

Oct. 30, 1962

W. N. LUNDBOM
MOBILE HOME FURNACE

3,061,706

Filed Feb. 2, 1960

3 Sheets-Sheet 1

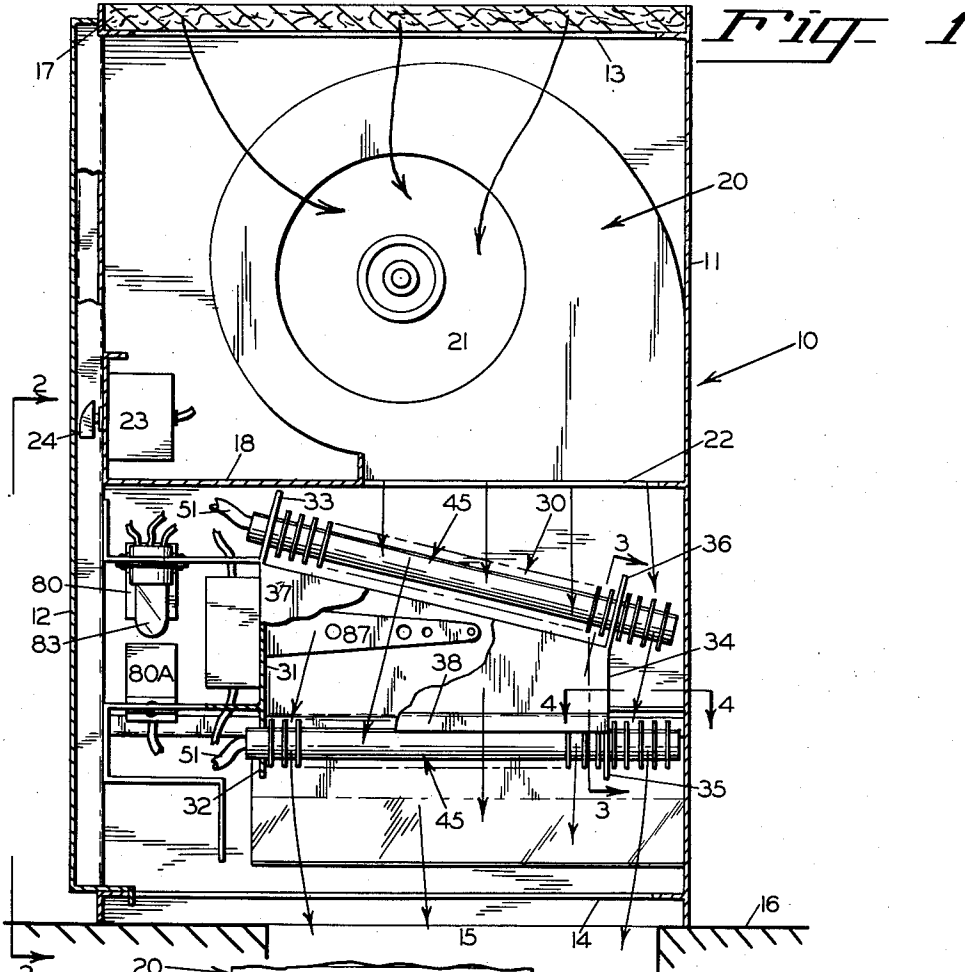


Fig. 1

