(No Model.) 2 Sheets—Sheet 1.

E. FOURCAULT & E. JACQUES.

REGENERATIVE GAS FURNACE.

No. 347,703. Patented Aug. 17, 1886.

FIG. 1

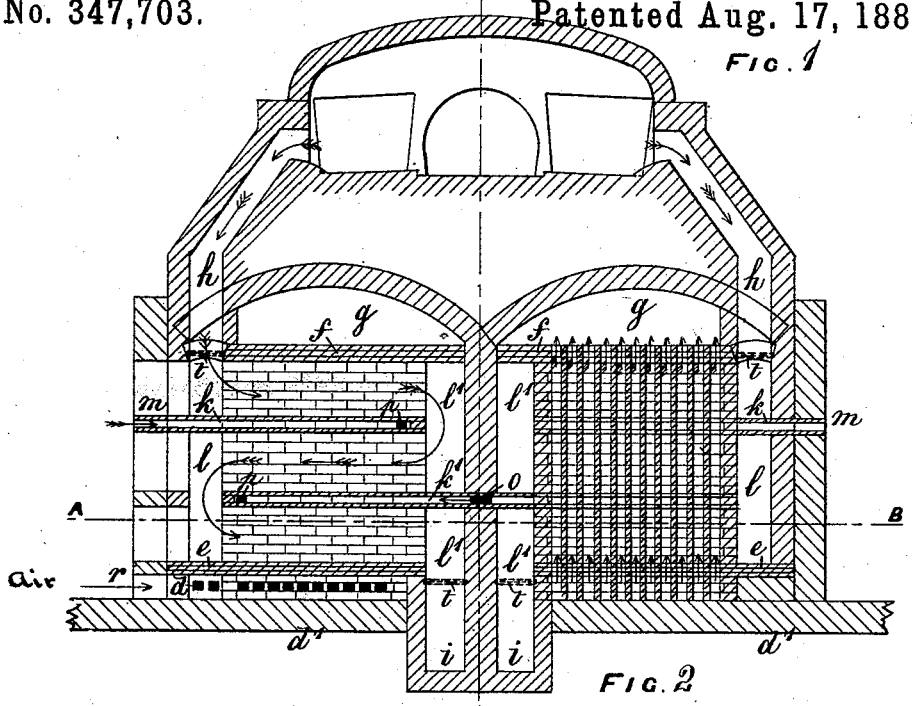
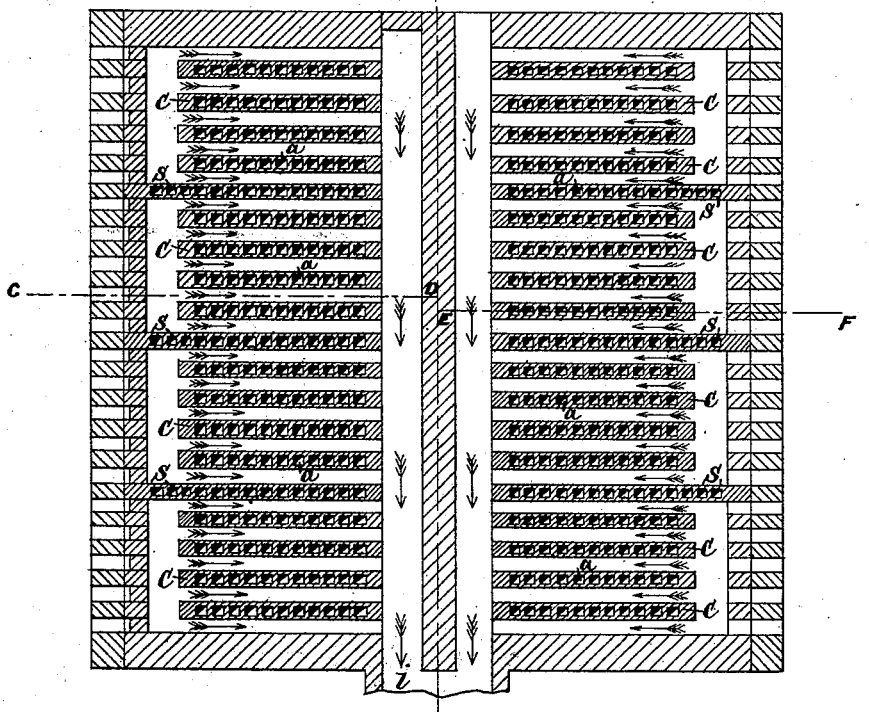


FIG. 2



Witnesses:-
W. R. Haight
J. C. Reynolds

Inventors:-
Emile Fourcault
and Ernest Jacques
by W. H. Babcock
Attorney

(No Model.) 2 Sheets—Sheet 2.

E. FOURCAULT & E. JACQUES.

REGENERATIVE GAS FURNACE.

No. 347,703. Patented Aug. 17, 1886.

