

May 30, 1939.

M. R. PRICE
BUILDING CONSTRUCTION
Filed April 20, 1938

2,160,794

2 Sheets-Sheet 1

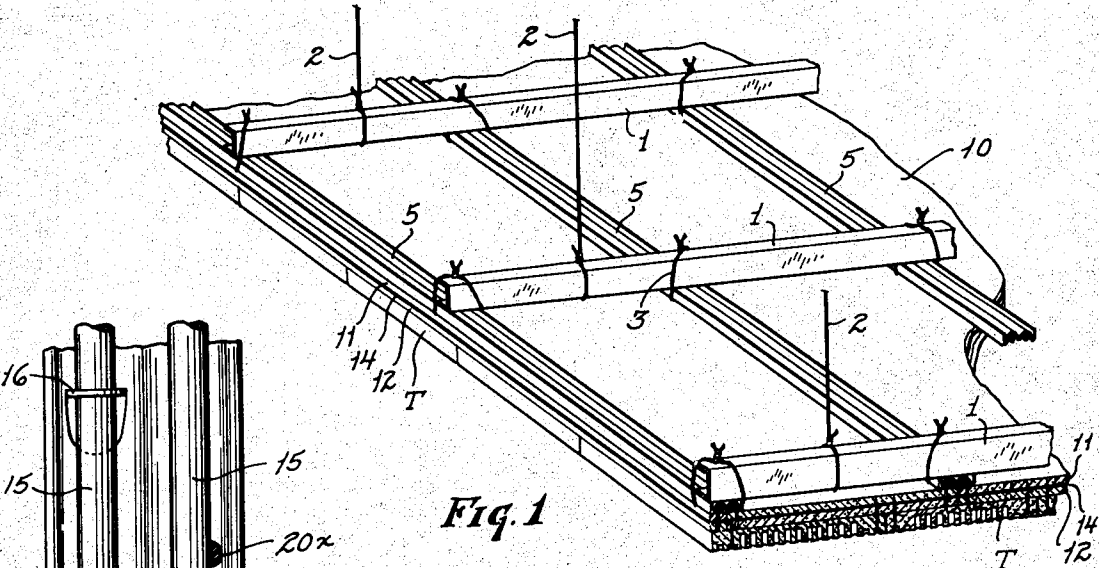


Fig. 1

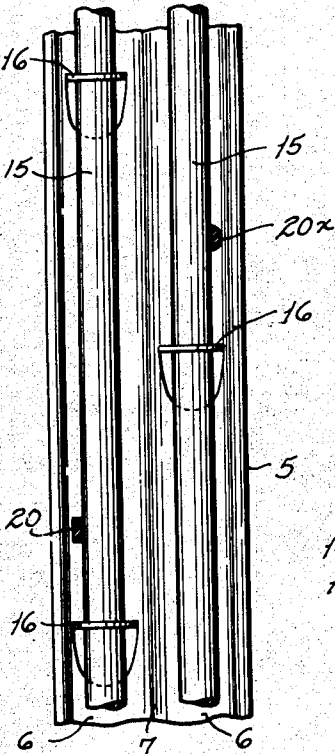


Fig. 2

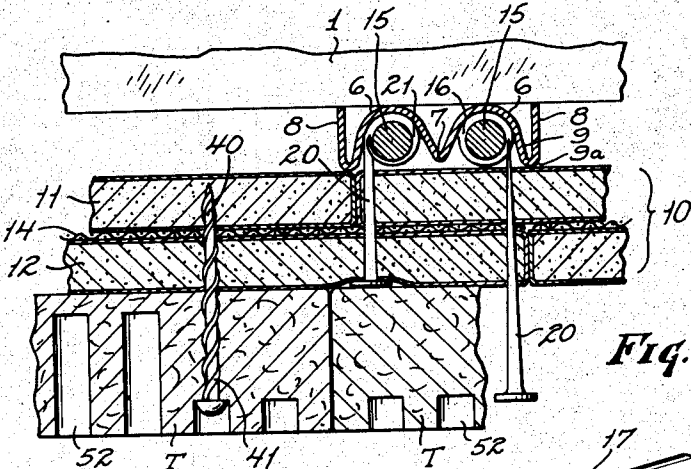


Fig. 3

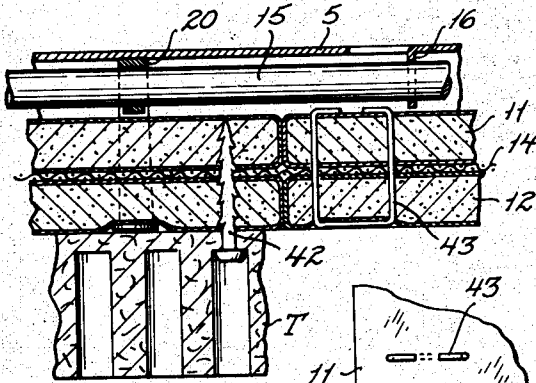


Fig. 6

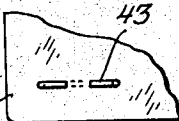


Fig. 9

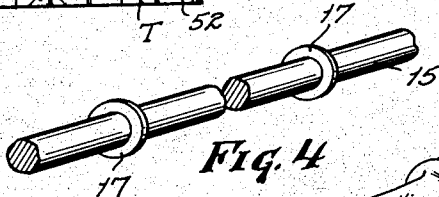


Fig. 4

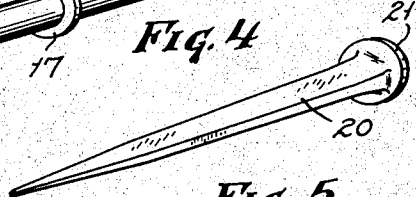


Fig. 5

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2 Sheets-Sheet 2

