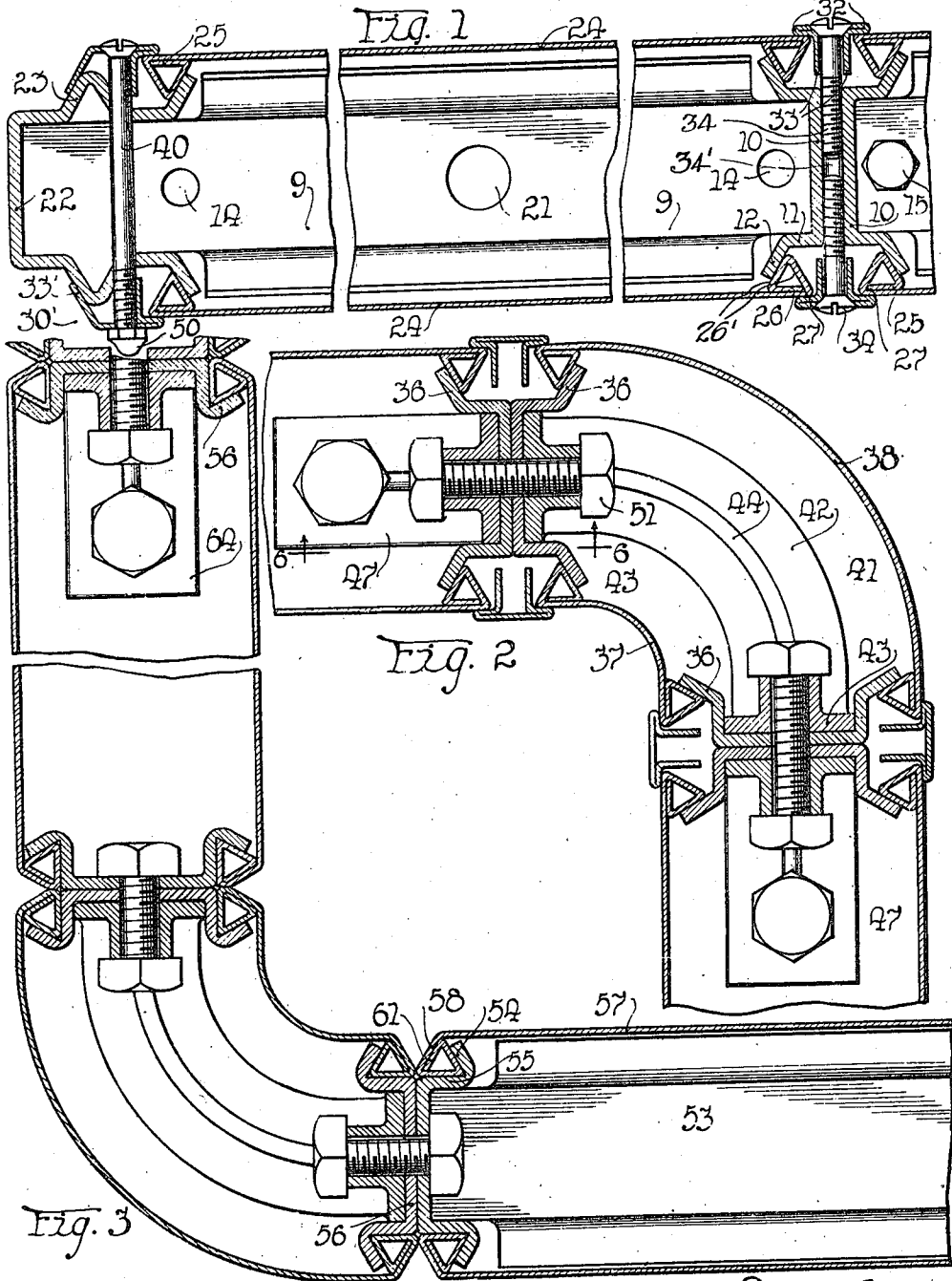


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SHEET METAL CONSTRUCTION.
