2 Sheets--Sheet 1.

J. L. WINSLOW.

Device for Feeding Air to Furnaces.

No. 164,357. Patented June 8, 1875.

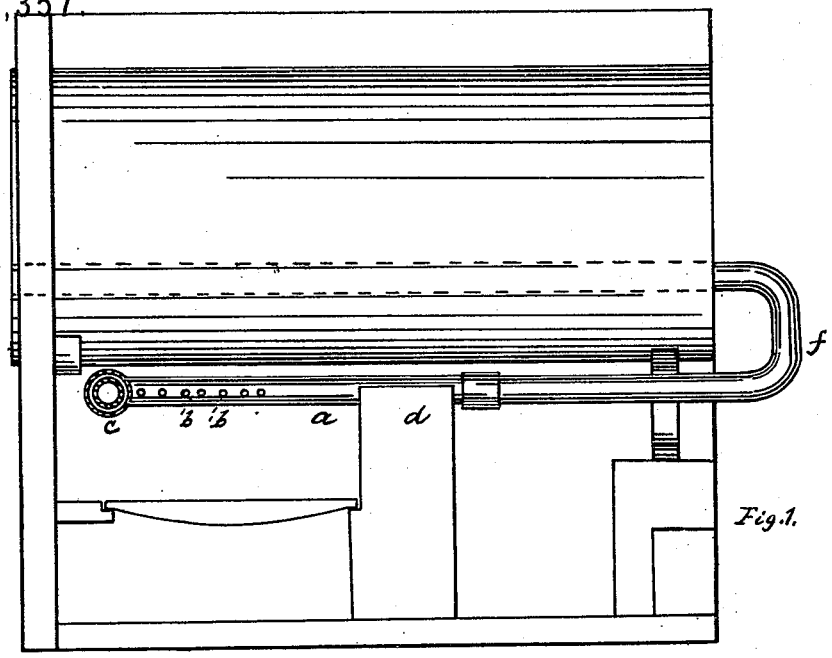

Fig. 1.

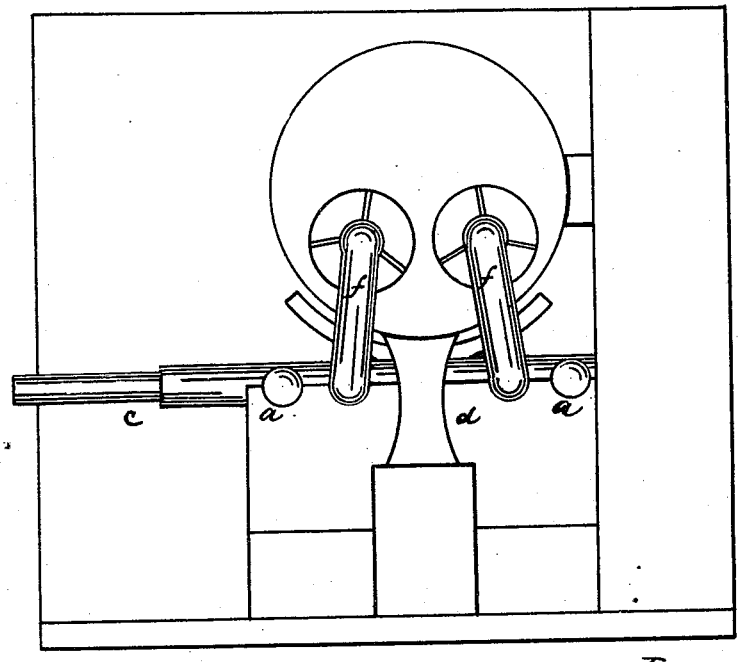

Fig. 2.

Witnesses
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Charles E. Clifford.

Inventor:
Joseph L. Winslow
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atty.

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

2 Sheets--Sheet 2.

J. L. WINSLOW.

Device for Feeding Air to Furnaces.

