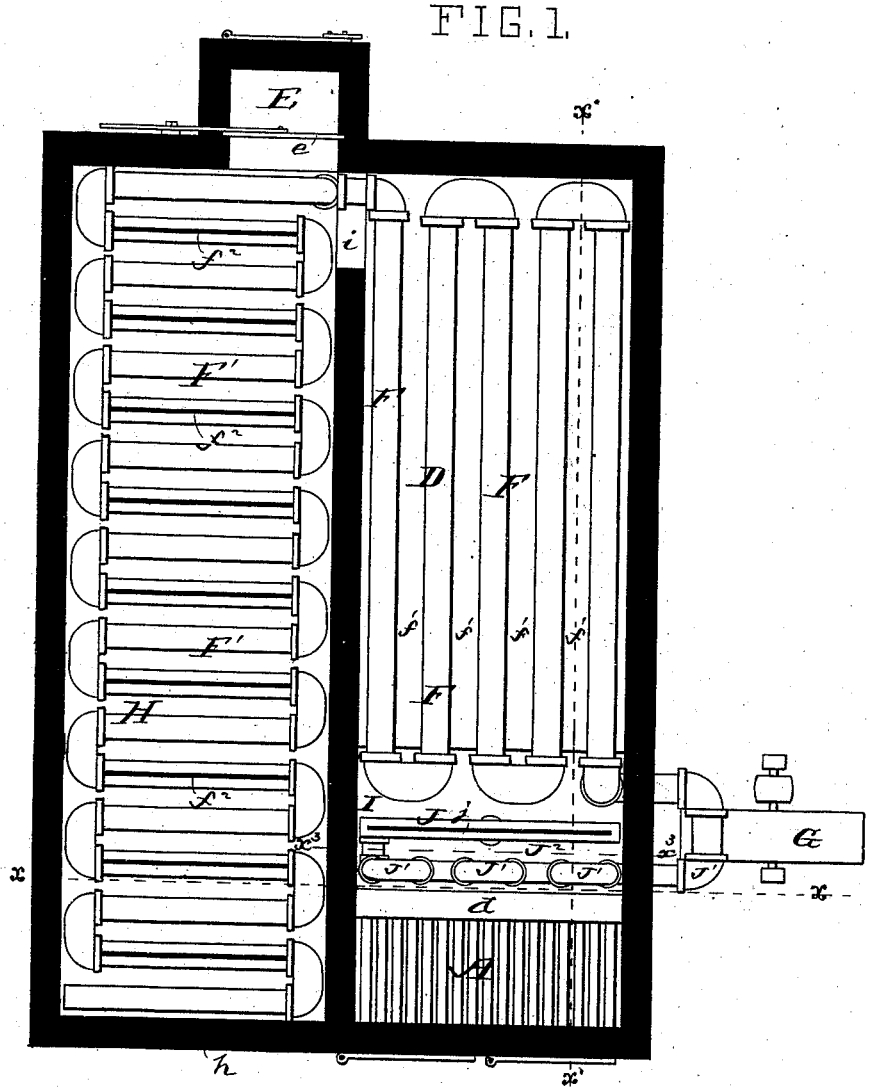
3 Sheets—Sheet 1.

J. HUTTON.

Utilizing Waste Heat of Furnaces.

No. 201,613. Patented March 26, 1878.

FIG. 1.



ATTEST.

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by Chas. D. Moody,
atty

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FIG. 2.

