

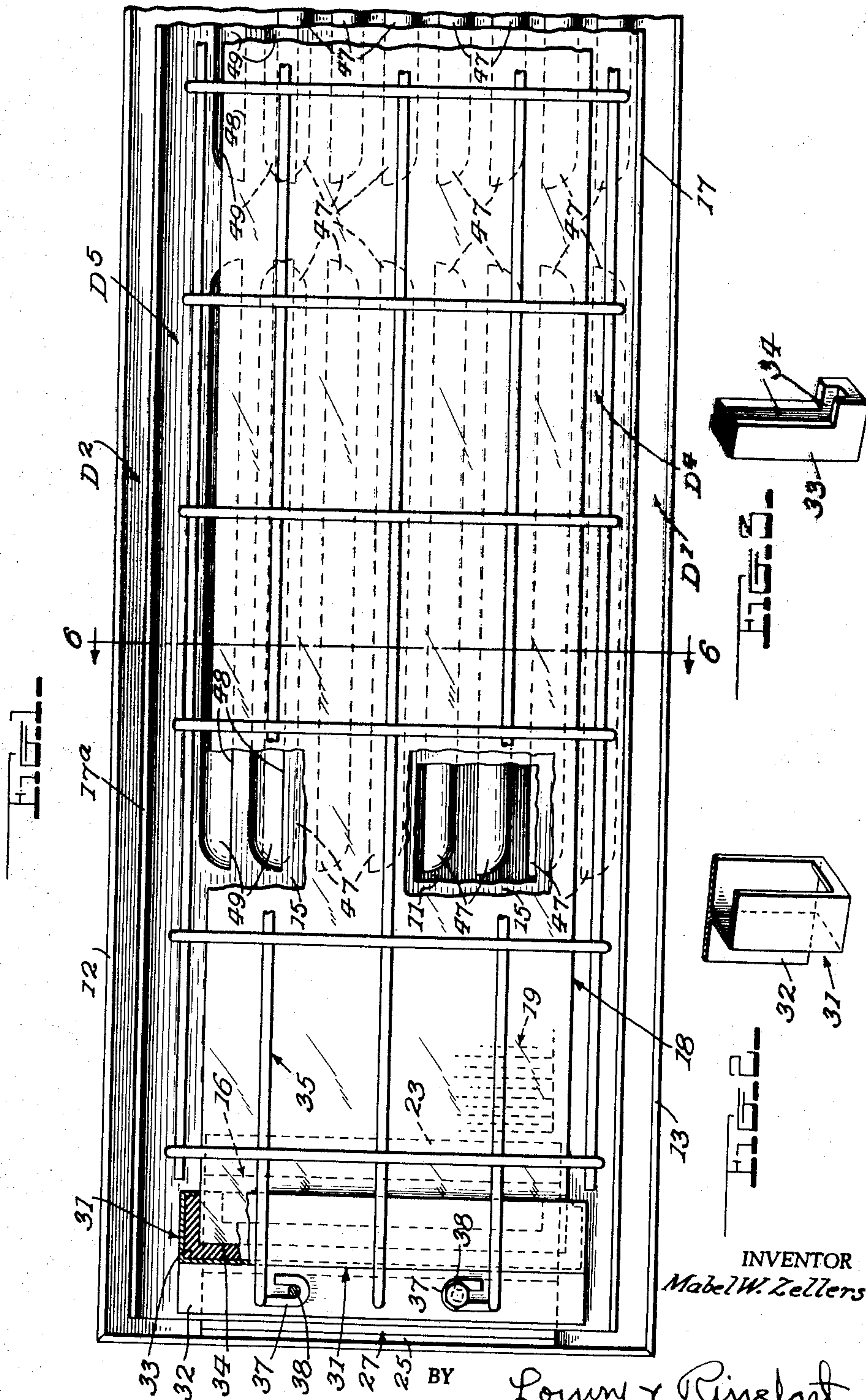
Aug. 8, 1961

M. W. ZELLERS  
ELECTRIC HEATER

2,995,644

Filed Sept. 29, 1959

3 Sheets-Sheet 1



