Nov. 21, 1933. L. R. McAFOOS 1,935,853

METHOD OF MAKING FURNACE DOOR FRAMES

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Fig. 1.

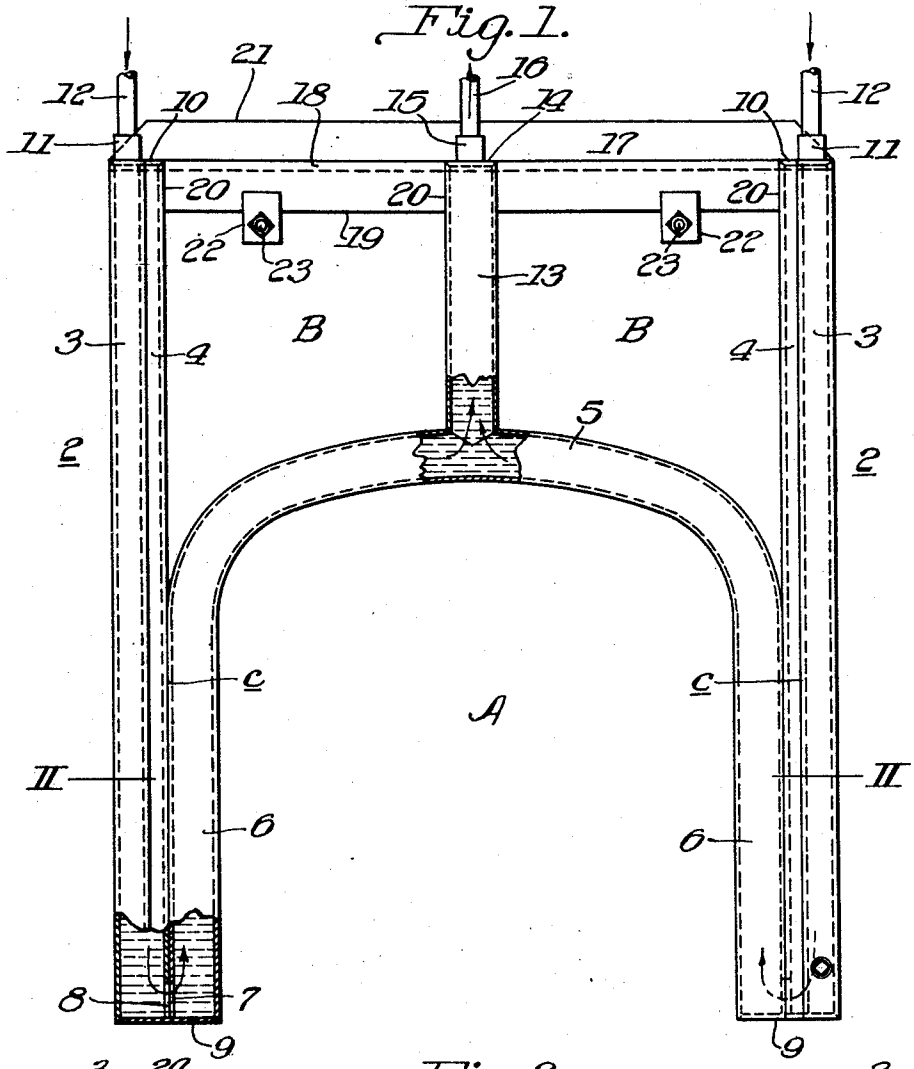


Fig. 2.

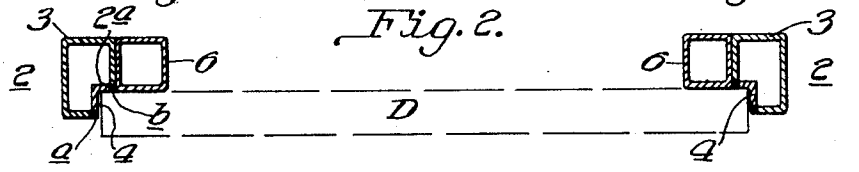
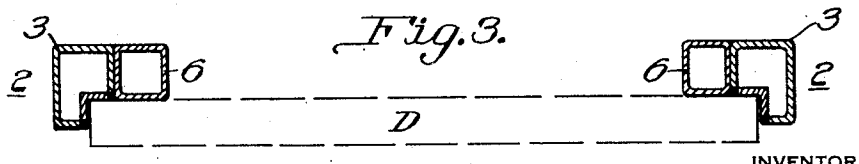


Fig. 3.



