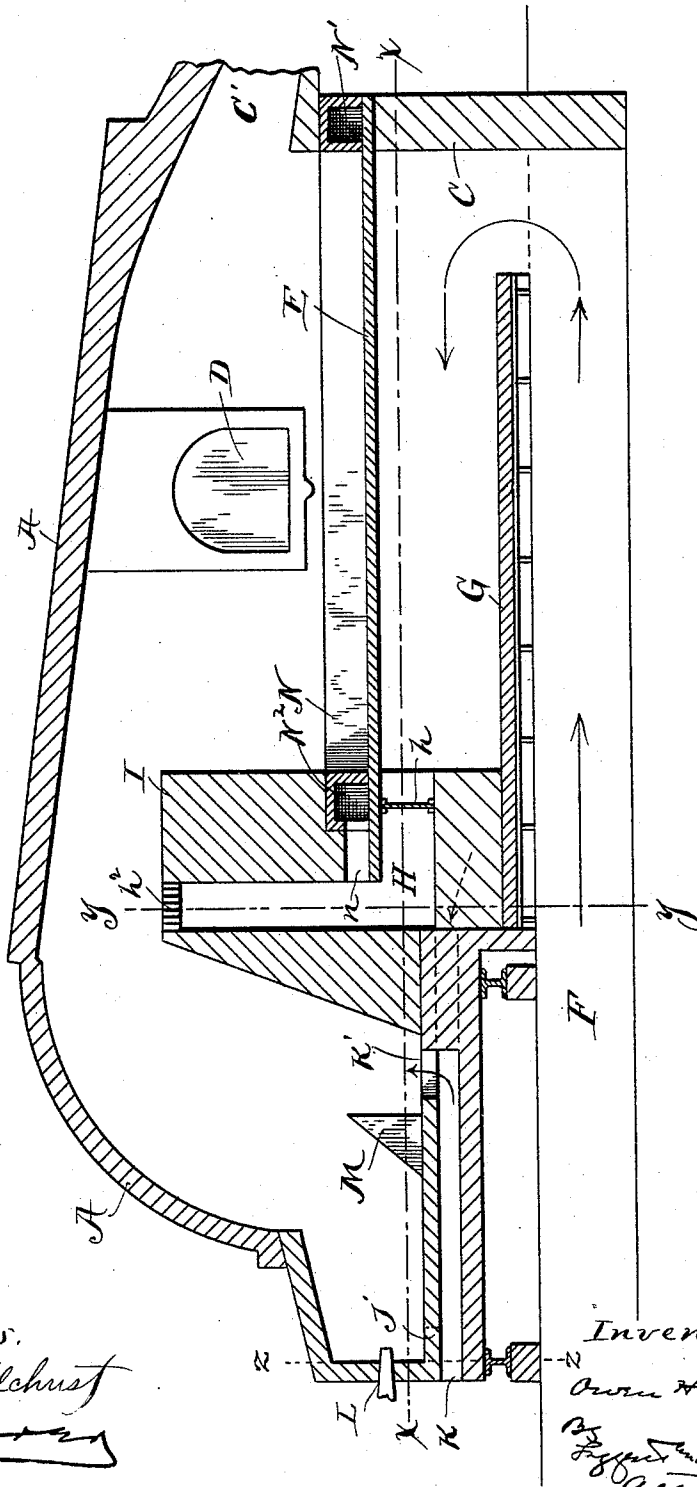


O. HUGHES.  
HEATING AND PUDDLING FURNACE.

No. 467,413.

Patented Jan. 19, 1892.

