W. N. BEST.

FLUID INJECTING ATTACHMENT FOR FURNACES.

APPLICATION FILED MAR. 16, 1916.

1,206,292.

Patented Nov. 28, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

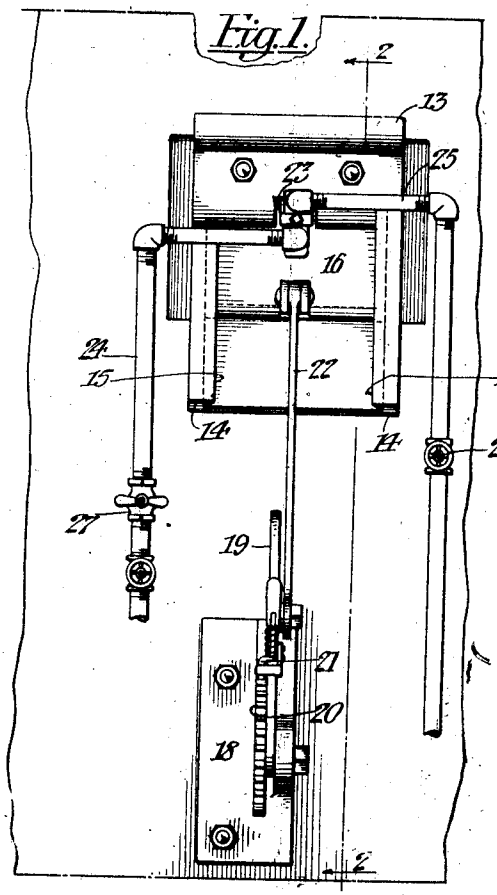


Fig. 2.

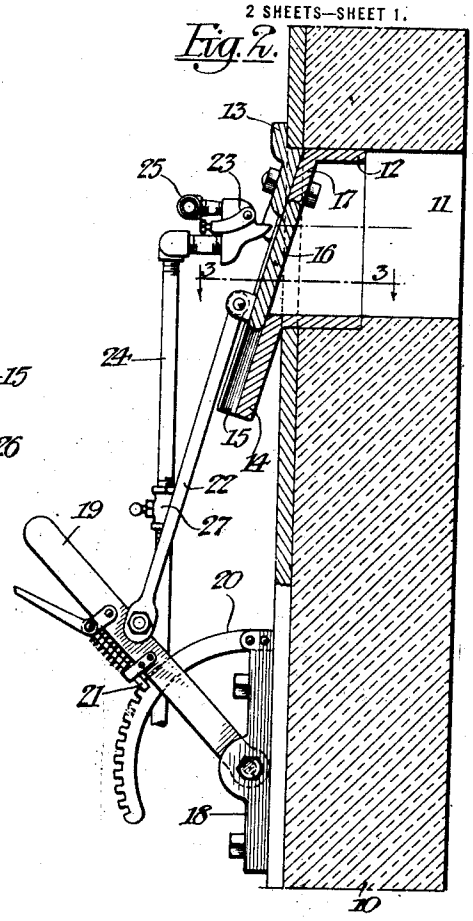
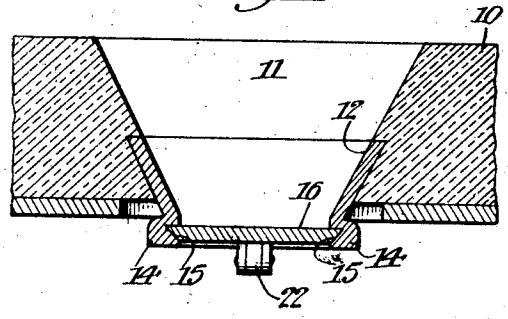


