Aug. 14, 1962 C. W. GORDON 3,049,200

PANEL MOUNTING FOR STEEL CASED FURNACES

Filed March 6, 1959 5 Sheets-Sheet 1

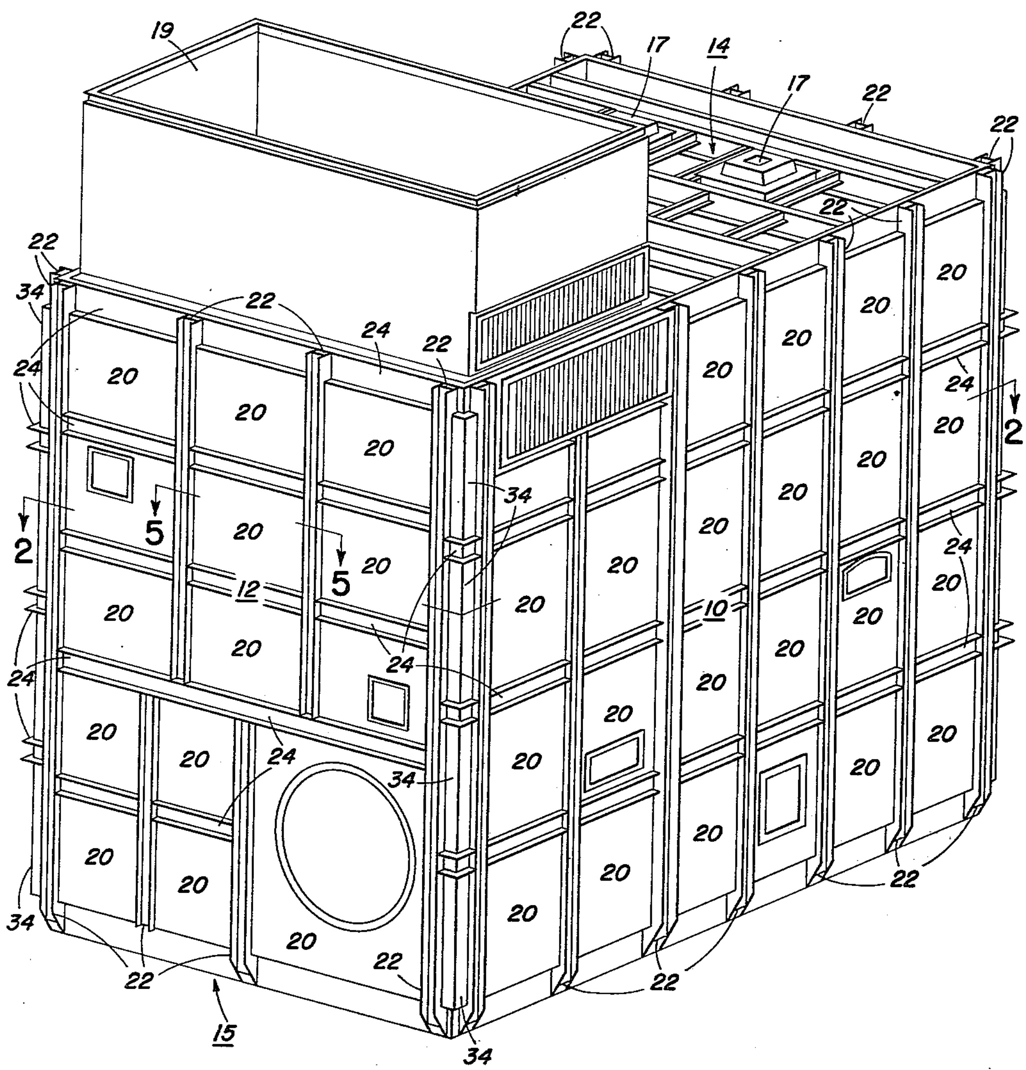


Fig. I.