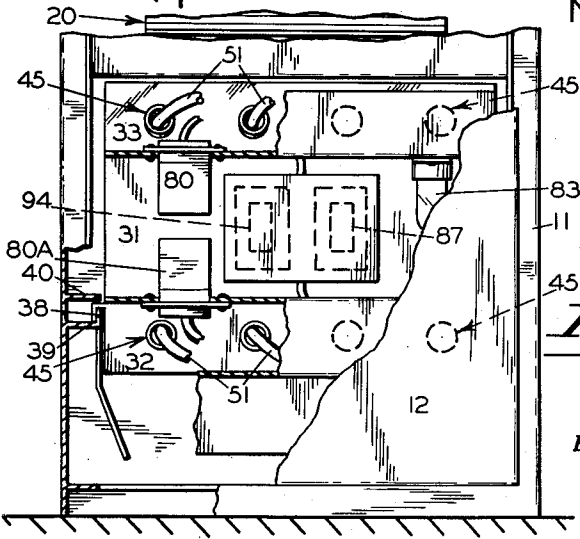


Fig. 2

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Fig 3

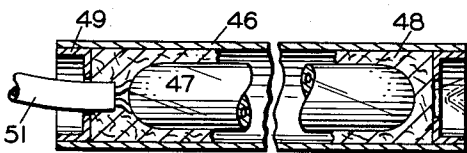
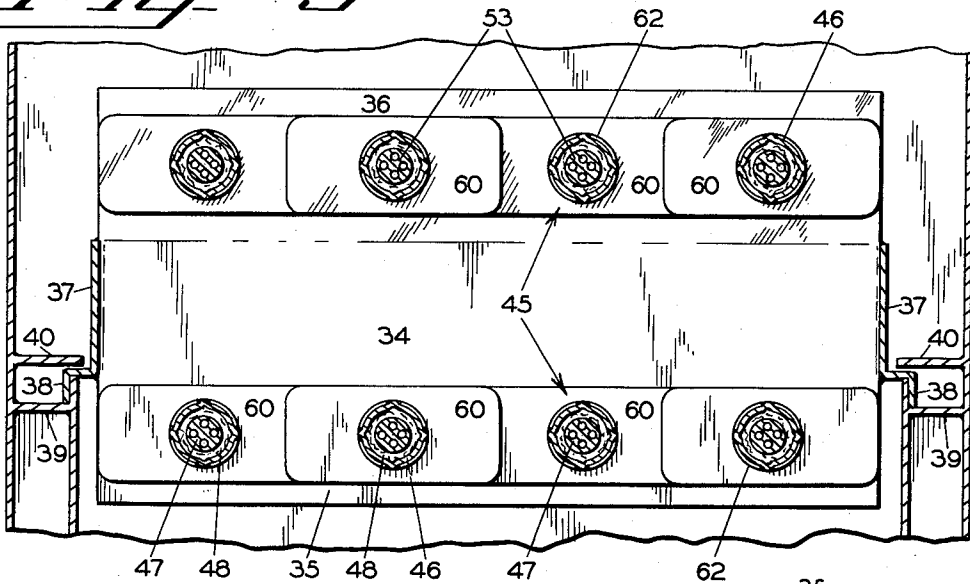