*Fig. 1.*



Witnesses:  
*E. Byron Gilchrist*  
*[Signature]*

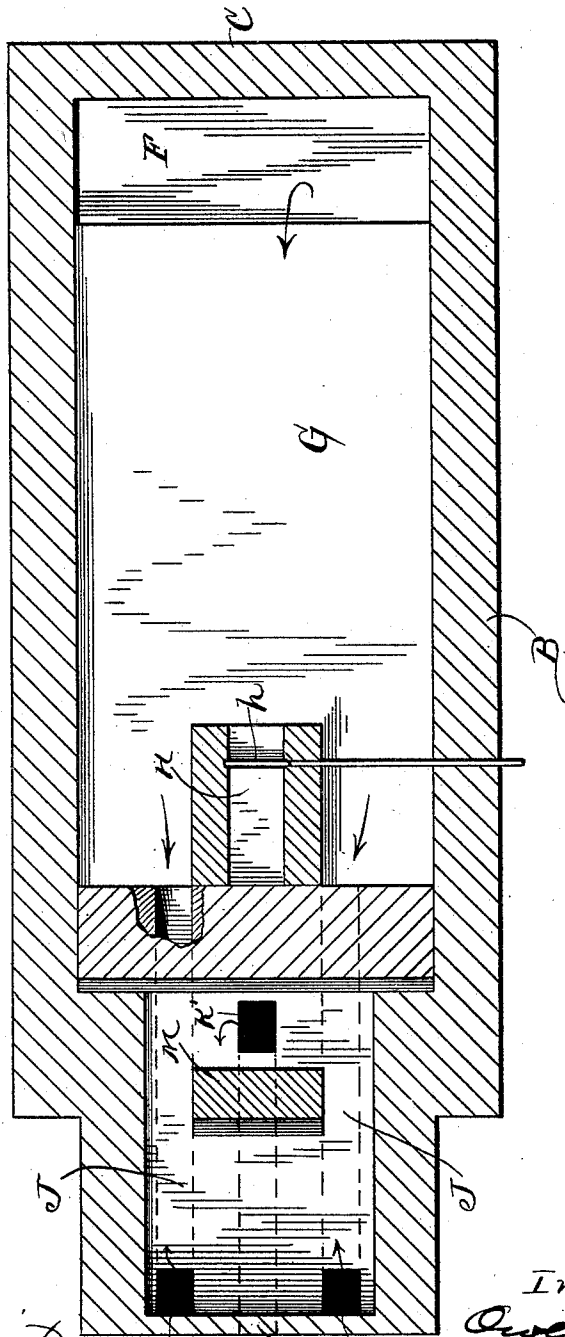
Inventor:  
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*Fig. 2.*



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Fig. 3.

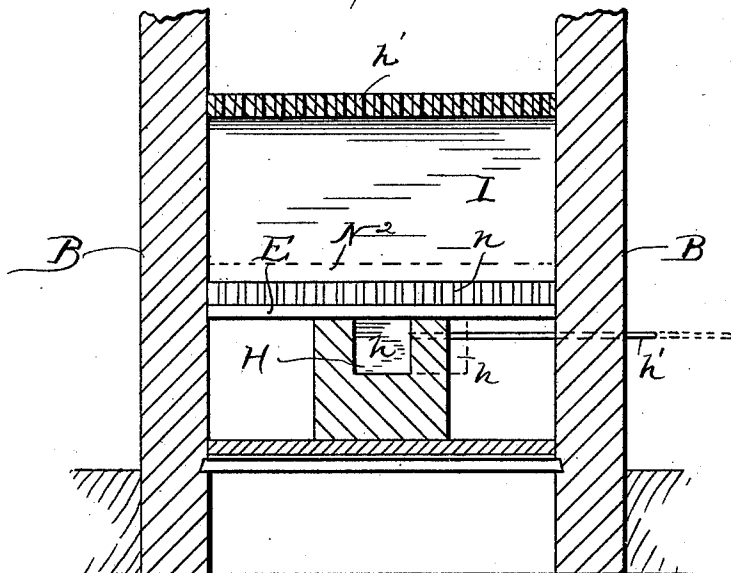
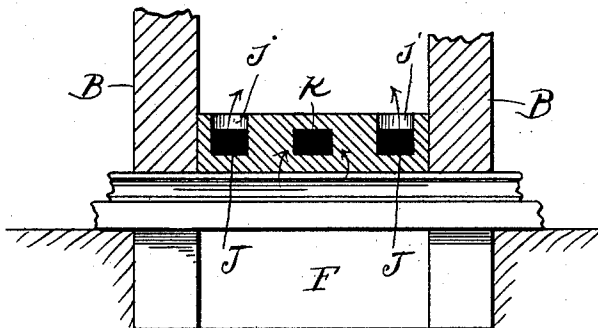


Fig. 4.



Witnesses

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# UNITED STATES PATENT OFFICE.

OWEN HUGHES, OF CLEVELAND, OHIO.

## HEATING AND PUDDLING FURNACE.

SPECIFICATION forming part of Letters Patent No. 467,413, dated January 19, 1892.

Application filed September 3, 1891. Serial No. 404,634. (No model.)

To all whom it may concern:

Be it known that I, OWEN HUGHES, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Heating and Puddling Furnaces; and I do hereby 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 pertains to make and use the same.

My invention relates to improvements in puddling and heating furnaces adapted to use oil for fuel; and it consists in certain features of construction and in combination of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation in longitudinal central section. Fig. 2 is a horizontal section taken on line  $x$   $x$ , Fig. 1. Fig. 3 is an elevation in transverse section on line  $y$   $y$ , Fig. 1. Fig. 4 is an elevation in transverse section on line  $z$   $z$ , Figs. 1 and 2.

A represents the top wall of the furnace, shaped substantially as heretofore.