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FIG. 1A-

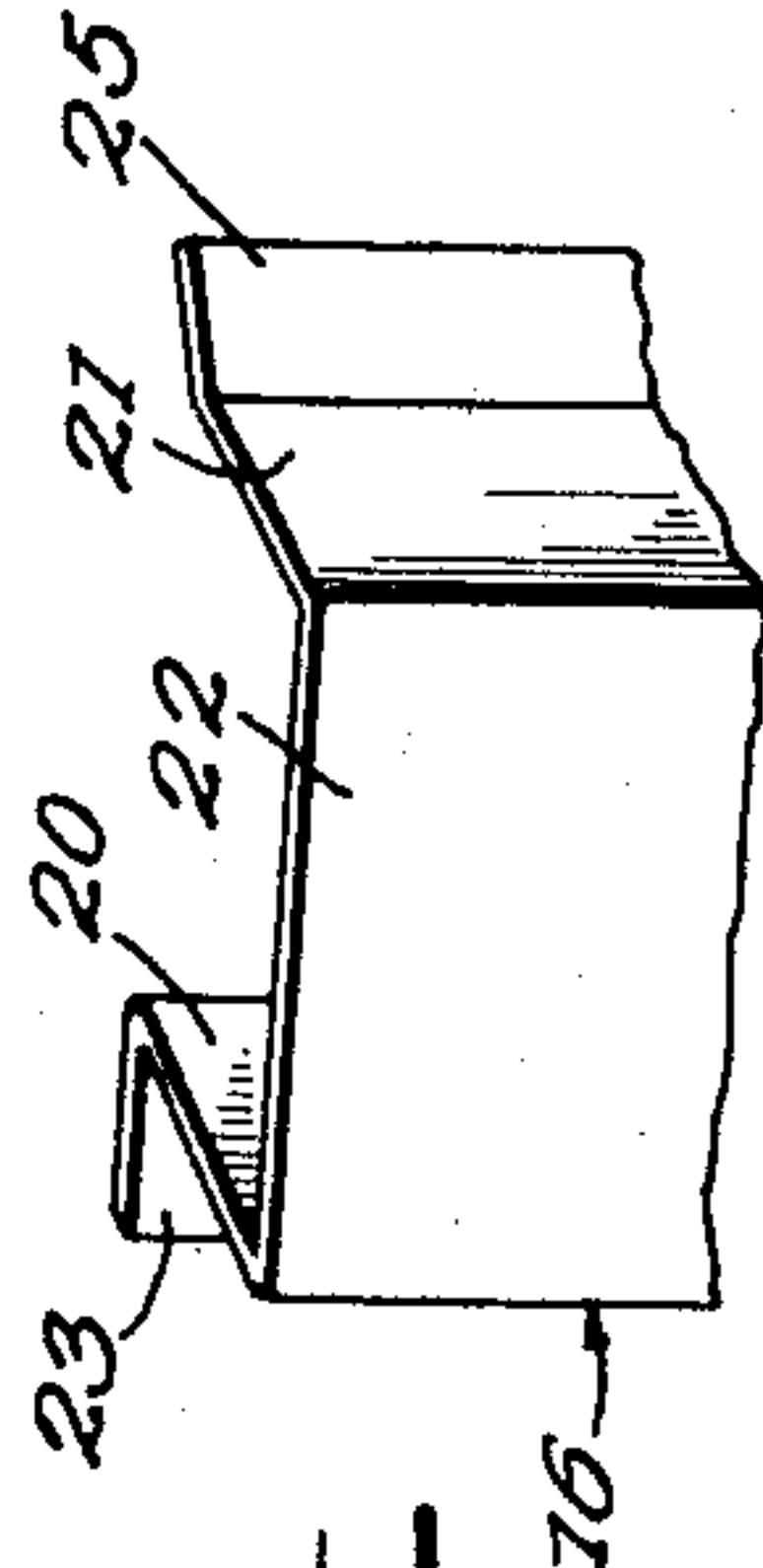
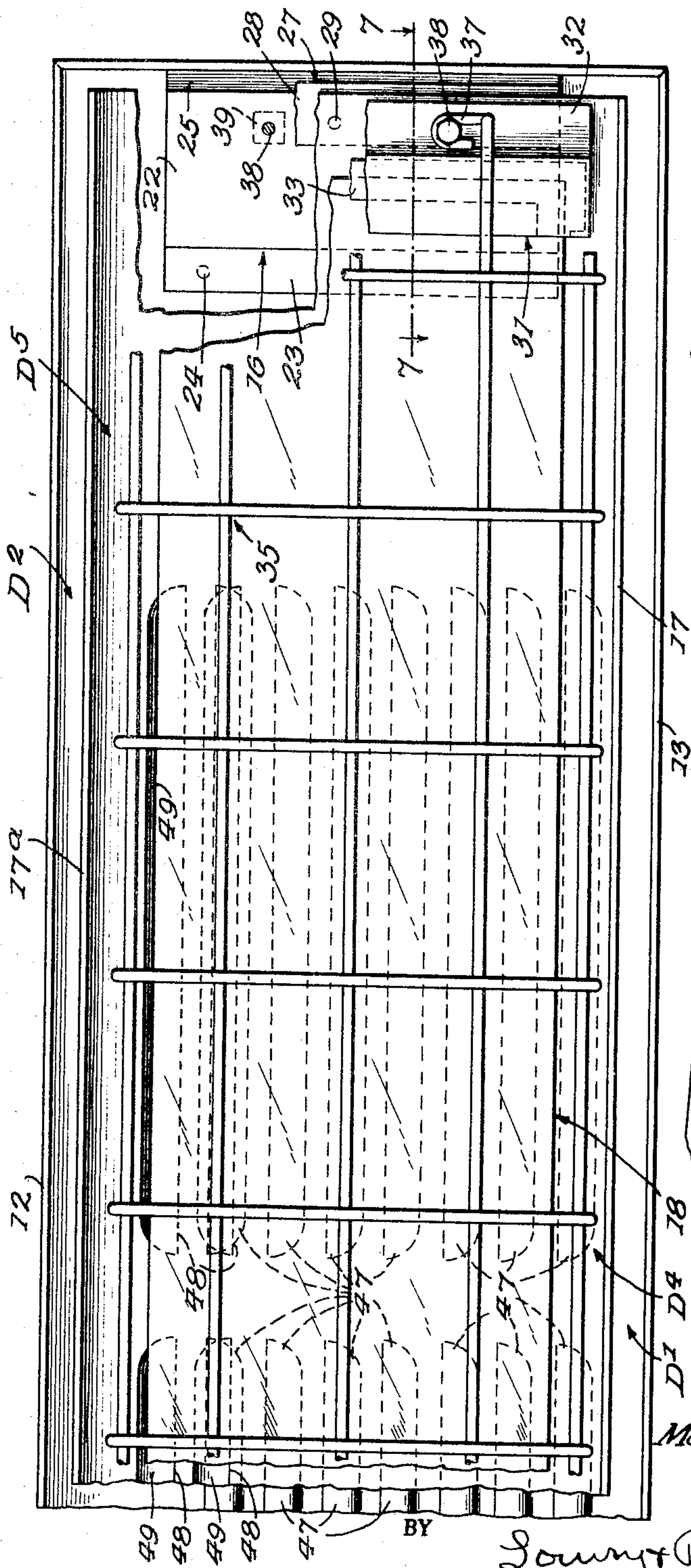