Fig 5

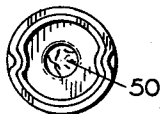


Fig 6

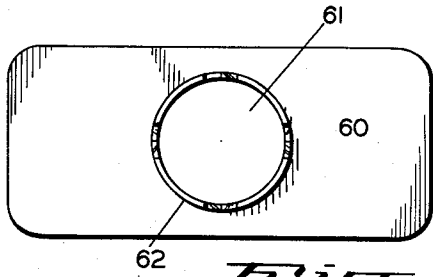


Fig 7

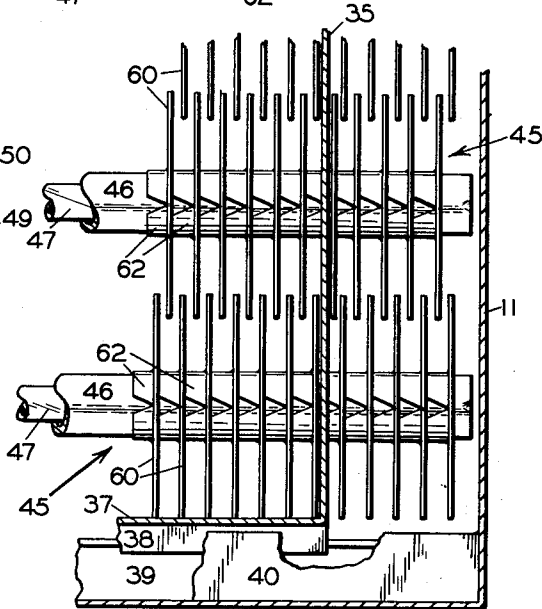


Fig 4

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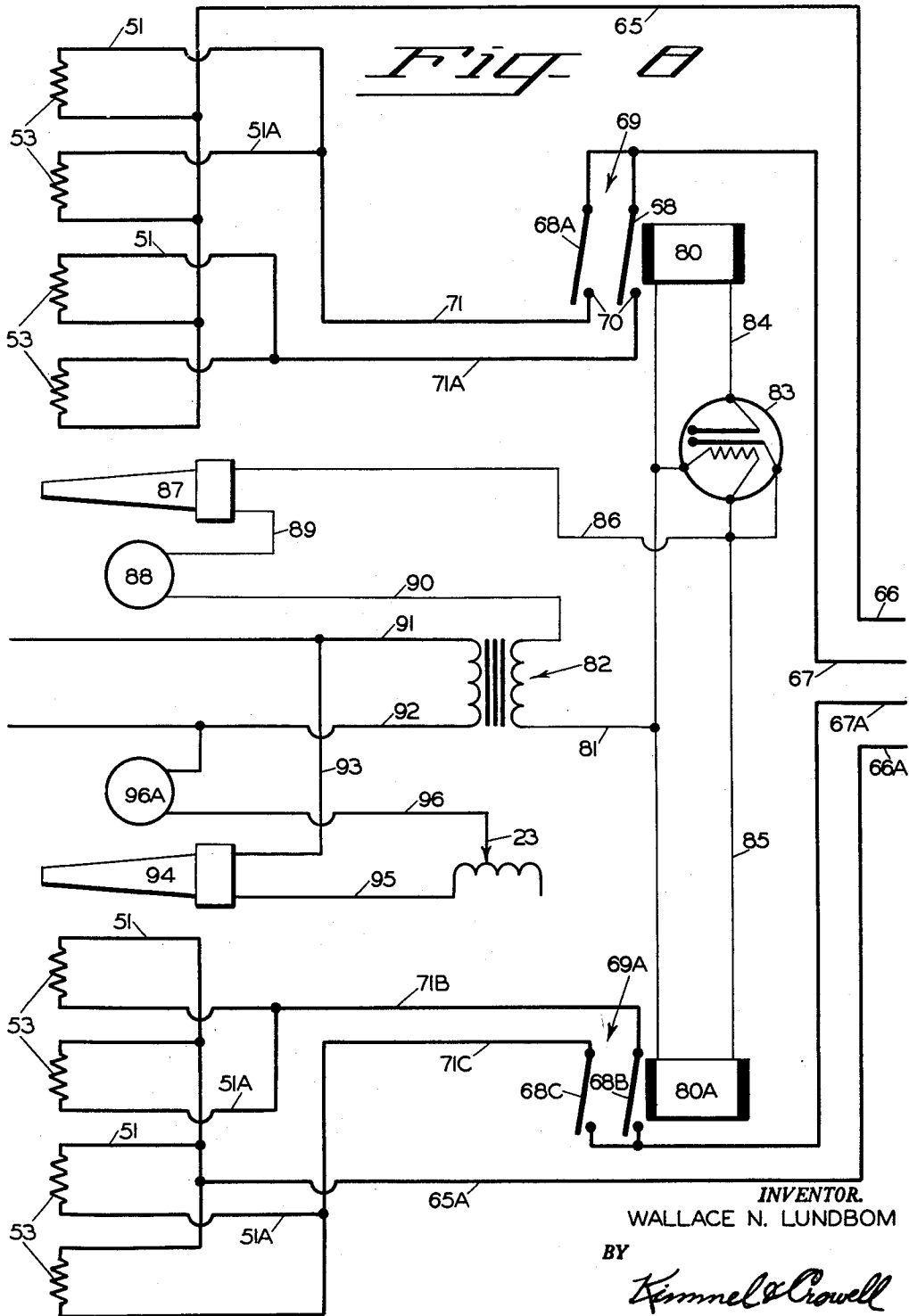
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3,061,706

MOBILE HOME FURNACE

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 Filed Feb. 2, 1960, Ser. No. 6,158
 2 Claims. (Cl. 219—39)

This invention relates to a furnace, and more particularly to a furnace for a mobile home such as a trailer or the like.

