

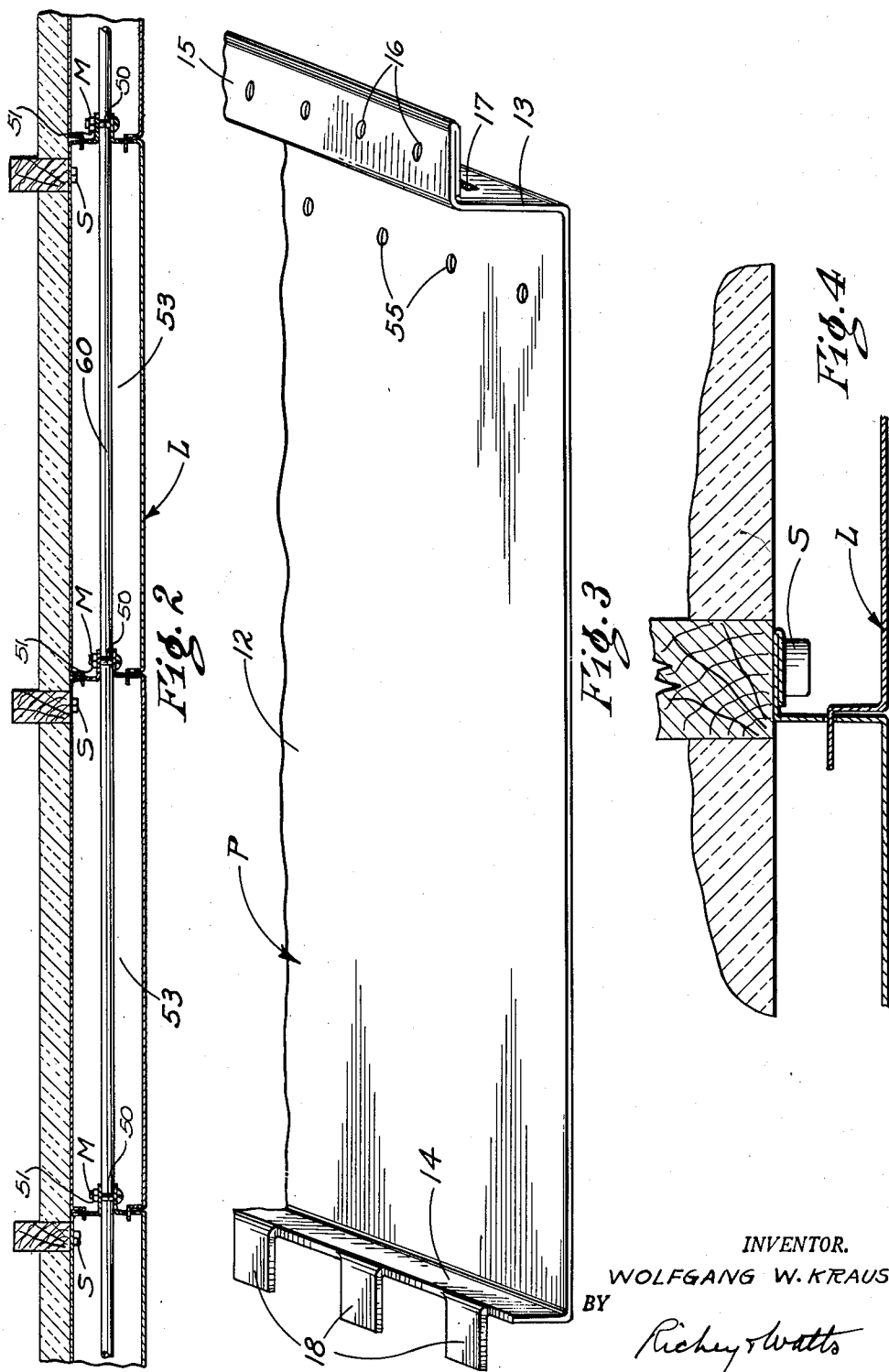
Feb. 10, 1953

W. W. KRAUSS
RADIANT HEATING PANEL

2,628,078

Filed Oct. 19, 1946

5 Sheets-Sheet 2



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