INVENTOR.
Charles W. Gordon

BY R. F. Bryant
ATTORNEY

Aug. 14, 1962 C. W. GORDON 3,049,200

PANEL MOUNTING FOR STEEL CASED FURNACES

Filed March 6, 1959 5 Sheets-Sheet 2

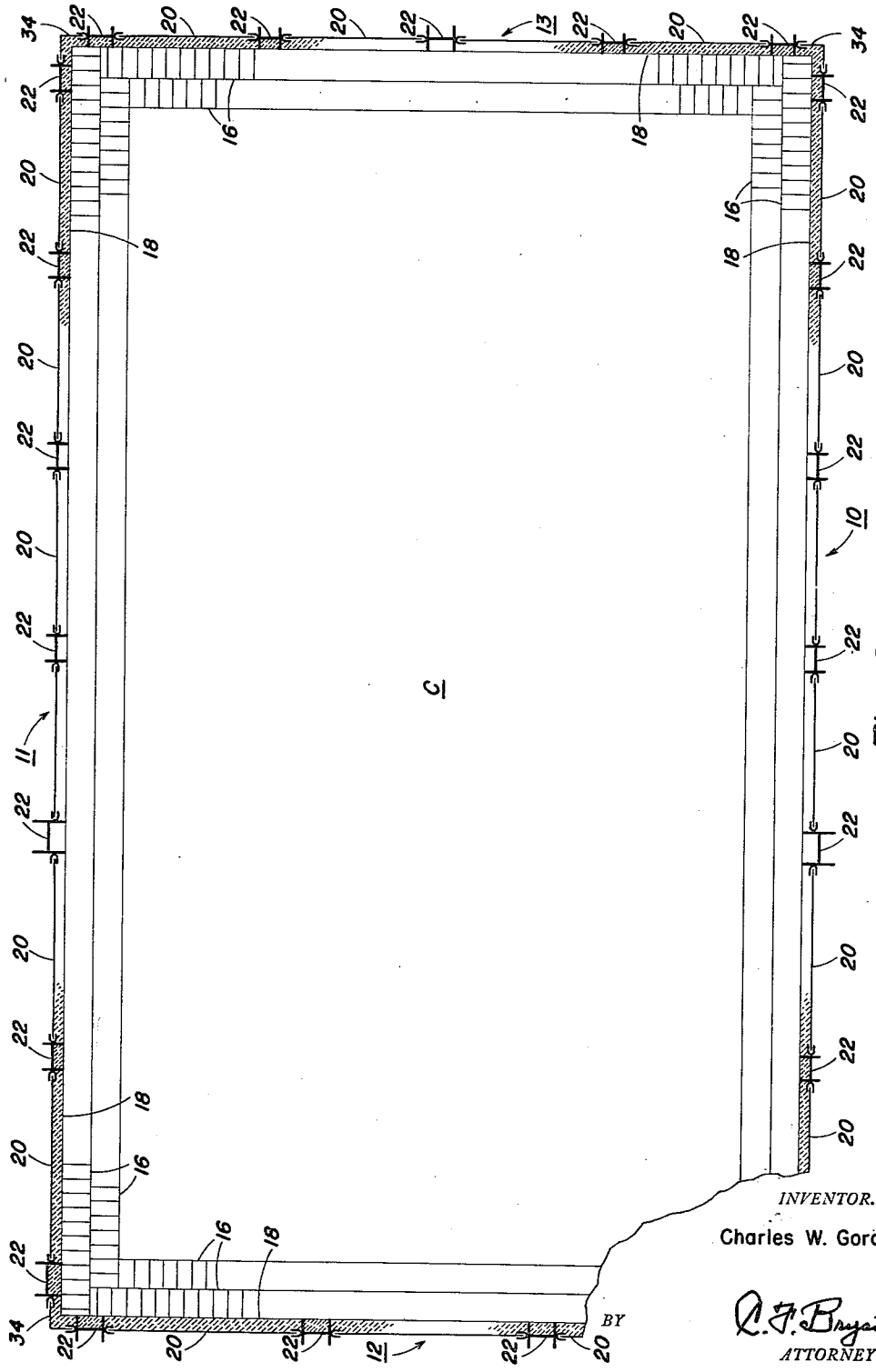


Fig. 2.