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Fig. 4.

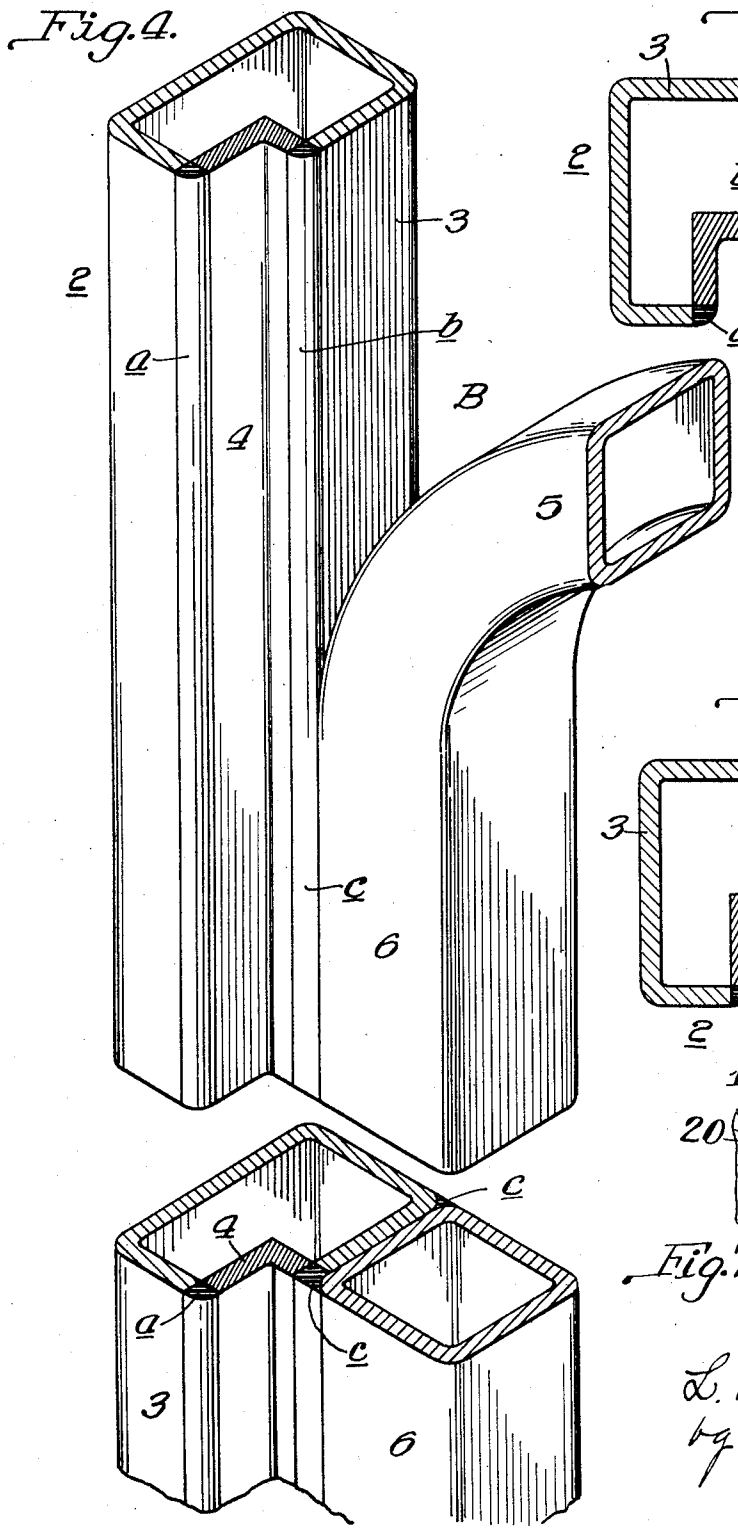


Fig. 6.

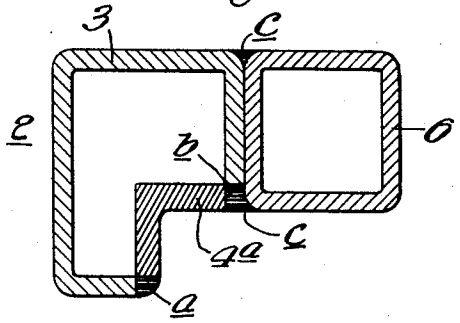


Fig. 5.

