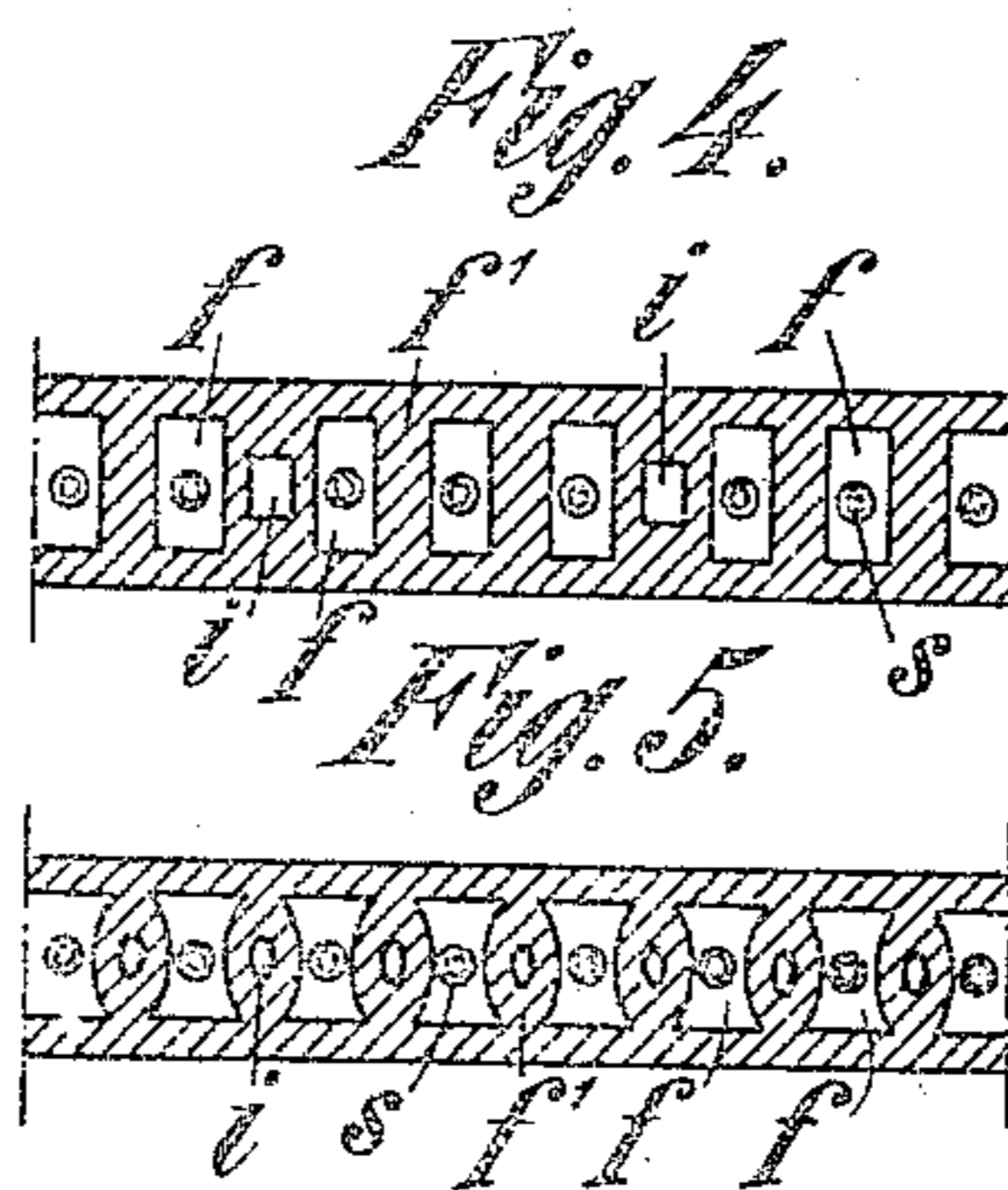
