M. GREEN.

DEFLECTOR FOR FURNACES.

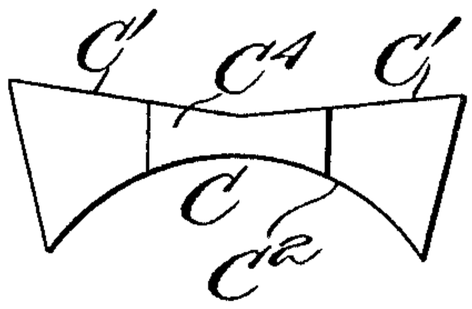
APPLICATION FILED MAY 18, 1910.

969,752.

Patented Sept. 6, 1910.

2 SHEETS—SHEET 1.

Fig. 5.



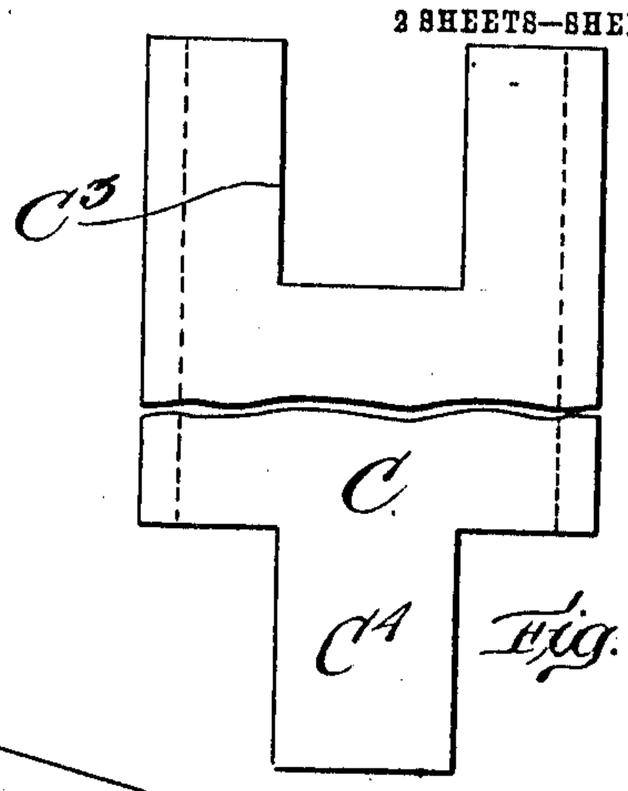


Fig. 6.