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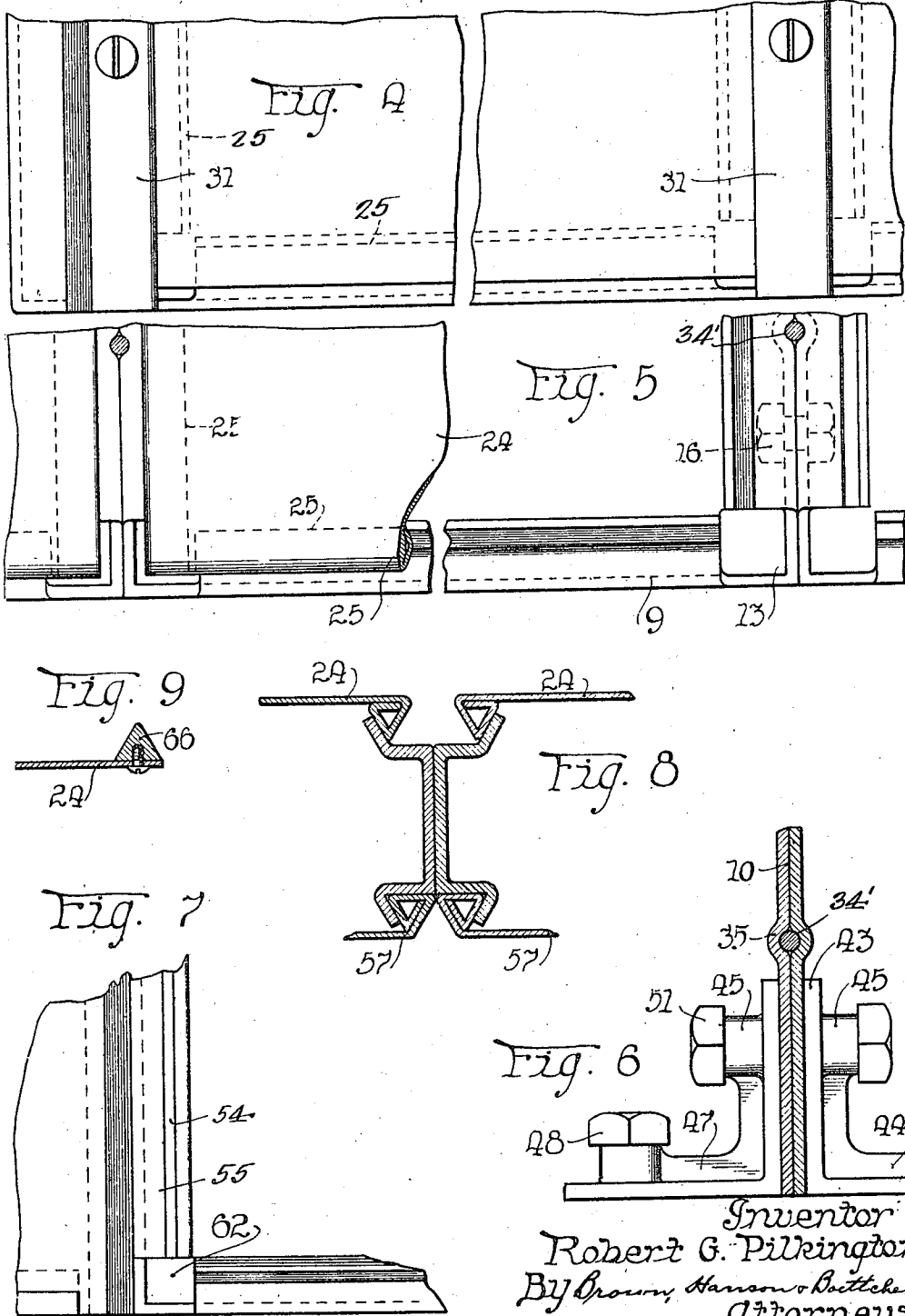
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2 SHEETS—SHEET 1.

