H. HARRISON.

FURNACE.

No. 180,475. Patented Aug. 1, 1876.

Fig. 1.

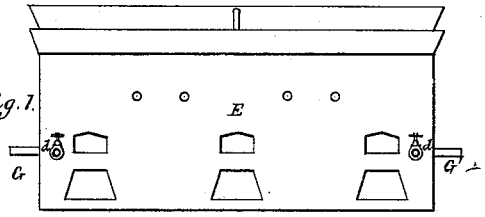


Fig. 2.

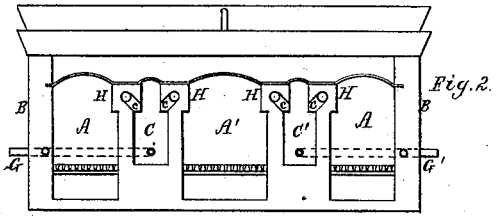


Fig. 3.

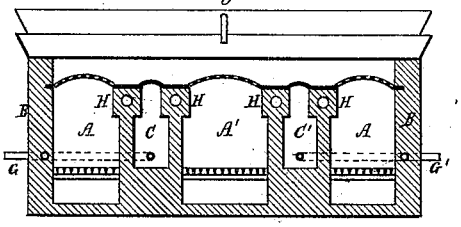


Fig. 5.

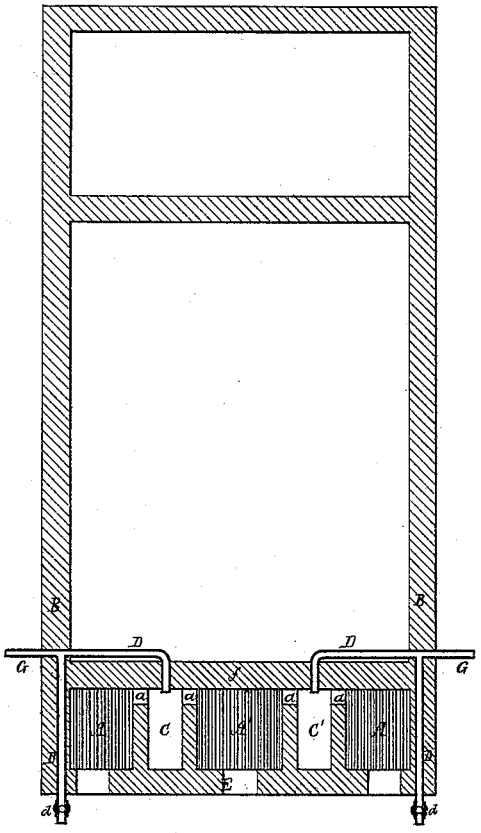
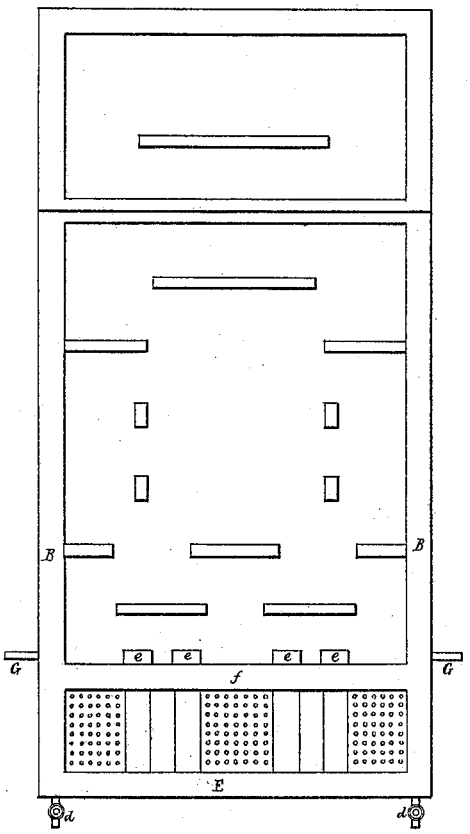


Fig. 4.



Witnesses.
Geo Gray
F. L. Hale.

Herbert Harrison.
by his attorney.
F. P. Hale

UNITED STATES PATENT OFFICE.

HERBERT HARRISON, OF GODERICH, ONTARIO, CANADA.

IMPROVEMENT IN FURNACES.

Specification forming part of Letters Patent No. 180,475, dated August 1, 1876; application filed June 23, 1876.