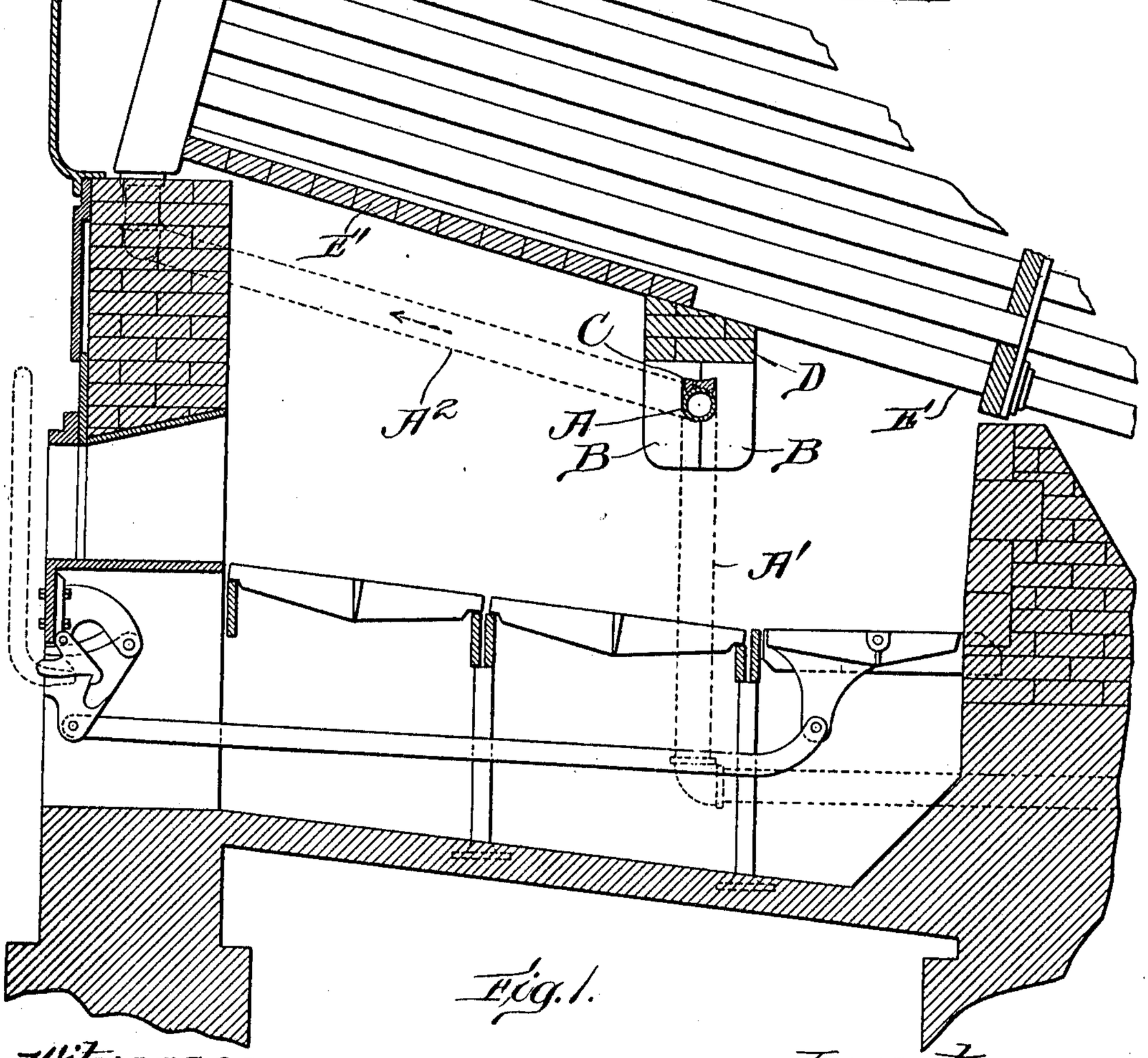


Fig. 1.

Witnesses:

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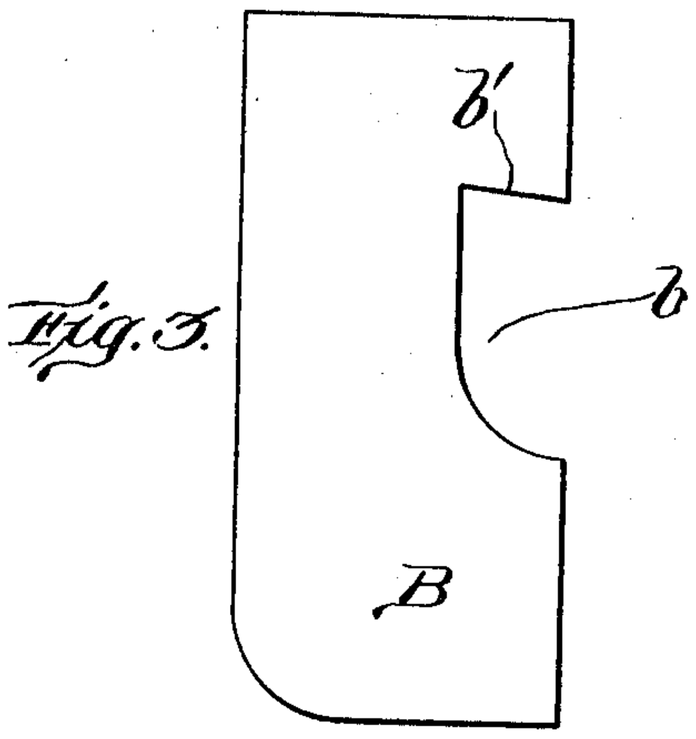


Fig. 3.