FIG. 3

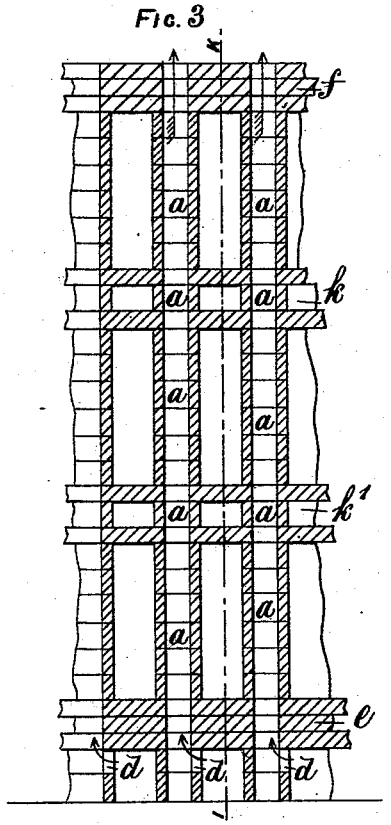


FIG. 4

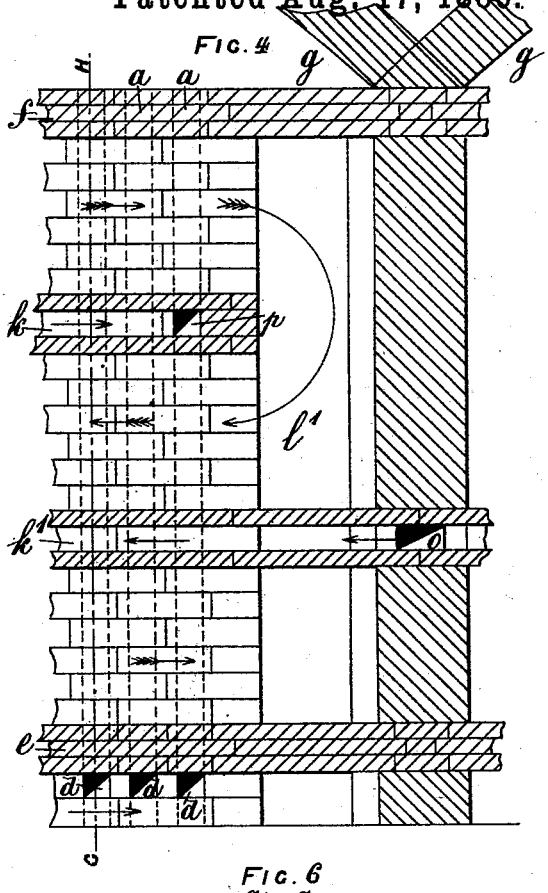


FIG. 5

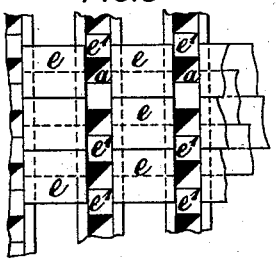


FIG. 6

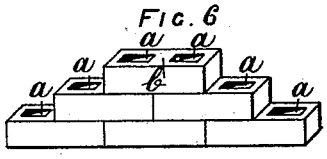


FIG. 7

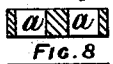
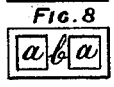


FIG. 8



Witnesses:
W. R. Haight
J. W. Reynolds

Inventors
Emile Fourcault
Ernest Jacques
by W. H. Babcock
Attorney

UNITED STATES PATENT OFFICE.

EMILE FOURCAULT AND ERNEST JACQUES, OF DAMPREMY, BELGIUM.

REGENERATIVE GAS-FURNACE.

SPECIFICATION forming part of Letters Patent No. 347,703, dated August 17, 1886

Application filed October 7, 1885. Serial No. 179,195. (No model.) Patented in Belgium May 26, 1885, No. 69,025.

To all whom it may concern:

Be it known that we, EMILE FOURCAULT and ERNEST JACQUES, subjects of the King of Belgium, both residing at Dampremy, in the Kingdom of Belgium, engineers, have invented a new and useful Improvement in Regenerative Gas-Furnaces, (for which we have obtained a patent in Belgium, No. 69,025, bearing date May 26, 1885,) of which the following is a specification, reference being had to the accompanying drawings forming part thereof.

Our invention relates to improvements in regenerative furnaces in which the escaping products of combustion are utilized to heat inflowing currents of air.

The said invention consists in the construction and combination of parts composing the regenerator, substantially as hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a vertical section through a pair of the improved stoves, the right-hand stove being shown in section through the vertical air-passages on the line E F, Fig. 2, and the left-hand stove through the passages from the heated gases on the line C D, Fig. 2; Fig. 2, a horizontal section through the same. Fig. 3 is a vertical section, on a larger scale, through the passages for the hot gases and the air. Fig. 4 is a similar vertical section showing one of the passages for the heated gases and the hollow horizontal dividing-partitions. Fig. 5 is a plan of Fig. 3; and Figs. 6, 7, and 8 show in detail the shape of the hollow bricks which we use in building the heating-surfaces of the stove.

The plain arrows show the course of the cold air, the half-feathered arrows of the heated air, and the feathered arrows of the hot gases.

Similar letters refer to similar parts throughout the several figures.