To all whom it may concern:

Be it known that I, HERBERT HARRISON, of Goderich, in the county of Huron, Province of Ontario, Canada, have invented a new and useful Improvement in Furnaces or Heat-Producing Apparatus; 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 drawing, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to an improved method of constructing furnaces or heat-producing apparatus, the object of such being to attain a more perfect combustion of the smoke and volatile products of the fuel than by the methods heretofore adopted; and my invention consists in combining, with a series of furnaces, combustion-chambers, one of which is arranged between each two of the series of furnaces employed, whereby the products generated by the combustion of the fuel in the furnaces are caused to pass into and through such chambers, where secondary or perfect combustion of the unconsumed carbon or smoke and gases takes place, such chambers being charged with any required amount of air or oxygen.

In the said drawing, Figure 1 is a front end elevation of an apparatus embodying my improvement, as applied to a salt-making apparatus. Fig. 2 is a front elevation with the end plate removed. Fig. 3 is a transverse and vertical section, taken through the furnaces and combustion-chambers. Fig. 4 is a top view with the evaporating-pan removed. Fig. 5 is a horizontal section taken through the air-inducts leading to the two combustion-chambers.

In carrying out my invention, I arrange a series of furnaces, A A′ A, in a suitable framework, B, the furnaces being of the ordinary construction, with the exception that the arched domes are made foraminous, in order to allow a part of the heat to rise and impinge against the bottom of the pan or the floor above. C C′ are two chambers, one of which is disposed between each two of the furnaces, the bottom of each of the chambers being disposed on a plane with the grates of the furnaces. Each of these chambers communicates by means of openings *a a* with the furnaces on opposite sides of it, so as to permit the smoke and volatile products to pass from the furnaces into such chambers. The arch or dome of each chamber is formed closed or unperforated, the object of such being to confine the smoke and gases while undergoing combustion. D D are two air-pipes, having their induction ends arranged in the front plate or wall E, such pipes extending horizontally around the outer furnaces, and having their eduction ends respectively opening into the chambers C C′, as shown in Fig. 5. Each of the pipes D is provided with a cock or register, *d*, by which the quantity of air introduced into the chambers may be regulated at pleasure. G G are steam-pipes connected with any suitable steam-generator, such pipe extending through the sides or walls of the case, and respectively into the elbows of the pipes D D, as shown in Fig. 5, the object of such steam-pipes being to create steam-induced currents of air to mingle with the unconsumed smoke and gases in the chambers C C′. H H H H are four fire-brick flues, which are disposed on the tops of the walls separating the furnaces from the chambers C C′. Each of these flues near its outer end is formed with a recess, *e*, which communicates with one of the chambers C, as shown in Fig. 2, the object of such being to permit the pure caloric contained in such chambers to rush in and fill the vacuum which is created in the flues H, by means of a jet of steam, which is introduced through pipes G, from any convenient generator, extending through the front wall of the apparatus, and concentrically into the flues H, such steam-jets causing a strong draft through the flues, and forcing the products of combustion through the eduction end *e* of the flues, (which extend through the rear walls *f* of the furnace,) as shown in Fig. 4, and underneath the drying-floor or evaporating-pans.

When the furnaces are in operation I fire the side furnaces alternately with the central one; the latter I prefer to make of greater cubical capacity than the side furnaces. By this method of firing I am enabled to obtain complete control over the smoke, intense heat being, as necessary, an element in obtaining complete combustion as a due supply of oxygen. It will thus be found than when the coal

in the two side furnaces has burned down brightly and clear, and fresh coal is placed in the central one, the clear heat of the side furnaces meeting the unconsumed carbon of the fresh fuel from the central one in chambers C, where a supply of air is provided, perfect combustion will take place.

When the flame of the central furnace has become bright and clear, the side furnaces are to be charged with fresh coal, the clear heat of such central furnace passing into the chambers C C′, and coming in contact with the smoke and gases evolved from the fuel in the side furnaces, and being furnished with any desired quantity of air will, as before, produce perfect combustion.

Having described my invention, what I claim is—

The combination of the furnaces A A′ A, with the chambers C C′, having communication, as described, and the air-inducts D D, steam-pipes G G, cocks *d d*, and the eduction-flues H H, &c., the whole being constructed and arranged substantially in manner, and so as to operate as set forth.

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

HERBERT HARRISON.

Witnesses:

ALMON A. THOMPSON,

ROYS I. CRANE.