B B represent the side walls, C the front wall of the furnace, and D the charging-door. The charge rests on floor E, this floor being constructed of heavy metal plate lined on top preferably with cinders, and known as a "cinder-floor."

F is a cold-air duct extending from the rear to the front end wall and extending laterally the internal width of the furnace, the rearward section of duct F occupying the place that in an ordinary puddling-furnace is occupied by the ash-pit.

G is a false bottom, constructed of iron plates, covered on top usually with a layer of fire-bricks. The cold air enters at the rear end of the duct F and passes up past the front end of the false bottom, and thence returns rearward between the false bottom and floor E, whereby the iron plates of floor E are kept from burning out and the current of air is heated to a high degree. On top of member G, at the rear and lateral central section thereof, is constructed a short flue H, having its induction presenting forward. This flue is provided with a damper  $h$ , the handle of which  $h'$  extends out through a corresponding hole in one of the side walls of the fur-

nace. The horizontal section of flue H is perhaps ten inches square internally, so that there is a large space on either side of this flue, and when damper  $h$  is drawn out or opened its projection into the space does not materially affect the air-current passing rearward on either side of flue H. Flue H, at the rearward end thereof, turns upward, extending laterally, preferably, the internal width of the furnace, as shown most clearly in Fig. 3, the upright section of this flue extending up through the bridge-wall I, the inlet of this flue at  $h^2$  being covered with checker-work—that is to say, with bricks set loosely. The main inlet of the heated air-current from between the two members E and G is through two flues J J, located on either side of a central cold-air flue K, the latter being open at the rear end and discharging upward at K' approximately next to the bridge-wall. Flues J J discharge upward at  $j$   $j$ , about opposite the inner end of the oil-burner L.

There are a variety of oil-burners in the market that are well known, and any one of which will answer the purpose. Hence it is not considered necessary to describe the oil-burner in detail.

M represents a deflector set crosswise the line of the inlet of the oil-burner and a short distance in rear of the bridge-wall.

C' represents the inlet-flue of the furnace, the same being supposed to connect with the chimney. (Not shown.)

N represents a flue or duct preferably of chilled iron, and constructed in and preferably surrounding the main or metal chamber of the furnace, being located just above floor E of the furnace, floor E being preferably extended approximately to the exterior of the furnace, and thus constituting the bottom wall of flue or duct N. The induction-opening of this flue is preferably at the front end of the furnace, as shown at N'. The rear section of the flue sets in the bridge-wall, as shown at N<sup>2</sup>, being in open relation by means of checker-work, as shown at  $n$ , Fig. 3, with flue H. Checker-work  $n$  extends preferably the entire width of flue H, which, in the present instance, is the entire internal width of the furnace. Flue N receives air from the external atmosphere at its induction-opening, conducts the same around the main or metal chamber

of the furnace, where it becomes intensely heated, discharging it at the checker-work *n*, whence it passes into flue H and up the latter.

The hot-air blast entering the rear section of the furnace from flues J J unites with the flame from the oil-burner. The flame is given an upward trend by engagement with deflector M, and the cold air admitted through flue K tends to lift the flame, so that the latter passes over the bridge-wall without materially breaking, as would be the case if the flame directly impinged the bridge-wall, and in passing over the bridge-wall a fresh and vast supply of intensely-heated air from the checker-work at *h*<sup>2</sup> is added to the volume discharged into the main chamber of the furnace where the products of combustion reverberate over and about the charge.

I have reduced my invention to practice, and thus far the furnace has given entire satisfaction, being exceedingly economical in the amount of fuel required as compared with the construction of heating and puddling furnaces heretofore used.

What I claim is—

1. In a heating or puddling furnace, in combination, a heater, a hot-air duct discharging into the combustion-chamber at either side of the oil-burner, and a cold-air duct discharging into the combustion-chamber between the

inlet of said hot-air ducts and bridge-wall, substantially as set forth.

2. In a heating or puddling furnace, in combination, a heater, hot-air ducts discharging into the combustion-chamber, substantially as indicated, a deflector located between the education of the hot-air ducts and bridge-wall, and a cold-air duct discharging into the combustion-chamber between the deflector and bridge-wall, substantially as set forth.

3. The combination, in a furnace, with a combustion-chamber, bridge-wall, and a cold-air duct discharging through outlets in the bridge-wall and combustion-chamber, of a flue extending about the main or metal chamber of the furnace along the sides and ends of said chamber and having its inlet end opening into the external atmosphere, said flue being located in the surrounding walls of the main or metal chamber and at the rear communicating with a flue that extends to the top of the bridge-wall, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 17th day of August, 1891.

OWEN HUGHES.

Witnesses:

C. H. DORER,

E. BYRON GILCHRIST.