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SHEET-METAL CONSTRUCTION.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ROBERT G. PILKINGTON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Sheet-Metal Construction, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

The present invention relates to sheet metal construction. My invention provides a "system" of sheet metal construction characterized by facility and rapidity of erection and dismantling. The construction is of the sectional panel type and the various parts thereof are standardized and interchangeable. The system comprises formed sheet metal panels and cooperating supporting members which can be quickly and easily assembled and dismantled.

More particularly the invention comprises the mode of attaching these panels to the supporting members and the particular construction and arrangement of the supporting members to the end of rapid and easy assemblage and disassemblage. A further, but highly important feature, is the manner of forming the attaching beads so that the same is internally braced.

My improved system of sheet metal construction has a wide range of utility. I contemplate its employment for the construction of portable houses, emergency or permanent buildings, walls, partitions, booths, collapsible containers, vehicle bodies, signs, etc. A structure built by my improved system of sheet metal construction has all the advantages of lightness, strength, portability, facile erection and dismantling, smooth attractive finish, and in addition is substantially fire and sound proof. These characteristics will convey some idea of the broad field of utility of my improved system.

A preferred adaptation of my improved system is to the construction of portable houses, emergency buildings, walls and partitions. I have illustrated in the appended drawings and described in the following specification, one particular adaptation of my improved system of sheet metal construction as applied to the erection of building walls or the like.

Walls or partitions can be erected by my system in permanent buildings constructed

of the usual standard materials, or a complete house or building can be fabricated from the standardized parts of the system. The walls can be increased along any dimension by the mere addition of panel sections and supporting members. The labor and tools required in the erection of any part of my system are a minimum. A screw driver is the only tool necessary to apply one particular form of panel to the supporting members. No tools whatever are required for applying a modified type, which is merely pushed or snapped into place in the supporting members. The latter type of panel is peculiarly adapted to houses or buildings containing explosives, as it will disengage from the supporting structure and relieve the same in the event of an explosion within the building, but is practically irremovable from the outside of the building.

The different members of the supporting structure are constructed and arranged to facilitate the installation of electrical conduit in the wall. The rigidity of the assembled wall is assured by interconnecting the supporting members.

In the drawings—

Figure 1 is a sectional view of a portion of a wall erected according to my system of sheet metal construction.

Fig. 2 is a similar view showing a corner of a wall.

Fig. 3 is a sectional view of a wall employing the interlocking panel.

Fig. 4 is a fragmentary elevational view of the wall shown in Fig. 1.

Fig. 5 is a fragmentary elevational view illustrating the frames erected and the panels of Fig. 1 applied thereto.

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 2.

Fig. 7 is a fragmentary elevational view of the interlocking panel and frame construction illustrated in Fig. 3.

Fig. 8 is a fragmentary sectional view of a modified form of supporting structure adapted to receive both types of panel, and

Fig. 9 is a detail section illustrating the bead as being screwed to the panel.

Referring to Figs. 1 and 5, a supporting structure is first erected, consisting of a plurality of open rectangular frames designated 9. Each frame is made of channels or channel members and each comprises the web 10 and the straight and oblique flanges 11 and 12. The flanges 11 and 12 project inwardly and laterally from the web por-

tion around the entire perimeter of the frame.

I preferably construct each channel of four frame bars formed out of flat bars, by pressing their margins to form the flanges 11 and 12. The frame bars are connected by welding their ends together at the four corners of the frame. At the corners of the frame the flanges are cut away from the web as shown at 13 in Fig. 5.

