

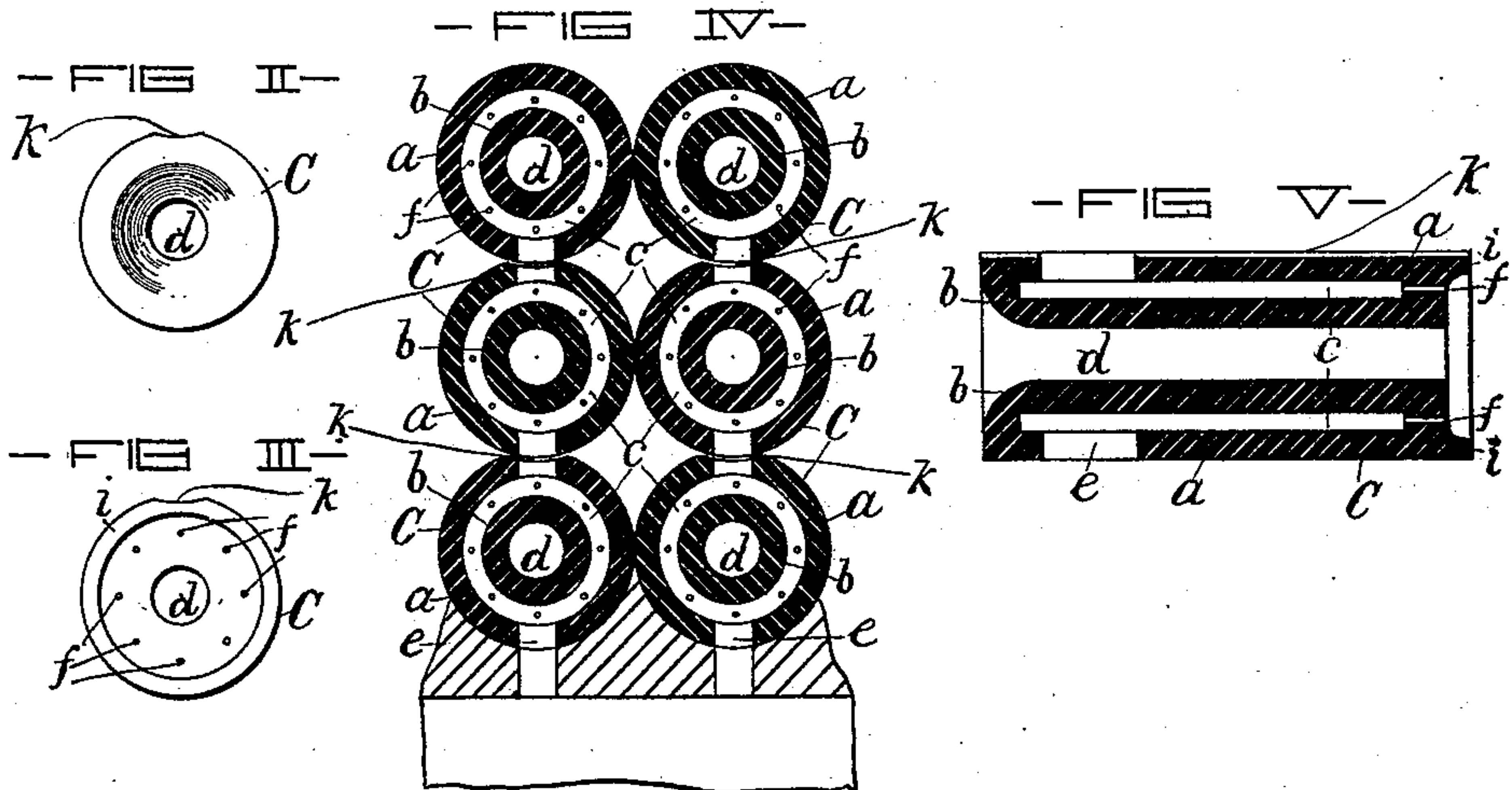