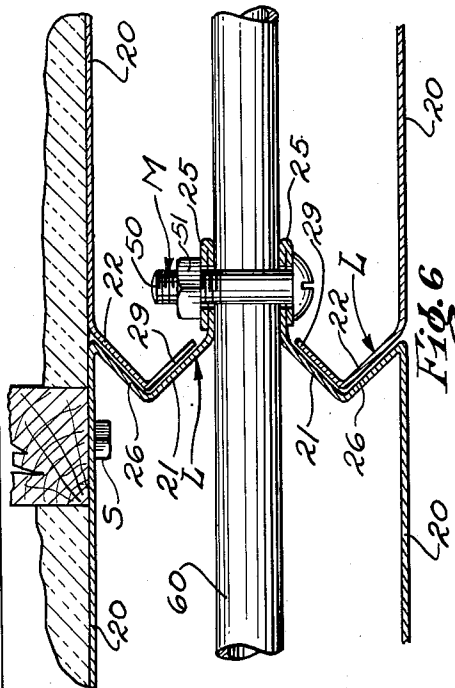
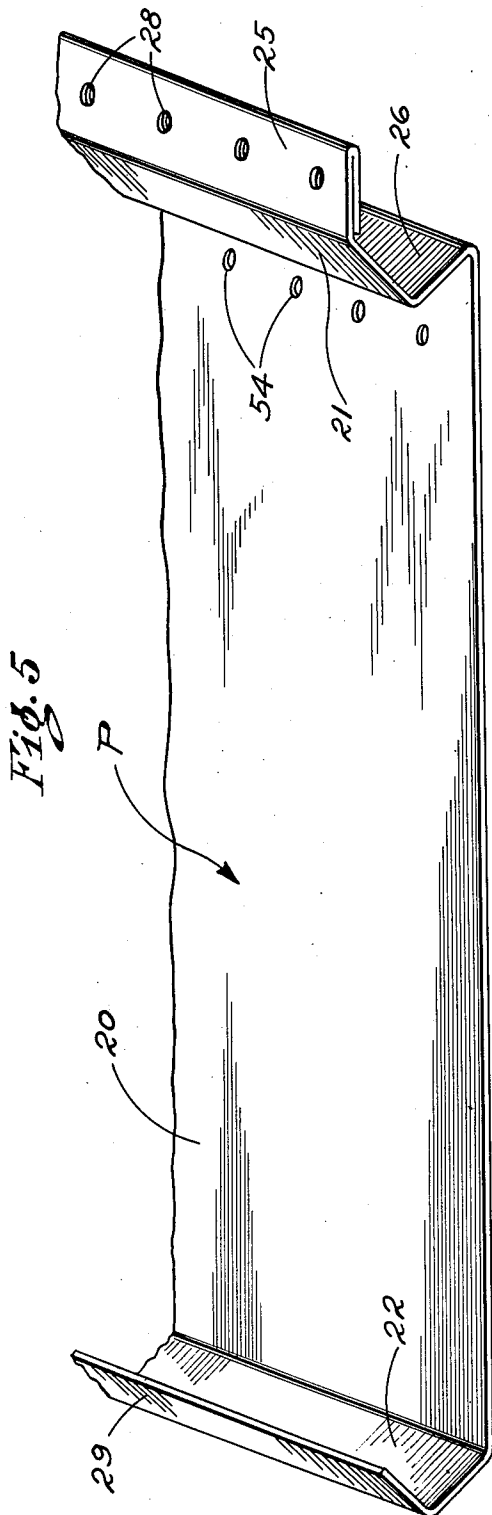
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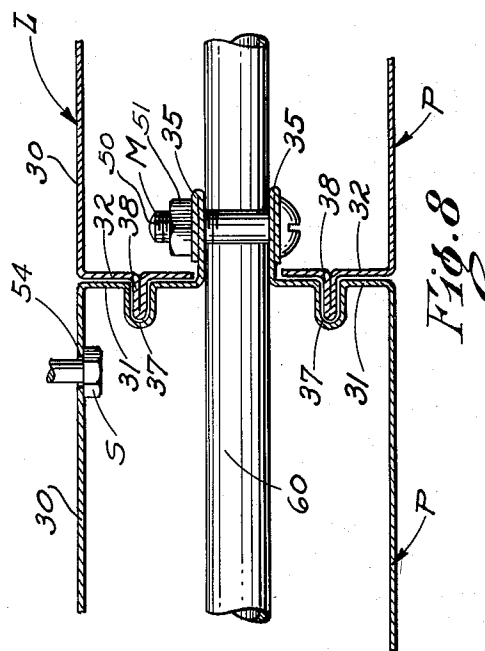
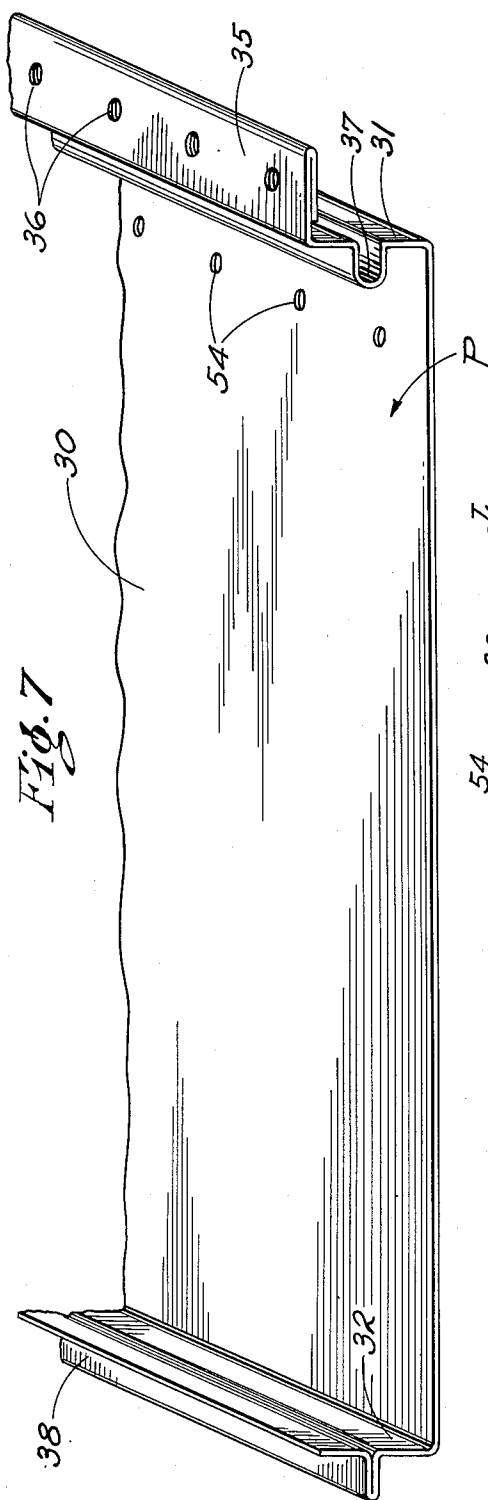
