(No Model.)

G. RHODEN.

DOUBLE FURNACE.

No. 307,143. Patented Oct. 28, 1884.

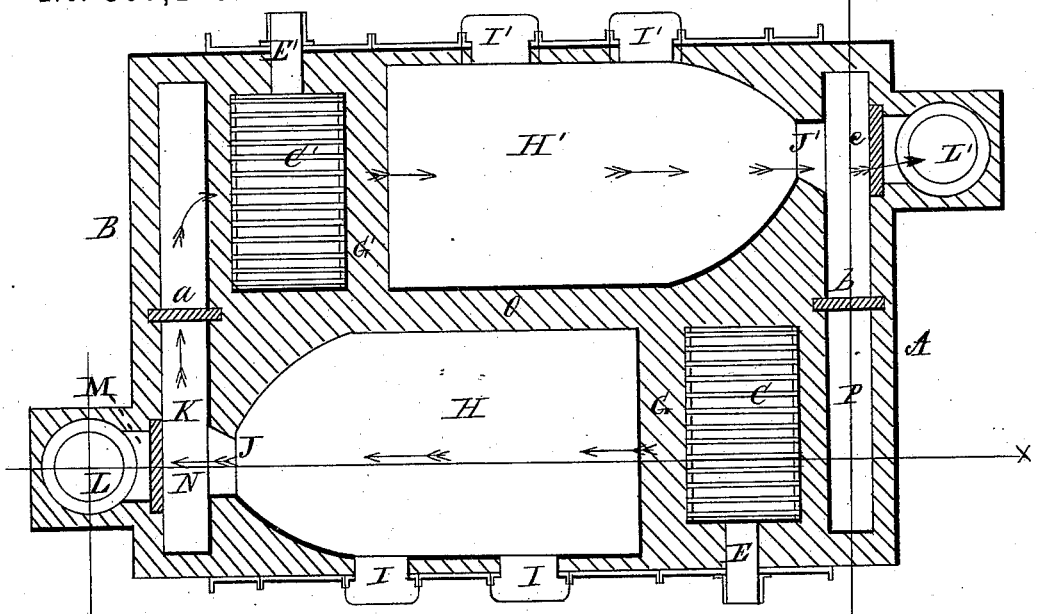

Fig. 1.

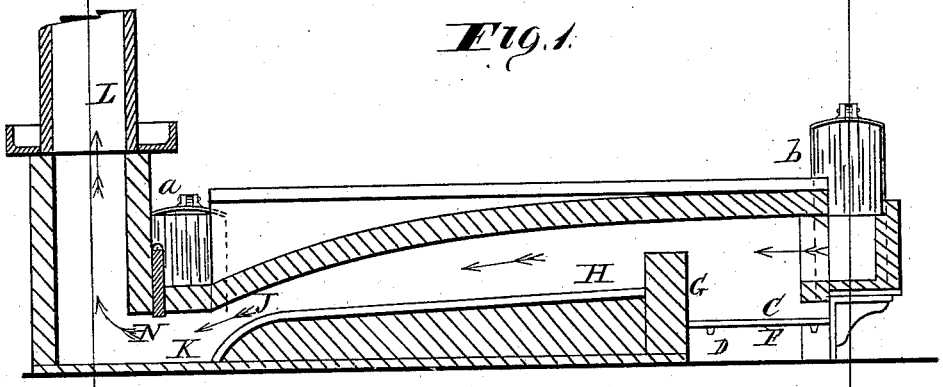

Fig. 2.

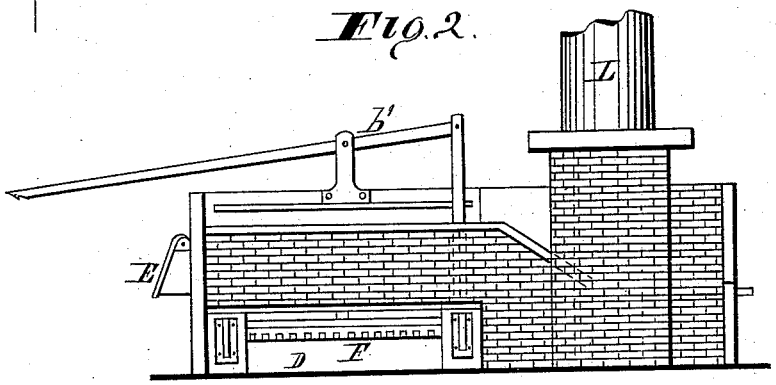

Fig. 3.

Witnesses.
J. H. Burridge
C. H. Turney

Inventor
George Rhoden
W. H. Burridge
Atty.

UNITED STATES PATENT OFFICE.

GEORGE RHODEN, OF CLEVELAND, OHIO.

DOUBLE FURNACE.

SPECIFICATION forming part of Letters Patent No. 307,143, dated October 28, 1884.

Application filed January 22, 1884. (No model.)

To all whom it may concern:

Be it known that I, GEORGE RHODEN, of Cleveland, in the county of Cuayhoga and State of Ohio, have invented a certain new and Improved Double Furnace; and I do hereby declare that the following is a full and complete description thereof.

The nature of this invention relates to that class of furnaces constructed for reheating ingots and other bodies of metal, and also for annealing purposes; and the object of the invention is to more fully utilize the fuel by consuming the gases eliminated by the ignited fuel, which, in ordinary furnaces for the above specified purpose, pass off unconsumed and consequently lost.

A more full description of the aforesaid invention, and of the practical operation of the same, will be found in the following specification, and illustrated in the annexed drawings, making a part of the same, in which—

Figure 1 represents a horizontal section of the furnace, showing a plan view of the interior thereof. Fig. 2 is a longitudinal vertical section taken through the line 4 4. Fig. 3 is an end elevation of the furnace.