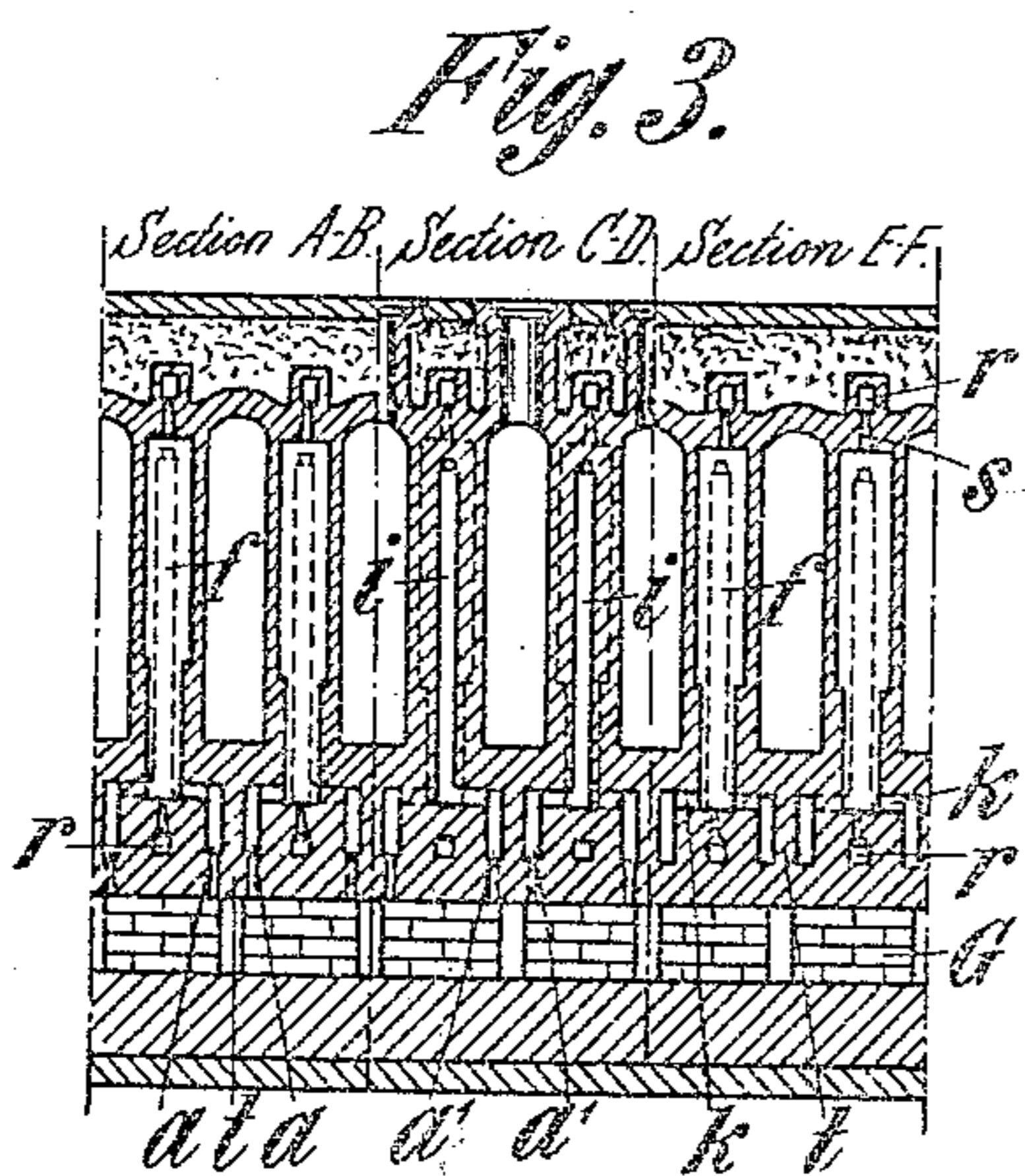