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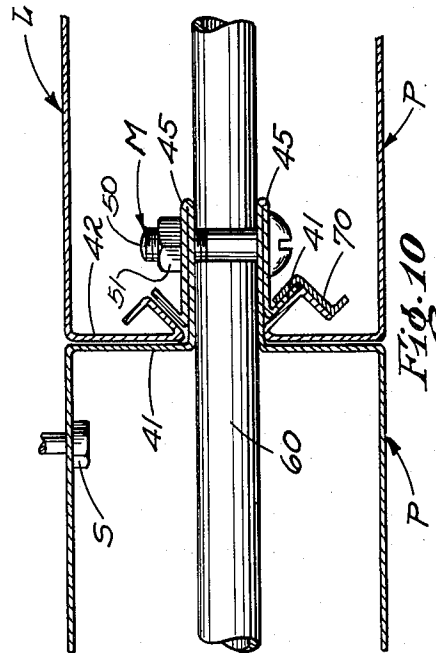
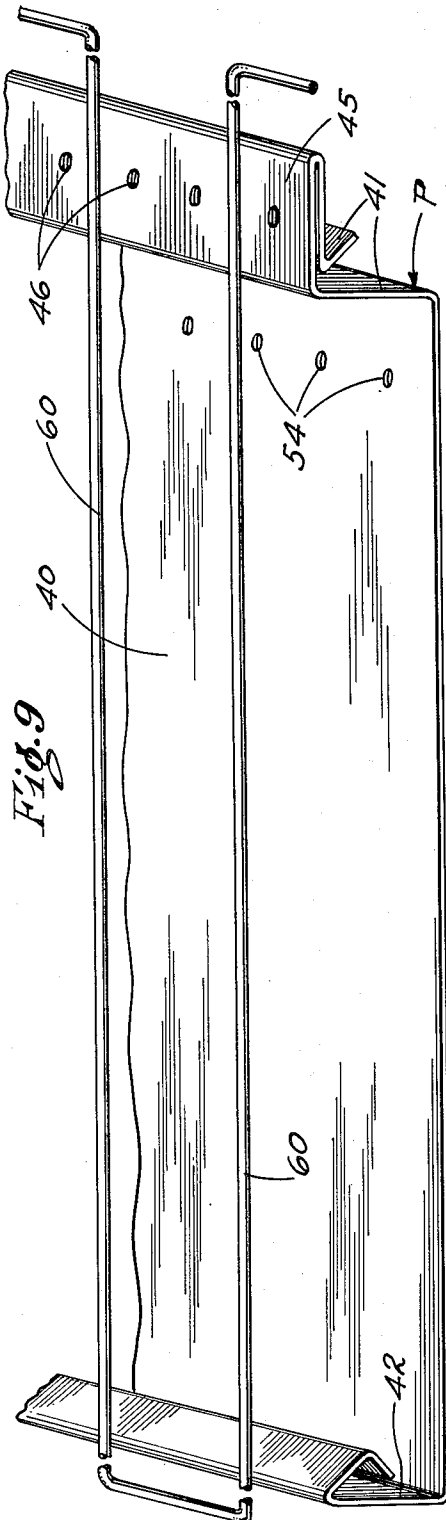
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2,628,078