The bricks, of refractory material, which constitute the heating-surface of the stove, are shown in Figs. 6, 7, and 8, and are fourteen and one-half inches long by seven and one-fourth inches wide and four inches thick, each having two square holes, *a a*, through it about four inches square, the exterior walls, therefore, being one and five-eights inch thick, and the partition *b* between them about three and one-fourth inches thick. It will be seen in Fig. 6 that a wall built with these bricks, making them break joint in the usual way, will be seven and one-fourth inches thick and any desired height and length, having square vertical passages through it, and the arrangement of the joints and the large faces of the bricks insure the stability of the wall. We build a series of parallel walls of these bricks, as shown in Figs. 1 and 2, a space being left between each two walls of about six inches, and each stove consists of a sufficient number of these parallel walls *c c c*, having vertical passages *a* through them. The walls are built upon a flat foundation of masonry at *d'*, and after the first two or three courses have been laid the spaces between the walls are covered with a sufficient thickness of flat bricks or tiles, *e*, laid so as to break joint, and serving to separate the cold air to be heated from the escaping products of combustion which are utilized to heat it. This cold air is admitted from outside the stove into the space between the walls, and thence through lateral apertures *d d d* into the vertical channels *a*. Above the tiles *e* the building of the walls is continued upward to the desired height, their upper ends being covered with a sufficient thickness of flat bricks or tiles *f*, having perforations corresponding with the passages *a* in the walls, and above the covering *f* is built an arched reservoir, *g*, for the air after it has been heated.

The heating-gases, which are admitted from the furnace, where they are produced through the passages *h* at the top of the stove, are made to circulate backward and forward between the walls *a* before passing into the flue *i* to the chimney. For this purpose horizontal partitions *k k'* are built across the walls *a* at different heights, closing the chambers *l l'* alternately, so that the gases are forced to circulate in the direction shown by the arrows in Figs. 1 and 4. These partitions are made hollow, as shown in Figs. 1, 3, and 4, air being admitted into them either through the external wall of the stove *m* or through a passage, *o*, in the central wall, *n*, which divides the pair of stoves, as shown in Figs. 1 and 4. The partitions *k k'* are formed of flat tiles above and below, separated by hollow perforated bricks *a*, and having openings through them corresponding with the open-

ings in the bricks. The air which enters the hollow partitions *k k'* becomes heated and escapes through lateral openings *p* into the adjoining vertical passage *a*.

The heated gas is admitted through the passages *h* into the upper part of the chamber *l*, circulates below the hot-air receiver *g*, and between the walls *a* to the chamber *l'*, thence back under the partition *k* to the chamber *l*, and again forced under the partition *k* and above the covering *e* to the chamber *l'*, and through the flue *i* to a chimney. At the same time cold air enters from *r* the spaces between the walls below the covering *e*, and thence passes through the openings *d* up through the vertical passages *a* in the walls into the receivers *g*, becoming highly heated in its passage. From the receivers *g* it can be conducted away and utilized. Small square tiles *c*, Fig. 5, are fitted between the perforations *a* to keep the tiles *e* from shifting.

Each of the pair of stoves is divided into four or more parts by divisions *s s s*, formed by carrying the corresponding walls *a* to the outer wall of the stove, and by arranging valves or movable dampers of any of the ordinary well-known kinds at *t* in the entrance-passages *h* and the exit passages to the flue *i* any of these separate parts of the stove can be readily cut off from the remainder for the purpose of cleaning or repair, and the heat of the several parts and of each of the stoves can be adjusted and regulated so as to maintain a practically uniform temperature.

On bad foundations vertical and transverse ties or stays of iron may be used to keep the walls of perforated brick-work in place.

In order to obtain the best result, the regenerator-stove should be so proportioned and arranged that the air passes very slowly through the vertical passages *a* in the walls, and this we effect by using a very large number of these passages, so as to have a large area of passage and great heating-surface, the air traveling slowly and being exposed for a long time to the action of the heat.

The stoves may be used single or in pairs, as shown, and may be square, rectangular, or of other convenient shape, and their size and proportions may be varied according to the particular purpose and the circumstances in which they are to be used.

We are aware that it is not new to construct a regenerator of bricks which are perforated in the direction of their length and arranged to leave transverse passages between them, the rows alternating to cover said passages, and the products of combustion passing up through the bricks of one row and outside those of another row, while the air to be heated passes outside the former and inside the latter. We are also aware that it is not new to construct a regenerator of walls of vertically-channeled bricks and horizontally-channeled bricks arranged alternately. We do not claim, broadly, either of these constructions; but

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a regenerator, the parallel walls *c*, provided with spaces *a*, in combination with the hollow horizontal partitions *k k'*, connected with air-inlet openings *r* and *o*, chambers *l l'*, gas-passages *h*, and flues *i*, substantially as and for the purpose set forth.

2. The combination of the parallel walls *c* and perforations *a*, cold-air-inlet openings *d*, perforated coverings *e* and *f*, vertical hollow partitions *s*, hot-air receivers *g*, and regulating-valves *t*, substantially as and for the purposes described and shown.

EMILE FOURCAULT.
ERNEST JACQUES.

Witnesses:
H. WITTAMERL,
A. SCUDEBURG.