

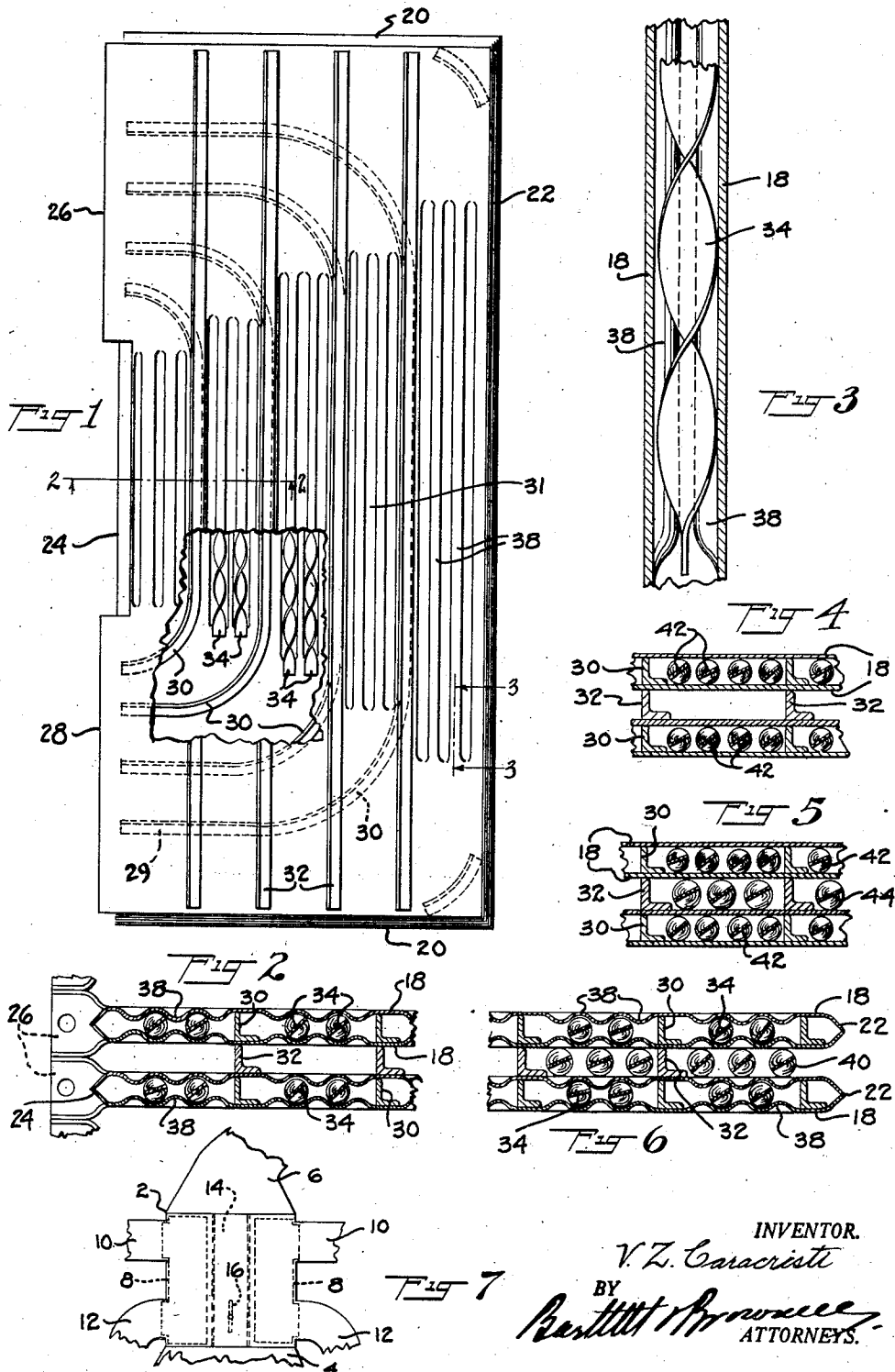
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AIR HEATER

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INVENTOR.

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BY

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UNITED STATES PATENT OFFICE

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AIR HEATER

Application filed May 8, 1925. Serial No. 28,872.

My invention relates to air heaters of the type that are used in connection with stoker furnaces for utilizing a substantial portion of the heat of the waste gases of combustion to heat air and to direct the heated air into the furnace to support combustion. Air heaters of this type are commonly made up of a plurality of air heating elements that are arranged side by side and spaced apart so as to provide gas passes between them. Each air heating element usually consists of two substantially rectangular sheet metal plates which are arranged side by side and spaced apart and have both of their end edges and one of their longitudinal edges closed, and their other longitudinal edges closed except for inlet and outlet openings adjacent to their upper and lower ends, respectively, for permitting the air to be heated to pass between the plates.

An object of the present invention is to increase the efficiency of air heaters of the character indicated.

Another object of the invention is to provide an air heater of this character which is simple in construction, and in which the maximum area of heat radiating surface is employed.

The several features of the invention, whereby the above mentioned and other objects may be attained, will be clearly understood from the following description and accompanying drawings, in which:

Figure 1 is a side elevation, partly broken away, of an air heating element constituting a component part of my improved air heater;

Fig. 2 is a sectional view on an enlarged scale taken on the line 2—2 of Fig. 1 and showing a plurality of air heating elements as arranged in the air heater;

Fig. 3 is a sectional view on an enlarged scale taken on the line 3—3 of Fig. 1;

Figs. 4 and 5 are detail sectional views corresponding to a portion of Fig. 2 but of modified forms;

Fig. 6 is a similar detail sectional view of still another modified form but showing the opposite longitudinal edge of the air heating elements from that shown in Fig. 2; and

Fig. 7 is a front view on a reduced scale

and partly diagrammatical of my improved air heater.