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

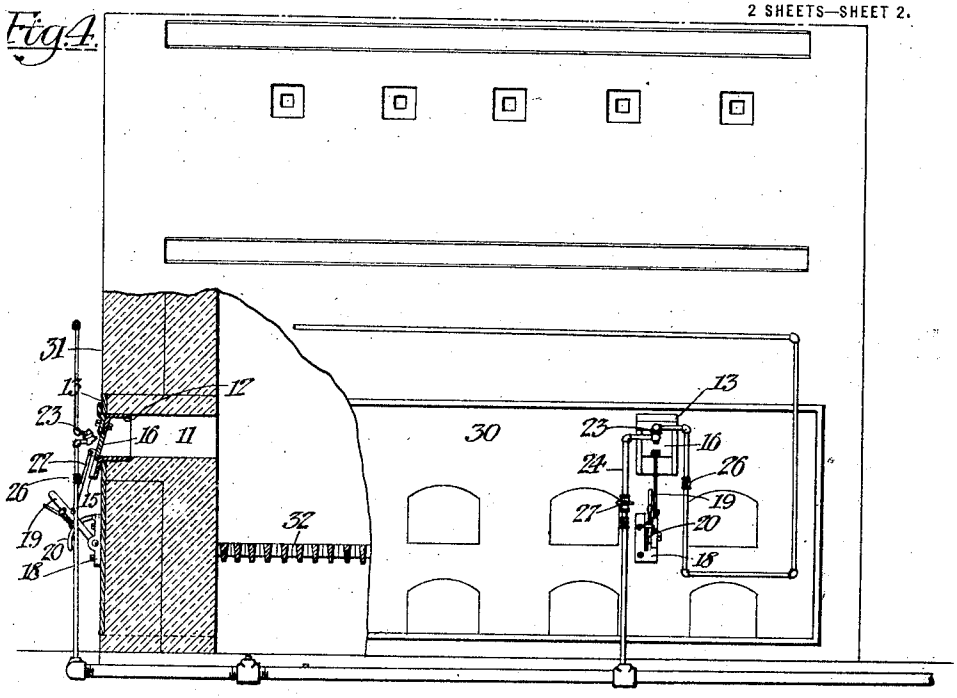
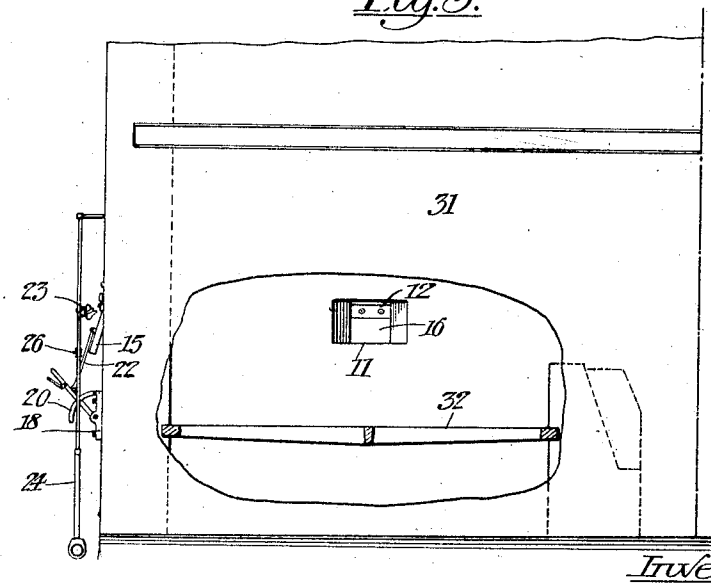


Fig. 5.



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UNITED STATES PATENT OFFICE.

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FLUID-INJECTING ATTACHMENT FOR FURNACES.

1,206,292. Specification of Letters Patent. Patented Nov. 28, 1916.

Application filed March 16, 1916. Serial No. 84,545.

To all whom it may concern:

Be it known that I, WILLIAM N. BEST, a citizen of the United States, and resident of New York city, borough of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Fluid-Injecting Attachments for Furnaces, of which the following is a specification.