RADIANT HEATING PANEL

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7 Claims. (Cl. 257-124)

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The present invention relates generally to the heating art and is particularly concerned with novel panels for radiant heating systems and with novel elements comprising said panels.

A considerable variety of means for conveying heating fluids through walls, ceilings and floors of buildings for radiant heating of the rooms thereof have been developed. Heretofore, however, there has never to my knowledge been conceived or employed a means equally suitable for use with both hot water type systems and hot air type systems despite the obvious and important advantages of such means.

By virtue of the present invention, panels for radiant heating systems which are usable interchangeably with hot air type and hot water type heating means, are available for the first time. Channels and panels of this invention are of simple construction and consist of a minimum number of different parts and, in contradistinction to the means presently employed, are readily assembled and installed and disassembled, and have a substantially greater heating efficiency than conventional means which require cement or plaster radiating surfaces instead of metal radiating surfaces.

Those skilled in the art will gain a further understanding of the present invention by referring to the drawings accompanying and forming a part of this specification, in which

Figure 1 is a perspective fragmentary view of a hot air radiant heating system comprising panels of this invention;

Figure 2 is an end elevational view of a hot water or steam radiant heating system including panels of this invention comprising the ceiling of a room;

Figure 3 is a perspective fragmentary view of one type of channel of this invention;

Figure 4 is an end elevational view of a section of a panel composed of channels of the Fig. 3 type secured to a supporting structure;

Figure 5 is a perspective fragmentary view of another type of channel of this invention;

Figure 6 is a sectional view of a panel composed of channels of the Fig. 5 type and a hot water or steam pipe;

Figure 7 is a perspective fragmentary view of still another type of channel of this invention;

Figure 8 is a view in section of a panel comprising channels of the Fig. 7 type and a hot water or steam pipe;

Figure 9 is a perspective fragmentary view of still another type of channel of this invention; and

Figure 10 is a sectional view of a panel composed of channels of the type shown in Fig. 9 and a steam or hot water pipe.

