

W. SWINDELL.  
REGENERATOR FURNACE.

No. 282,586.

Patented Aug. 7, 1883.

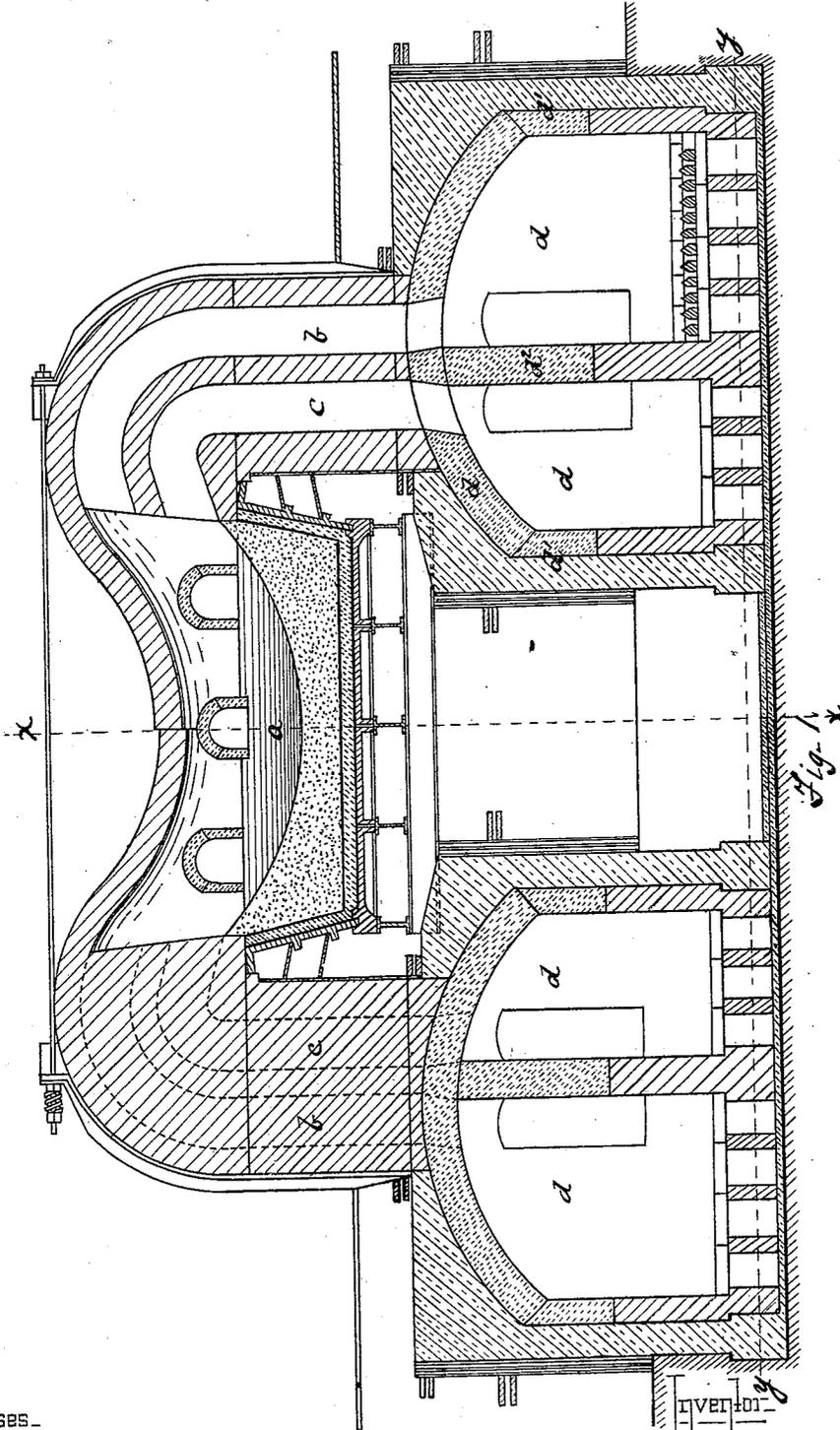


Fig. 1


 MESSRS.  
 W. A. Brown  
 and  
 J. K. Smith

W. Swindell,  
 by his attys  
 Bakewell & Kern

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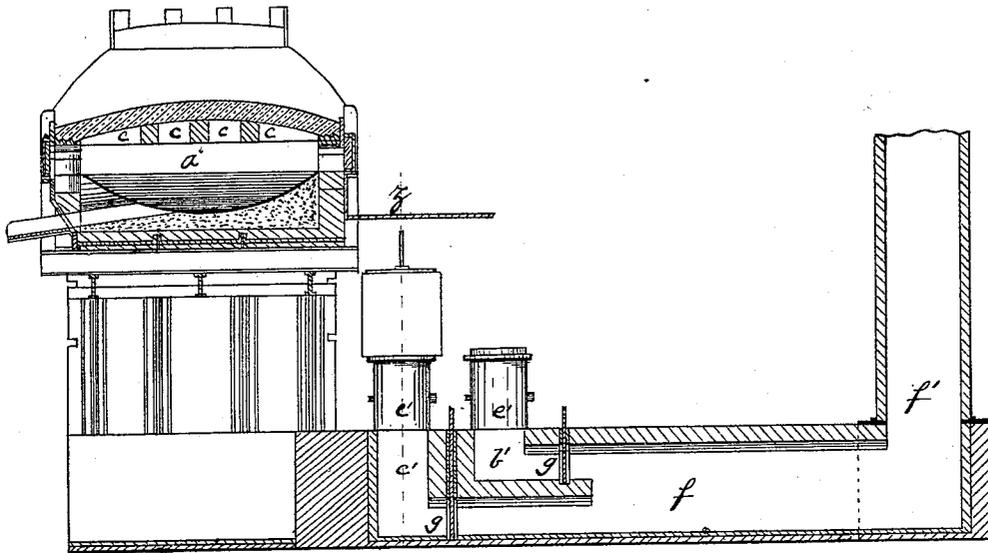