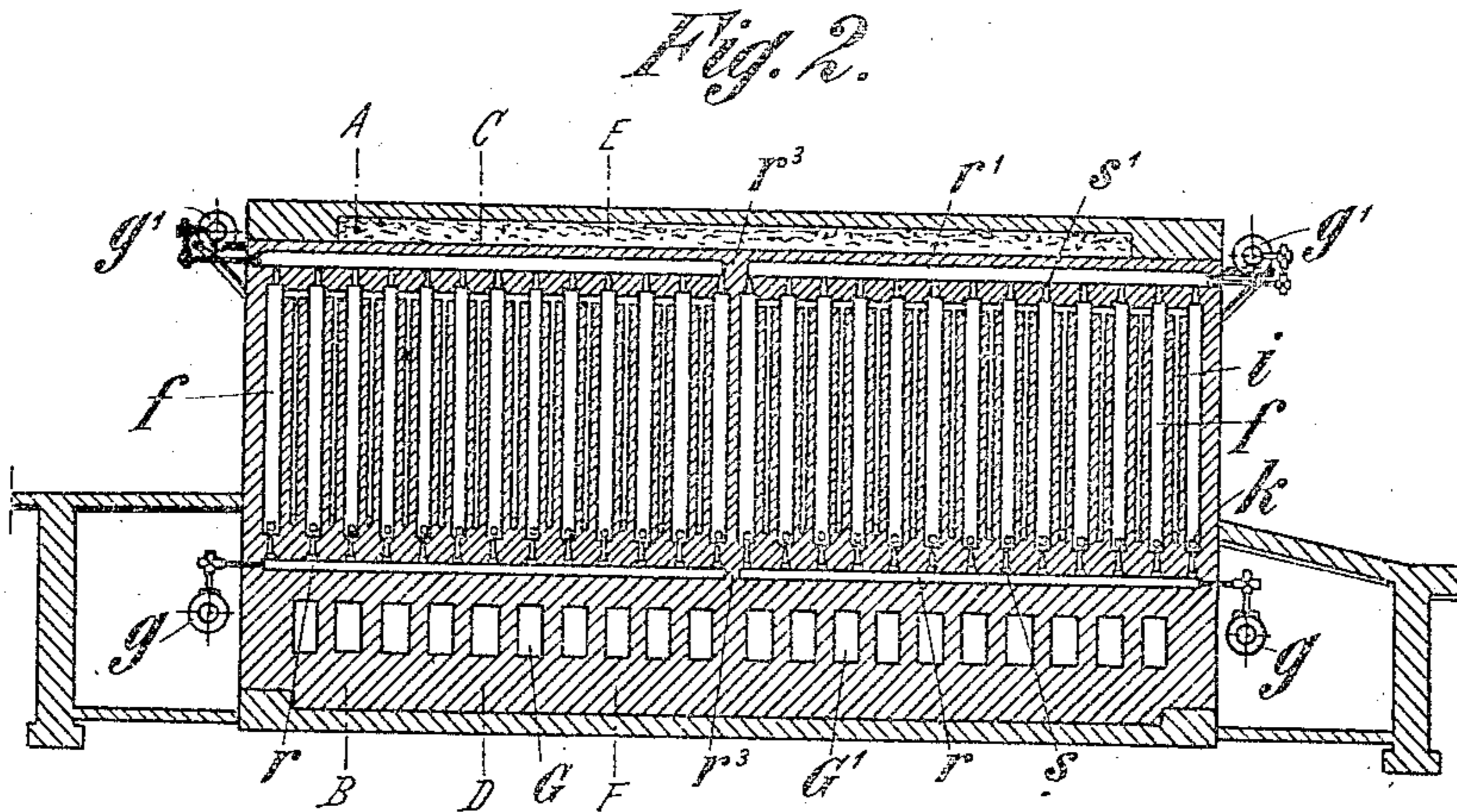