FIG. 1B-

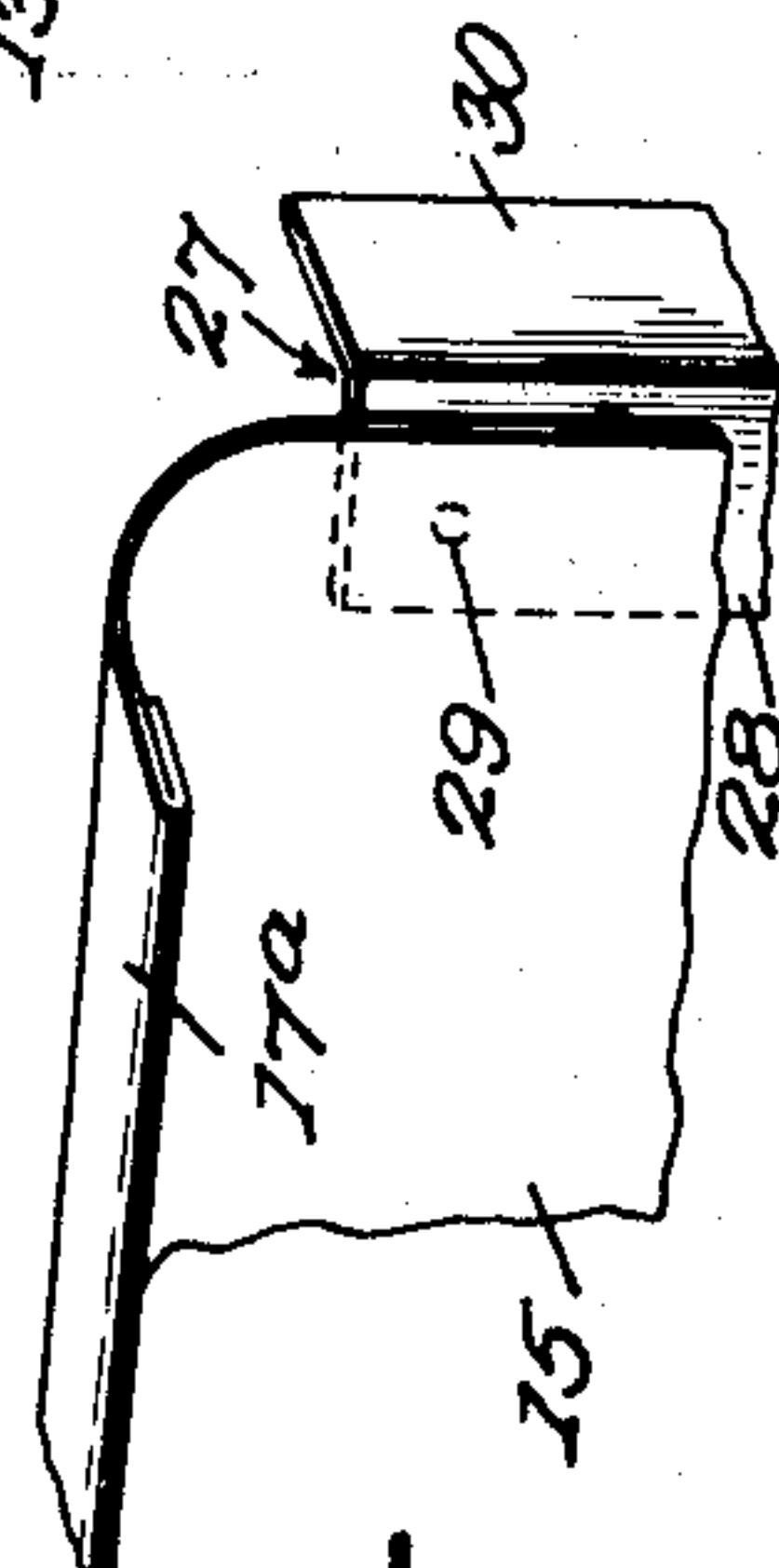


FIG. 1C-

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