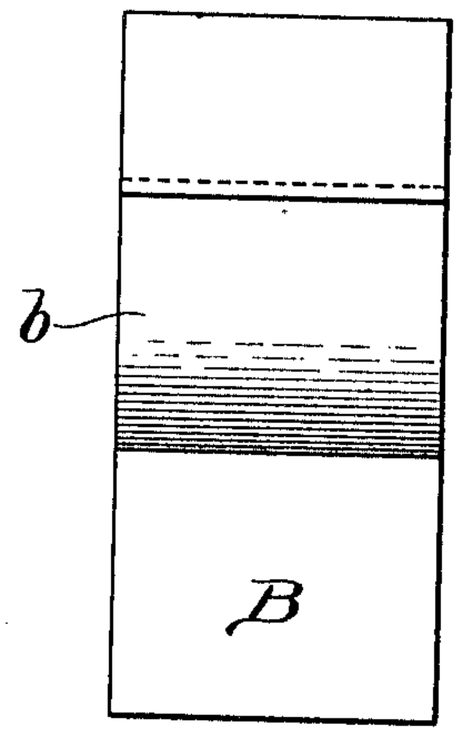


Fig. 4.

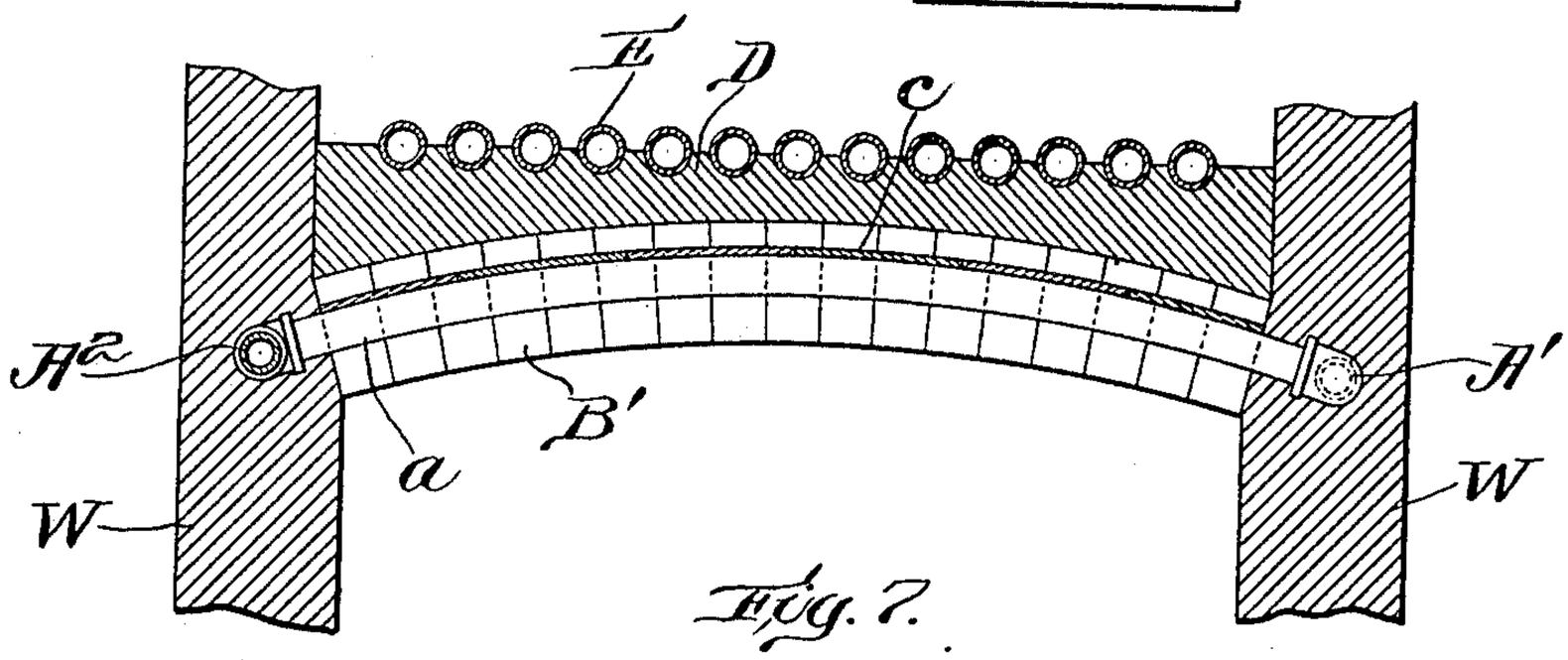
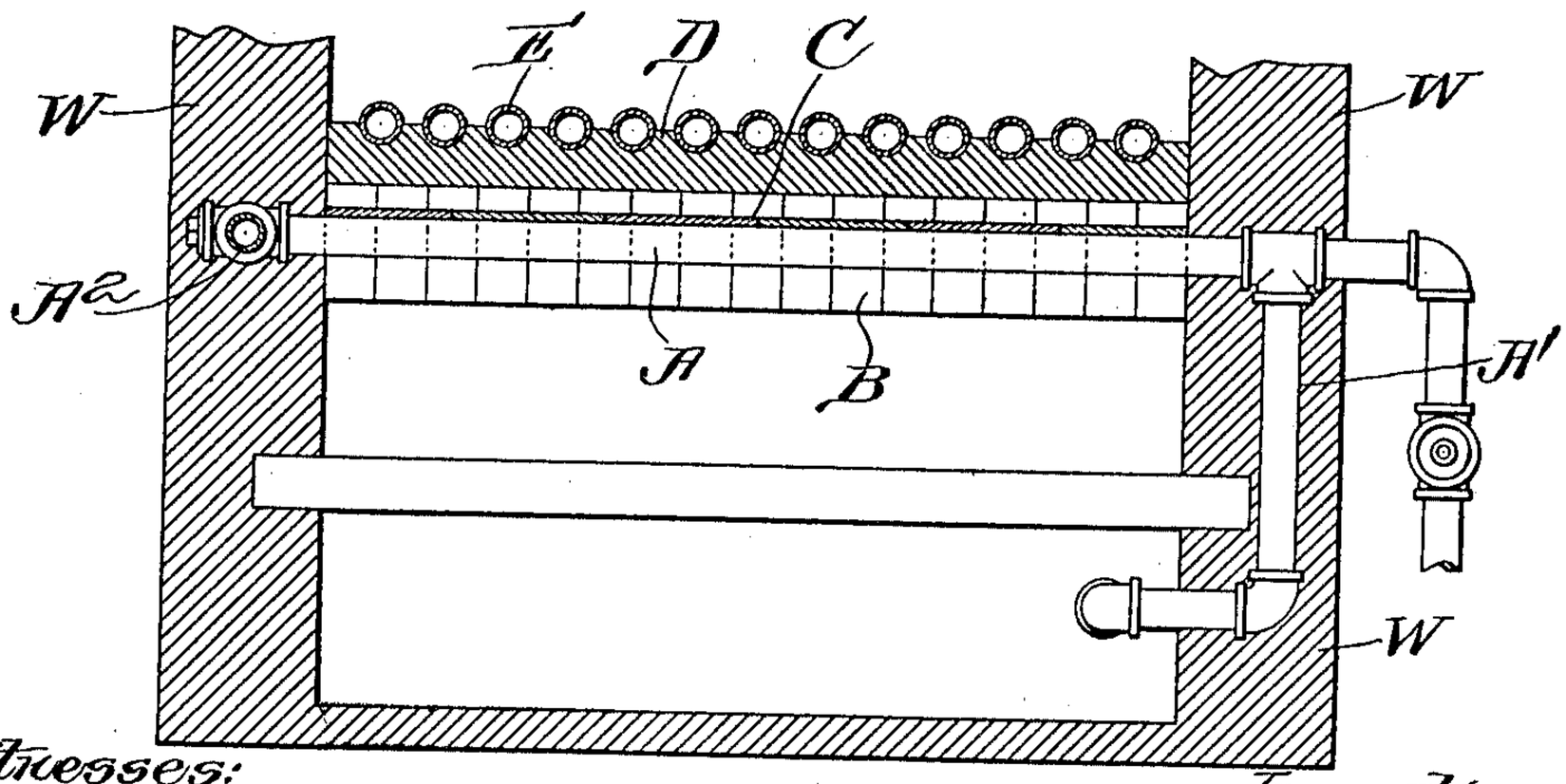


