The combination with a furnace wall, of a support extending from said furnace wall, a back plate rising from and extending along the rear edge of said support, said plate resting against said wall and being formed of upper and lower sections supported one upon the other, the abutting edges of said plate sections having horizontal flanges provided with interengaging studs and sockets and the lowermost of said horizontal flanges being provided with a vertical flange extending above the other horizontal flange, and an air supplying wall formed of vertical sections resting on said support and against said back plate, said wall sections having anchoring hooks engaging said vertical flange and disposed over the uppermost of said horizontal flanges to retain the studs and sockets in engagement.

9. A horizontal wall supporting plate anchored at one edge and having its other edge turned downwardly to support a furnace grate, and an additional detachably secured support for said plate whose upper end seats in the angle between the horizontal and downwardly extending portions thereof.

10. A horizontal wall supporting plate including two sections abutting at their ends and anchored at one edge, and an additional detachably secured support for said plate sections having its upper end secured thereto in position to support both abutting ends thereof.

11. A horizontal wall supporting plate including two sections abutting at their ends and anchored at one edge, the abutting ends of said plate sections having depending flanges, an additional support for said abutting ends provided with shoulder means underlying both flanges, and a bolt passing through said flanges and additional support.

12. A back plate section for air supply walls comprising a horizontally elongated plate adapted to be secured upon and to project upwardly from a supporting plate, said horizontally elongated plate having a laterally extending horizontal flange along its upper edge and an upwardly extending flange along the edge of said horizontal flange, said horizontal flange being provided with spaced openings adapted to receive studs on an upper plate section.

In testimony whereof I have hereunto set my hand.

ROBERT H. WAGER.