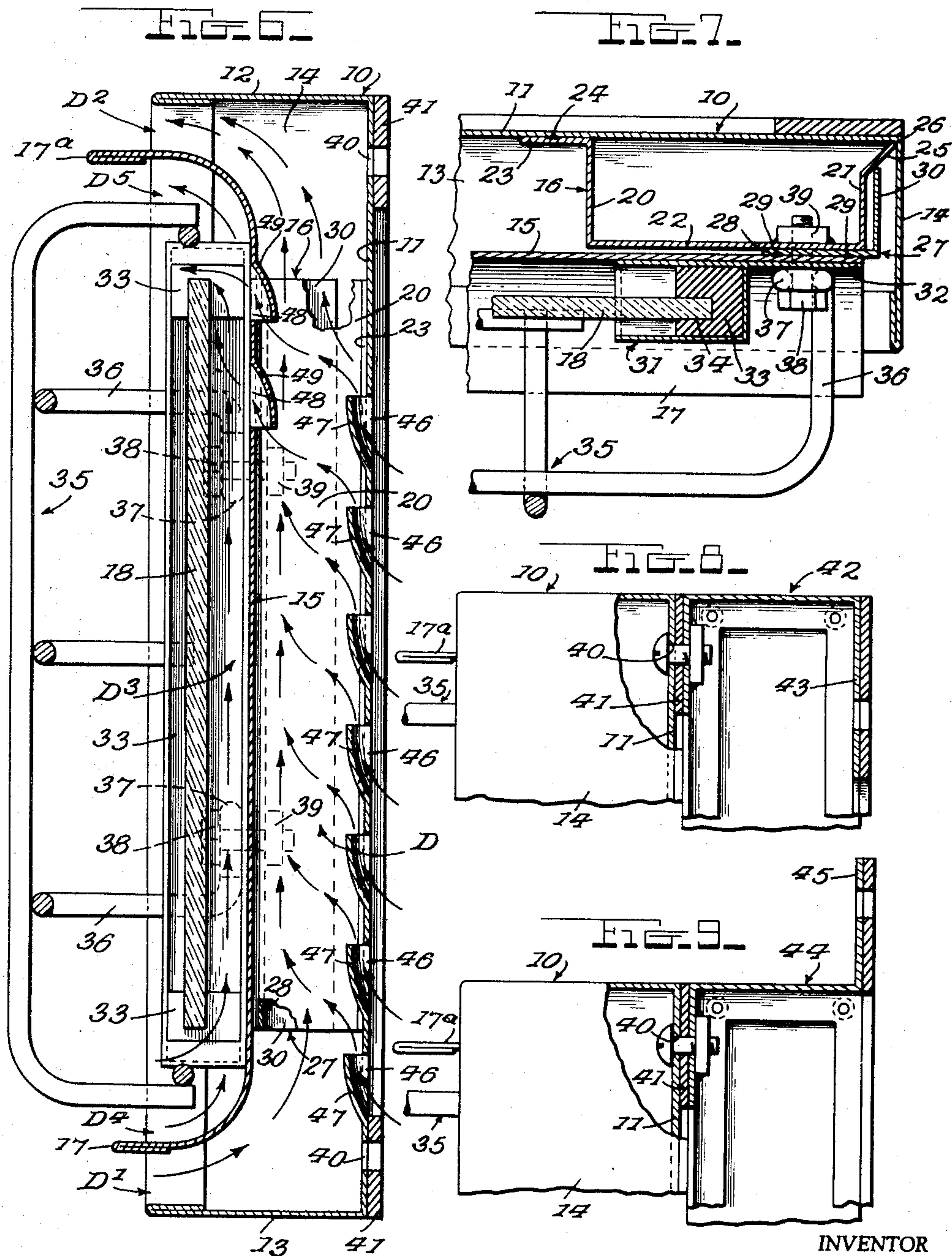
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3 Sheets-Sheet 3