INVENTOR.
Charles W. Gordon

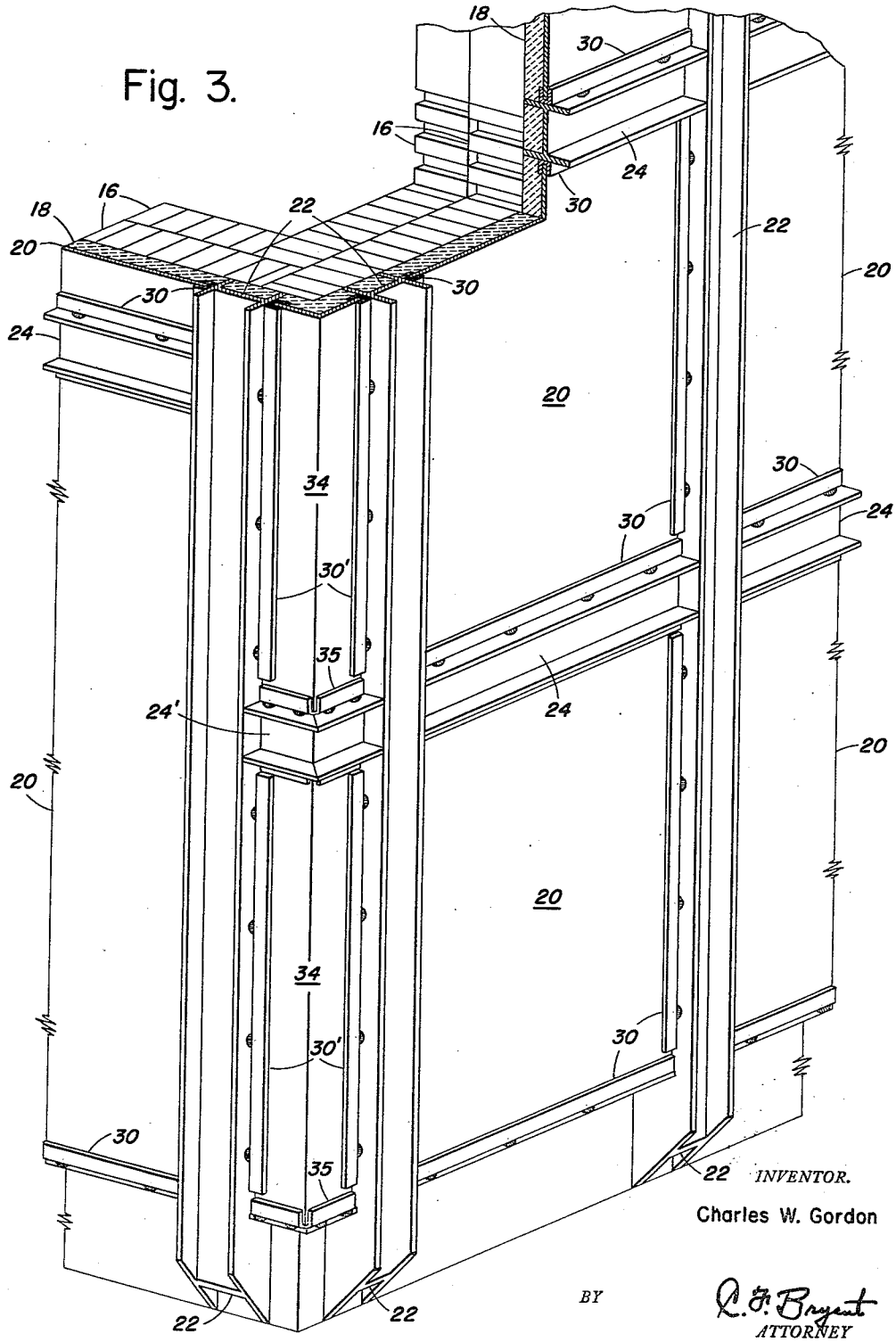
R. F. Bryant
ATTORNEY

Aug. 14, 1962 C. W. GORDON 3,049,200

PANEL MOUNTING FOR STEEL CASED FURNACES

Filed March 6, 1959 5 Sheets-Sheet 3

Fig. 3.



INVENTOR.
Charles W. Gordon

BY R. F. Bryant
ATTORNEY

Aug. 14, 1962 C. W. GORDON 3,049,200

PANEL MOUNTING FOR STEEL CASED FURNACES

Filed March 6, 1959 5 Sheets-Sheet 4

Fig. 4.