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

Generally, the illustrated panels L comprise a plurality of rows of channels P in which adjacent channels are disposed substantially side by side to define a substantially continuous plane surface,

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means M for securing the rows together to define a passage for fluid, and means S for securing the panels to a supporting structure such as ceiling joists.

There are a variety of forms of channels P, as illustrated, but each of these channels comprises an elongated metal sheet having a body portion and opposed side portions shaped to engage complementary sides of adjacent channels. The panel of Fig. 3 has an elongated body portion 12, an edge portion 13 which defines a side of the channel and an edge portion 14 which defines another side of the channel opposed to the first mentioned side. The edge portion 13 is shaped to define a flange 15 disposed substantially parallel to said body portion. The flange 15 is provided with a plurality of substantially aligned apertures 16 and is substantially co-extensive with the edge 13. The edge 13 in the section between the body and flange 15 is further provided with a plurality of slots 17 which are substantially aligned along the length of said section. The edge portion 14 is provided with a plurality of tongues 18 to be received in slots 17 of an adjacent channel of similar construction.

The channel of Fig. 5 is generally similar to that of Fig. 3, having an elongated body portion 20 and edge portions 21 and 22 defining opposed sides of the channel. The edge 21 defines a flange 25 disposed substantially parallel to the body 20, and defines a recess 26 extending substantially the full length of edge 21. The flange 25 is provided with a plurality of substantially aligned apertures 28 and is substantially coextensive with edge 21. The edge 21 is shaped to define a recess 26 of substantially V-shape in cross-section in the portion of the side between the flange 25 and the body 20. The edge 22 defines a projecting portion 29 to be received and closely fitted in a recess 26 of an adjacent channel of similar construction.

The channel of Fig. 7 likewise has a body portion 30 and edge portions 31 and 32 defining opposed sides of the channel. The edge 31 defines a flange 35 disposed substantially parallel to the body 30, and provided with a plurality of substantially aligned apertures 36. The edge 31 is shaped to define a recess 37 of substantially U-shape in cross-section in the portion between the flange 35 and the body 30. The edge 32 defines a projecting portion 38 to be received and closely fitted in a recess 37 of an adjacent channel of similar construction.

The channel of Fig. 9 resembles those described above, having an elongated body 40, and edge portions 41 and 42 which define opposed sides of the channel. The edge 41 defines a flange 45 which is disposed substantially parallel to the body 40 and is provided with a plurality of substantially aligned apertures 46. The edge 42 comprises a portion adjacent to, and disposed at substantially right angles to, body 40, and a portion directed at said body and defining a V-shaped element in cross section. The edge por-

tion 41 is appropriately shaped to receive an edge 42 of a similar channel in close fitting engagement, as described.

Some of the channels may be provided with apertures 54 in their body portions to receive means S. As shown in Figs. 3, 5, 7 and 9 these apertures are preferably substantially aligned along the length of the body.

One form of panel L of this invention comprises a row of channels B disposed substantially side by side with the projecting portion of one channel disposed in engagement with the adjacent channel in the recess of said channel. Panels of this form may cooperate with a surface, such as a portion of a wall or ceiling of a room, to define adjacent fluid passageways open at the ends, as shown in Fig. 4. Attachment of such panels to said wall or ceiling may be made by screws or studs S extending through apertures in the flanges of the channels.

Another form of panel L comprises two opposed rows of channels P in which adjacent channels are disposed side by side to define a substantially continuous surface. The flanges of opposing channels are disposed with openings in register and are secured together, as shown in Figs. 2, 6, 8 and 10 by means of bolts 50 and nuts 51 engaged therewith, comprising means M. In this form a plurality of adjacent passageways 53 communicating with each other are defined.