A plurality of spaced holes 14 are punched through the web 10 on all sides of the frame 9. At top and bottom of the frame, bolts or screws 15 pass through these holes into the building structure, which may consist of the flooring and ceiling or the sills and joists, as the case may be. In frame units of a standardized size these holes will have a definite location and spacing. Thus the holes in the sides of adjoining frames will align, enabling the several frames to be all interconnected by bolts passing through the side webs, as shown in dotted lines in Fig. 5. The frames may be superposed one upon the other, or the wall may be expanded in any direction by merely bolting the adjoining frames together.

The web 10 is provided with a central opening 21, at the top, bottom and on each side of the frame, adapted for the installation of electrical conduit or cable. The openings 21 of the several frames will always register and through these the conduit can be strung to any desired part of the wall.

As shown in Fig. 1, where the wall terminates or two walls intersect, a special frame is employed, one side of which has a relatively deep channel designated 22. Each side of this panel is ribbed as shown at 23 for a purpose which I shall hereinafter describe.

The channel 22 may be provided as an independent unit, adapted to be bolted to the floor, ceiling or adjacent wall, as I shall hereinafter describe.

After the frames have been erected, and have been bolted to their supports and to each other and the conduit strung, the panel sections 24 are applied. As illustrated in section in Fig. 1, these panels are composed of thin sheet metal and have beads 25 either integrally formed along each edge, or applied as a separate bead 66, as shown in Fig. 9. These beads are preferably, though not essentially, triangular in section, their ends being preferably arranged at substantially 60° to each other. In forming them I preferably fold the edge 26 of the metal sheet to provide a plurality of facets 26', folding the exposed edge facet into the interior of the bead so that it lies along the inner surface of the panel and has its extreme or free edge wedged into the corner 27. The compression strength is greatly increased in this triangular formation by the internal

bracing of the edge or marginal portion, and the bead is more staunch against crushing and deforming than would be a circular bead of corresponding size.

While other forms of beads on the sheet 24 would cooperate with other features of my invention, I have shown the beads as being triangular in section, as this section best illustrates my invention.

At the corners of the panels 24 the vertical beads 25 extend down to the edge of the panel and the horizontal beads 25 are cut off adjacent the vertical beads, all as shown in Figs. 4 and 5.

The panels are applied with the triangular beads 25 engaging with the oblique flanges 12, the engagement being applied to one edge of the panel or to all edges thereof. A pressed metal strip 31 is thereafter inserted between the edges of adjoining panels. This strip comprises the lateral flanges 32 and the parallel spaced flanges 33. A plurality of openings 34', equidistantly placed along the web of the strip, are provided for the insertion of the screws 34 which tap into threaded openings 34' between abutting panel sections.

These openings are formed by indenting the web 10, as shown at 35 in Fig. 6. The indentations of adjoining frames match and after the frames are bolted together the hole thus formed is tapped for the reception of the screw 34. These threaded sockets are spaced in accordance with the spacing of the screw holes in the strip 30.

By tightening up the screws 34 the triangular beads 25 are cammed in along the oblique flanges 12, thus drawing the panel section taut from both side edges. A modified strip 30¹ is provided for cooperation with the rib 23 along the side of the end frame. An oblique flange 33¹ (Fig. 1) bears upon the inclined face of the rib. A screw bolt 40 passes completely through both strips 30¹ and threads into a cap nut 50.

I preferably round the corners of adjoining walls as shown in Fig. 2. Here I erect a supporting frame structure 36 composed of the independent studding channels placed back to back and either spot welded or bolted together, and upon which I mount the curved panel sections 37 and 38. These parts are all carefully standardized, similarly to the frames 9 and panels 24. The studding channels of the frame 36 are of the same general cross section as are the members of the frame 9.

The corner panels, which receive the curved panels 37 and 38, are interconnected at their ends by curved brackets 41, secured to the floor and ceiling. These brackets comprise the arcuate web 42 and the two vertical extensions 43, bearing against the channels of the studding members 36. The brackets are reinforced by ribs 44 and have apertured bosses 45 (Fig. 6) adapted to reg-

ister with the lowermost holes 14 in the webs of the frame members. Angle brackets 47, having similar ribs and bosses, are disposed in back of each frame member. The angle
 5 brackets are bolted to the building structure by the bolts 48, and are clamped to the frame members and the corner brackets 41 by transverse bolts 51. The application of the curved panels 37 and 38 to the frame
 10 members 36 will be apparent from the foregoing description.