Fig. 7.

Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

MALCOLM GREEN, OF BOSTON, MASSACHUSETTS.

DEFLECTOR FOR FURNACES.

969,752. Specification of Letters Patent. Patented Sept. 6, 1910.

Application filed May 18, 1910. Serial No. 561,976.

To all whom it may concern:

Be it known that I, MALCOLM GREEN, a subject of the King of Great Britain and Ireland, and resident of Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Deflectors for Furnaces, of which the following is a specification.

My invention relates to the construction of deflectors for fire boxes and furnaces and has for its object the provision of such elements of construction as will allow deflectors of unusually wide span to be economically constructed, safely maintained, and easily repaired and restored, and will enable such deflectors to improve in their functional operation upon the furnace deflectors and arches heretofore constructed and used.

The fire-brick arch which has for some time been employed in various modifications to serve as a deflector for fire-boxes and furnaces, presents certain practical limitations. The spring of such an arch produces a larger opening for the gases of combustion at the middle than is provided near the ends of the arch, and consequently the effect of such an arch is to cause a concentration of the gaseous current at the middle of the furnace to the detriment of combustion at the sides. Moreover, when arches of this character are made with very slight spring, they exert an undesirably heavy thrust upon the furnace walls which have to be buttressed or otherwise reinforced as by tie rods.

By means of my improvements presently to be described in detail, the disadvantages above alluded to are entirely obviated and a furnace deflector produced which hangs as a curtain of uniform height over the grate bars of the furnace, which exerts no end thrust upon the walls of the furnace and which is far easier to repair or replace as well as to install than the fire-brick deflectors heretofore employed. The construction in which my invention inheres does not suffer from limitations in respect to any practically desirable span of the deflector.

In the drawings hereto annexed which illustrate an example of my invention,—Figure 1 is a vertical longitudinal cross section of a boiler fire-box; Fig. 2 is a transverse section of the fire-box through the deflector or curtain; Fig. 3 is a side elevation on an enlarged scale of one of the blocks of refractory material which enters into the composition of my improved curtain or deflector; Fig. 4 is a front elevation of the said block; Fig. 5 is an end view of a saddle member; Fig. 6 is a top plan view of said saddle member; and Fig. 7 shows partly in cross section and partly in elevation, a modified form of deflector embodying my invention.

Referring to Figs. 1 and 2, A represents a tubular girder, in the case shown an ordinary tube which is preferably of seamless drawn steel, and which extends from wall to wall across the furnace or fire-box being suitably embedded in and supported by the furnace walls W. This hollow girder is provided with means for maintaining a cooling circulation and this circulating means preferably, and for reasons of economy, is provided by the pipe connections A′ and A² which communicate respectively with the rear and front header of a boiler so that the natural and normal circulation of water through the tubular system of which the girder A is a part will be maintained by the operation of the boiler.