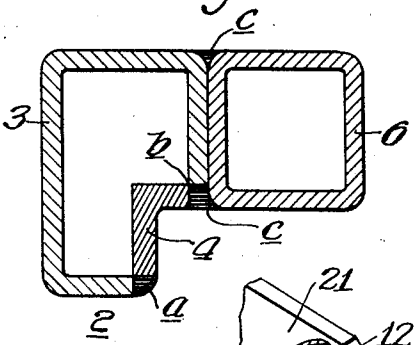
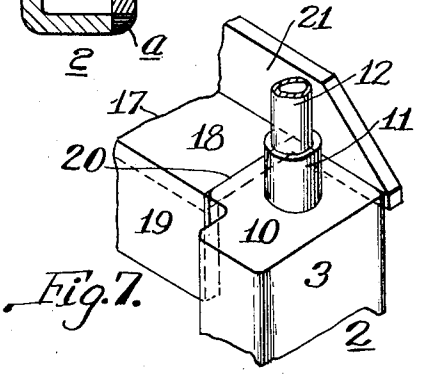


Fig. 7.



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METHOD OF MAKING FURNACE DOOR FRAMES

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Application December 26, 1929
Serial No. 416,604

3 Claims. (Cl. 29—157.4)

My invention relates to improvements in furnace door frames, and more particularly to furnace door frames of the character employed on open hearth furnaces and the like, and such as shown and described in my pending application Serial No. 408,320, filed November 9, 1929.

The prime object of the present invention is to provide a new and improved door frame of the type above specified, comprising members formed of seamless or lap welded tubing or the like, members formed of sheet metal, and members including structural metal shapes assembled and secured together to form a skeleton frame of efficient construction, embodying passages for the desired circulation of a cooling fluid therein.

Further objects are, to provide a frame of skeleton construction embodying members that readily permit of the frame being manufactured in various sizes or dimensions to be applied to furnace door openings varying in area, and one that may be applied to and removed from a furnace without dismantling the same; to provide a construction embodying new and improved leg portions of a frame; and leg portions made up of properly bent sheet metal sections and structural angle members, with the said sheet metal suitably attached along longitudinally extending edges to edges of the angle members.

In the accompanying drawings, which illustrate an application of my invention:

Fig. 1 is a front elevational view of a door frame embodying my invention;

Fig. 2, a horizontal section on the line II—II of Fig. 1;

Fig. 3, a view similar to Fig. 2, showing the means for varying the frame dimensionally;

Fig. 4, an enlarged perspective view, partly broken away, showing a leg member and a portion of the lintel;

Fig. 5, an enlarged cross section of a portion of Fig. 2;

Fig. 6, an enlarged cross-section of a portion of Fig. 3 and

Fig. 7 is a detail perspective view showing the leg-securing means.

Referring to the drawings, 2 designates generally the leg members or portions of a skeleton frame structure, said leg members 2 being of sufficient length to extend from the bottom of the furnace door opening A to points well above the top of said opening, said leg members being designed to be positioned one on each side of the opening A.

As illustrated and as preferred, members 2 comprise a combination of bent sheet metal and structural elements combined to produce simple, strong and durable legs assembled to form hollow members capable of being made up of various sizes, both as to their longitudinal and cross sectional areas. Each of the legs 2 comprise a sheet metal portion 3, bent into substantially rectangular cross section, having one corner portion 2*a* thereof open to receive a longitudinally extending structural member 4, preferably in the form of an angle member. The longitudinally extending free edges of the member 3 are attached to, preferably by welding, as indicated by the characters *a* and *b*, the vertically extending edges of the angle member 4.

From this construction, it will be apparent that the size of the leg 2 may be readily varied by the employment of different size angle members 4, and/or bent sheet metal portions 3. The angle members of the legs 2 constitute an important and characteristic feature of the present construction, and function to provide a very desirable wearing or bearing surface for the door of any preferred construction or size employed in connection with the door frame, and, in addition to this function, said angle members 4 materially strengthen the legs over a leg construction made up entirely of sheet metal with edges thereof welded or otherwise secured together.

5 designates generally the lintel portion of the skeleton frame. This portion, as shown, is of U-shape in configuration, thus providing a central arch portion and depending lintel legs 6, and is preferably formed of a seamless tubing having a rectangular cross section.