Heat may generally be delivered to panels L by means of a hot air header connecting the passageways of the panels with a furnace, or by means of a steam or hot water pipe 52. As shown in Figs. 2, 6, 8 and 10, these pipes are disposed between upper and lower courses of panels, being gripped between opposed flanges and held in position relative to the panels. Each of these pipes defines in plan view, as shown in Fig. 9, a series of relatively closely spaced, elongated and jointed U-sections. The U-sections are disposed across a plurality of passageways of the panels and extend at substantially right angles to sides of the channels comprising said panels.

In assembling panels of this invention, the channels are disposed substantially side by side in a row with the projecting side portion of one channel disposed in close fitting engagement with the adjacent channel being received in the recess of the side of that channel. If the panel is to include a steam or hot water pipe, after the manner shown in Fig. 2, such pipe is disposed between the opposed flanges 15 of two rows of channels. The rows of channels are secured together in this arrangement by means M comprising bolts 50 disposed through registered apertures in the opposing flanges and nuts 51 threadwise engaged with said bolts. The panel may be secured to a wall, joist, truss or the like, by means S comprising studs, as illustrated in Fig. 2, the studs extending through apertures 54 and engaging said wall or other supporting structure.

In assembling the panel shown in Fig. 1, two rows of channels comprising channels arranged in edge to edge engagement as described are disposed as an upper and a lower course and are disposed at right angles to each other. That is, the flanges of one course extend in a direction at right angles to the flanges of the other course. These rows are secured together by means M disposed through registered apertures in opposed flange portions of the upper and lower courses, and are secured to a supporting structure by studs S, as above described.

Panels of the type illustrated in Fig. 10 may

be made by assembling pairs of the Fig. 9 type in rows in which adjacent channels are disposed in close fitting engagement, the projecting side portion 42 of one channel being received in the recessed side portion 41 of the adjacent channel. A row including the channels having apertures 54 to receive studs S is disposed against the supporting wall or ceiling surface and the studs S are inserted into those apertures and into engagement with said wall or ceiling. A second row of channels, in which a strip 70 is welded to the edge of each side 41 below the flange 45, is then secured to the supported row by means M and a hot water or steam pipe 60 is gripped between the two rows, as shown.

A radiant heating assembly may include a plurality of panels L disposed in edge to edge contact to define elongated adjacent passageways for fluid and to define a surface constituting a floor or ceiling of a room. In the event that the heating fluid is steam or hot water and pipes are employed to convey it to the radiating surfaces of the panels, the ends of the passageways of the panels of the assembly may suitably be blocked to prevent flow of air into or out of these passageways. If the system involves the use of hot air as a heating means for the radiating surface of the assembly, suitable ducts for delivering air into the passageway within the assembly and for removing air from these passageways ought to be provided. In the latter case, all the ends of the passageways not communicating with the source of hot air through such ducts are preferably blocked to prevent the flow of air into or out of the passageways.

Having thus described the present invention so that others may be able to understand and practice the same, I state that what I desire to secure by Letters Patent is defined in what is claimed.

I claim:

1. A radiant heating panel comprising a plurality of elongated channels defining an upper course in which adjacent channels are disposed substantially side by side, additional elongated channels defining a lower course in which adjacent channels are disposed substantially side by side, the channels of said courses facing each other and extending at substantially right angles to each other to define a plurality of intersecting passageways for fluid within the panel, said panel having openings to conduct fluid into and from said passageways, and means securing the upper and lower courses together, said channels each comprising a metal sheet having a body portion, an edge portion constituting a side of the channel and defining a flange having transverse apertures, and another edge portion constituting the other side of the channel and defining a projecting portion in interlocking engagement with a flanged portion of an adjacent channel, and said course-securing means being disposed in registered apertures of opposed upper and lower flanges and engaging said flanges.

2. A radiant heating assembly comprising a pipe for conveying a heating fluid and a panel including a plurality of channels defining an upper course in which adjacent channels are disposed substantially side by side, additional elongated channels defining a lower course in which adjacent channels are disposed substantially side by side, said upper and lower courses facing each other and cooperating to define a plurality of adjacent elongated passageways for fluid, and

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means securing the upper and lower course rows together with said pipe therebetween and extending across each passageway, said channels each comprising a metal sheet having a body portion, an edge portion constituting a side of the channel and defining a flange having transverse apertures and having a plurality of spaced slots, and another edge portion constituting the other side of the channel and defining a plurality of spaced course securing means being disposed in registered apertures of opposing flanges.