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2,995,644

## ELECTRIC HEATER

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6 Claims. (Cl. 219—34)

This invention is an improvement on the construction disclosed in my U.S. Patent 2,882,381 of April 14, 1959. In that construction, room air ascends between a radiant heating panel and a vertical plate behind said panel, and additional room air ascends between said plate and the back wall of a shallow casing in which said heating panel and plate are mounted.

An object of the present invention has been to provide for admitting fresh outside air, entering through a small register, into the space between the aforesaid vertical plate and the back wall of the casing, and to provide for conducting some of the fresh air thus admitted, into the upper portion of the space between said plate and the radiant heating panel. Thus, the heater is caused to not only heat and circulate room air but to heat fresh air and mix it with the room air, for ventilation.

Another object of the invention has been to provide an improved construction for mounting the radiant heating panel and the vertical plate in the casing and for reinforcing the ends of said plate.

Yet another object has been to provide a novel construction in which threaded fasteners which are employed in mounting the vertical plate and the heating panel, also secure a front guard in place.

With the above and other objects in view, as will be presently apparent, the invention consists in general of certain novel details of construction and combinations of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly claimed.

In the drawings, like characters of reference indicate like parts in the several views, and

FIGURES 1 and 1A, when placed end to end, jointly disclose a front elevation, partly broken away;

FIGURE 2 is a sectional perspective showing a portion of one of the channeled panel-mounting members;

FIGURE 3 is a similar view of one of cushions employed within the panel-mounting members;

FIGURE 4 is a fragmentary perspective view showing one end of the vertical plate and its reinforcing angle;

FIGURE 5 is a fragmentary perspective view of one of the bracket members employed in mounting the heating panel, the vertical plate and the guard;

FIGURE 6 is an enlarged transverse section on line 6—6 of FIGURE 1;

FIGURE 7 is an enlarged detail horizontal section on line 7—7 of FIGURE 1A;

FIGURE 8 is a fragmentary vertical section, partly in elevation, showing an adapter box which may be employed when the face of the register to which the heater is to be secured is smaller than the back area of the heater casing; and

FIGURE 9 is a similar view, showing an adapter box which may be employed when the face of the register is larger than the back area of the heater casing.

The drawings disclose a preferred construction; and while that construction will be rather specifically described, it is to be understood that variations may well be made.

A vertical rectangular sheet metal casing 10 is provided, said casing being shallow from front to rear and having an open front. The casing back wall 11 is joined to the top 12, the bottom 13 and the end walls 14 in any appropriate manner.