The lintel portion 5 is designed to be placed between the legs 2 in such a manner that the lower ends of the lintel legs 6 and the lower portion of the legs proper 2 coincide, openings 7 formed in the outer walls of the lintel leg portions registering with similar openings 8 in the innermost walls of the leg members 2. As shown, the said portions have their rear faces positioned in alinement. When thus positioned, the said leg portions of the lintel and legs proper are secured together by stitch welding along their front and rear meeting edges, as indicated by the character *c*, said welds on the front of the frame being co-extensive with the welds *b*. It will be understood that the openings 7 and 8 form a communication between the hollow structures for the passage of a cooling fluid between the interiors of said lintel and leg portions of the frame.

The hollow leg members 2, as well as the hol-

low leg portions of the lintel, are closed at their lower ends by closure members or plates 9, welded or otherwise secured thereto. The upper ends of the leg members 2 are designed to be closed by members or caps 10; said caps are each formed with an apertured extension 11 threaded to receive a fluid inlet conduit 12.

A vertically extending centrally disposed tubular member 13 projects upwardly from the arch of the lintel portion. This member is preferably formed of tubing and is of the same cross section as the cross section of the remaining portion of the lintel. This tubular member 13 is in open communication with the arched portion of the lintel. The upper end of member 13 preferably terminates in the same horizontal plane as the upper ends of the leg members, and is closed by means of a closure member 14, the latter having an extension 15 threaded to receive an outlet conduit connection 16.

For the purpose of anchoring the leg members and their connecting lintel portion into a strong and durable skeleton frame, I provide a member 17 preferably formed of a bent metal plate. For example, I have shown the member 17 bent into the form of a Z, having its connecting web 18 disposed horizontally in the plane of the upper ends of the leg members 2 and the vertical member 13. One vertical flange 19 of the member 17 extends downwardly between said leg and vertical members. said flange and web being cut away, as at 20, to receive the upper ends of the leg and vertical members, the same being secured therein by welding or other suitable means. The remaining flange 21 of the member 17 extends upwardly and rearwardly of the frame for cooperation with suitable means (not shown) on the furnace structure for securing the frame thereto. In addition, I provide clips 22 welded to the flange 19 and having bolts 23 therethrough for attaching the frame to the furnace structure.

As particularly shown in Figs. 2 and 3, and the enlarged sections of Figs. 5 and 6, I have shown the construction employed for dimensionally altering the door frame, to accommodate doors D, indicated by the broken lines, of varying sizes. For this purpose, the angle members 4 and 4a are welded in the leg portions 2, as hereinbefore described, said members being of different sizes to provide guiding means for doors of different sizes, as will be readily understood.

Also, as shown in Fig. 6, the cross sectional area of the leg portion 2 may be varied by changing the size of the sheet metal portion 3.

From the foregoing, it will be seen that the skeleton construction provided affords openings B through the frame, permitting access to the front wall of the furnace without removing the frame.

As indicated by the arrows of Fig. 1, the fluid circulation is as follows. Water or other cooling medium is introduced into the hollow leg members 2 by means of the inlet conduits 12 and pass downwardly, entering into one leg of the lintel portion through openings 7 and 8. The circulating fluid then passes upwardly through the passage in the hollow lintel portion 6, then upwardly through the tubular member 13, and is discharged by means of the outlet conduit 16.

I claim:

1. The method of manufacture of furnace door frames which consists in forming the legs of the frame by bending sheet metal into hollow angular members, separately forming a hollow sheet metal U-shaped lintel member of angular cross section, said frame legs and the legs of the lintel portion having openings therein, then positioning the legs of the frame adjacent the lintel legs with the openings in registration and with portions of the frame legs offset relatively to the lintel legs, and then uniting the frame legs and the lintel legs.

2. The method of manufacture of furnace door frames which consists in forming the legs of the frame by bending sheet metal into hollow angular members with each member having a longitudinally extending opening therein across one corner, closing said opening by inserting an angle member therein and securing the angle member to the walls of the opening, separately forming a hollow sheet metal U-shaped lintel member of angular cross section, said frame legs and the legs of the lintel portion having openings therein, then positioning the legs of the lintel member between the legs of the frame with the openings in registration and with portions of the frame legs offset relatively to the lintel legs, and then uniting the frame legs and the lintel legs.

3. The method according to claim 2 wherein said uniting of the frame legs and the lintel legs is effected by rows of welding common to the frame and the lintel legs.

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