Blocks B of fire-brick or similar refractory material are suspended upon and embrace the hollow girder A and as shown in Figs. 1, 3 and 4 are placed upon the hollow girder A in pairs, the blocks of each pair having mutually matching surfaces recessed to inclose the girder A and so shaped as to be suspended thereon. These recesses *b* are formed with an undercut as at *b′* which coöperates with a suitably shaped channel on the top of the girder A. This channeled top is preferably constructed and provided as follows: Referring to Figs. 5 and 6, a channeled saddle member C is shown, the under side of which is curved so as to fit the top of the tubular girder A, the upper side having two downwardly sloping surfaces C′ which form a shallow channel in the top of the saddle member. Preferably, also, and for convenience in assembling, a number of saddle members C are provided, one end of each being recessed as at C³ (see Fig. 6), and the other provided with a tongue C⁴, the tongue of one saddle member fitting into the recess or notch of the next. In assembling the deflector or curtain, when the tubular girder A is in place, the saddle members C are placed upon its top. Thereafter the mutually matching blocks B are slipped sidewise over the girder A and its saddle C, the undercuts at *b′* coöperating with the

sloping surfaces C′ of the saddle channel to keep the blocks B from slipping off. Each pair of blocks B entirely surrounds the girder and saddle members as shown in Fig. 1. Then a filling of fire-brick D may, if desired, be placed upon the tops of the blocks B to extend upward as in the instance shown to the lower tier of boiler tubes E. The roof of the gas-mixing chamber in the illustration here shown, is composed of fire-brick tiles E′ which fill the spaces between the tubes of the lower tier E, so that the deflector or curtain constitutes an inverted dam to check the flow of gases sufficiently to insure thorough intermixture and complete combustion. The blocks B which constitute the effective fire-resisting portion of the deflector curtain, are preferably laid in position dry, that is to say, without any cementing as by a fire clay, so that in case one of the blocks becomes damaged it will be easy by removing two or three bricks of the superincumbent filling to slip the damaged block B sidewise off the girder A and to replace it by a new one, when the bricks of the filling may be restored and cemented with fire clay. The circulation through the hollow girder A prevents it from becoming heated to such an extent as will impair its rigidity and capability of sustaining the load upon it. Deflectors or girders of this character may be made practically of any span simply by properly designing the hollow girder to sustain the load. No thrust is exerted upon the furnace walls W and the fire-box curtain itself in this preferred form will be of equal height over the entire fire-box, thus insuring an even distribution of draft in the furnace and consequently promoting uniformity of combustion and economy of fuel. If, however, for any special reasons it be desired to have the furnace deflector curved in the shape of an arch, while the arch form may be adopted, the characteristic structural peculiarities of the arch with other consequent disadvantages may be dispensed with by employing a tubular girder which is curved as shown in Fig. 7 where *a* represents the curved tubular girder, *c* the saddle members, also curved to suit the contour of the girder, and mutually matching blocks B′ similar in all respects to the blocks B shown in Figs. 3 and 4 with the exception that they should be tapered from top to bottom like the voussoirs of an arch. Although the form of an arch is here reproduced the presence of a girder relieves the side walls W from any appreciable arch-thrust. Should it be desired to make the fire deflector or curtain curve downwardly at the middle, a hollow girder shaped to suit the desires of the constructor will be readily adapted to the purpose.

The utilization of heat in the deflector by including the hollow girder in the circulatory system of the boiler, leads to increased economy, and the consequent absorption of the heat from the refractory material of which the blocks B are composed, materially increases the durability of these members.

What I claim and desire to secure by Letters Patent is:

1. In a fire-box deflector, the combination of a tubular supporting girder, a saddle fitting over said girder and channeled on its upper side, mutually matching blocks of refractory material recessed to embrace the girder and fit the channeled saddle, inclosing the girder and suspended by the girder, and means to maintain cooling circulation in the tubular girder.

2. In a fire-box deflector, the combination of a tubular supporting girder, a saddle fitting over said girder composed of interlocking sections, channeled on their upper side, mutually matching blocks of refractory material recessed to embrace the girder and fit the channeled saddle, inclosing the girder and suspended by the girder, and means to maintain cooling circulation in the tubular girder.

Signed by me at Boston, Suffolk county, Massachusetts this ninth day of May 1910.

MALCOLM GREEN.

Witnesses:
ODIN ROBERTS,
CHARLES D. WOODBERRY.