3. A radiant heating assembly comprising a pipe for conveying a heating fluid and a panel including a plurality of channels arranged to define a plurality of edge to edge rows in each of which adjacent channels are disposed substantially side by side, half of said rows comprising an upper course and defining with lower course rows a plurality of adjacent elongated passageways for fluid, and means securing the upper and lower course rows together with said pipe therebetween and extending across each passageway, said channels each comprising a metal sheet having a body portion, and edge portion constituting a side of the channel and defining a flange having transverse apertures and a recess of substantially V-shape in transverse cross-section, and another edge portion constituting the other side of the channel and defining a projecting portion disposed in the V-shaped recess of an adjacent channel, and said course securing means being disposed in registered apertures of opposing flanges.

4. A radiant heating assembly comprising a pipe for conveying a heating fluid and a panel including a plurality of channels arranged to define a plurality of edge to edge rows in each of which adjacent channels are disposed substantially side by side, half of said rows comprising an upper course and defining with lower course rows a plurality of adjacent elongated passageways for fluid, and means securing the upper and lower course rows together with said pipe therebetween and extending across each passageway, said channels each comprising a metal sheet having a body portion, an edge portion constituting a side of the channel and defining a flange having transverse apertures and a narrow substantially U-shaped recess extending substantially the full length of said side, and another edge portion constituting the other side of the channel and defining a projecting portion disposed in the U-shaped recess of an adjacent channel, and said course securing means being disposed in registered apertures of opposing flanges.

5. A radiant heating panel comprising a plurality of elongated channels defining an upper course in which adjacent channels are disposed substantially side by side, additional elongated channels defining a lower course in which adjacent channels are disposed substantially side by side, said upper and lower courses facing each other and cooperating to define a plurality of adjacent elongated passageways for fluid, said panel having openings to conduct fluid into and out of said passageways, and means securing the upper and lower courses together, said channels each comprising a metal sheet having a body portion, an edge portion constituting a side of the channel and defining a flange having transverse apertures, and another edge portion constituting the other side of the channel and defining a projecting portion in interlocking engagement with a flanged portion of an adjacent channel, and said course-securing means being

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disposed in registered apertures of opposed upper and lower flanges and engaging said flanges.

6. A radiant heating panel comprising a plurality of elongated channels arranged to define a plurality of edge to edge rows in each of which adjacent channels are disposed substantially side by side, half of said rows comprising an upper course defining with lower course rows a plurality of spaces for flow of heating fluid within the panel, each of said channels consisting of a sheet metal body having its opposite sides bent upwardly to form complementary edge portions, one of said edge portions being wider and extending farther from the body portion than the other edge portion and having a flange approximately parallel to said body, the edge portions of the channels in one course being assembled with interlocking engagement with complementary edge portions of adjacent channels in the same course, and the channels of one course being spaced apart from those of the other course and thereby forming passages connecting adjacent channels, and means connecting together the opposed flanges of channels in the two courses.

7. A radiant heating assembly comprising a pipe for conveying a heating fluid and a panel comprising a plurality of elongated channels arranged to define a plurality of edge to edge rows in each of which adjacent channels are disposed substantially side by side, half of said rows comprising an upper course defining with lower course rows a plurality of spaces for flow of heating fluid within the panel, each of said channels consisting of a sheet metal body having its opposite sides bent upwardly to form complementary edge portions, one of said edge portions being wider and extending farther from the body portion than the other edge portion and having a flange approximately parallel to said body, the edge portions of the channels in one course being assembled with interlocking engagement with complementary edge portions of adjacent channels in the same course, and the channels of one course being spaced apart from those of the other course and thereby forming passages connecting adjacent channels, and means connecting together the opposed flanges of channels in the two courses with said pipe therebetween and extending across each of the said spaces.

WOLFGANG W. KRAUSS.

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