B. VERSEN.

FURNACE HEAD FOR GAS FURNACES WITH CHANGING DIRECTION OF FLAMES.

APPLICATION FILED JUNE 8, 1909.

975,738.

Patented Nov. 15, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

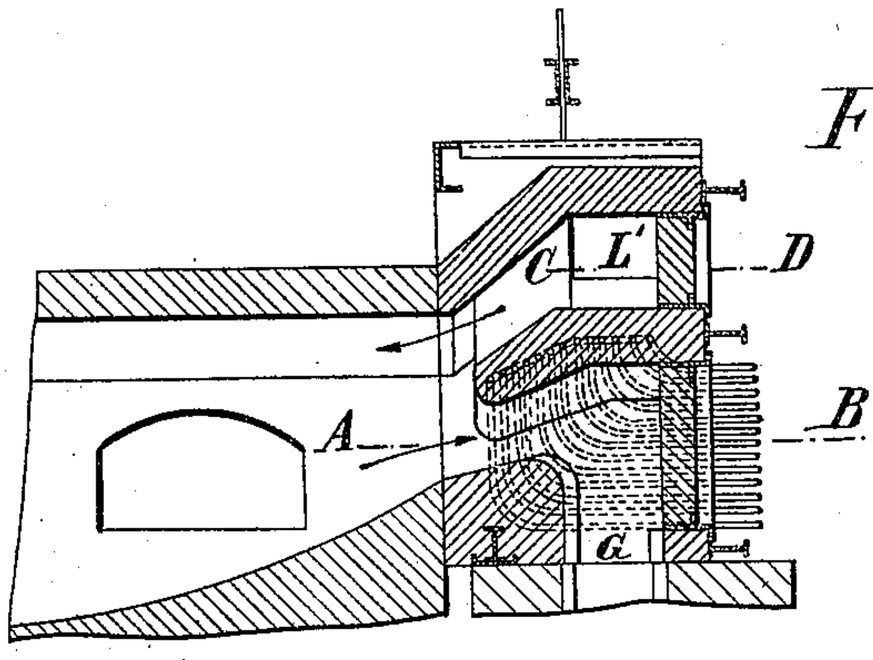


Fig. 2.

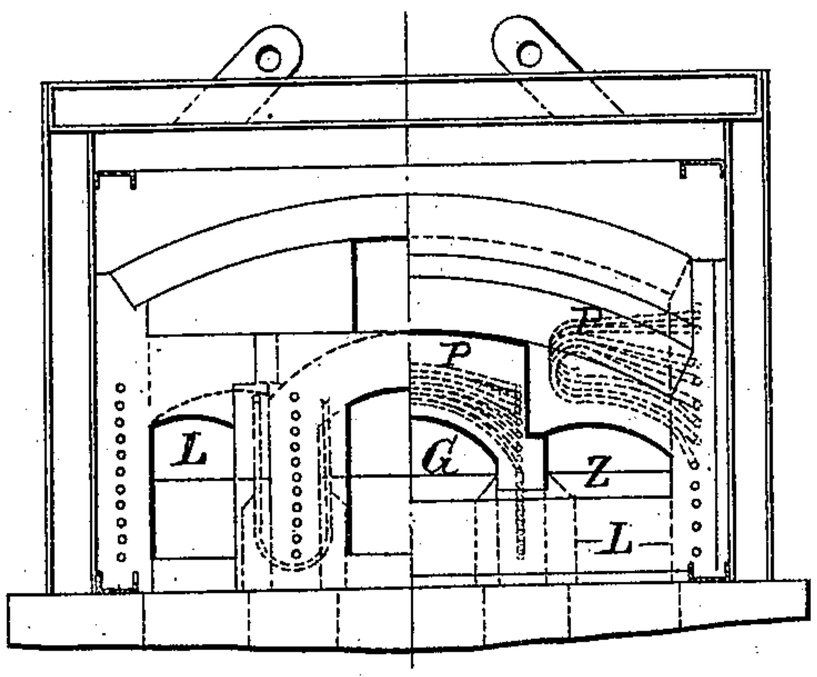
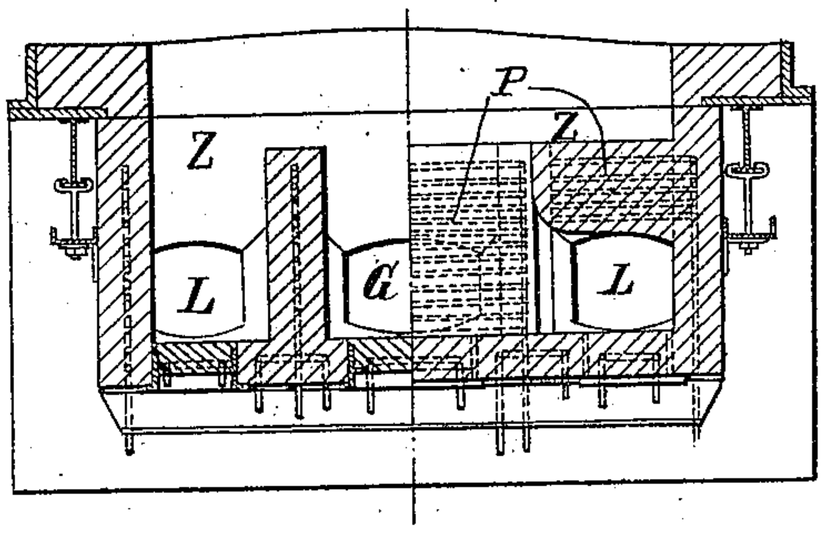


Fig. 3.



