H. FRANK.

Regenerative Furnace-Valves.

No. 134,371. Patented Dec. 31, 1872.

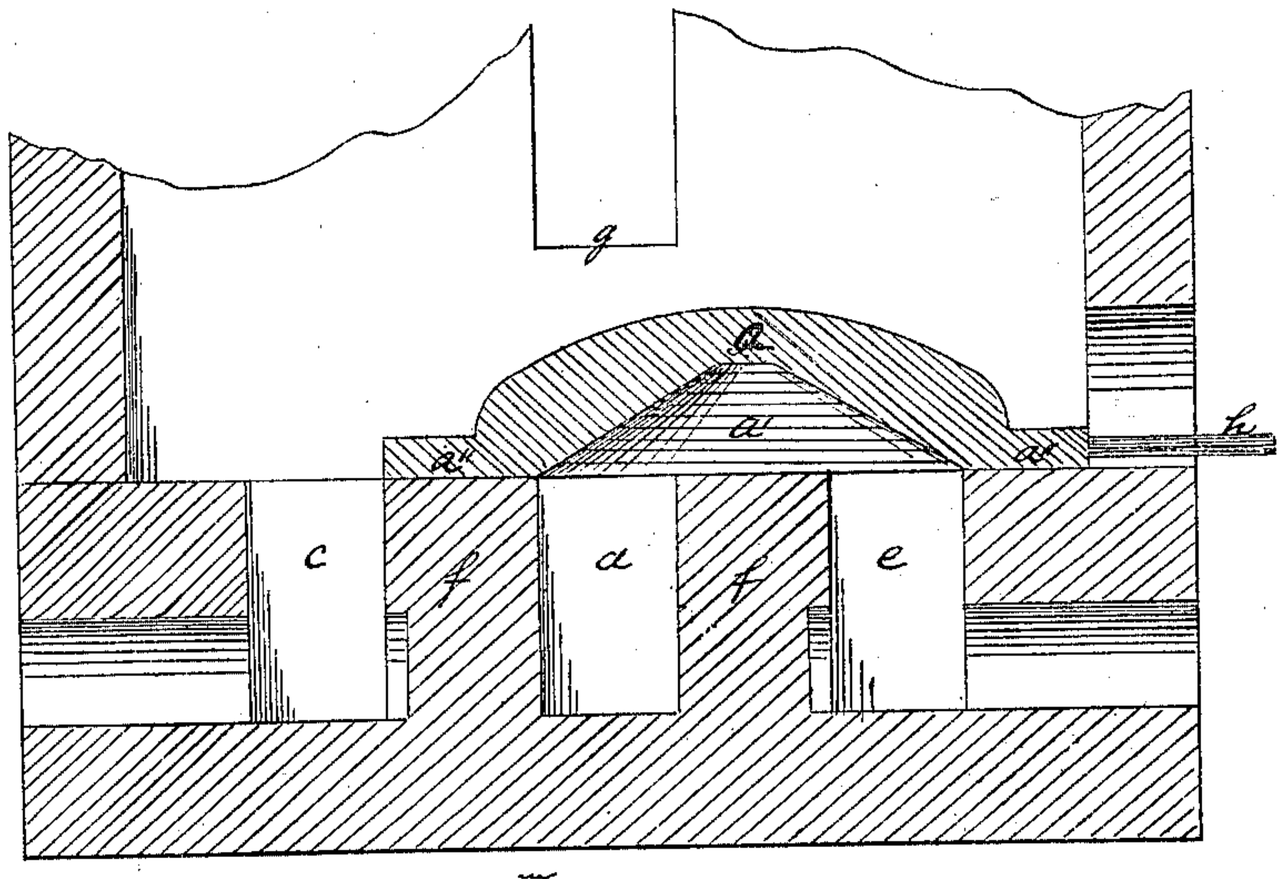

Fig. 1.