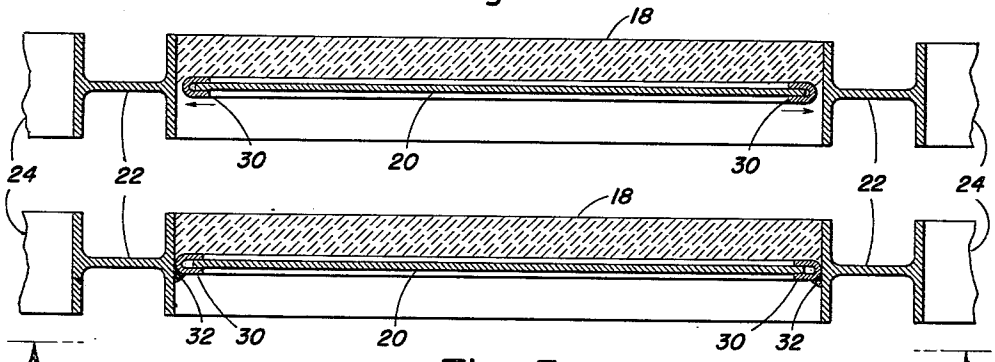


Fig. 5.

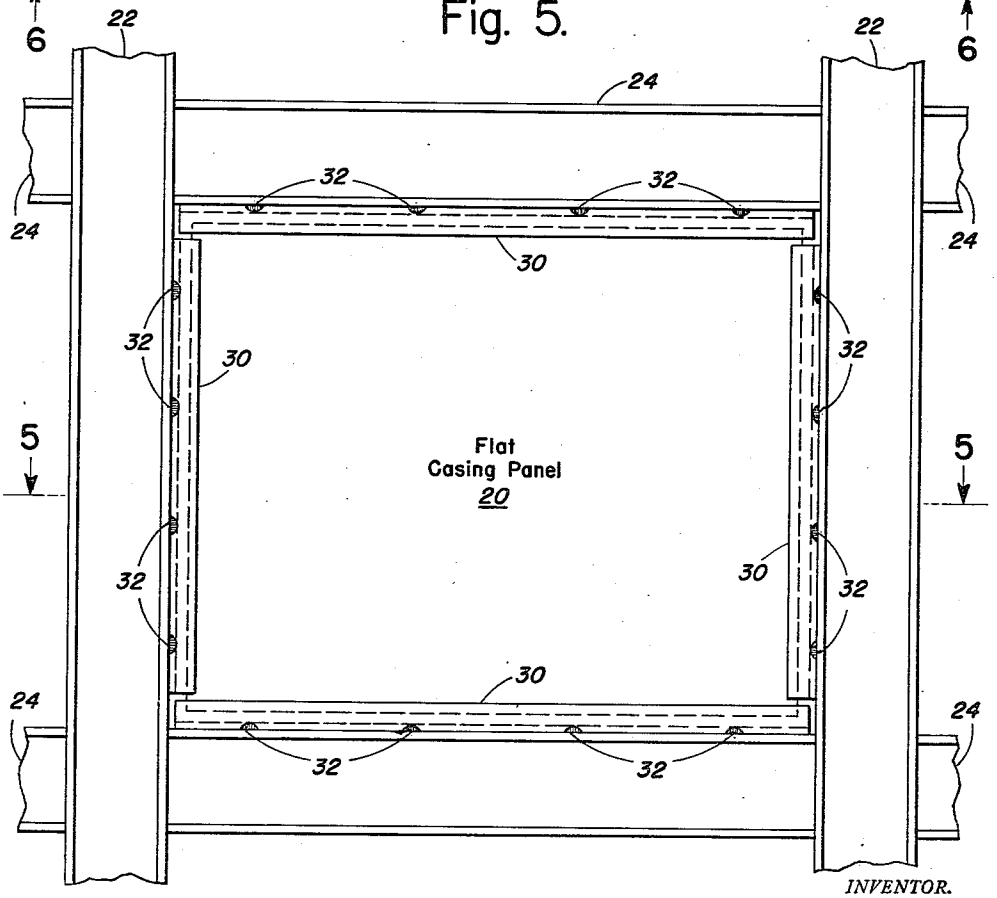


Fig. 6.