In lieu of the frames 9, the supporting frame structure 36 may be composed entirely or partly of the studding channels and angle brackets 47. I have illustrated
 15 this in Fig. 3, in connection with the modified form of panel bead which I shall now describe.

Referring to Figs. 3 and 7, the frames 53
 20 designed for receiving the interlocking type of panel bead, are substantially the same as the preceding frames 9, with the exception that the inclined flanges 54 are folded back toward the straight flanges 55 to form an
 25 acute angle between the flanges. Both types of frames can be formed from the same sized blanks. The flanges of the independent studding channels 56 are also given this acute formation.

The modified panel 57 has its triangular
 30 beads 58 formed so that a corner of the triangle can be snapped into the acute recess between the flanges 54 and 55. The natural resiliency of the sheet metal panel enables
 35 it to be snapped over the inclined flanges 54 by giving the edges of the panel a quick, sharp push. The edge 61 of the sheet metal is turned into the interior of the bead and is wedged in the corner thereof, similarly to
 40 the bead 25.

The flanges 54 and 55 are cut away at the corners of the frame as is shown at 62 in Fig. 7. The corners of the panels 57 are
 45 formed as were the corners of the panels 24.

This form of panel has the advantage of requiring no screws, strips or tools in its application. It is particularly adapted for the outer siding of a wall. Its removal can
 50 be effected only by pushing outward from within the supporting structure, unless provision therefor has been made in the nature of holes or lugs in the panel body intended for the application of a suitable tool.

I find it advantageous in the erection of
 55 exterior walls to use supporting members such as are illustrated in Fig. 8 and to apply the panels 24 to the inner side of the structure and the panels 57 to the outer side. The advantages of both types of panels are thus
 60 obtained.

As shown in Fig. 3, I propose erecting a supporting frame structure composed of studding channels similar to those used in erecting the frames 36 or 56 and angle
 65 brackets 64. The pairs of studding channels

are placed back to back and are spot welded or bolted together. The pair of channels forms a composite supporting member which is secured at each end to the building structure by either one or two angle brackets 64.
 70 With this arrangement the upper and lower beads of the panel would engage with a channel roughly similar to the channel 23 of Fig. 1, which would be bolted or otherwise secured to the floor and ceiling. The chan-
 75 nel 22 would of course have either oblique or acute flanges in conformity with the studding channels. This construction has greater flexibility of arrangement and disposal than is possible with the frames 9 and 53. Dif-
 80 ferent sized panels may be utilized, and moreover the wall may be distorted to clear obstructions.

Obviously, windows and doors may be embodied in the panel sections.

The completed wall presents a neat, finished appearance and is fireproof, substantially soundproof, and can be easily cleaned.

It will be apparent that my improved construction is capable of extensive modification and re-arrangement, but I intend that all such deviations be construed as coming within the spirit and scope of the appended claims:

1. In combination, a frame member having an inclined bearing surface, a panel adapted to be fastened to said frame member and a bead on said panel having an inclined engaging surface for coöperating with said bearing surface to hold the panel against edgewise movement in the plane of the frame member, said bead being internally
 95 100 braced against distortion by compression.

2. In combination, a frame member having an inclined bearing surface, a panel adapted to be fastened to said frame member, a bead on said panel having an inclined engaging surface to contact with said bearing surface, said bead being internally braced against distortion by compression, and means carried by the frame member and engaging the plate for forcibly engaging said inclined surfaces.

3. In combination, a plurality of frame members having oppositely inclined bearing surfaces, a plurality of independent sectional panels adapted to be mounted on said frame members, marginal tubular internally braced beads on said panels having inclined engaging surfaces, and means for forcibly engaging said inclined surfaces for tensioning the panels.