This invention relates to certain improvements in furnaces and more particularly to certain improvements adapted for use in connection with furnaces burning coke, coal or other solid fuel.

My invention involves improved means for injecting and admitting fluid to the combustion chamber above the fire bed.

The device may be utilized for injecting liquid fuel and combustion supporting air so as to greatly increase the temperature in the furnace, and adapted to carry a big load, or it may be used for admitting air to facilitate the combustion of the gases and carbonaceous particles rising from the fire bed, and the securing of the maximum combustion action and the elimination of all smoke. It may be brought into or out of use at will and thus when burning oil, may take care of fluctuating loads and increase very materially the efficiency of the boiler, or when used for consuming smoke, it may be brought into operation only when fresh fuel has been added to the fire.

I do not wish to restrict the use of my device to furnaces burning carbonaceous or other solid fuel as it may be used in forging furnaces or in various other ways where a quick heat is desired by the use of liquid fuel.

Reference is to be had to the accompanying drawing illustrating one embodiment of my invention and in which similar reference characters indicate corresponding parts in the several views.

In these drawings: Figure 1 is an outside face-view of a device constructed in accordance with my invention; Fig. 2 is a central vertical section substantially on the line 2—2; Fig. 3 is a transverse section on the line 3—3 of Fig. 2; Fig. 4 is a front view of a furnace, a portion thereof being broken away and showing two of my improved constructions employed in connection therewith; and Fig. 5 is a side view of a furnace, a portion thereof being broken away.

In the specific construction illustrated in Figs. 1, 2 and 3, I have shown a furnace wall 10 of any suitable non-combustible heat receiving material and provided with an opening 11 therethrough. This opening may have substantially parallel top and bottom walls, but its side walls preferably flare inwardly as shown in Fig. 3 so that the inner end of the opening is of materially greater width than the outer end. Rigidly secured to the furnace wall at the opening is a cast iron box in the form of a collar or sleeve 12 projecting into the opening and held in place by the inwardly flaring sides of the collar as shown in Fig. 3 and by a plate or flange 13 bolted along the upper edge as shown particularly in Fig. 2. The lower edge of this plate 13 has an aperture or notch through which the burner or injector may deliver.

The collar has two side flanges 14, 14, which extend downwardly and outwardly and are provided with oppositely facing grooves 15 within which a closure plate 16 may slide. The edges of the plate may be tapered so as to fit within the grooves as shown in Fig. 3, while the upper edge of the plate may be curved so as to fit within a concave recess in the lower edge of a depending flange 17 integral with the upper side of the collar or sleeve. The plate 16 closes the notch or aperture in the plate 13 when in raised position, but when lowered, substantially the whole opening comes below the burner instead of above, or at the sides.

Rigidly secured to the outer surface of the furnace wall at a point below the opening 11 is a bracket 18 to which is pivoted a lever arm 19. Rigid with the bracket is a curved segment bar 20 and the lever carries a spring pressed dog 21 which may engage with the teeth of the segment to hold the lever arm 19 in any desired position. A link 22 is pivotally connected to the lever arm 19 and to lugs on the outer surface of the closure plate 16 so that the plate may be moved to or from the closing position and rigidly held in either limiting or intermediate position.

Supported just outside of the outer surface of the closure plate is a burner 23 which

may be constructed substantially as shown in my prior Patent No. 752,195, issued February 16, '04. The burner has a supply conduit 24 for delivering oil, tar, or other liquid or semi-liquid fuel and a supply conduit 25 for delivering an expansible fluid such as air or steam. The supply to the burner may be regulated by suitable valves 26 and 27 in the supply conduits.