INVENTOR.
Charles W. Gordon

BY

ATTORNEY

Aug. 14, 1962 C. W. GORDON 3,049,200

PANEL MOUNTING FOR STEEL CASED FURNACES

Filed March 6, 1959 5 Sheets-Sheet 5

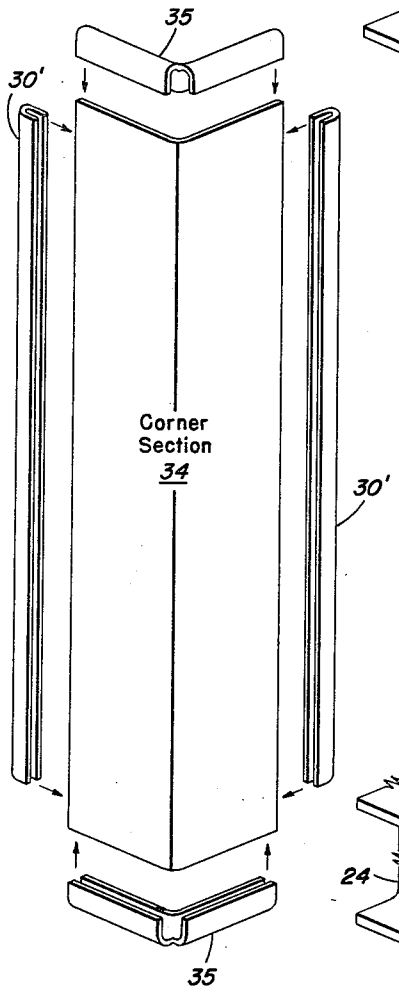


Fig. 7.

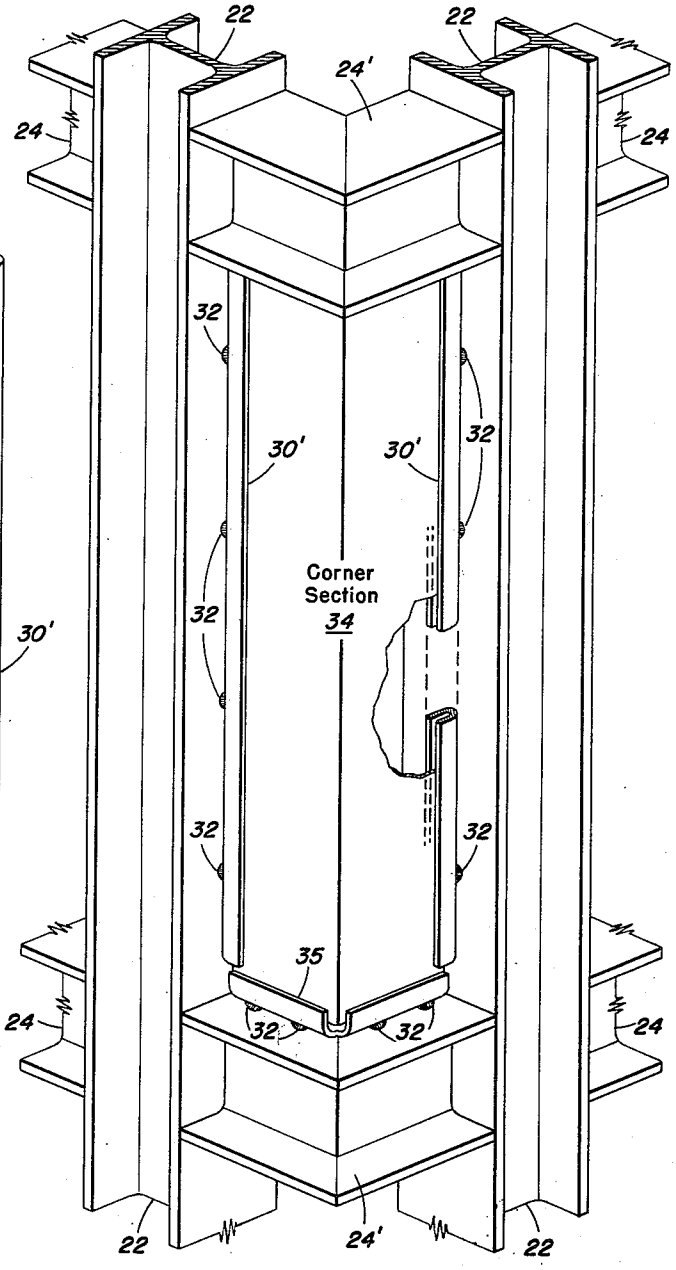


Fig. 8.

