No. 760,633. PATENTED MAY 24, 1904.

A. KURZWERNHART.

METHOD OF AVOIDING LOSS OF HEAT IN FURNACES.

APPLICATION FILED FEB. 24, 1904.

NO MODEL.

Fig. 1.

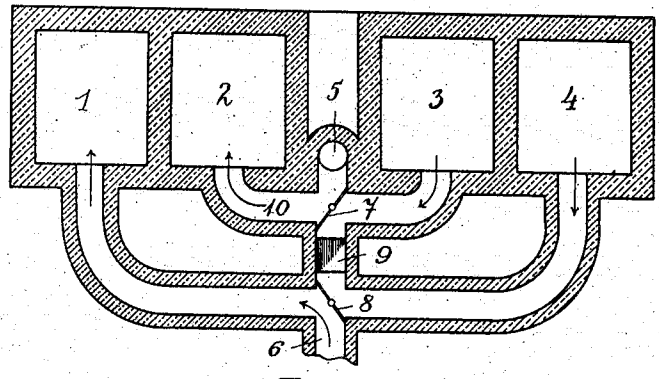


Fig. 2.

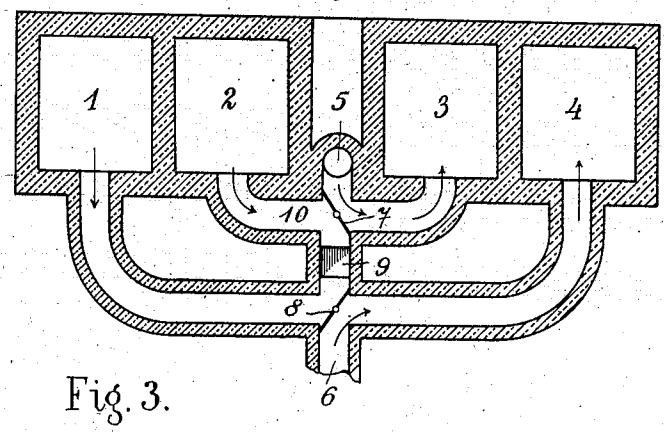


Fig. 3.

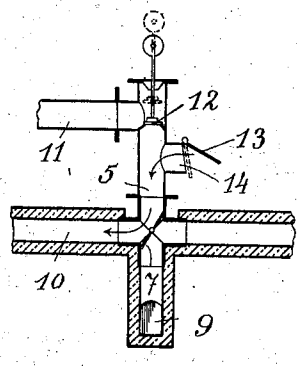
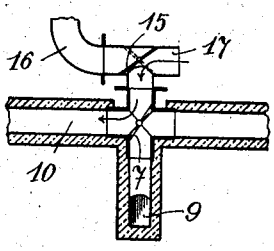


Fig. 4.



WITNESSES

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No. 760,633. Patented May 24, 1904.

UNITED STATES PATENT OFFICE.

ADALBERT KURZWERNHART, OF ZUCKMANTEL, NEAR TEPLITZ, AUSTRIA-HUNGARY.

METHOD OF AVOIDING LOSS OF HEAT IN FURNACES.

SPECIFICATION forming part of Letters Patent No. 760,633, dated May 24, 1904.

Application filed February 24, 1904. Serial No. 195,062. (No specimens.)

To all whom it may concern:

Be it known that I, ADALBERT KURZWERNHART, a subject of the Emperor of Austria-Hungary, residing at Zuckmantel, near Teplitz, in the Empire of Austria-Hungary, have invented a new and useful Method of Avoiding Loss of Heat in Furnaces, of which the following is a specification.

This invention relates to improvements in Siemens regenerative furnaces, and has for its object to provide means for preventing loss of gas on reversing the controlling-valve.

In reversing the gas and air current in Siemens furnaces loss of the gases of combustion is caused not only by the escape of the gas through the valve into the chimney during the period of reversing, but also chiefly from the fact that after the reversal has taken place the whole contents of the regenerative chamber is emptied into the chimney, and thus escapes without being used.

This invention relates to a method for completely avoiding the loss of gas on reversing the direction of the flow.

The method in which the loss of gas takes place and my novel method of avoiding such loss will be understood by reference to the accompanying drawings, in which—

Figures 1 and 2 are horizontal sections through one of the regenerative chambers and passages of a Siemens furnace, and Figs. 3 and 4 are sectional views of suitable forms of device by means of which the invention can be carried out in practice.