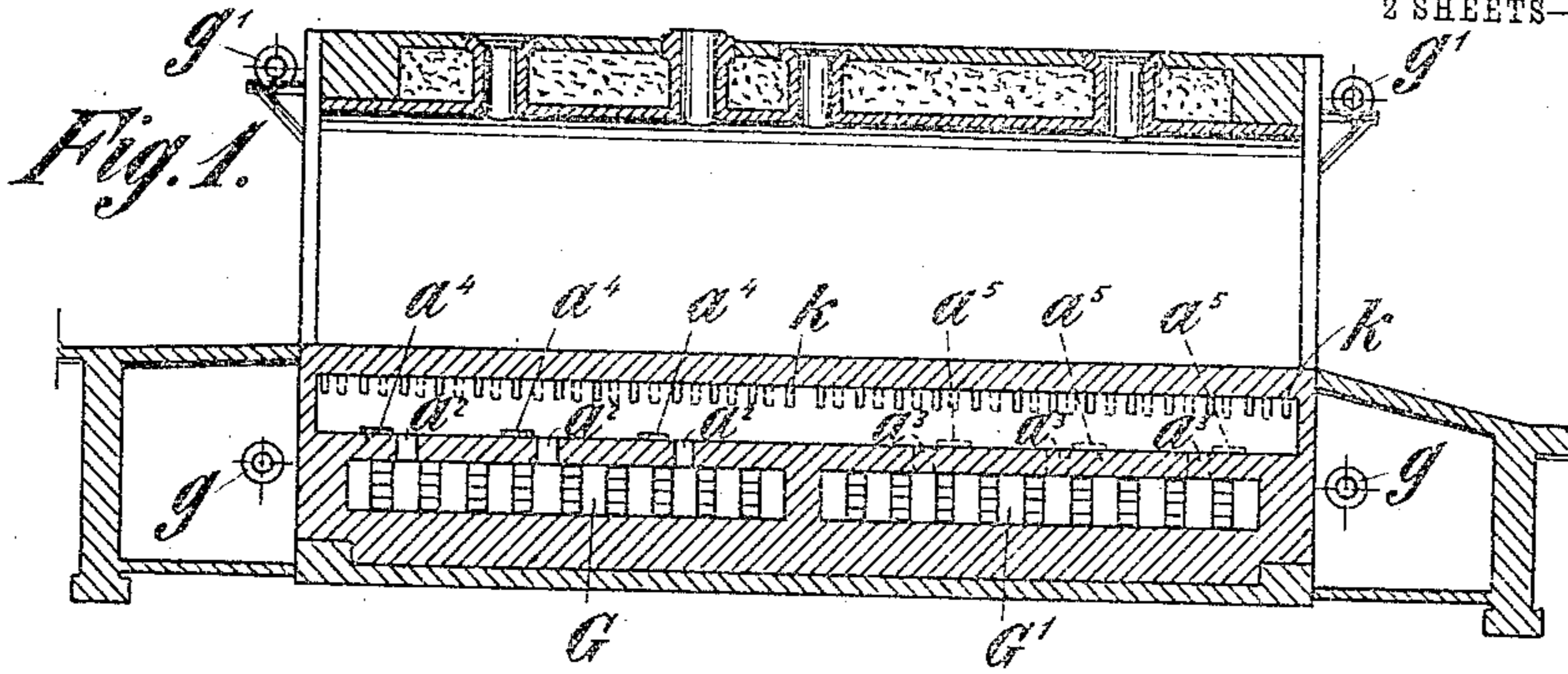