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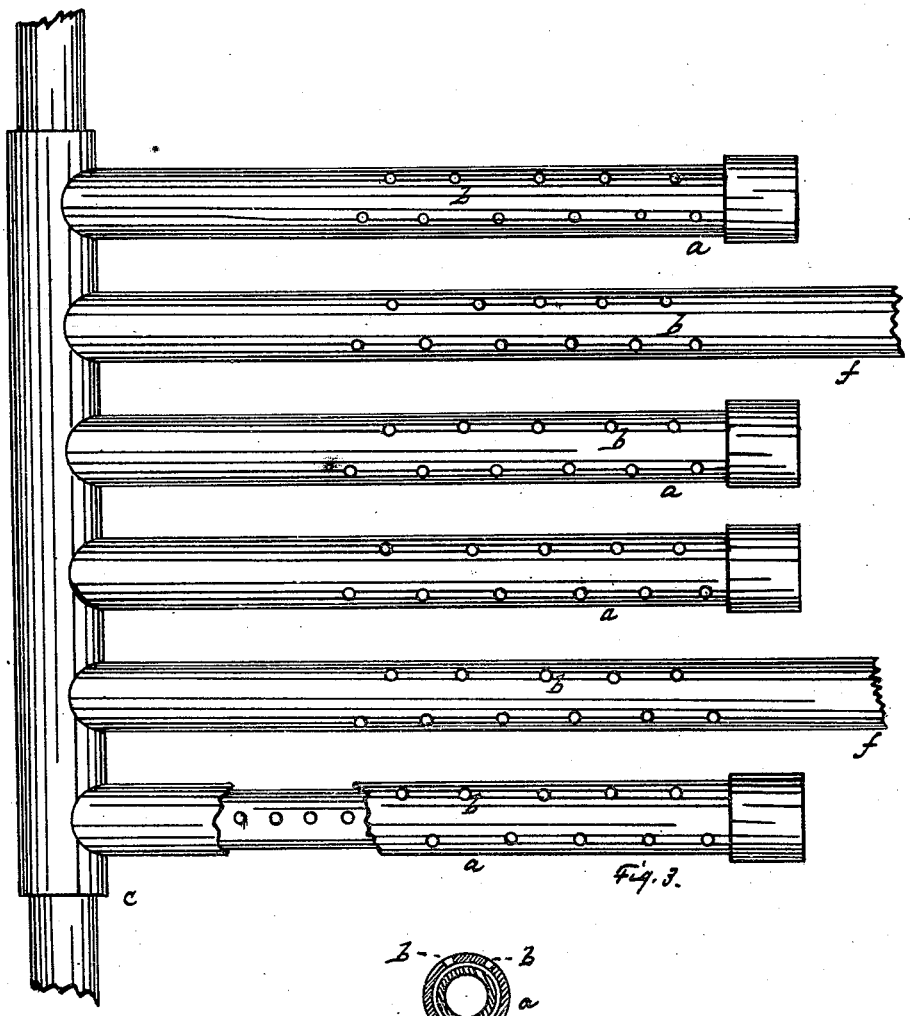

Fig. 3.

Fig. 4.

Witnesses:
Frank H. Jordan.
Charles E. Clifford.

Inventor:-
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UNITED STATES PATENT OFFICE.

JOSEPH L. WINSLOW, OF DEERING, MAINE.

IMPROVEMENT IN DEVICES FOR FEEDING AIR TO FURNACES.

Specification forming part of Letters Patent No. **164,357**, dated June 8, 1875; application filed May 3, 1875.

To all whom it may concern:

Be it known that I, JOSEPH L. WINSLOW, of Deering, in the county of Cumberland and State of Maine, have invented certain new and useful Improvements in Smoke-Consumers for Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a side view. Fig. 2 is an end view. Fig. 3 is a top-plan view of the air-pipes over the furnace. Fig. 4 is an end view, in section, of the outer and inner pipe, showing the arrangement of the perforations.

Same letters show like parts.

My invention relates to certain improvements and devices designed to augment the effective power of fuel for heating purposes, and also in the production of steam.

It is familiar that the presence of air is necessary to the combustion of any kind of fuel. With this view drafts have been arranged to a variety of furnaces and other structures of an analogous kind, by which an increased ingress of air to the fuel and the flame is provided. In all of these instances, I believe, the air has been drawn in either up through the fuel or in some other way by the natural action of the draft produced by the rarefaction of the air within the fire-chamber. These have produced beneficial results, and have increased the amount of heat derived from a given amount of fuel. Still the results have been but partial for several reasons: The air has not been supplied to the proper place. It has not been in the proper condition. It was dependent upon the draft of the fire, and it was not subject to regulation and control or direction.

My invention aims more particularly to the combustion of those gases which are generated in the consumption of any kind of fuel, thereby increasing the heating power of a given quantity of fuel, preventing the emission of large volumes of smoke, and the fouling and clogging of the flues and other conduits of the same by the unconsumed portions of the fuel evolved.

It may be here remarked that this supply of air is not dependent upon the draft created by the fire, but is wholly independent and separate from that, and is furnished by force or pressure in such amounts (in any direction) as the conditions of the fire may require.

In this particular the object of my invention is to supply the fresh air to the gases as they rise from the fuel, in order that they may be consumed, and an additional fire and heating capacity thus created above that caused by the ordinary combustion of fuel.

I will now describe more particularly the devices through which the air is thus supplied.

In the accompanying drawings, *a* show pipes, which are provided with perforations *b* for the passage of the air out from them into the gases which I design to consume. Within these pipes are other smaller ones, also perforated, through which the air passes into the annular space between the outside of the inner pipe and the inside of the outer pipe.