Fig. 2.

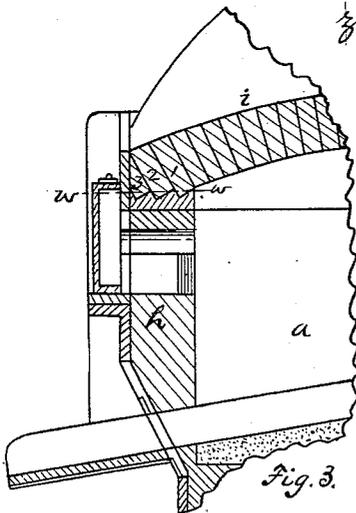


Fig. 3.

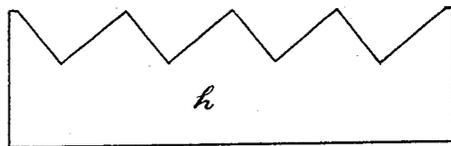


Fig. 4.

WITNESSES

W. B. Corwin,  
J. W. K. Smith

INVENTOR

William Swindell,  
by his attys  
Bakewell & Kern

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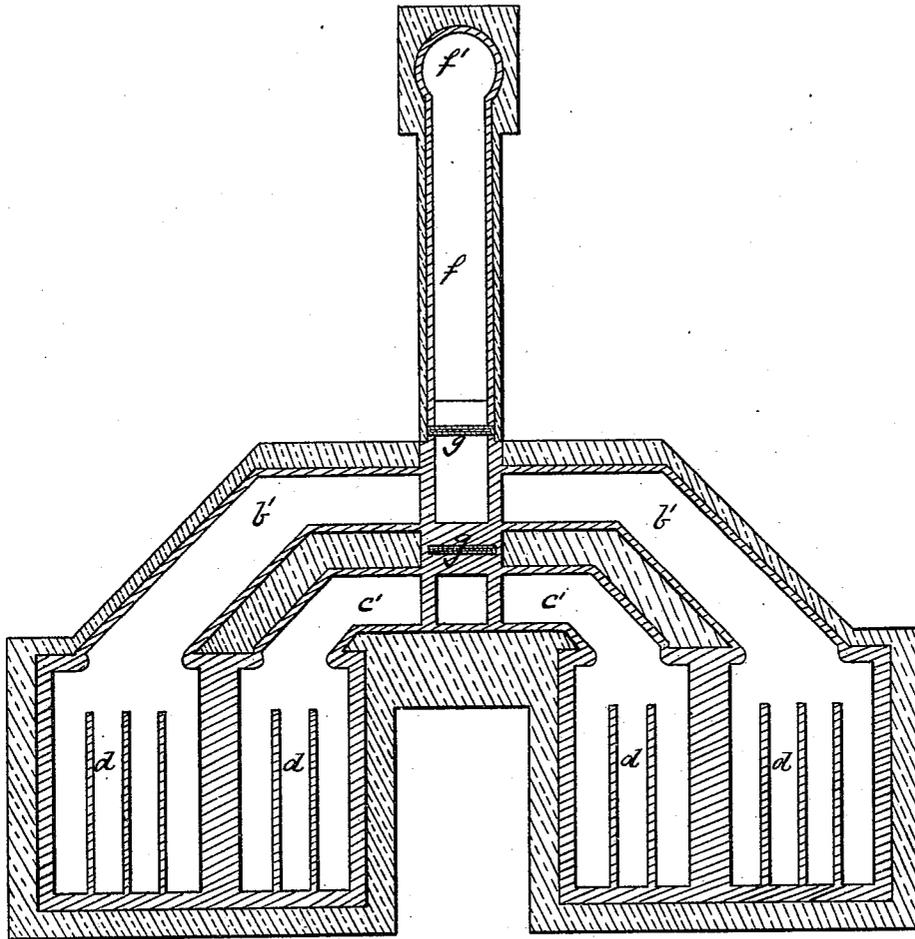