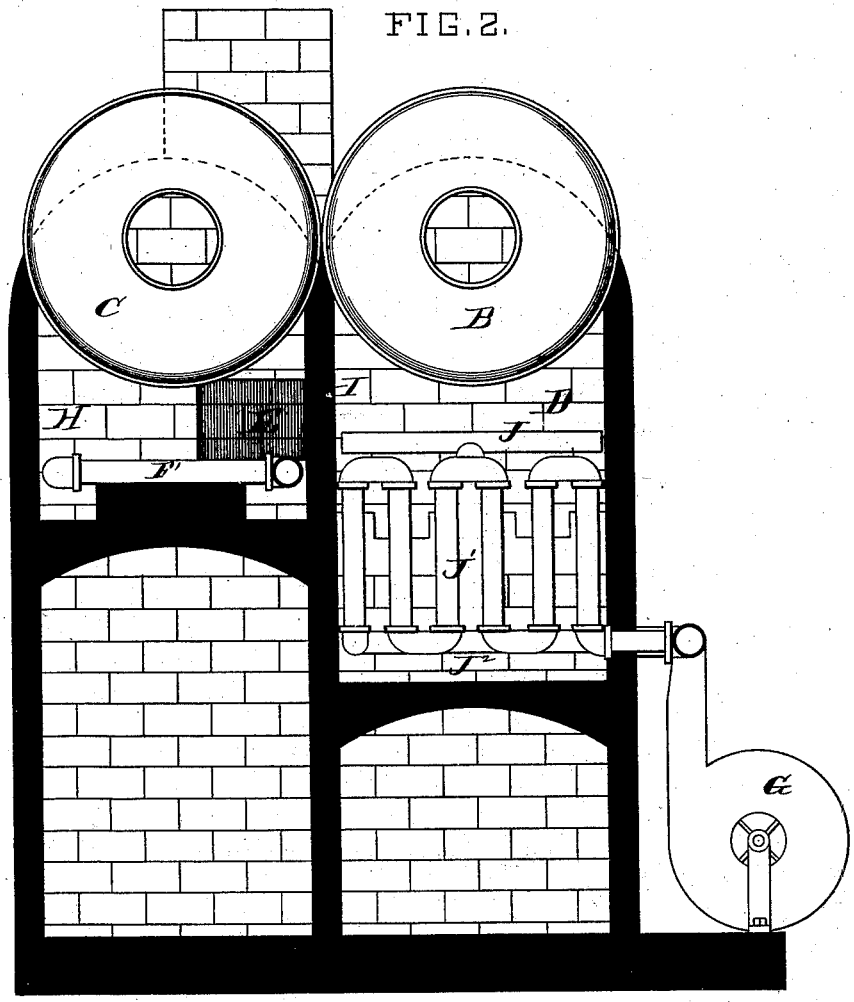
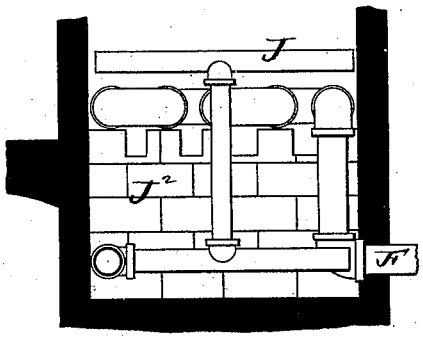


FIG. 3.



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3 Sheets—Sheet 3.

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FIG. 4.