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HORIZONTAL REGENERATIVE COKE OVEN, &c.
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898,439.

Patented Sept. 15, 1908.

2 SHEETS—SHEET 1.



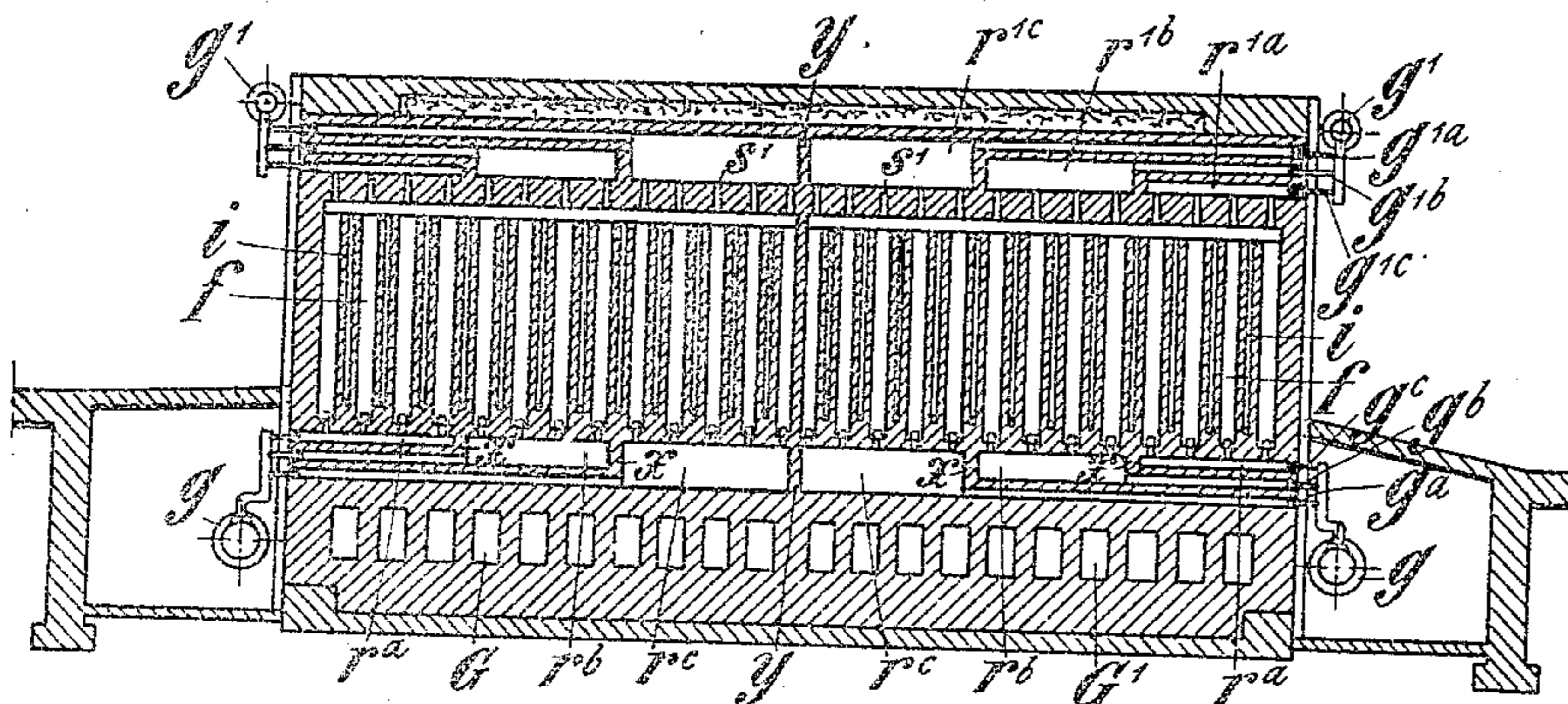
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398,439.

2 SHEETS—SHEET 2.

Fig. 6.



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UNITED STATES PATENT OFFICE.

FRANCIS JOSEPH COLLIN, OF DORTMUND, GERMANY.

HORIZONTAL REGENERATIVE COKE-OVEN, &c.

No. 398,439.

Specification of Letters Patent.

Patented Sept. 15, 1908.

Application filed March 21, 1907. Serial No. 363,587.

To all whom it may concern:

Be it known that I, FRANCIS JOSEPH COLLIN, a subject of the King of Prussia, and a resident of Beurhausstrasse 14, in the city of Dortmund, Kingdom of Prussia, and German Empire, have invented a certain new and useful Regenerative Coke-Oven, of which the following is a specification.

In all systems of coke ovens with reversal of draft, and particularly in the case of the regenerative coke ovens worked in this manner, the principle of effecting the heating of the heating flues alternately with fresh gas and with waste heat (that is to say, the products of combustion of the heating gases) resides in the fact, that part of the wall passages is heated with fresh gas, while the other part however is heated only by the waste heat of the first mentioned part, that is to say with the products of combustion, passing through said channels and generated by the heating gases. When the draft is reversed the operation is also reversed, so that the passages which have previously been heated by waste heat only are now fed by fresh heating gas, while the channels previously heated with gas, are now exposed to the waste heat only. This system shows the inconvenience, that the temperature is appreciably reduced at each reversal of draft in the wall passages serving for the carrying off of the waste heat. Thus a constantly repeated fluctuation of temperature in all wall passages takes place, whenever the change of draft is effected. Besides the deleterious effects upon the fire-proof masonry, these fluctuations interfere with the operation of the oven or kiln and consequently with the output.

The invention, about to be described, is intended, to overcome this inconvenience by using a constant and direct supply of gas for the heating of all the heating passages or channels of the side walls. With this end in view every heating channel or passage is provided in the first place at either end, that is to say at the top and at the bottom, with a heating appliance, that is to say with a feeding nozzle for admitting the heating gas. These two heating appliances effect the heating of the channel alternately and in opposite directions. When one of the heating appliances is in operation, the other heating appliance is cut off. The particular channel or passage to which the two heating appliances belong, is therefore continuously heated by direct heat. Aside from the two heat-

ing appliances, every wall heating channel itself is preferably provided in addition with two special connecting flues, leading to the regenerators, which will alternately produce the hot air required for the combustion of the heating gases or which carry off the waste heat. By means of these two connecting flues and by the two heating appliances, the change of draft in the several heating channels or passages is made possible, without any necessity of temporarily interrupting the heating of the same.