The air heater as illustrated in Fig. 7 of the drawings is provided with a casing 2 having its lower end adapted to be in communication with a furnace flue through a conduit 4 and its upper end adapted to be in communication with a chimney flue through a conduit 6 so as to cause the waste gases of combustion from the furnace to pass therethrough. The interior of the casing is divided vertically into opposed air heating chambers 8 each having an air inlet 10 and an air outlet 12. The chambers 8 are arranged at opposite sides of a vertical flue 14 which is adapted to be controlled by a damper 16.

An air heating section is arranged in each of the chambers 8 and is made up of a plurality of air heating elements arranged side by side and spaced apart so as to provide gas passes between them that extend between the inlet and outlet conduits 4 and 6 of the heater casing. Each of the air heating elements is made up of two substantially rectangular sheet metal plates 18 arranged side by side and spaced apart to provide an air passage-way between them. The end edges 20 and one of the longitudinal edges 22 of the plates of each air heating element are brought together so as to close these edges, and the central portion 24 of the other longitudinal edges of the plates are brought together so as to close that edge portion. The portions of the latter longitudinal edges of the plates extending between the portion 24 and the ends of the plates are bent outwardly so as to form inlet and outlet openings 26 and 28, respectively. The space between the plates is divided up into a plurality of passages which have their ends extending to the inlet and outlet openings 26 and 28 by means of suitably shaped angle irons 30 arranged between the plates and welded to at least one of them, each angle iron having horizontal end portions 29 and a vertical central portion 31. In assembling the air heating elements, as above described, a series of vertically arranged angle irons 32 are placed between the elements so as to space them apart, the outwardly bent edge portions of the walls of

the inlet and outlet openings 26 and 28 of adjacent elements being welded together as indicated in Fig. 2. The air heating elements are so positioned in the heater casing that the inlet and outlet openings 26 and 28 of each air heating section are in communication with the associated air inlet and outlet 10 and 12, respectively.

Except as hereinafter described, the parts above referred to may be of a well known construction.

In accordance with the present invention, the construction is such that a maximum area of heating surfaces is provided, and this is done without causing any material decrease in the rate of the passage of the air through the air heating elements or in the passage of the waste gases through the gas passes. To provide for this in accordance with the form of my invention illustrated in Figs. 1, 2 and 3 of the drawings, a series of two spirally twisted strips 34 are arranged side by side in each air passage formed by the angle irons 30, the spiral strips extending substantially the length of the vertical central portions 31 of the adjacent angle irons. Also as shown in these figures, the plates of the heating elements are provided with corrugations 38 which are suitably formed so as to closely surround opposite longitudinal portions of the twisted strips 34. With this construction it will be apparent that the air passing through the passages in each air heating element will be broken up and will be caused to travel in more or less spiral paths there-through as the air passes over the twisted strips 34. Thus the twisted strips 34 and the corrugations 38 add materially to the air heating surfaces of the heating elements and thus greater efficiency in the heating of the air will be secured. It will also be apparent that such a construction will not materially retard the flow of the streams of air through the passages.

In the construction illustrated in Fig. 6 a series of twisted strips 40 are arranged longitudinally between the heating elements and may if desired extend substantially the length of the plates. It will be apparent that these twisted strips 40 will also have the effect of increasing the area of the heat radiating surfaces of the elements and this will be done without materially retarding the flow of the waste gases through the space between the elements.

In the form illustrated in Fig. 4 the plates of each air heating element are flat, and the increased heat radiating surface is obtained by the mere positioning of twisted metal strips 42 in the air passages of the heating element.

The form illustrated in Fig. 5 is the same as that illustrated in Fig. 4 except that twisted metal strips 44 are arranged in the gas passes between the heating elements.

The twisted strips in both the air passages and the gas passes may be held in position by spot-welding them to one of the adjacent plates.

As will be evident to those skilled in the art, my invention permits various modifications without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. An air heating element for an air heater of the class described having, in combination, two plates arranged side by side and spaced apart, a plurality of partitions arranged in parallel relation between the plates to provide a plurality of air passages, and devices arranged in said air passages tending to cause a part of the air passing through each of said passages to traverse a spiral path, opposite sides of each of said devices being arranged closely adjacent to said plates, and the air passing between the plates being heated by the application of heat to the outer surfaces of the plates.

2. An air heating element for an air heater of the class described having, in combination, two plates arranged side by side and spaced apart, a plurality of partitions arranged in parallel relation between the plates to provide a plurality of air passages and devices arranged in said air passages tending to cause a part of the air passing through each of said passages to traverse a spiral path, comprising spirally twisted strips arranged longitudinally in said passages, opposite sides of each of said strips being arranged closely adjacent to said plates, and the air passing between the plates being heated by the application of heat to the outer surfaces of the plates.

3. An air heating element for an air heater of the class described having, in combination, two plates arranged side by side and spaced apart to provide an air passageway between them, and devices arranged in said air passageway tending to cause air passing there-through to traverse a plurality of substantially spiral longitudinally extending paths, comprising a plurality of spirally twisted strips arranged longitudinally in the general direction of the passage of the air, said plates having a plurality of corrugations extending longitudinally thereof and suitably formed to cause the material of the plates to closely surround opposite longitudinal portions of said strips, and the air passing between the plates being heated by the application of heat to the outer surfaces of the plates.

In testimony whereof, I have signed my name to this specification this 6th day of May, 1925.

VIRGINIUS Z. CARACRISTI.