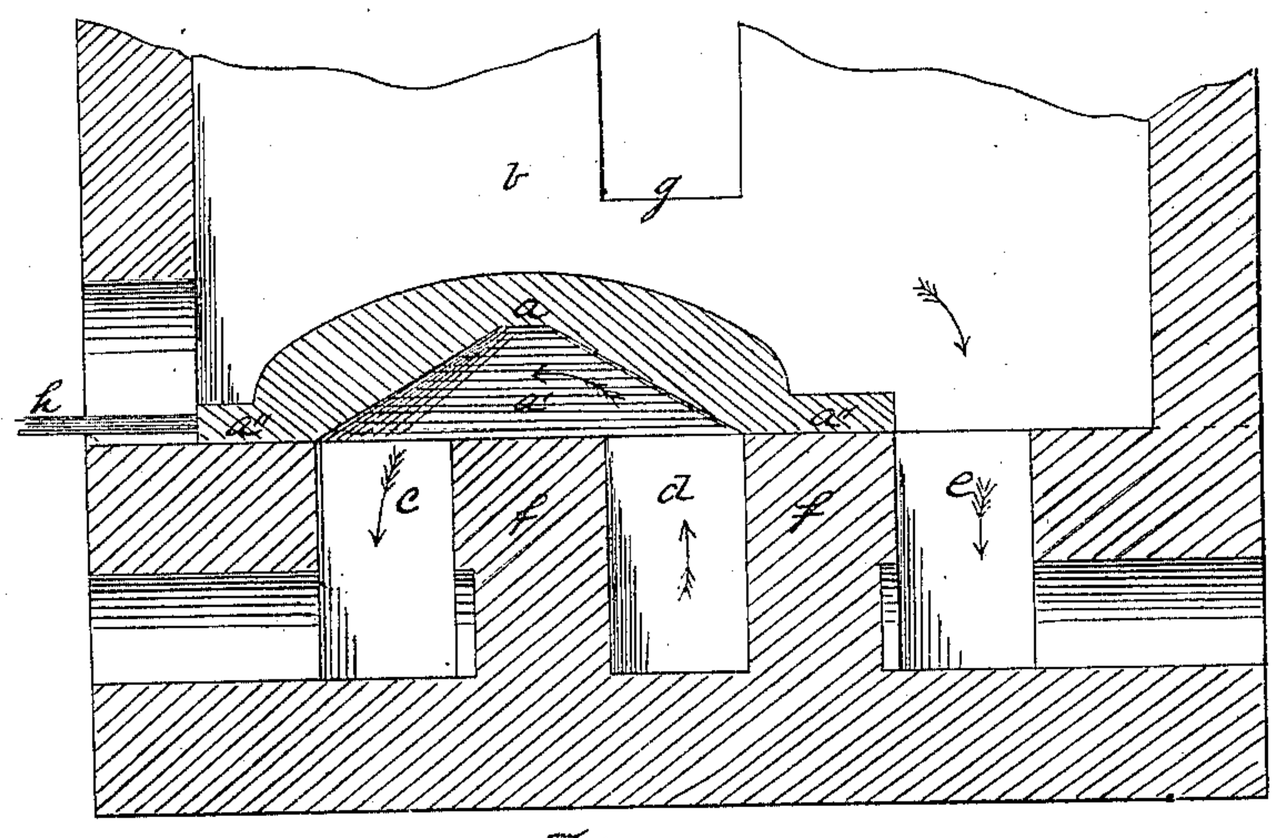

Fig. 2.

Witnesses—

James I. Kay

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AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

UNITED STATES PATENT OFFICE.

HIMAN FRANK, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN REGENERATIVE-FURNACE VALVES.

Specification forming part of Letters Patent No. **134,371**, dated December 31, 1872

To all whom it may concern:

Be it known that I, HIMAN FRANK, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Valves for Regenerative Furnaces; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing making a part of this specification, which, by two longitudinal views, illustrates my invention.

Like letters of reference indicate like parts in each.