Upon the accompanying drawing the new arrangement is illustrated, Figure 1 being a longitudinal section through one of the chambers of the oven, and through one of the bottom flues and the regenerator or producer. Fig. 2 is a similar section through one of the walls of the oven, the gas admitting passages and the regenerator. Fig. 3 represents cross sections on the lines A—B, C—D, and E—F respectively of Fig. 2, taken through the oven, the walls and its bottom channels. In Figs. 4 and 5 various forms of arrangement of the wall passages or channels are shown for the alternate admission of air and the carrying off of the waste heat in the ribs or partitions between the wall heating channels proper. Fig. 6 is a longitudinal section through one of the walls of the oven with special arrangement of the feeding channels for the heating gas.

For effecting the change of draft the usual, well-known devices, such as reversing flap and gas valves, are employed in the construction of apparatus shown, the reversing flaps serving, as is well known, for the purpose of directing the gases of combustion (the waste heat) into the chimney through one of the gas producers or regenerators according to the position of said flap and for the purpose of connecting the other regenerator at the same time with the air admission channels, while the gas valves effect alternately the opening and closing of the lower and of the upper gas heating appliance. The movements of the reversing flap and gas valves are preferably so arranged, as to be dependent upon each other, in such a manner, that when the reversing flap is turned, the gas valves are also reversed.

The heating is effected in the following manner:—The heating channels or flues *f* as well as the passages *z*, situated in the partitions or ribs *f'* between the several heating channels of each of the walls of the oven, are

connected to two bottom flues, the heating channels f being connected to the bottom flue a and the channels i to the bottom flues a' . The bottom flues or ducts a , a and a' , a' are respectively arranged below the oven chamber and they are separated from each other by a partition wall, so that below the several chambers of the oven each two channels or passages a will alternate with two channels or passages a' . Where the width of the oven chamber does not admit of arranging two channels a , a or a' , a' side by side of each other, which may occur in the case of very narrow ovens, the separating partition wall t may also be dispensed with, inasmuch as the direction of draft from two adjoining bottom flues a , a or a' , a' is always the same. The bottom channels or passages a , a are connected by the openings a^2 , a^2 to the regenerator or producer G and the channels a' , a' are connected to the regenerator or producer G' by means of the openings a^3 , a^3 . The size of the connecting openings a^2 and a^3 may be regulated by closing slides a^4 and a^5 , which can be operated in suitable manner. When the producer or regenerator G' which is connected to the bottom flues a' , is effecting the carrying off of the waste heat (gases of combustion), that is to say, when the gases of combustion are carried off to the chimney by this regenerator, the heated air, which is required for the combustion of the heating gases, rises from the other regenerator G , into the bottom flues a and through the lateral openings k of the same into the wall channels or passages f , where it effects the ignition of the heating gas, which is admitted from below into the wall passages f , from the conduits g , through channels r , and nozzles s . This kind of arrangement is old. The burning mixture of gas and air however, from the wall channels or passages f is not caused in the present invention to pass through part of these wall channels or passages f themselves, which are not fed with heating gas and are connected to the chimney, as has been the usual practice heretofore, but the said mixture of gas and air is carried off through the flues i , which are arranged in the bond bricks, that is to say, in the separating walls f' (see Figs. 4 and 5), provided between the wall channels f , in a manner, similar to that shown with reference to the ovens without producers or regenerators described in German Patent 114828. Upon then effecting the change of draft by shutting the lower heating gas admitting conduit and opening the upper conduit, and by connecting the regenerator G to the chimney by reversing the reversing flap, the flues i are employed as air conduits for the heating of the upper part, and the gas, which is forced in from above by means of nozzles s' from the conduits g' , and the distributing passages r' , and which is ignited by contact

with the heated air, fed into the flues i from the regenerator or producer G' , drops down through the wall channels f into the bottom flue a , and thence it passes to the regenerator or producer G and finally into the chimney. In this manner the alternate heating of the wall channels f is effected from above on the one hand, and from below on the other hand, so that the said channels are heated continuously without interruption. The arrangement of the flues i in the separating walls f' of the wall channels f is preferably effected in the most simple manner according to the arrangement shown in Fig. 5, for the purpose of insuring good effects. As will be seen from this figure, every rib or partition f' is provided between the channels f with a flue or channel i . In the arrangement according to Fig. 4, several wall heating channels f are provided with one common flue i , which in this case would have to be made correspondingly larger than in the construction shown in Fig. 5, where every channel f is provided with a corresponding flue i .