In Fig. 1 the valve is shown in the position before the direction of flow of the gas-current is reversed. 1 and 4 are the two air regenerative chambers; 2 and 3, the two gas regenerative chambers. 5 is the gas-supply pipe, here shown arranged vertically; 6, the air-inlet opening; 7, the gas-reversing valve; 8, the air-reversing valve, and 9 the flue. The chamber 1 is filled with air, the chamber 2 with gas, and the chambers 3 and 4 with products of combustion, (carbonic-acid gas, &c.) If now the reversing-valves be operated so that they assume the position illustrated in Fig. 2, gas flows through the chamber 3 in the well-known manner and air through the chamber 4. The products of combustion which are contained in both the above-named chambers are then caused to flow into the furnace situated above the regenerative chambers and thence into the chambers 1 and 2. The air contained in the chamber 1 escapes into the chimney. Also the gaseous contents of the chamber 2 and of the passage 10, Fig. 2, escape into the chimney. In every position of the reversing-valve 7 intermediate between the positions indicated in Figs. 1 and 2 there exists a direct connection between the gas-passage 5 and the chimney 9, so that in such positions the gas can escape unused directly into the chimney. In order now to avoid such loss of gas, according to this invention I arrange for cutting off the flow of gas to the regenerative chamber by closing the gas-supply passage through the medium of suitable gear before the valve is reversed in the usual way, a separate suitably-arranged inlet being opened for the introduction of air into the gas regenerative chamber and into the gas-passage provided in front thereof. The air which flows in through this inlet forces the gas contained in the gas-passage and in the regenerative chamber 2, Fig. 1, into the furnace, where it meets with the air which flows upward in the usual manner from the air regenerative chamber 1 and is consumed. When now it is ascertained by the decrease of the flame in the furnace that all the gas has been utilized from the gas regenerative chamber, the above-mentioned air-inlet opening is closed, the direction of the current is reversed in the usual way, and the gas-cut-off device, which has been closed, is again opened. At the moment of the decrease of the flame in the furnace the gas regenerative chamber 2 is filled only with air instead of with gas, as has heretofore been the case. All the other chambers have the contents they possessed before the reversing operation, as above described, so that the further continuation of the heating or of the combustion after the reversing takes place in the usual way. The difference is that only the air contained in the chamber 2 and which serves to displace the gas is emptied into the chimney, whereas

heretofore a like volume of gas has been lost and also gas corresponding in volume to that of the gas-passage 10. At the same time the loss entailed by the direct escape of gas from the passage during the reversing operation is completely avoided.

In applying the invention to a regenerative furnace the gas-supply must be provided with a suitable form of cut-off device, and, furthermore, an air-opening which is capable of being closed must be arranged at any suitable point—for example, behind the cut-off device (in the direction of the gas-current) or at a point in the gas-passage. These two devices—namely, the gas-cut-off device and the air-inlet opening—can be, where not already existing, adapted to any regenerative furnace whatever the type of reversing device with which it is provided.

Fig. 3 shows, by way of example, a mode of carrying out the invention. The gas is conveyed to the passage 5 through the passage 11. The gas-flow can be cut off by the cut-off device, which is here shown in the form of the valve 12. In the figure the valve is illustrated as being closed in full lines and fully open in broken lines. At the side of the passage 5 there is provided the air-inlet opening 14, which is adapted to be closed by the valve 13. The said valve 13 is shown open in the full lines and closed in the broken lines. The position of the reversing-valve 7 corresponds to the position illustrated in Fig. 1, wherein the gas flows through the regenerative chamber. For reversing, the gas-current is first cut off by means of the valve 12, and the air-inlet valve 13 is then opened, as shown in full lines in Fig. 3. The air then flows through the opening 14, the passage 5, and the left gas-passage 10, as indicated by the arrows, into the regenerative chamber 2, which is filled with gas, the said air in its flow forcing all the gas from these spaces into the furnace. After the valve 13 is closed the valve 7 is reversed to the position shown in Fig. 2, and then valve 12 is opened for the further normal continuation of the supply of air and gas for combustion.

Both the devices essential for the above-described process—namely, the gas-cut-off device and the air-inlet opening—can be united to form a single device, as shown, by way of example, in Fig. 4. In this arrangement only one valve 15 is provided in the gas-supply passage 16, and the end of the passage is left open at 17. The dotted position of the valve 15 shows the position for ordinary heating. Before the reversal the valve is brought to the position indicated in full lines in Fig. 4, whereby the gas is cut off and air flows in the above-described manner through the opening 17, as indicated by the arrows.

The construction and arrangement of the two necessary devices—that is to say, the gas-cut-off device and the air-inlet opening—can be modified in any other suitable way. It is only essential that the air-inlet opening shall be arranged as nearly as possible in the neighborhood of the gas-cut-off device in order to avoid a blind passage, in which an easily-explosible gas mixture could collect.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

A method of avoiding loss of gas in Siemens regenerative furnaces wherein, before the reversing operation, the gas contained in the regenerative chamber and in the passages connected therewith is forced into the furnace by air which, after the gas has been cut off in a known manner, is introduced through a lateral opening, substantially as hereinbefore described.

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

ADALBERT KURZWERNHART.

Witnesses:

HERMANN SCHULZE,

PAUL E. SCHILLING.