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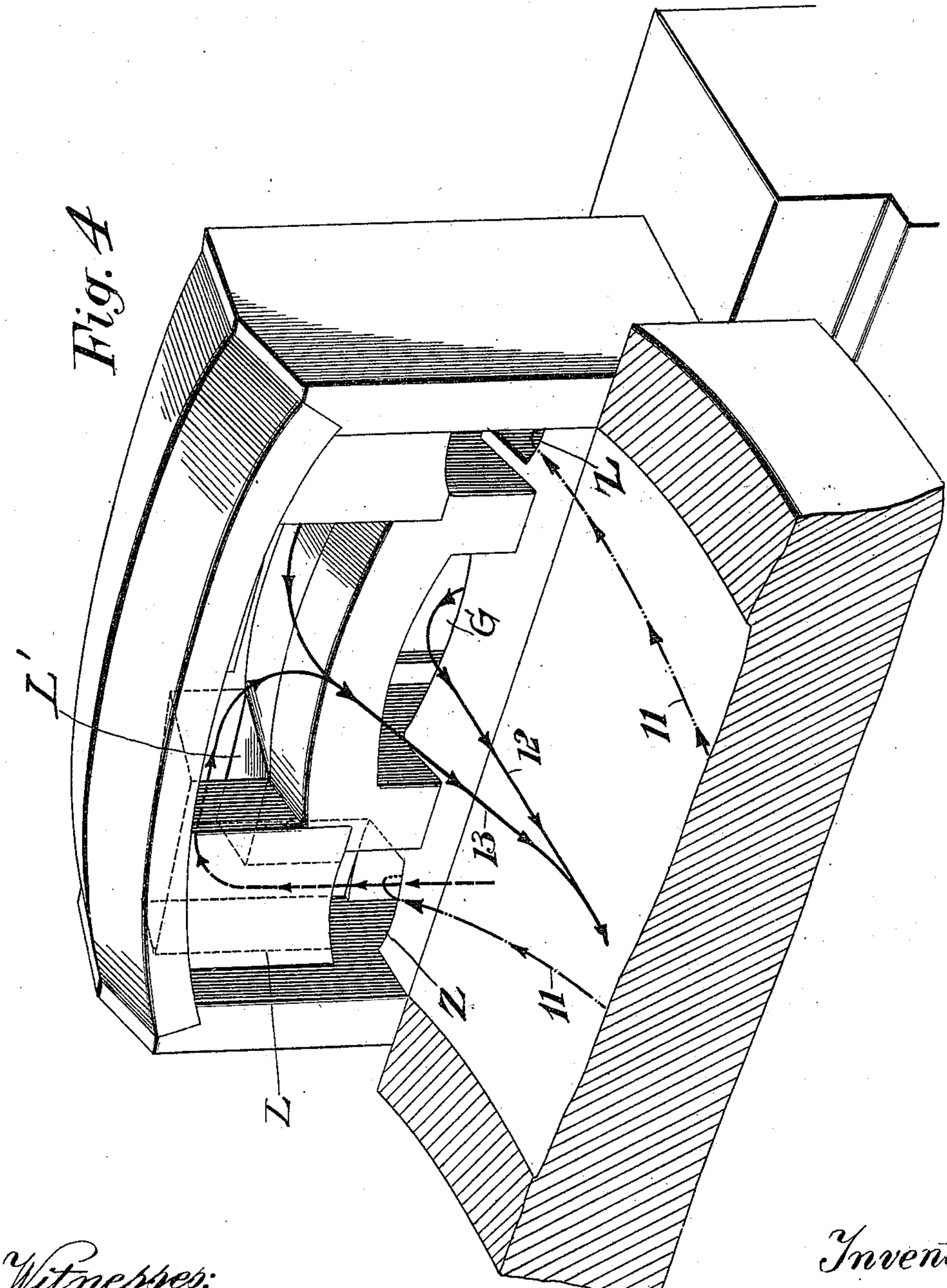
2 SHEETS—SHEET 2.

Fig. 4



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UNITED STATES PATENT OFFICE.

BRUNO VERSEN, OF DORTMUND, GERMANY.

FURNACE-HEAD FOR GAS-FURNACES WITH CHANGING DIRECTION OF FLAMES.

975,738. Specification of Letters Patent. Patented Nov. 15, 1910.

Application filed June 8, 1909. Serial No. 500,906.