In Fig. 2 the admission of the heating gas takes place into the nozzles s and s' from the conduits g and g' and through the channels r and r' , this arrangement showing at each side of the oven one conduit g , and one conduit g' , as illustrated in the drawing, so that each one half of the heating channels f in the partition wall between the oven chambers is furnished with heating gas from the end parts of the plant, the gas distributing channels r and r' being divided in the middle by a web r^3 . In Fig. 6 a modification of this construction is shown, which is distinguished by the fact, that in the top part and in the bottom part of the oven three heating gas conduits each are arranged g_a , g_b , g_c and respectively g_{1a} , g_{1b} , g_{1c} , which admit the heating gas through channels r_a , r_b , r_c and respectively r_{1a} , r_{1b} , r_{1c} to smaller series of wall channels f . By means of this arrangement it is intended to feed heating gas uniformly to those wall channels or passages f also, which are situated at a greater distance from the end wall, that is to say more towards the middle of the oven. The webs or partitions x x which separate the channels r_a , r_b , r_c and r_{1a} , r_{1b} , r_{1c} may also be dispensed with, inasmuch as the heating gas is distributed over one half of the length of the oven by the several conduits of different length, which lead off from g_a , g_b , g_c and g_{1a} , g_{1b} , g_{1c} respectively. In the same manner the center web or partition y may also be dispensed with, without interfering in the least with the operation of the oven. The webs x and y serve therefore for insuring a perfectly reliable distribution of the heating gases to the heating channels.

The constructional modifications, illustrated in Figs. 2 and 6 may be combined with each other in such a manner, that in the

lower part the distribution of the heating gases takes place in the manner shown in Fig. 6 that is to say by means of the channels r_a, r_b, r_c while in the upper part only one channel r' is arranged, as shown in Fig. 2, which extends as far as the middle. The arrangement may also be reversed, that is to say, in the upper part, three separate gas admitting conduits may be provided, while in the lower part only one channel of this kind is arranged. All these variations are not essential for the spirit of this invention.

By the combination described of arrangements, which in themselves are mostly well known, the change of draft in the heating channels of the walls of the oven is produced, without interrupting the direct heating of the same, in view of the heating of the wall channels or wall passages, which had previously taken place from below for instance, being changed to a heating from the top at the moment of the reversing of the reversing flap and of the gas valves. The advantages accomplished are quite important, inasmuch as by the arrangement described a continuous intense heating of all the wall channels is produced and at the same time all the fluctuations of temperature met with in the previous plants, are done away with, and the shortest paths possible are furnished both to the heating gas and to the air, and then, all differences of draft and pressure for the several heating channels are obviated and greater durability is moreover imparted to the fire-proof material of the masonry, because the differences of pressure and of draft

and the continuously repeated fluctuations of temperature, which loosen the joints of the bricks in the masonry of the walls, and cause them to become untight, are overcome. The result of the continuous and direct heating of the wall channels is a very considerable increase in the output and production of coke in particular. Furthermore than that, the system of heating described, affords the possibility of accomplishing the increase of height of the oven chambers, so much aimed at nowadays, without any fear of causing too great a loss of heat to the heating flues, by the time the heat reaches the ends of the same.

What I claim and desire to secure by Letters Patent of the United States is:

A regenerative coke oven, comprising a pair of regenerators, a pair of coking chambers, vertical heating flues intermediate the coking chambers, means for admitting a heating medium alternately to the upper and lower ends of said flues, a first duct connecting the first regenerator with the lower end of the flues, a second duct communicating with the second regenerator, and passages intermediate the flues for connecting the upper ends of said flues with said second duct, substantially as specified.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

FRANCIS JOSEPH COLLIN.

Witnesses:

ALFRED POHLMÉYER,
M. ENGELS.