Fig. 5.

WITNESSES.

*W. B. Cowie*  
*J. K. Smith*

INVENTOR

*William Swindell*  
by his attys  
*Bakewell & Kern*

(No Model.)

4 Sheets—Sheet 4.

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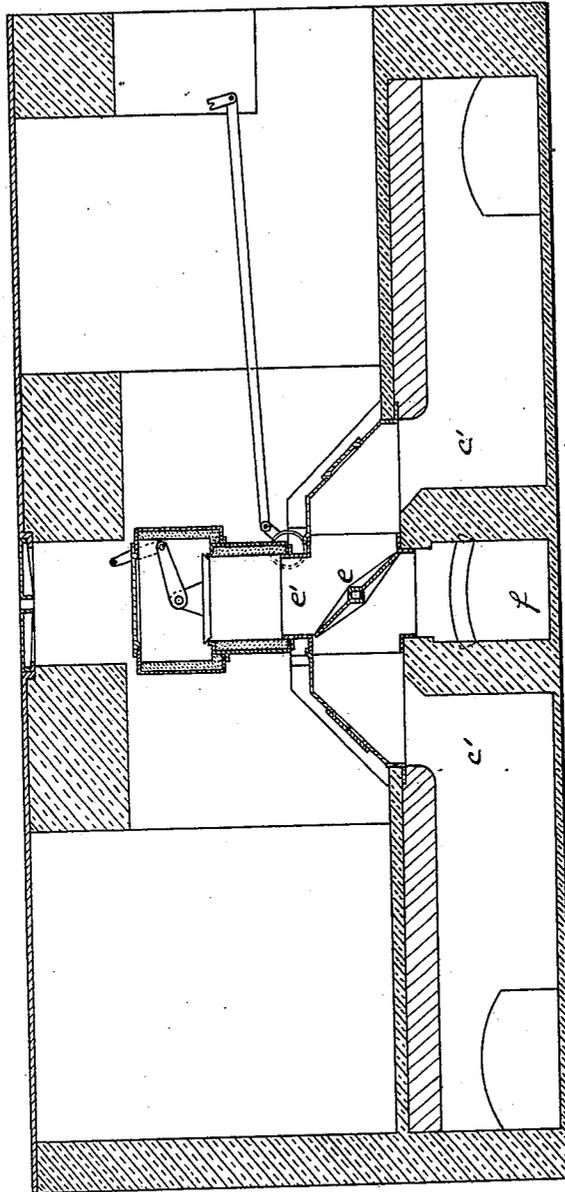


Fig. 6.

Witnesses.

*W. B. Conwin,*  
*J. W. K. Smith*

Inventor.

*William Swindell*  
*by his attys*  
*Bakewell & Kent*

# UNITED STATES PATENT OFFICE.

WILLIAM SWINDELL, OF ALLEGHENY CITY, PENNSYLVANIA.

## REGENERATOR-FURNACE.

SPECIFICATION forming part of Letters Patent No. 282,586, dated August 7, 1883.

Application filed October 15, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM SWINDELL, of Allegheny city, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Regenerator-Furnaces; and I do hereby declare the following to be a full, clear, and exact description thereof.

I make use of a separate valve for the air and gas flues at or near their point of discharge to the stack. Heretofore with the old construction, in which the valve was placed in the common stack-flue, it often happened that when the waste products of combustion were passing out at one side of the furnace one set of channels or flues became extremely hot, while the other remained comparatively cool. The effect of this unequal temperature on the opposite sides of the walls of the furnace and its chambers and flues was very deleterious, and tended to the speedy destruction of the same. It is apparent that with one valve it was impossible to regulate the degree of heat in the separate flues. By my improvement I am enabled to regulate and equalize the heat in the chambers and waste-flues by simply manipulating the valves.