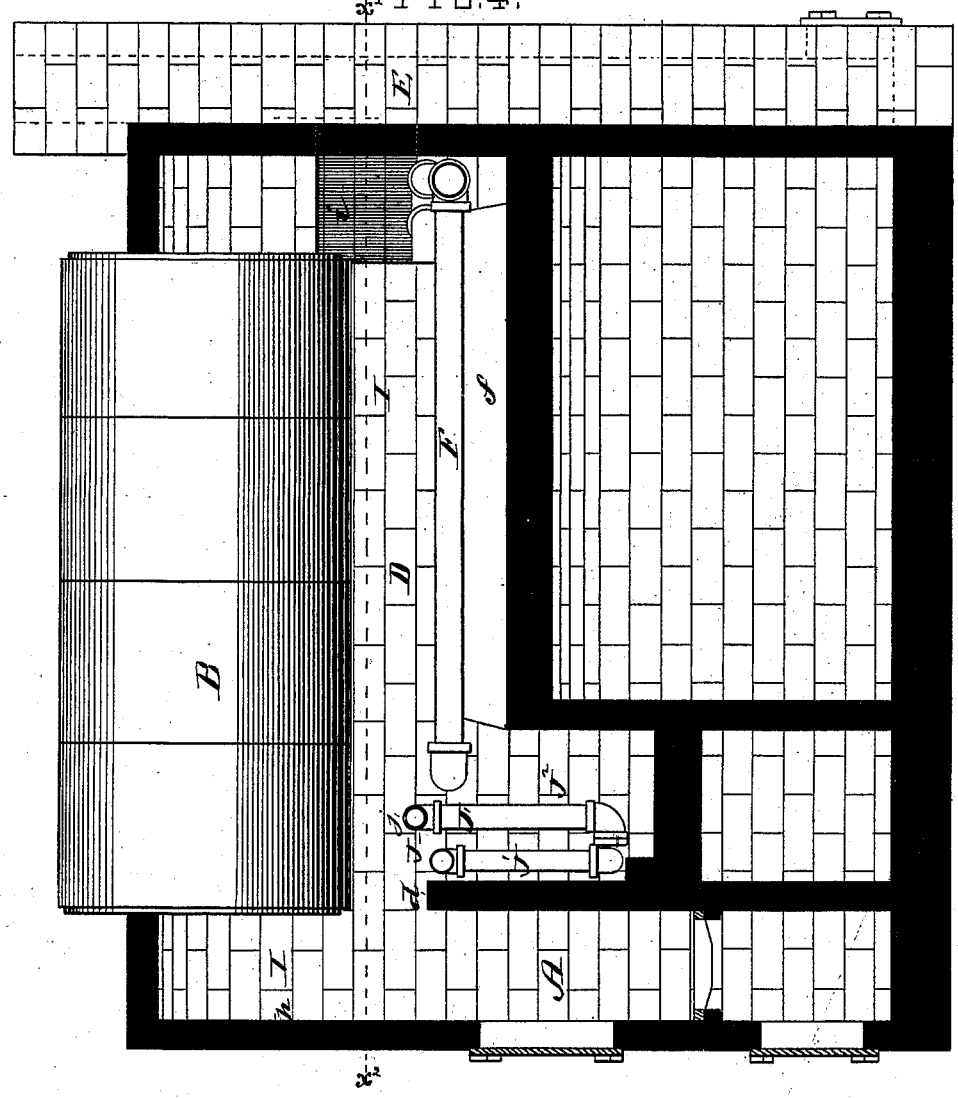
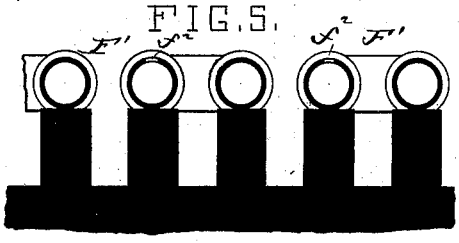


FIG. 5.



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UNITED STATES PATENT OFFICE.

JOHN HUTTON, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN UTILIZING WASTE HEAT OF FURNACES.

Specification forming part of Letters Patent No. **201,613**, dated March 26, 1878; application filed February 21, 1878.

To all whom it may concern:

Be it known that I, JOHN HUTTON, a resident of St. Louis, Missouri, have invented a new and useful Improvement in Utilizing the Waste Heat of Furnaces, and in the application of heated air, of which the following is a full, clear, and exact description, reference being had to the annexed drawing, making part of this specification, in which—

Figure 1 is a horizontal section taken on the line x^2 x^2 of Fig. 4; Fig. 2, a transverse vertical section taken on the line x x of Fig. 1; Fig. 3, a detail, being a transverse sectional elevation taken on the line x^3 x^3 of Fig. 1; Fig. 4, a longitudinal vertical section taken on the line x^1 x^1 of Fig. 1; and Fig. 5, a detail, being a longitudinal vertical section taken through the hot-air pipes and their supports beneath the second boiler.

Similar letters represent similar parts.

By means of the present invention the waste heat of a furnace is used to heat an air-blast, which, when heated, can be applied in any desirable way.

The invention is shown in connection with a boiler-furnace, and the heated air-blast is employed to heat a second boiler alongside the first one.

The invention further has relation to the means by which the waste heat is made to heat the air-blast, and by which the heated blast is discharged against the second boiler. It also has reference to the provision for retaining the heat beneath the boilers, and to the means for more effectually consuming the smoke passing the bridge-wall of the furnace.