4. In the improvement herein described, a wall panel having a hollow bead formed on the margin of said panel, said bead being internally braced against distortion by compression by an integral part of the panel lying within the bead.

5. In the improvement herein described, a wall panel having a bead formed inte- 130

grally with and on the margin of said panel, said bead being substantially triangular in cross section and braced internally against distortion by compression by an integral part of the panel lying within the bead.

6. The improvements herein described, including a sheet having a bead formed integrally with the plate, said bead comprising a plurality of facets, the extreme marginal or first facet lying against the sheet, the free edge of said first facet abutting within the angle between the sheet and next adjacent facet to brace said bead internally.

7. The herein described plate for use in building construction, having a triangular bead formed integrally with the edge of the plate, said bead being formed by three successive creases of the plate into substantially 60 degree angles, the extreme edge of the plate being in contact with the inner side of the plate along the third angle to form an internal brace.

8. The herein described plate for use in wall construction having a triangular sheet-metal bead upon the edge thereof, said bead being internally braced against distortion by compression.

9. In combination, a plate for use in building construction having a hollow internally braced triangular bead upon the edge thereof, a frame member having an angular bearing surface and means connected to said frame member for applying pressure to said bead to bring one side of said bead into engagement with said bearing surface.

10. In the improvement herein described, a frame member on which wall panels may be mounted comprising a central web and flanges, said flanges each comprising an intermediate portion lying at substantially right angles to the web and a marginal inclined portion extending outwardly from the intermediate portion, the space above the intermediate portion and between the inclined portions of the frame member being free and unobstructed, and means between said inclined portions adapted to engage the edges of the panels to tension said panels.

11. In the improvement herein described, a pair of compression members, a pair of frame members fastened to said compression members to form a frame on which wall panels may be mounted, said frame members each comprising a web portion and a marginal inwardly inclined portion, and means on said frame members adapted to engage the edges of said wall panels to tension the wall panels.

12. The improvements herein described, including a frame member comprising a

channel said channel having a central web and a marginal flange inclined outwardly to the central web and a plate having an angular hollow triangular marginal bead engaging the inclined marginal flange of the channel, and means for pressing and holding the angular marginal bead against the inclined marginal flange and thereby holding the plate under tension.

13. In the improved building construction herein described, a frame structure having bearing surfaces, a pair of panels comprising plates having triangular internally braced marginal beads, a cover strip lying over the beads and means mounted on the frame for pressing down and holding the beads against the bearing surfaces of the frame, thereby placing the panels under tension.

14. In combination, a framework provided with inclined bearing surfaces, a plurality of independent sectional sheet metal panels mounted on said framework and means associated with said framework for engaging the marginal edges of the panels and drawing said edges along said inclined bearing surfaces to tension the panels.

15. In combination, a framework provided with inclined bearing surfaces, a plurality of independent sectional sheet metal panels with inclined engaging surfaces, and means cooperating with the framework and engaging the panels whereby the panels are held under tension by forcing said inclined engaging surfaces along said inclined bearing surfaces.

16. In combination, a frame work provided with inclined bearing surfaces, sheet metal panels provided with inclined engaging surfaces, and means on said frame work whereby the panels are tensioned upon the inclined bearing surfaces of the frame work.

17. In combination, a frame work provided with inclined bearing surfaces, sheet metal panels mounted on said frame work and means associated with said frame work for drawing the marginal edges of the panels along said inclined bearing surfaces to tension the panels.

18. The improvements herein described, comprising a plate for use in building construction, a bead on the edge of the plate formed integrally with the plate, said bead formed by bending the edge of the plate back upon itself in the form of a triangle, the extreme edge of the plate abutting into an internal angle of the bead.

In witness whereof I hereunto subscribe my name this 1st day of March A. D. 1918.

ROBERT G. PILKINGTON.