These perforations in the inner and outer pipes or conductors are not on the same sides of the two, but on opposite sides, so that the air has to pass around in the annular space before it finds its exit through the perforations of the outer pipe. By this means the air becomes heated, and is thus, when injected into the gases arising from the fire, in good condition to promote active combustion. If admitted in the cool or cold state, its effects would be much less beneficial toward the consumption of the gases, and if in too large quantities, and not in proper condition, would prevent the same.

In the drawing I have represented the pipes as placed immediately over the fire-grate, connected with a cross-head pipe, *c*, and with their rear ends resting on the bridge-wall *d;* but it is manifest that, if such a position would cause the pipes to be burned out too rapidly, they could be placed in the rear of the bridge-wall, and not over the fire-pot; but, however arranged, the inner pipe of the cross-head is made to communicate with same conducting-pipe, through which the fresh air is forced into the cross-head piece, and from thence

into the several pipes, which conduct and direct the air to the position desired for the consumption of the gases. The air is forced through these tubes by an apparatus independent of the draft of the fire, such as a blower or any other known and convenient means.

I have described the means of conducting the air as pipes or tubes, but claim to employ any convenient means to conduct the air to the desired point, and to present to the fire any convenient form of surface.

f show perforated conductors of the air, passing through the flues of an ordinary flue-boiler.

It is difficult to get or conduct the flame through the entire length of the flues of a boiler, for the reason that no sufficient supply of oxygen can be maintained through the length of the same, and therefore this necessary condition to the existence of the flame being absent, the fire only penetrates a portion of the distance through the flues. No mere draft is sufficient to supply this deficiency; but by the introduction of the air-conductors which I have described, and my forced distribution of air, the flame may be generated the entire length of the flues, and thus greatly increasing the steam-making capacity of a boiler and of a given amount of fuel. By such an arrangement, also, the escape of unconsumed gases through the smoke-stack is much diminished.

This invention is particularly useful in the consumption of fuels which are rich in carbon, where there is a necessity of a continued uniform supply of fresh air, in order to the consumption of the gases, particularly in contracted spaces and small furnaces.

Dampers or valves can be supplied as common, by means of which the volume of air supplied can be regulated.

It is evident that this improvement can also be applied to those boilers where the fire passes outside the tubes, and the tubes contain the water.

The economy of the invention is evident, for, in proportion as the combustion of the elements of the fuel is more complete, the consumption of fuel is lessened. So, also, economy of space is consulted by the requirement of a less amount of fuel for a given time in structures, such as steamers, compelled to carry their own fuel, giving increased room for cargo.

As before intimated, the improvement can be applied to any heating apparatus, and the exact locality of the same in relation to the fire is governed by convenience, and such considerations as arise from the form and object of such furnaces and flues.

Although I have specified the conducting-tubes as passing longitudinally of the heated spaces, it is manifest that, if convenience required, they could be placed across the same.

The patent of S. Pierce, No. 23,490, April 5, 1859, differs from my invention in the following particulars: The air-tubes are surrounded by water-tubes; the air is supplied to the fire by the furnace-draft; the air is not compelled to pass around from the openings of an inner pipe to the openings of an inclosing-pipe, and so become heated before being discharged among the gases arising from the combustion of the fuel. I do not claim such an invention.

The patent to W. H. Phelon has no tubes over the fire-pot. It draws the air into a combustion-chamber in the rear of the bridge-wall by means of steam. It does not show the arrangement of the inner and outer pipes for the heating of the air before being injected into the flames. The pipes, not being over the fire, could not accomplish the object referred to in my specification. I do not claim the subject of that invention. Patent dated March 24, 1874, No. 148,981.

The patent to G. W. Cummings, No. 156,208, August 27, 1874, differs from my application in the fact that it is for blowing air and steam into the fire-box by the injection of steam. It does not show the inner and outer pipes, with their perforations, for heating the air before it is thrown into the gases.

My invention contemplates an apparatus by which the pure air is forced in over the flames in the fire-pot by some device like a blower, well known, and then, before being admitted into actual contact with the gases of the flame, is held for a short time between the inner and outer pipe, for the purpose of being heated, the heated condition being the best one for the purposes described, in which it can be injected into the gases of the fire to promote their combustion.

What I claim as my invention, and desire to secure by Letters Patent, is—

The combination of the perforated pipes *a* and the perforated pipes placed within the same, the perforations being made upon opposite sides of the respective pipes, for the purpose of transmitting a forced and heated current of pure air into the gases arising from combustion in a furnace or other heating device, as and for the purposes herein described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOSEPH L. WINSLOW.

Witnesses:
WM. HENRY CLIFFORD,
FRANK H. JORDAN.