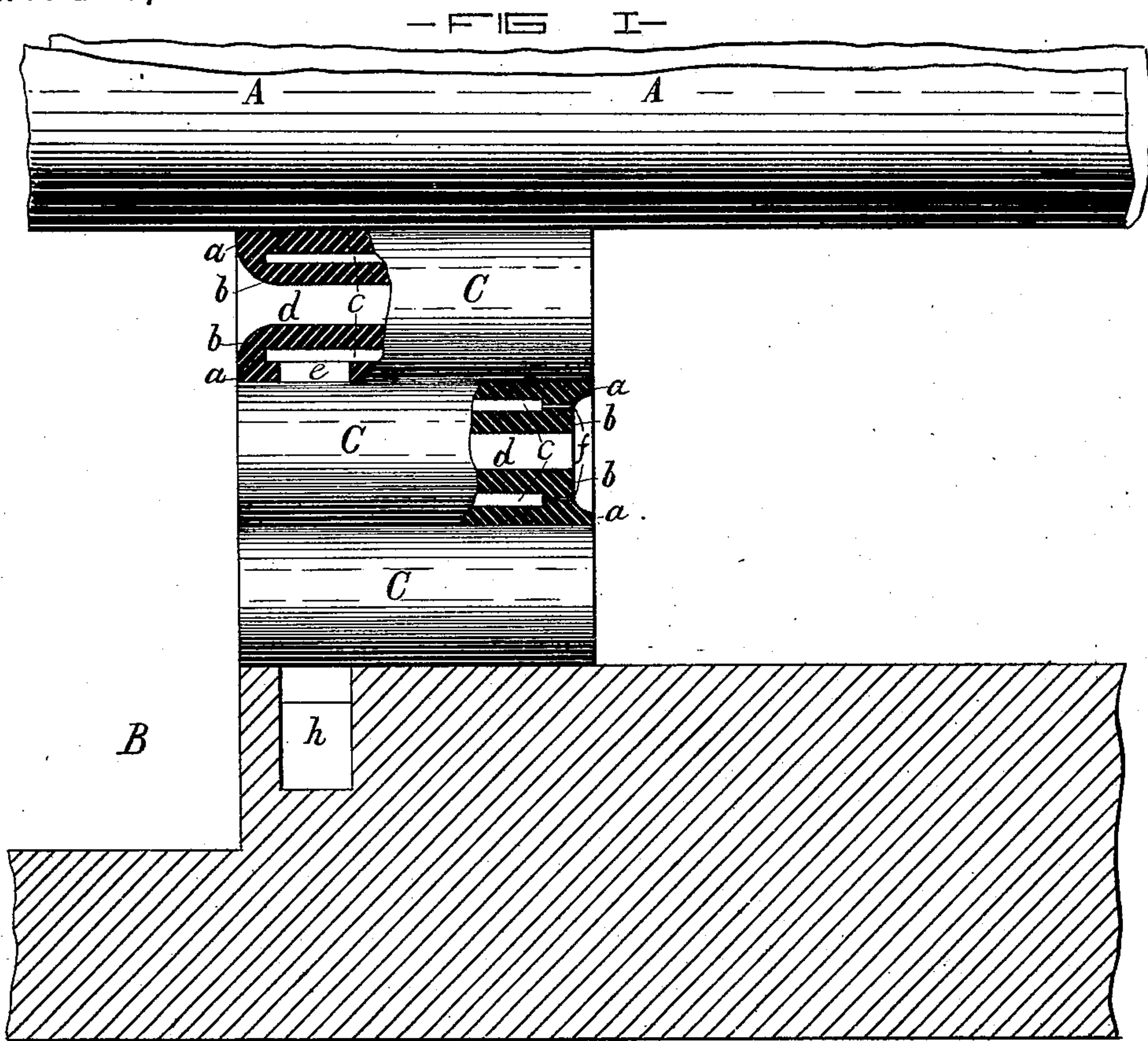
(No Model.)