To all whom it may concern:

Be it known that I, BRUNO VERSEN, a subject of the German Emperor, and resident of Dortmund, Germany, have invented certain new and useful Improvements in Furnace-Heads for Gas-Furnaces with Changing Direction of Flames, of which the following is a specification.

This invention relates to furnaces and especially to that class of metallurgical or similar furnaces, which are heated by gas with simultaneous introduction of air, and wherein in periodical intermissions the direction of the introduced stream of gas and air is reversed.

An object of the invention is to improve the caloric efficiency of the furnace by providing apertures in the furnace head for the escape of the "heat," *i. e.* the combustion mixture of air and gas, said apertures being disposed at about the same height as the apertures for the introduction of the gas. By this means the air which serves for raising the temperature of the heating flame is maintained within said flame in the entire interior space of the furnace.

Another object of the invention is to provide means on the furnace head for cooling the same and thereby increasing the durability of the head, said cooling means being simultaneously adapted to serve as reinforcing means for the head.

Other objects will be more clearly understood by reference to the following specification and accompanying drawing and will be more clearly pointed out in and by the appended claims.

In the drawing, Figure 1 is a longitudinal section through a furnace head with parts of the furnace. Fig. 2 on the left hand side is a front elevation of the furnace head and on the right hand side a rear elevation of the same, *i. e.* the furnace head seen from the inside of the furnace. Fig. 3 shows on the left hand side a transverse section of the furnace head on line A—B of Fig. 1 and on the right hand side a section on line C—D of Fig. 1. Fig. 4 is a perspective view of the furnace head on a larger scale, the inner side of the furnace head being shown exposed.

In the improved furnace head air is preferably conveyed through the same by vertical lateral flues L, which open on or near the top of the furnace into the same by a common port L′. The gas may be conveyed to the furnace by a flue advisably disposed between the air flue and opening into the furnace by a port arranged below the common air port L′. Below the common air port L′ branch flues Z extend from the lateral flues L and open into the furnace advisably at the same height with respect to the opening of the gas flue G. At the period in which the head serves as an exhaust head the heat on the hearth of the furnace will be conveyed through the branch flues Z following the arrows 11 indicated in dash dotted lines on Fig. 4. By this means the heat will be maintained in close proximity to the material to be heated until said heat leaves the furnace. When the head serves as an intake head air in the form of a blast will be conveyed through the lateral flues L and owing to the momentum of the blast it will pass the branch flues Z without entering the same, but it will be rather conveyed into the furnace through the common port L′ as indicated in Fig. 4 by the arrows 13; the gas will leave the central flue in the direction indicated by the arrows 12. But even if air should enter the furnace through the lateral flues Z no obnoxious effect would be attained thereby, said air rather exerting a cooling influence upon the neighboring parts and walls of said flues.

For the purpose of protecting the furnace head against premature deterioration, cooling pipes P are advisably embedded in the various portions of the head. It is of advantage to divide these cooling means in a plurality of systems, so that an equal cooling effect may be obtained in the various parts of the head. As shown in Figs. 1, 2 and 3, a plurality of cooling pipes are embedded between the common port L′ and the gas port, other cooling pipes are arranged in the walls separating the branch flues Z from the gas flues G while a third plurality of pipes are disposed in the walls between the main air flues L and the branch flues Z. These systems of piping simultaneously serve as a reinforcing means for the entire furnace head in a very effective way, enabling the same to resist vibrations and jars, especially when it is lifted off by means of a crane or when it is repaired.

On account of the advantageous distribution of the air, it is obvious that the weight of the head may be decreased in comparison with a head of usual construction, so that even in very large furnaces these heads may be removed and may be exchanged in a man-

ner which is ordinarily used for converters. Another advantage obtained thereby is the improvement of the heating effect which is accompanied by economical advantages and a considerable saving in fuel. Another economical advantage rests in the fact that smaller furnace heads can more easily be replaced by entire new ones than furnace heads of large dimensions. As the furnace head is comparatively short, measured in the direction of the longitudinal axis of the furnace, it is possible to increase the length of the hearth and thereby the possible output without increasing the length of the furnace over all.

I claim:—

1. In a furnace head of the class described the combination of lateral air flues and a central gas flue, said lateral flues opening into the furnace in a common port above the port of said central flue, and branch flues extending from said lateral flues into the furnace below said common port.

2. In a furnace head of the class described the combination of lateral air flues and a central gas flue, said lateral flues opening into the furnace in a common port above the port of said central gas flue and branch flues extending from said lateral flues and opening into the furnace at the height of the port of said gas flue.

3. In a furnace head of the class described the combination of lateral air flues and a central gas flue, said lateral flues opening into the furnace in a common port above the port of the gas flue, branch flues extending from said lateral flues and opening into the furnace at the height of the port of said gas flue, and cooling pipes embedded in the wall portions between the common port and the port of the gas flue, in the wall portions between the lateral flues and the branch flues, and in lateral walls of the furnace head, said cooling pipes being adapted to serve as reinforcing means for the furnace head.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

BRUNO VERSEN.

Witnesses:

OTTO KÖNIG,

CHAS. J. WRIGHT.