INVENTOR.
Charles W. Gordon

BY R. F. Bryant
ATTORNEY

United States Patent Office 3,049,200 Patented Aug. 14, 1962

3,049,200

PANEL MOUNTING FOR STEEL CASED FURNACES

Charles W. Gordon, Glen Ellyn, Ill., assignor to Combustion Engineering, Inc., New York, N.Y., a corporation of Delaware

Filed Mar. 6, 1959, Ser. No. 797,737
4 Claims. (Cl. 189—34)

My invention relates to the construction of casings or walls for furnaces such as are utilized to dry and/or incinerate materials typified by city refuse and sewage sludge, and it has special reference to the formation of such furnace casings from panels of steel or other sheet metal.

Broadly stated, the object of my invention is to simplify the design of such furnace casings while lowering the cost of their fabrication and lessening the time needed to install them in the field.

A more specific object is to provide improved means for mounting such sheet metal plate sections into the casing panel assemblage and there securing the four edges of each panel plate to supporting buckstays that surround the plate.

Other objects and advantages will become apparent from the following description of an illustrative embodiment of the invention when taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a simplified perspective representation of a sludge drying and incineration furnace wherein my inventive improvements are incorporated;

FIG. 2 is a section, looking down from line 2—2 of FIG. 1, showing the four furnace walls and indicating how the left and right edges of individual casing sheets therein are secured via novel U channels to the supporting buckstays which extend vertically along the left and right sides of each panel sheet;

FIG. 3 reproduces to enlarged scale, again in perspective, the foremost corner and other portions of the FIG. 1 furnace and cuts away the upper portion of that corner with accompanying representation of further design details;

FIG. 4 is an enlarged representation in section of one of the furnace casing panels of FIGS. 1–2 drawn to indicate how the flat panel plate with its edge-engaging U channels appears when first lifted into place between supporting buckstays;

FIG. 5 is a corresponding representation, taken from section line 5—5 of FIGS. 1 and 6, of the same casing panel after its U channel fittings have been driven outwardly into contact with and tack welded to the buckstays;

FIG. 6 is a view in front elevation, from line 6—6 of FIG. 5, showing all four of the panel edge U channels similarly contacting and tack welded to their associated buckstay supports;

FIG. 7 indicates how my novel U channel fittings are slipped over the edges of a corner plate section in preparation for assembling that section into a corner of the complete furnace casing; and

FIG. 8 shows this same FIG. 7 corner plate section fitted into the furnace corner between supporting buckstays with its four U channel fittings respectively being tack welded to those buckstays.

Illustrative Steel Cased Furnace With Which My Invention Is Disclosed

The casing construction improvements of my invention are disclosed by FIG. 1 and the other drawing views as being utilized with a furnace whose combustion chamber, designated C in FIG. 2, is enclosed by two side walls 10 and 11 plus two end walls 12 and 13 plus a roof wall 14 and a floor wall 15. Lining these walls is suitable refractory material indicated by FIGS. 2–3 in the form of outer and inner layers of ceramic brick 16. In the illustrative furnace represented sewage sludge or other fuel to be burned is introduced through the roof 14 via burner openings 17, while the hot gaseous products of combustion leave the furnace interior C via a large gas outlet opening 19 also in the furnace top.

Facing and held against the aforesaid outer layer of furnace lining brick 16 is heat insulating material 18 there maintained in place by sheet metal casing plates 20 plus a supporting grid structure made up of a first series of buckstays that extend vertically in spaced parallel relation as shown at 22 plus a second series of spaced parallel buckstays that extend horizontally as shown at 24 in criss-crossing relation to the vertical buckstays. These intersecting buckstay elements 22 and 24 may satisfactorily have the I beam cross sections represented, and they are of course suitably joined to each other (via welding or other attachment not shown) at the various points of intersection.

My inventive improvements have to do with mounting the steel or other sheet metal panel plates 20 in the represented plate-space openings between the buckstay supports 22 and 24 of the casing structure; and as the description proceeds it will become evident that furnaces other than the one here illustratively represented for drying and/or burning sewage sludge also may have these same improvements applied thereto with comparable practical benefits.