R. R. ZELL.

GAS COMBINING AND HEATING BLOCK FOR FURNACE BRIDGE WALLS, &c.

No. 273,661.

Patented Mar. 6, 1883.



- WITNESSES -

*Danl. Fisher*  
*Edward J. Riggs*

- INVENTOR -

*Robert R. Zell,*  
*by G. H. Howard,*  
*att'y.*



# UNITED STATES PATENT OFFICE.

ROBERT R. ZELL, OF BALTIMORE, MARYLAND.

GAS COMBINING AND HEATING BLOCK FOR FURNACE BRIDGE-WALLS, &c.

SPECIFICATION forming part of Letters Patent No. 273,661, dated March 6, 1893.

Application filed November 4, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT R. ZELL, of the city of Baltimore and State of Maryland, have made certain Improvements in Gas Combining and Heating Blocks for Furnace Bridge-Walls, &c., of which the following is a specification.

This invention relates to certain improvements in a series of blocks to be used in the construction of furnace bridge-walls, exterior walls of furnaces, and various other structures to effect a proper combination and heating of air and gases; and it consists in a series of non-sectional blocks of terra-cotta, fire-brick, or other refractory material, having an interior and an exterior shell, with a space between them, provided with certain passages or openings, whereby combustible gases of different kinds and atmospheric air are combined after passing through or from the said blocks, and constructed to interlock one with the other in vertical rows, whereby air-tight joints are formed, as will hereinafter fully appear.

In the further description of my said invention which follows reference is made to the accompanying drawings, forming a part hereof, and in which—

Figure I is a view of a part of a steam-boiler and a bridge-wall, the latter being constructed in part of my improved gas combining and heating blocks, illustrating one of the uses to which the invention may be applied. Figs. II and III are respectively a front and a back end view of the block. Fig. IV is a cross-section of a series of the blocks united. Fig. V is a longitudinal section of one of the blocks.

Similar letters of reference indicate similar parts in all the views.

A is a part of a boiler-shell, and B a portion of the furnace. C C are the gas combining and heating blocks, which in Figs. I and IV are shown as forming a part of a bridge-wall. The block C, which is constructed of fire-brick or some other refractory material in one piece, consists essentially of an outer and inner shell, preferably of cylindrical form, respectively represented by *a* and *b*, separated centrally by an annular space, *c*, and connected at their ends, as shown in the drawings. The central aperture of the block is denoted by *d*. The annular space *c* has an inlet-opening, *e*, and outlet-passages *f*. These passages are shown in the

drawings as holes through the rear junction-piece; but slots or other shaped openings may be used. When the blocks are used to form a bridge-wall the annular spaces are all united, and to effect this all of the blocks except the upper ones have two apertures *e*. By reference to the drawings it will be seen that the blocks C interlock one with the other in vertical rows, each block except the upper one having a channel, *h*, extending longitudinally thereof, and at the point where the outer shell, *a*, is perforated or provided with the outlet-openings *e*, in which the block directly above it rests. By this means air-tight joints are effected between the blocks forming the vertical rows, and the said blocks, when built up, are self-supporting, and are therefore not dependent upon adjoining rows for lateral support. Supposing the blocks are used in a bridge-wall of a furnace, as shown in Fig. I, the products of imperfect combustion from the fuel pass through the central opening, *d*, in the blocks, and upon their exit are combined with atmospheric air which enters the annular space in the blocks, primarily through a duct, *h*, in the lower part of the bridge-wall, which is of brick, or through any other duct adapted for the purpose, and escapes through the holes *f*. A lip, *i*, formed on the rear end of the block, prevents to some extent lateral deflection of the combined gases. It will be seen that the blocks are thoroughly heated by the passage through and around them of the heated products of imperfect combustion. Consequently the air is raised to such temperature as to facilitate the union or combination of the gases. Further, it will be understood that each block acts as an Argand burner, except that the action is reversed, the combustible gases passing through the central opening and the supporter of combustion—oxygen of the atmosphere—around the same.

I am aware that blocks similar to the ones herein described have been used for substantially the same purpose as mine; but such blocks have invariably been constructed in sections—that is to say, they are formed of two or more parts placed together. Blocks built up or constructed of independent pieces or sections cannot, however, perform the functions required of them in a satisfactory manner for any protracted time, in view of their



distortion by heat, which has the effect of opening the joints, thereby preventing the separation of the air and gases until both are heated to the proper temperature for union.  
5 Further, the distortion of the parts cannot be uniform in its character. Consequently the block is eventually destroyed. My block is essentially a non-sectional one, it being constructed of one piece of material and devoid  
10 of joints. It follows, therefore, that should it be distorted in shape by heat its character remains unchanged. Another difference between my combined blocks and others of the same class heretofore constructed is that my invention  
15 consists not merely of a system of blocks built up to form a structure of independent pieces, but of vertical rows, each one of which is formed of blocks interlocked where the communicating passages between the annular gas-  
20 spaces occur.

I therefore claim as my invention—

A wall adapted for application to a boiler-furnace or for other purposes where atmospheric air is to be heated and combined with heated gases or the products of imperfect combustion, which consists of a series of blocks of terra-cotta, fire-brick, or other refractory material, having an inner and an outer shell connected at their ends by junction-pieces, so as to form an annular air-space, and the said  
25 space provided with inlet and outlet apertures, substantially as described, and the whole constructed of a single piece, or non-sectional in character, the said blocks being interlocked to form self-sustaining vertical rows and to  
30 effect air-tight joints between them, substantially as specified. 35

ROBERT R. ZELL.

Witnesses:

WM. T. HOWARD,  
JOHN WILLIAMS.