A primary object of the invention is the provision of a forced air electric furnace particularly adaptable for mobile home units which is particularly characterized by ease of installation, small size, and ready applicability to a mobile unit wherein space is at a premium.

An additional object of the invention is the provision of a device of this character wherein aluminum fins and tubes form the primary heating elements, and wherein the heat is distributed by a fan or blower.

An additional object of the invention is the provision of such a device wherein a plurality of heating elements are provided arranged in banks, so organized that there is a time lag between the energization of the first bank and the subsequent bank or banks in order to preclude overloading of the circuits.

An additional object of the invention is the provision of such a device which may be readily connected to either overhead or under floor ducts in the trailer, without any change in the unit.

Still another object of the invention is the provision of such a furnace wherein the entire interior unit including the blower and heating elements are contained in a single cabinet of relatively small size.

Still another object of the invention is the provision of a device of this character wherein the entire heating assembly is mounted on a sliding track, so that the same may be readily removed from and replaced in the cabinet with a minimum of difficulty and effort, wherever repairs or cleaning are necessary.

An additional object of the invention is the provision of a furnace of this character which completely eliminates the storage of fuel, wherein there is no flame and no soot or other products of combustion, wherein there are no open coil elements, and which is completely automatic in operation and requires a minimum of attention.

Still other objects reside in the combinations of elements, arrangements of parts, and features of construction, all as will be more fully pointed out hereinafter and disclosed in the accompanying drawings wherein there is shown a preferred embodiment of this inventive concept.

Still other objects will, in part, be obvious, and, in part, be pointed out hereinafter.

In the drawings:

FIGURE 1 is a vertical side sectional view of the assembly, certain parts of the wiring being broken away.

FIGURE 2 is an enlarged front elevational view of the device, parts thereof being broken away to show the interior elements of construction.

FIGURE 3 is an enlarged sectional view taken substantially along the line 3—3 of FIGURE 1 as viewed in the direction indicated by the arrows.

FIGURE 4 is an enlarged sectional view taken substantially along the line 4—4 of FIGURE 1 as viewed in the direction indicated by the arrows.

FIGURE 5 is a sectional view, partially broken away, disclosing one of the heating elements.

FIGURE 6 is an end elevational view of the element of FIGURE 5 showing the end cap used to seal the heating tube and core.

FIGURE 7 is a plan view of one of the aluminum fins used in the heating element disassociated from the device.

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FIGURE 8 is a schematic wiring diagram showing the electrical circuits employed with this furnace.

Similar reference characters refer to similar parts throughout the several views of the drawings.

5 Having reference now to the drawings in detail, there is generally indicated at 10 an electric furnace constructed in accordance with the instant inventive concept. The furnace includes a cabinet 11, having a removable front panel 12, an open top 13, and an open bottom 14. In the 10 illustrative embodiment herein shown the bottom 14 is adapted to be positioned over a floor duct 15 in the floor 16, for passage of heated air from the unit thereinto. The open top 13 is provided with a filter 17, of any desired conventional construction, and in an alternative construction, the open top 13 may be connected to an over- 15 head duct if desired.

A central horizontally disposed partition 18 supports a squirrel cage type fan, generally indicated at 20, and of any desired capacity, although a 750 cubic foot per minute fan has been found to be especially suitable.

Air drawn through the filter 17 enters the side openings 21 of the fan 20, and is passed through the fan and out through an opening 22 in the partition 18, as indicated by the arrows in FIGURE 1.

25 A multiple speed switch 23 provided with an operating handle 24 is suitably connected as by wires 25, in a manner to be more fully pointed out hereinafter, to the blower 20, in order to control the speed of air passing there-through.

30 The heating unit generally indicated at 30 is positioned below the horizontal partition 18, and is adapted, in a manner to be more fully pointed out hereinafter, to heat air passed thereover by means of the fan 20.