Another feature of my invention consists in forming a joint between the crown and side walls of the furnace, of a horizontal notched or serrated outline, so that if the wear of the walls causes them to shrink away from the crown, the crack thus made will be stopped by one of the overlapping bricks, and will not open clear through the wall.

To enable others skilled in the art to make and use my invention, I will now describe it by reference to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of a regenerator-furnace. Fig. 2 is a vertical cross-section of the furnace on the line  $xx$  of Fig. 1. Figs. 3 and 4 are details of construction. Fig. 5 is a horizontal section on the line  $yy$  of Fig. 1. Fig. 6 is a vertical section on the line  $zz$  of Fig. 2.

Like letters of reference indicate like parts in each.

The furnace  $a$  is of the usual construction, having air and gas flues  $b$  and  $c$ , which enter the bed on a regular curve. The regenerators  $d$ , reversing-valves  $e$ , valve-chambers  $e'$ , flues

$c'$   $d'$  from the valves to the regenerators, stack-flue  $f$ , and stack  $f'$  are all of a common construction and arrangement.

The arch of the generator  $d$  is struck from the thick side walls,  $d'$ , and does not bear its entire weight on the partition  $d''$ , which separates the flues, and consequently is not liable to fall in case of the shrinkage of the bricks and the giving down of the partition  $d''$  from the intense heat.

As heretofore constructed, the valve which regulated the passage of the waste heat to the stack was placed in the stack-flue  $f$ , beyond the ends of the separate air and gas flues  $d'$   $e'$ , and, as before stated, it was impossible to regulate any variation of temperature between the two flues. The consequence was that it was necessary to have the air and gas flues of the same relative area as the regenerator-chambers, so that when, by the reversal of the furnace, such flues were the outgoing flues, the volume of waste heat should be proportionate to the size of their chambers; otherwise an unequal heat existed in the said flues and their regenerator-chambers, and such variation caused the cutting away of the walls on one side and their warping and shrinkage, and resulted in the speedy destruction of the furnace. This was often caused by the unequal burning out of the flues, which produced a disproportionate area therein, and resulted in the unequal heating of the regenerator-chambers and flues just mentioned. In these furnaces the air-flues and regenerator-chambers are usually one-third larger than the gas-flues and chambers. To obviate this danger and to obtain the advantage of equal heat in both flues and regenerator-chambers, I have placed a separate valve,  $g$ , in each flue. In case of unequal heating of the flues and regenerator-chambers such unequal heating can be corrected and the temperature equalized by the adjustment of the valves. This is an important feature, because when one flue gets hotter than the other it draws the current away from the other, and so becomes more and more heated and increases the evil. The manipulation of the valves enables me to fill or dam up the waste heat in the hotter regenerator-chamber, and cause it to flow more freely through the cooler one, and thus to restore an equilibrium of heat, and this

even when the exit-flues leading from the bed to the regenerator-chambers are worn into disproportionate proportions.

The crown *i* of the furnace is joined to the walls *h* by means of square-ended bricks 1 2 3, placed in the arch with their ends resting on the wall, forming therewith a horizontal or nearly horizontal joint having notched or zigzag meeting edges. Heretofore the corner between the arch of the crown *i* and the wall *h* was filled by an irregular-shaped brick called a "skewback." This made a straight joint on the dotted line *w w*, and the effect of the wear of the side wall of the furnace, which is very great, was to cause it to give down in front and open a straight wedge-shaped crack along the joint *w w*, through which the flame and heat passed. This increased the rapidity of the wear and necessitated rebuilding of the furnace often. By my improved construction the giving down of the wall is at first limited to the point of the brick 1, and when that is passed to the point of the second, and so on, the succeeding bricks each interposing a barrier to the cracking and opening of the wall.

I do not herein claim the combination of the curved flues *b c* with a reversing regenerator-furnace, as I reserve the same for a separate application.

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

1. A regenerator-furnace having separate valves controlling the air and gas flues at their discharging-point nearest the stack, substantially as and for the purposes described.
2. A regenerator-furnace having the crown united to the top of the walls by a horizontal or substantially horizontal serrated or zigzag line formed by the ends of the outer bricks of the crown, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand.

WILLIAM SWINDELL.

Witnesses:

T. B. KERR,  
JAMES H. PORTE.