Referring to the drawing, A represents a furnace preferably used by me in carrying out the invention, and such as is commonly used beneath a steam-boiler. B represents the boiler, heated directly by the heat-currents proceeding from the furnace A, and C represents the second boiler alongside it. D represents the flue leading from the furnace A, beneath the boiler B, and into the escape-flue E. F represents a pipe leading from a blower, G, into the flue D, (and forward and back therein to increase its heating-surface,) and thence into and throughout the flue-space H beneath the second boiler C. That portion of the pipe that is beneath the boiler B is arranged, preferably, in the lower part of the flue D, being raised slightly from the bottom of the flue by means of the supports f f, which are immediately beneath the pipe, in order to provide spaces f^1 f^1 between and below the level of the folds of the pipe, into which the heat-currents from the furnace can pass and more effectually heat the pipe. This part of the pipe, in its windings, is extended longitudinally to and fro in the flue D. That portion of the pipe that is beneath the second boiler, and designated F′, is extended in its windings, preferably, transversely to and fro across the flue H, as shown, and in the upper part of the various folds of the pipe are a series of slots, f^2 f^2, through which the air, as herein described, can pass from the pipe upward against the boiler C. There is a party-wall, I, separating the flue-spaces D and H, saving at i, which opening is used, in the present connection, for the passage of the products of combustion from the flue D into the flue H, and thence into the flue E.

The operation of the invention, as thus far described, is as follows: The furnace A is fired in the ordinary manner, and the boiler B is heated by that portion of the heat that passes upward against it; but, as is well known, a considerable portion of the heat, as the heat-currents are traversing the flue D, is dissipated in the hearth or bottom of the flue, and thereby practically wasted. The hearth becomes very hot, as well as any object placed thereon; hence, by reason of the pipe F being located in the flue, and especially at the lower part thereof, it becomes highly heated and by this (otherwise wasted) portion of the heat. An air-current, by means of the blower G, is now sent through the pipe, where it acquires the temperature of the pipe. It is thence forced into the pipe F′, whence it passes, through the slots f^2 f^2, outward against the boiler C, heating the latter. By this means the waste heat in the flue D is transmitted to an air-current, which, under the influence of the blower, is caused to serve a useful purpose.

If desired, a hollow hearth might be used in place of the pipe F, and the same effect be measurably produced; and also a single hollow construction be used beneath the boiler C in place

of the winding pipe F′. Further, if preferred, the escape-flue E might be arranged at the other end, *h*, of the flue H, and the products of combustion be made to pass beneath the boiler C before escaping. The party-wall I serves to concentrate the heat-currents from the furnace upon the pipe F.

After the furnace-fire is very bright and the flue D well heated, a damper, *e*, in the flue E may be closed, thereby inclosing beneath the boiler C the body of heated air escaping from the pipe F′ until it is necessary to fire again. This serves to economize the heat.

At J is shown a device by which the air, after being heated by the waste heat, is caused to act upon the boiler B, or the one directly over the flue D. It also serves as an effective device for burning the smoke. A pipe, J^1, leading from the blower G, winds around at J^2 in a space just beyond the bridge-wall *d*, where it becomes heated by the waste heat in manner similar to the heating of the pipe F. This heats the air therein, which, by means of the blower, is forced through the slit *j* against the boiler B. This slit extends nearly or quite the width of the flue D at the bridge-wall, and by means of it a continuous sheet of air is made to obstruct the passage of the smoke. The smoke and air are thus enabled to combine much more effectually than if a series of perforations had been used in place of the slit, and than if the air had not been forced directly upward against the boiler.

I claim—

1. The combination of the furnace A, flue D, flue H, pipe F F′, and blower G, substantially as described.

2. The combination of the furnace A, boiler C, flues D and H, pipe F F′, and blower G, substantially as described.

3. The combination of the furnace A, boilers B and C, flues D and H, pipe F F′, and blower G, substantially as described.

4. In a boiler-furnace, the pipe F, raised upon the supports *f f* to form the spaces f^1 f^1, as and for the purpose described.

5. The combination of the flue E, having the damper *e*, in combination with the flue H and pipe F F′, as and for the purpose described.

Witness my hand.

JOHN HUTTON.

Witnesses:

CHARLES D. MOODY,

DAVID THOMAS.