The heating unit 30 consists of a front plate 31, having 35 a lower flange 32, and an upper inclined flange 33, and a rear plate 34. Rear plate 34 also has a lower flange 35 which is aligned with the lower flange 32, and an inclined upper flange 36, in parallelism to the flange 33. The purpose of the flanges will be more fully described hereinafter. Side plates 37 connect front and rear plates 31 and 34 to form a box-like assembly.

The side plates 37 are provided as best shown in FIGURE 3, with offset depending flanges 38, which slidably engage in channels 39 formed on the side walls of the housing 11. Guide and retaining plates 40 positioned 40 above the channels 39 serve to hold the flanges 38 in the channels, for longitudinal sliding movement in and out of the casing or housing 11 when the front panel 12 is removed.

50 An upper bank of heating elements 45 extends between the flanges 33 and 36, the upper bank being inclined at an angle as best shown in FIGURE 1, while a lower bank substantially identical heating elements 45 extends between the flanges 32 and 35, the lower bank being positioned substantially horizontally.

Each heating element comprises, as best shown in FIGURES 5 and 6, an outer aluminum tube 46, within which is positioned a ceramic core 47, which contains a conventional Nichrome heating element. Insulation 48 is provided between the tube 46 and the core 47, and the parts are held in related assembly by suitable end caps 49, which may be provided with openings 50 for the admission of wires 51 (see FIGURE 5). The ends of the tube and cap are crimped as at 52 (see FIGURE 6) 65 to hold the caps in related assembly. The Nichrome heating elements are shown in cross section at 53 in FIGURE 3.

Each of the heating tubes 45 is provided with a plurality of heating fins 60, each fin being comprised of an aluminum sheet of generally rectangular configuration having a central opening 61 therein surrounded by a split.

flange 62. The flanges 62 serve as spacers to insure equidistant spacing of the fins 60 on each heating tube 45, and the fins of adjacent elements are overlapped as best shown in FIGURES 3 and 4.

It will thus be seen that air is passed from the fan or blower 20 over the upper and lower banks of heating elements 45, the heating of which is controlled in a manner to be more fully described hereinafter, and heated to a suitable extent. The angular inclination of the upper bank relative to the lower bank, plus the overlapping of the various fins causes the air to pass through the heating elements with a wiping action, thus more effectively heating the same in a limited time. The air then passes out through the opening 14 in the bottom of the casing or housing 11 and into the ducts 15.

Having reference now to FIGURE 8, it will be seen that each Nichrome heating element is connected by one of wires 51 to a common lead 65 which comprises the cold line leading from any desired source of electrical energy, which extends from the end 66 of the conductor 65. The corresponding hot wire 67 extends to the blades 68 and 68A of a double pole switch 69, the two poles of which are adapted or energized in a manner to be more fully described hereinafter, to contact opposed contact members 70. The contact members 70 are connected by leads 71 and 71A to the hot wires 51A of the Nichrome heating elements, in such manner that when the two poles of the double pole switch are closed all of the heating elements 53 will be simultaneously energized. The double pole switch is provided to prevent overload on any particular heating elements. The lines 66 and 67 in the illustrative embodiment shown supply electrical energy to the upper bank of heating elements, while corresponding lines 66A and 67A supply current to the lower bank of heating elements 53. The arrangement is such that the cold wire end 66A communicates with the cold line 65A, which in turn is connected with the common line leading to the cold lines 51 of the heating elements 53 of the lower bank of the heaters 45. The hot line 67A extends to the two poles 68B and 68C of a second double pole switch generally indicated at 69A, from which hot lines 71B and 71C lead to the individual hot lines 51A of the heating elements 53 of the lower bank of heating tubes 45. Means are provided for controlling the operation of the two double pole switches 69 and 69A in accordance with the ambient temperature and take the form of a pair of relays 80 and 80A which respectively operate the switches 69 and 69A. The relays are supplied with current from the hot line 31 of a low voltage transformer 82, the cold line of both relays extending through a suitable conventional time delay switch 83, which is connected to the relays 80 and 80A by means of wires 84 and 85, respectively. The time delay switch 83 is also connected as by means of a wire 86 to a fan control switch 87, which operates on a 25 degree differential to control the action of the fan or blower 20. The fan control switch is in turn actuated by means of a thermostat 88, which is connected thereto by a line 89, while a line 90 extends to the low voltage side of low voltage transformer 82. High voltage is supplied to the transformer 82 by means of a line 91, and a return line 92. A terminal in the line 91 connects with a wire 93, which is in turn connected to a high limit control switch 94, of conventional design, which in turn is connected through a line 95 to the multiple speed switch 23. A line 96 extends from the multiple speed switch 23 to the motor switch 96A.