Like letters of reference denote like parts in the drawings.

The invention above alluded to consists of two furnaces, A and B, so constructed and arranged in relation to each other that they have an open communication one with the other, and conjointly operative for heating purposes; or each one may be used separately, if so desired. The furnaces are duplicates; hence a description of one of them will serve for the other. Said furnaces, like those in ordinary use, are constructed of brick, having their exterior sides plated with sheet metal secured with stay-rods in the usual way.

C, Figs. 1 and 2, is the fire-place of the furnace A, and D the ash-pit. E is the door of the fire-place; F, the grate-bars, and G the bridge-wall, behind which is the receiving-chamber H, wherein the ingots or other materials are placed for being reheated. I I are the doors of the chamber, and J the throat of the chamber, opening into the transverse flue K. Said flue communicates with the smoke-stack L through the passage M, provided with a damper, N, for closing the said passage. Said furnace in its general structure is or may be like those in ordinary use.

The furnace A above described is put in communication with the furnace B by the transverse flue K, which, as will be seen in Fig. 1, extends from the rear end of the furnace A to the front end of the furnace B. The two furnaces are arranged in respect to each other side by side, but reversely, as seen in the drawings. The two furnaces are divided from each other by the partition O, and have no communication one with the other excepting through the transverse flue K, above referred to, and a corresponding flue, P, at the opposite end of the plant, both of which flues are provided with dampers, respectively, *a* and *b*, whereby the two furnaces may be shut off from each other or opened, as may be desired. Said dampers are operated by levers, one of which is shown at *b'* in Fig. 3. The other is substantially like it.

The furnace B, as above said, is a duplicate of the furnace A, and of which H' is the receiving-chamber; G', the bridge-wall; C', the fire-place, and E' the door thereof, and I' the doors of the heating-chamber.

Practically the operation of the two furnaces is as follows: The flame, heat, and gases in the fire-place C pass therefrom over the bridge-wall into the chamber H, in which are placed the ingots or other materials to be heated. The smoke and unconsumed gases that may be in the chamber, instead of being allowed to escape therefrom directly into the stack L, (as in the ordinary single furnace,) are shut off therefrom by the damper N, and made to pass along the flue K to the fire-place C', onto the incandescent coals therein, and by which the smoke or unconsumed gases from the fire-place C are burned, and which at the same time increase the activity and heat of the fire therein, thereby producing an increment of heat by the ignition and consumption of the gases from the fire-place C, which, as before said, are unconsumed and lost in the ordinary single furnace. That the smoke, &c., from the furnace A may pass through the flue K to the furnace B, the damper *a*, operated by the lever *b'*, Fig. 3, is lifted, as shown in Fig. 2, for a free passage to the furnace B. The heat, smoke, and gases from the fire-place C' pass

therefrom into the chamber H′ for heating the materials placed therein, which is more quickly done than in a single furnace, in virtue of the increment of heat caused by the burning of the gases from the fire at C. The smoke, &c., are allowed to escape from the chamber or oven H′ through the throat J′, thence into the stack L′, the damper *c* being opened for that purpose, whereas the damper *b* in the flue P is closed to prevent the smoke from returning to the fire place C.

It will be obvious from the corelation and joint operation of the two furnaces above described that there can be but little waste in the matter of fuel as compared with that of a single furnace employed for heating purposes, and the process of heating is effected in much less time in consequence of the increment of heat produced by the consumption of the smoke and gases in the two furnaces adapted to each other, as herein described.

It will be proper to remark here that the arrows indicate the course of the smoke, &c., starting from the fire-place C around to the fire-place C′. The current of smoke, &c., however, may start from the fire-place C′, and pass around to the fire-place C and chamber H, and escape therefrom through the stack L by simply closing the damper *a* and stack-damper *c*, and opening the damper *b* and the stack-damper N, thereby causing the smoke, &c., to pass from the fire-place C′ around to the fire-place C, thence into the chamber H, from which it will escape through the stack L, as aforesaid. It is desirable that this change in the starting-place of the smoke, &c., be made each time that the fire is supplied with fresh fuel or coal—that is to say, when fresh fuel is fed to the fire at C, none is supplied at the same time to the fire at C′, it being allowed to continue in a clear burning condition, so that the gases and smoke caused by the fresh coals on the fire at C will be immediately burned by the live bed of coals of the fire at C′, and so when fresh fuel is supplied to the fire at C′ none is supplied at the same time to the fire at C. The smoke, gases, &c., caused by the fresh fuel on the fire at C′ will pass over to the clear burning coals at C by closing the dampers *a c* and opening the dampers *b* and N, and so on. Each time that one of the fires is supplied with coal a change is made in the course of the smoke, &c., from one fire-place to the other by shutting and opening the dampers, as described. The dampers N and *c* are operated by levers or handles, respectively, in connection therewith, as are the levers for operating the dampers *a* and *b*. Said dampers may be placed on the top of the stack instead of near the base, as seen in the drawings.

Although the furnaces are especially intended for reheating purposes, they are equally well adapted for heating steam-boilers, or for puddling-furnaces, and other similar heating purposes, requiring for that purpose only such modification as to properly adapt them to the purposes above mentioned.

I do not confine myself to the exact construction of the details of the two furnaces as herein shown and described, as the same may be modified in some particulars without changing the essential nature of the invention.

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

In furnaces for heating ingots and other articles, the combination and reverse arrangement of the furnaces A and B in corelation for operating conjointly by means of transverse flues K and P, provided with dampers, respectively, *a* and *b*, and stack-dampers, substantially as described, and for the purposes specified.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE RHODEN.

Witnesses:

J. H. BURRIDGE,

C. H. TURNEY.