My invention relates to that class of furnaces designated "regenerative," in which the waste products of combustion are utilized to heat the air and gas which constitute the fuel. This is done in chambers or ovens, which are termed "regenerators," and which have a series of passages or flues passing back from the furnace-bed, in which the hot gases from the bed are conducted to the stack, while the inflowing air and gas are caused to pass over and around these flues and passages, and are thereby heated. In some cases it is desirable to cause the hot products of combustion and the cold air to pass alternately through the same series of flues or passages for the purpose of clearing them of any deposit of carbon which may be made therein. The soot or other carbonaceous deposit readily burns out when air is admitted into the heated flues, the oxygen thereof having affinity for carbon at a high heat.

In Letters Patent No. 105,557, dated July 19, 1870, granted to Josiah W. Ells, provision is made for turning the currents of inflowing air and outflowing spent gas alternately through the same series of flues and passages by means of a damper; and in Letters Patent No. 105,558, by means of a damper the current of inflowing gas may be directed through one set of passages while the air passes through the other, or vice versa, at the will of the furnace-man.

My invention consists of a valve to be used in connection with suitable passages or flues instead of the dampers mentioned in the said Letters Patent.

To enable others skilled in the art to make and use my invention, I will describe its construction and mode of operation.

The valve *a* is dome-shaped, and is placed in a chamber, *b*, in the bottom of which are three flues, *c*, *d*, and *e*, two of which, *c* and *e*, are the passages by which the air and gas are led to the regenerator, and the third, *d*, is the passage which admits the air from the external atmosphere. The valve is of sufficient size for the dome *a'* to extend over and connect any two contiguous flues, *c* and *d* or *d* and *e*, or for the flat ends *a''* *a''* to cover and close the flues *c* and *e*, while the dome *a'* extends over the flue *d* and division-walls *f f*. The latter position of the valve closes all of the flues.

The gas to be used in connection with the air as fuel for the furnace is admitted through the opening *g* into the chamber *b*, while the air enters through the flue *d*. These two inflowing currents pass through separate channels to the furnace-bed, where they unite and form the elements of combustion.

In Fig. 1 the air entering through the flue *d* passes up through dome *a'* of the valve, thence down through the flue *e*, whence it passes back through a flue leading to the regenerator. The gas entering by the opening *g* into the chamber *b* passes down through the flue *c* to a flue leading to the regenerator. By moving the valve *a*, by means of the handle *h*, operated from the outside, so as to connect the two flues *d* and *e*, the air will be caused to pass through the flue *c*, while the gas passes through the flue *e*, as shown in Fig. 2.

It will be perceived that by arranging a similar valve in a convenient part of the furnace, the spent gases or heated products of combustion from the bed of the furnace may be caused to pass through one of the flues *c* or *e*, while the air from the flue *d* passes through the other.

By this means the several currents may be reversed by simply moving the damper, while in the method described in the patents above named it is necessary to open and close a second set of valves and dampers, which I entirely do away with, thereby saving much un-

necessary expense and complication in the construction of the furnace.

In some cases it is desirable to shut off the several currents entirely. This I accomplish by moving the valve *a* half the width of the chamber *b*, in which position the two flues *c* and *e* are covered by the ends *a''* *a''*, and the flue *d* has no outlet. This operation is impossible in the method described in the said Letters Patent.

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

1. The dome-shaped valve *a* operating, substantially as described, in combination with the flues *c*, *d*, and *e*, for reversing the aerial and gaseous currents of a regenerative furnace, at the option of the operator.

2. The air and gas flues arranged in relation to the dome-shaped valve so that by the operation of the valve the respective currents may be directed into either one of two passages at the will of the operator.

3. The valve *a* having extended ends *a''* *a''*, whereby the aerial and gaseous currents of a regenerative furnace may be cut off at the pleasure of the operator, substantially as described.

In testimony whereof I, the said HIMAN FRANK, have hereunto set my hand.

HIMAN FRANK.

Witnesses:

A. S. NICHOLSON,

THOS. B. KERR.