It will thus be seen that when the motor is initially turned on, the supply of heat to the heating units 53 is governed by the thermostat 88 and the high limit control switch 94, the speed of the blower, and the degree of heat supplied to the coils in turn being controlled through the switch 87 and the relays 80 and 80A, respectively. The double pole switches 69 and 69A prevent an overload on any individual heating elements 45, while

the time delay switch 83 is so arranged as to provide a suitable delay between the energization of the first or upper bank of heating elements and the second or lower bank.

It will thus be seen that there is herein provided an improved mobile home furnace, which is completely automatic in operation, which is simple and easy to install and service, which is relatively inexpensive, and which accomplishes all the objects of this invention, and others, including many advantages of great practical utility and commercial importance.

As many embodiments may be made of this inventive concept, and as many modifications may be made in the embodiment hereinbefore shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative and not in a limiting sense.

I claim:

1. A furnace for mobile homes or the like comprising in combination a casing having open upper and lower end portions, a horizontally disposed partition fixed in said casing intermediate the upper and lower ends thereof, portions of said partition defining an opening therethrough, a fan supported on said partition and having an outlet in alignment with said opening, a heating unit removably mounted in said casing in a plane vertically spaced from said fan and partition and in the path of air directed thereby, said heating unit comprising a generally box-shaped structure including front, rear, and side plate portions, a lower bank of parallel horizontally aligned heating elements secured at their opposite ends to said front and rear plates, an upper bank of parallel aligned heating elements secured at their opposite ends to said front and rear plates in vertically spaced acute angular relation with respect to said lower bank of heating elements, depending flanges on said heating unit formed integral therewith and disposed in spaced parallel relation to said side plates, oppositely disposed aligned guide channels in said casing adapted to receive the depending flanges on said heating unit, guide and retaining plates fixed to said casing and extending in overlying relation to said guide channels, and said retaining plates engageable with the depending flanges on said heating unit to prevent vertical displacement thereof from said channels.

2. A furnace for mobile homes or the like comprising in combination a casing having open upper and lower end portions, a horizontally disposed partition fixed in said casing intermediate the upper and lower ends thereof, portions of said partition defining an opening therethrough, a fan supported on said partition and having an outlet in alignment with said opening, a heating unit removably mounted in said casing in a plane vertically spaced from said fan and partition and in the path of air directed by said fan, said heating unit comprising a box-shaped structure including spaced parallel side plates, a front plate, and a vertically elongated rear plate, said front and rear plates having vertically extending parallel lower flanges and angularly extending parallel upper flanges, a lower bank of parallel horizontally aligned heating elements secured at their opposite ends to the lower flanges on said front and rear plates, an upper bank of parallel aligned heating elements secured at their opposite ends to the angularly extending parallel upper flanges on said front and rear plates, said upper bank of heating elements being in spaced acute angular relation to said lower bank of heating elements, said side plates each including a depending flange in spaced parallel relation thereto and extending longitudinally thereof, oppositely disposed horizontally aligned channels mounted in said casing and adapted to slidably receive the depending flanges on said side plates, guide and retaining plates mounted in said casing adjacent said channels and extending in overlying relation thereto, and said guide and retaining plates engageable with the

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depending flanges on said side plates to prevent vertical displacement thereof from said channels.

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