When the device is used to help carry a peak load or to take care of a temporary, but very high load, the closure plate 16 is lowered and the oil and expansible fluid are delivered to the burner. The oil is vaporized and delivered in a substantially fan-shaped sheet above the bed of the fire. It will be noted that the burner is located closely adjacent to the upper surface of the opening so that air may enter beneath the fan-shaped sheet of fuel vapor and properly support the combustion of this fuel. The closure plate 16 need be open to only a very slight extent to permit the injecting of this fuel, and the amount of air which acts to support the combustion may be regulated by raising or lowering the plate to the desired extent.

When the device is employed to consume the smoke and gases resulting from incomplete combustion of the solid fuel, either the oil regulating cock 27 or the cut-off valve may be shut and only steam or compressed air delivered through the burner. This will enter the combustion chamber in a substantially fan-shaped sheet and a considerable quantity of air will be drawn in from the atmosphere and beneath the burner by the injecting action of the expansive fluid. This will mingle with the smoke particles and the unconsumed gases and cause the combustion of both, thus increasing the efficiency of the furnace as well as saving fuel by the consumption of otherwise wasted fuels. The mechanical construction of the cast iron box or sleeve and its attachments is such that the maximum quantity of air may pass below the fan-shaped blanket of expansive fluid.

As previously stated, I do not wish to be limited to any particular type of furnace or particular location for my improved device. In Fig. 4 I have shown a furnace having a front wall 30, end walls 31 and a grate 32. I have shown one of the end walls as being provided with an inlet passage 11 and the cast iron box, closure and burner construction as shown in Figs. 1, 2 and 3, and have also shown the front wall as provided with a similar opening and fluid injecting devices. It will be noted that these inlets are disposed a sufficient distance above the grate so as to come above the fire-bed. The particular location and arrangement may be varied without departing from the spirit of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A furnace having an air inlet passage through the wall thereof and from the atmosphere to the fire box, the side walls of said passage flaring inwardly, a flange depending from the upper side of said passage at the outer end of the latter and having a recess in its lower edge, a vaporizer disposed adjacent the outer surface of said flange and opposite said recess and adapted to deliver a liquid fuel through said passage in a substantially fan-shaped sheet spaced above the lower side of said passage, and a closure slidable upwardly to vary the air inlet space below said vaporizer and adapted to engage with said flange and close said recess.

2. A furnace having an air inlet passage through the wall thereof, a flange depending from the upper side of said passage at the outer end of the latter and having its lower edge spaced above the lower side of said passage, a vaporizer disposed adjacent to the outer surface of said flange adapted to deliver vaporized fuel through said passage closely adjacent the lower side of said flange and a closure slidable upwardly past said vaporizer and into engagement with said flange to close said passage.

3. A furnace having an air inlet passage through the wall thereof, a cast iron box disposed within said passage and having its outer surface inclined at an angle to the plane of the wall and including two opposed guides, a closure plate slidable between said guides, a lever pivoted to the wall below said passage, a link connecting said lever and said closure plate, and means for locking said lever in position with said closure plate open to any desired extent.

4. A furnace having an air inlet passage through the wall thereof, a cast iron box disposed within said passage and having its outer surface inclined at an angle to the plane of the wall and including two opposed guides, a closure plate slidable between said guides, a lever pivoted to the wall below said passage, a link connecting said lever and said closure plate, means for locking said lever in position with said closure plate open to any desired extent, and means for delivering a substantially fan-shaped jet of expansible fluid through said passage in a line spaced a considerable distance above the lower wall of said passage.

5. A furnace having an air inlet passage through the wall thereof, the opposite side walls of said passage converging at their outer ends, a metal box having converging walls within the passage and serving to prevent outward movement of said box, a flange engaging with the outer surface of the furnace wall to prevent inward movement of

the box, said box having a pair of downwardly and outwardly extending spaced guides, a closure plate slidable between said guides to close said passage, and means adjacent the outer surface of said closure plate and adapted to deliver an expansible fluid inwardly through said passage when said closure is open.

Signed at New York city in the county of New York and State of New York this 14th day of March, A. D. 1916.

WILLIAM N. BEST.