How the Casing Panels 20 Are Fabricated and Installed and Secured in Place

In accordance with my invention, each of the casing panels 20 is formed by the easy and economical operation of simply cutting it to proper size from a flat sheet of steel or other suitable metal. Once installed in the furnace casing assemblage, each of these panel sheets 20 derives its support from the surrounding buckstays 22 and 24 through U channels or fittings 30 which first are slipped over the four panel edges as shown in FIG. 4, then driven outwardly into contact with buckstays 22 and 24 as shown in FIGS. 5 and 6, and thereafter secured to those buckstays by spaced tack welds 32.

Each of these U channel fittings 30 may be formed in any suitable manner, as from a strip of the same sheet metal stock as is the casing panel 20 with which the fitting is to be used. Such a strip can readily be hot pressed into the U shape represented, and then cut in the shop to the proper length for which the panel size calls. Top and bottom and left and right channel fittings 30 having lengths matched to the dimensions of a particular casing panel 20 are represented in FIG. 6. Each of these channels 30 has the rounded bend corners which FIGS. 4 and 5 indicate; sharp or square corners would of course be equally satisfactory.

From FIGS. 3–4–5 it will be seen that the opening

or slot in each U channel fitting **30** is just wide enough to receive the mating edge of its casing panel **20** with comparatively close snugness, thereby enabling the completed furnace casing to be made relatively pressure tight. At the same time this mating fit permits sliding adjustment between channel and panel during the installation operation now to be described.

In installing each of the casing panels **20**, the four U channel fittings **30** therefor first are slipped over the edges of the flat panel plate and advanced thereon as far as they will go; this assemblage of plate **20** and fittings **30** next is lifted into the opening formed therefor between intersecting buckstays **22** and **24**, with there initially being a small margin of space between fittings and buckstays are represented by FIG. 4; the channel fittings **30** are thereupon driven out until all four of them contact the surrounding buckstays, as indicated by FIGS. 5 and 6; and spaced tack welds **32** then are made on the outer casing side (away from insulation **18**) between each U channel **30** and the abutting flange of its associated buckstay **22** or **24**, for the purpose of holding the panel sheet **20** permanently in its proper place.

The above having been done, the line of contact between each channel fitting **30** and its buckstay **22** or **24** is filled with heat resistant plastic material (not represented), applied with a conventional caulking gun (also not shown), which imparts desired sealing to the contact juncture. Any and all open spaces around the panel **20** at the ends of its four U fittings **30** are likewise filled with similar caulking material, and in this way there can be produced a final furnace casing which is relatively pressure tight.

How the Corner Sections 34 Are Fabricated and Installed and Secured in Place

Each completed furnace casing includes not only the the flat panel plates **20** just described but also corner casing sections designated **34** in each of FIGS. 1, 2, 3, 7 and 8. The fabrication and installation of these corner sections **34** follows a procedure closely similar to that earlier described for the flat panel plates **20**; and it will now be outlined.

Each of these required corner sections **34** may be bent into the represented right-angle shape from a strip of the same sheet metal that is used to form the flat casing panels **20**; its two side edges are provided with U channel fittings **30'** duplicating those used with said flat panels **20**; and its top and bottom ends are similarly provided with the angle-shaped U channel fittings shown at **35** in FIGS. 3, 7, 8.

In installing each corner section **34**, the four U channels **30'** and **35** of FIG. 7 first are slipped over the mating edges of the corner section **34** and advanced thereon as far as they will go; this assemblage of corner section and fittings next is lifted into its proper place in the casing assemblage corner, with the side fittings **30'** contacting the adjoining vertical buckstays **22**; the top and bottom U channels **35** are thereupon driven up and down until each of them contacts the face of its adjoining corner portion **24'** of the horizontal buckstay **24** at that level; and spaced tack welds **32** then are made, as shown in FIG. 8 between the U fittings **30'** and **35** and the contacting faces of buckstay parts **22** and **24'** for the purpose of holding the corner section **34** permanently in its proper position.

The above having been done, the line of contact between each channel fitting **30'** and **35** and its associated buckstay part is filled with heat resistant plastic material (not represented), applied with a caulking gun as before; and any and all open spaces at the ends of U fittings **30'** and **35** also are filled with similar caulking material. In this way the corner portions of the final furnace casing can, along with the flat wall portions of the casing, be made relatively pressure tight.

