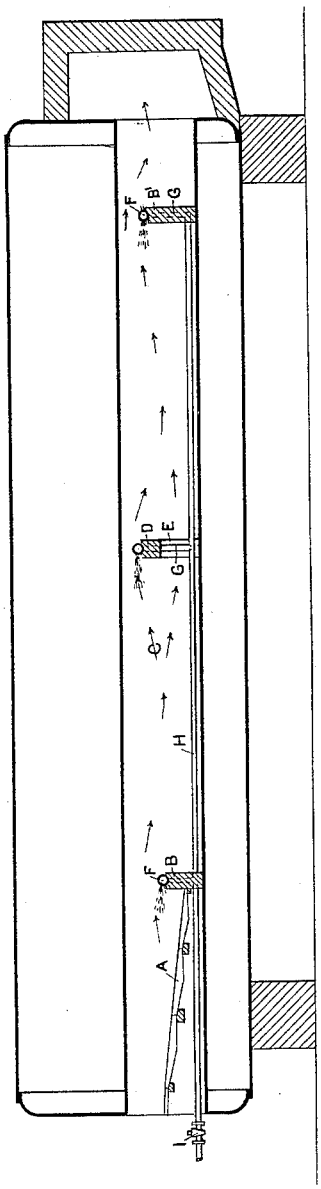
(No Model.)

A. FRANCIS & E. MANBRÉ.

FURNACE.

No. 419,007. Patented Jan. 7, 1890.



Witnesses

H. A. Lamb

C. L. Stuttevant

Inventors

Absalom Francis

Ernest Manbré

By his Attorney

Frankland James

UNITED STATES PATENT OFFICE.

ABSALOM FRANCIS, OF LIVERPOOL, AND ERNEST MANBRÉ, OF GARSTON, COUNTY OF LANCASTER, ENGLAND.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 419,007, dated January 7, 1890.

Application filed June 11, 1889. Serial No. 313,870. (No model.) Patented in France September 17, 1888, No. 193,017; in Belgium No. 83,289, and in England August 2, 1888, No. 11,173.

To all whom it may concern:

Be it known that we, ABSALOM FRANCIS and ERNEST MANBRÉ, subjects of the Queen of Great Britain, residing at Liverpool and Garston, respectively, both in the county of Lancaster, in the Kingdom of England, have invented certain new and useful Improvements in or appertaining to Furnaces, (for which we have received Letters Patent in France, No. 193,017, dated September 17, 1888; in Belgium, No. 83,289, and in England, No. 11,173, dated August 2, 1888,) of which the following is a specification.

This invention relates to the economizing of fuel in heating-furnaces; and it has for its object an apparatus for obtaining a greatly-increased economy of fuel by means of a more complete combustion in any kind of heating-furnace, but especially in steam-boiler furnaces.

It is well known that coal or other combustible material employed in furnaces, flues, or the like does not undergo complete combustion by reason of the insufficiency of the supply of oxygen which is necessary for such combustion. The quantity of air usually supplied to heating-furnaces is frequently insufficient to provide the amount of oxygen which is essential to complete combustion.

Now according to our invention we obtain a more complete economy of fuel by heating the combustion under control and by consuming the smoke. This we accomplish by means of a series of fine jets of air, which, under a pressure of three pounds per square inch or upward, is directed against the current of gases passing toward the chimney and in a sufficiently hot part of the furnace or flues to insure the proper combustion of the said gases. We prefer about ten pounds per square inch. The jets may be of any convenient number, shape, or size. By means of the jets nearly the whole of the smoke is retained in the hot furnace and flues, and a sufficient amount of air is mixed with it to bring about its complete combustion. This results in a considerable saving of fuel, and the smoke is thereby reduced to a minimum.

The manner in which we carry our invention into effect may be understood from the accompanying drawing, which shows a longitudinal section of our apparatus as it may be applied to a cylindrical internally-flued boiler.

A is the furnace or grate.

B is the first bridge, hereinafter called the "grate-bridge." Other bridges D B′, &c., of suitable material may be placed in the flue C at a convenient distance apart—say about eight or ten feet apart—in a boiler thirty feet long.

H is a pipe (or pipes) supplying the compressed air to the jets. This pipe is placed in any convenient position along the lower part of the flue C, and preferably below the level of the grate, and is provided with a cock I or other hand-regulator, by means of which the attendant may increase the supply as soon as he notices any smoke issuing from the chimney, or otherwise regulate the supply as he thinks fit. The pipe H is provided at each bridge with a branch G, which is connected with a second pipe or long chamber F lying along the top or in front of the bridge. The pipes F F are provided with suitable perforations or slots, which face toward the front of the boiler, and out of which the jets may issue at any convenient angle, so long as they are in a direction contrary to that of the draft.

In some instances, especially in long flues, it may be found desirable to make each of the alternate bridges D higher than the others, and to provide them at their lower parts with an opening E, as shown in the drawing. This causes the whole or a portion of the furnace-gases to take a sinuous course, as seen by the arrows, so that the lower part of the flue is heated as well as its upper portion.

In some cases a separate pipe H and cock I may be provided for each bridge; also, the grate-bridge B may be, if desired, made higher and a second jet-pipe F placed in front of it between the upper pipe and the grate-bars.

By this invention not only is the smoke burned, but the combustion is intensified, the

heat raised in a much shorter period than by the ordinary arrangements, and a considerable economy of fuel is effected.

It is obvious that with slight modifications the apparatus may be applied to other kinds of furnaces besides the one shown in the drawing.

We are well aware that air has before now been introduced into the flue at the bridge or other part; also, that forced drafts of divers kinds have been used; also, that steam-jets and combined air and steam-jets, the steam being under pressure and inducing the air, have been applied to various forms of furnaces; also, that air under pressure is regularly supplied to blast and other furnaces to maintain combustion, and we make no claim for any of these.

We declare that what we claim is—

1. In a furnace, a longitudinally-arranged pipe supplying compressed air, vertical pipes extending therefrom, and transverse pipes F, connected with said vertical pipes and having perforations located upon the side from which the draft comes, and means for regulating the air-supply.

2. In combination with a furnace-flue, a longitudinally-arranged pipe supplying compressed air, a series of bridges within said flue, vertical pipes passing through the same and connected at their lower end with the main supply-pipe, and transversely-arranged pipes F, supported by said bridges and connected to said vertical pipes and having perforations for delivering air in a direction contrary to the draft, substantially as described.

3. In combination with a furnace-flue, a longitudinally-arranged pipe supplying compressed air, a series of bridges within said flue, vertical pipes passing through the same and connected at their lower end with the main supply-pipe, and transversely-arranged pipes F, supported by said bridges and connected to said vertical pipes and having perforations for delivering air in a direction contrary to the draft, each alternate bridge being higher than those adjacent and having an opening in its lower part, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

A. FRANCIS.
ERNEST MANBRÉ.

Witnesses:
WM. P. THOMPSON,
GEO. C. DYMOND.