A vertical rectangular sheet metal plate 15 is mounted in the casing 10 on brackets 16, said plate being spaced

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forwardly from the back wall 11 to leave a duct D between said plate and wall. The plate 15 is of smaller size than the back wall 11, and said plate is spaced downwardly from the top 12, upwardly from the bottom 13, and somewhat inwardly from the end walls 14.

A lower flange 17 projects forwardly from the lower edge of the plate 15 and is upwardly spaced from the bottom 13 to provide an entrance throat D<sup>1</sup> for the duct D. An upper flange 17<sup>a</sup> projects forwardly from the upper edge of the plate 15 and is spaced downwardly from the top 12, leaving an air discharge passage D<sup>2</sup> for the duct D.

The heating panel 18 is vertically mounted in the open front of the casing 10 and is spaced forwardly from the plate 15 to form a duct D<sup>3</sup>. The lower edge of the panel 18 is upwardly spaced from the flange 17 to provide a duct entrance D<sup>4</sup>, and the upper edge of said panel is downwardly spaced from the flange 17<sup>a</sup> to provide a duct outlet D<sup>5</sup>.

The panel 18 has a printed-on electrical resistance element on its rear side as in the patent above mentioned, a portion of this element is diagrammatically indicated at 19 in the lower left corner portion of FIGURE 1.

The brackets 16 are each of vertically channeled form with their ends open and spaced respectively below the casing top 12 and above the casing bottom 13 to allow air to flow upwardly through said brackets for cooling purposes. Each bracket 16 (see FIGURES 5 and 7) has two parallel vertical flanges 20 and 21 projecting rearwardly from a vertical web 22. The flange 20 has a rear flange 23 welded at 24 to the casing back wall 11. The flange 21 has an oblique rear edge portion 25 welded at 26 in the corner at which the back wall 11 joins the end wall 14. This oblique edge portion 25 spaces the major portion of the flange 21 somewhat inwardly from the end wall 14.

The end portions of the vertical plate 15 are in front of the webs 22 and each of said end portions has a vertical reinforcing angle bar 27 (see FIGURES 4 and 7). Each angle bar 27 has a front flange 28 spot-welded at 29 to the rear side of the plate 15 and disposed against the front side of the bracket web 22. Each angle bar 27 also has a rearwardly projecting flange 30 disposed in the space between the bracket flange 21 and the casing end wall 14. The rear edge of the flange 30 preferably abuts the oblique portion 25 of the bracket flange 21 and thus aids in properly positioning the plate 15 during assembly.

Two vertically channeled mounting members 31 (see FIGURES 2 and 7) are provided for the ends of the heating panel 18. These mounting members 31 are disposed against the front side of the plate 15 and have lateral attaching flanges 32 likewise disposed against said plate. Insulating cushions 33 are confined within the mounting members 31 and have channels 34 snugly receiving the ends of the panel 18.

A suitable guard 35 is spaced forwardly from the panel 15 and has rearwardly projecting attaching portions 36 which terminate in loops 37 which are disposed against the attaching flanges 32 of the members 31.

Bolts 38 (see FIGURE 7) extend rearwardly through the loops 37, attaching flanges 32, angle flanges 28, and webs 22, and are threaded into nuts 39 welded to said webs. These bolts thus secure the heating panel 18, the plate 15 and the guard 35 to the fixed brackets 16, and a construction is thus provided which may be easily assembled, easily disassembled if required, and easily reassembled.

The casing 10 is to be mounted in communication with a conventional fresh air admitting register and is provided with bolt holes 40 and a gasket 41 for this purpose. If the casing 10 and the register are of about the same size, said casing is secured directly to the register face plate. If the register be relatively small, an adapter box



42 (FIGURE 8) is interposed between casing and register, said adapter box being inwardly flanged at 43. If the register be relatively large, the adapter box 44 of FIGURE 9 is interposed between casing and register, said adapter box 44 being outwardly flanged at 45.

Whether the casing 10 be directly mounted on the register or mounted on an adapter box secured to the register, provision is made for admitting fresh air from the register into the duct D and for conducting some of the air from this duct D into the upper portion of the duct D<sup>3</sup> (see FIGURE 6). To this end, the back wall 11 of the casing 10 is formed with vertically spaced, horizontally elongated, fresh air inlet openings 46 and with louvers 47 which incline steeply and forwardly from the lower edges of said openings 46, and the upper portion of the vertical plate 15 is formed with vertically spaced, horizontally elongated air conducting openings 48 and with louvers 49 which decline steeply and rearwardly from the upper edges of said openings 48.