My New Casing Design Is Hightly Practical

Steel clad furnace casings which incorporate the improvements of my invention are superior to past designs because the parts therefor can be fabricated in the shop more speedily and at lower cost, and also because erection of the complete casing at the installation site likewise can be accomplished more quickly and at reduced expense.

During shop fabrication, only a minimum of labor is involved in that the U shaped strips or channels **30** (and also **35**) are pressed from flat plate stock to the form shown, while the main casing panels **20** themselves are simply flat sheets of plate stock cut to the proper size. No holes of any kind need be drilled in any of these component parts; and the use of screws and bolts is totally eliminated.

During erection at the installation site, the labor requirements are correspondingly modest and all operations of casing assemblage are comparatively easy and rapid. Attachment of the flat panel plates **20** and the corner sections **34** to their supporting buckstays **22** and **24** via the edge fittings **30** (and **35**) and the spot welds **32** is accomplished both readily and quickly, while the final sealing with a caulking gun (not shown) likewise is easily done.

My inventively new casing design thus facilitates both the manufacture and the installation of furnaces of the steel clad type here under consideration.

Although I have disclosed the invention as being applied to a furnace intended for the drying and/or incineration of materials such as city refuse and sewage sludge, it will be understood that such disclosure is merely illustrative and that the same improvements are capable of being applied to metal cased furnaces intended for numerous other uses.

The inventive improvements herein disclosed and claimed are therefore extensive in their adaptation and hence are not to be restricted to the specific form here disclosed by way of illustration.

What I claim is:

1. A furnace wall casing of sheet metal construction comprising, in combination, generally vertical buckstays which lie in the plane of said casing and which are horizontally spaced one from another, generally horizontal buckstays likewise lying in the plane of said casing and being vertically spaced one from another and extending between said vertical buckstays to form openings each of which is framed by horizontal buckstays along its top and bottom and by vertical buckstays along its left and right sides, a casing panel of flat sheet metal for each of said buckstay-framed openings cut to a size slightly smaller than the dimensions of that opening, channel strips of U cross section respectively provided for and slipped in snug relation over the four edges of each of said panels with each assemblage thus formed being insertable into the aforesaid opening for that panel and with all four of said panel-edge-engaging U channels then being drivable outwardly into contact with their adjoining buckstays, and means in the form of welds for securing each of said outwardly-driven U channels to its contacting buckstay whereby each of said casing panels whose edges are engaged by those so secured U channels is firmly held within and serves to close the aforesaid buckstay-framed opening therefor in the casing structure.

2. The furnace casing organization defined by claim 1 wherein the sheet metal casing panels as novelly secured in their buckstay-frame openings hold in place inner insulating material such as the drawings hereof represent at 18.

3. A furnace casing organization as defined by claim 1 wherein the sheet metal casing panels as novelly secured in their buckstay-framed openings have heat resistant plastic material applied around the outer edges of their U channel fittings for the purpose of establishing a seal between those fittings and the surrounding frame elements.

4. In the construction of a furnace wall casing of sheet metal design which casing includes an opening that is framed by upper and lower buckstays defining the top

and bottom thereof plus left and right side buckstays defining the two sides thereof, the method of securing into said opening a closing panel of flat sheet metal which comprises the steps of cutting said panel to a size slightly smaller than the dimensions of the framed opening, providing for all four edges of said panel sheet channel strips of U cross section that are adapted to slip over their respective panel edges in snug relation, slipping said U channels over and fully upon said four panel edges, inserting said panel with its four engaging U channels into said framed opening, driving said U channels outwardly into contact with the opening frame buckstays which directly adjoin them with resultant full closure of the opening by

the panel plus its edge-engaging channels, and then welding each of said outwardly-driven U channels to its contacting frame buckstay whereby those edge-engaging channels now serve to hold said panel sheet firmly within the aforesaid framed opening in the stated closing relation thereto.

References Cited in the file of this patent

UNITED STATES PATENTS

2,095,037	Reintjes	Oct. 5, 1937
2,172,766	Kuhner	Sept. 12, 1939
2,543,559	Sylvan	Feb. 27, 1951
2,664,740	Cochrane	Jan. 5, 1954