The openings 46 admit fresh air from the register to the duct D to mingle with the somewhat heated room air ascending therein. The openings 48 conduct some of this ascending air from the duct D into the upper end portion of the duct D<sup>3</sup> to mix with the heated room air ascending in the latter. All of the mixed and ascending room air and fresh air are forwardly discharged through the duct outlet D<sup>2</sup> and D<sup>5</sup> and thus both heating and ventilating functions are performed.

From the foregoing it will be seen that novel and advantageous construction has been disclosed for attaining the desired ends. However, attention is again invited to the possibility of making variations within the scope of the invention.

I claim:

1. In an electric heater of the type including a casing having a vertical back wall and an open front, a vertical radiant heating panel mounted in the front portion of said casing and a vertical plate behind said heating panel, and wherein room air ascends between said plate and said heating panel and is thus heated and other room air is recirculated by ascending between said plate and said casing back wall for movement out of said casing with the heated air; said casing back wall being provided with fresh air inlet means for the space between said casing back wall and said plate with said fresh air inlet means extending a major portion of the height of said space to effect a thorough mixing of fresh air with the recirculating room air, and the upper portion of said plate being provided with air conducting means from said space into the space between the upper portion of said plate and the upper portion of said heating panel to direct a mixture of fresh air and recirculating room air into the heated room air and out through said casing front with the heated room air.

2. A structure as specified in claim 1; in which vertically spaced horizontally elongated openings constitute said fresh air inlet means, in which louvers incline steeply forward from the lower edges of these fresh air inlet openings, in which other vertically spaced horizontally elongated openings constitute said air conducting means, and in which louvers decline steeply rearward from the upper edges of these air conducting openings.

3. An electric heater comprising a vertical casing of shallow form from front to rear and having an open front, said casing having a back wall, vertical end walls, a top and a bottom; a radiant heating panel mounted vertically in the open front of said casing, said heating panel being downwardly spaced from said top, upwardly spaced from said bottom and forwardly spaced from said back wall;

and a vertical plate mounted in said casing between said heating panel and said back wall and spaced from both said panel and back wall, said plate being downwardly spaced from said top and upwardly spaced from said bottom, said plate having an upper forwardly projecting flange spaced upwardly from said heating panel and spaced downwardly from said top, said plate also having a lower forwardly projecting flange spaced downwardly from said heating panel and spaced upwardly from said bottom with said plate combining to define an air passage having a lower horizontal room air inlet and an upper horizontal heated air outlet; said back wall having fresh air inlet means opening into the space between said back wall and said heating panel for mixing fresh air with recirculating room air, the upper portion of said plate having air conducting means from the upper portion of said space to the space between said plate and said heating panel to direct a mixture of recirculating room air and fresh air into the heated air.

4. A structure as specified in claim 3; in which vertically spaced horizontally elongated openings constitute said fresh air inlet means, in which louvers incline steeply forward from the lower edges of these fresh air inlet openings to direct fresh air into the space in the direction of the recirculating room air, in which other vertically spaced horizontally elongated openings constitute said air conducting means, and in which louvers decline steeply rearward from the upper edges of these air conducting openings to direct the recirculating room air and fresh air mixture into the heated air in the direction of flow thereof.

5. An electric heater comprising a vertical casing of shallow form from front to rear and having an open front, said casing having a back wall, vertical end walls, a top and a bottom; two vertically channeled bracket members secured to said back wall inwardly of said vertical end walls and having open upper and lower ends spaced from said top and bottom, respectively, said bracket members each having parallel vertical side flanges projecting rearwardly from a front web, a vertical plate in said casing and spaced from said top and bottom, said plate having end portions in front of said webs, vertically elongated reinforcing angles secured to the rear sides of said end portions and having front flanges disposed against the front sides of said webs, said angles also having rearwardly projecting flanges between said bracket members and said end walls, a vertical radiant heating panel in the open front of said casing and spaced from said top and bottom, mounting members in which the ends of said heating panel are mounted, said mounting members having attaching flanges disposed against the front sides of said plate end portions, and threaded fasteners extending through said attaching flanges, said plate end portions, said front flanges of said reinforcing angles and said webs of said bracket members.

6. A structure as specified in claim 5, in which a guard is disposed in front of said heating panel, said guard having rearwardly projecting attaching portions secured against said plate end portions by means of said threaded fasteners.

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