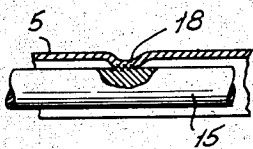


Fig. 7

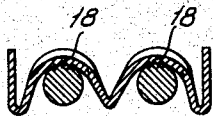


Fig. 8

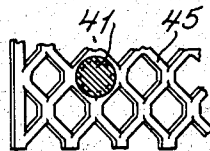


Fig. 10

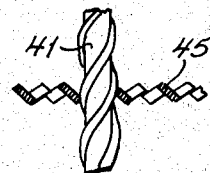


Fig. 11

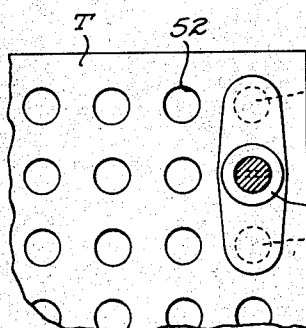


Fig. 12

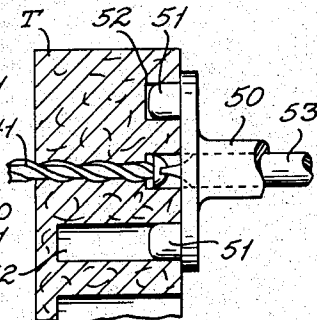


Fig. 13

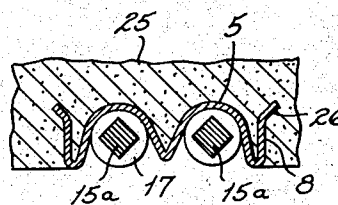


Fig. 14

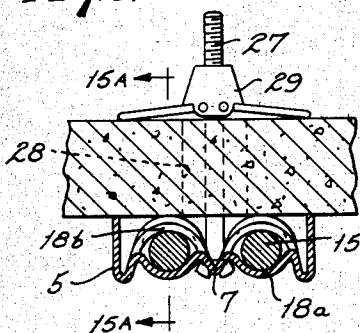


Fig. 15

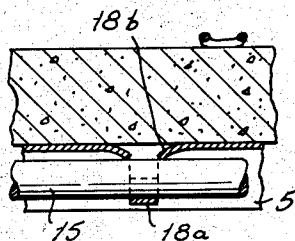


Fig. 15A

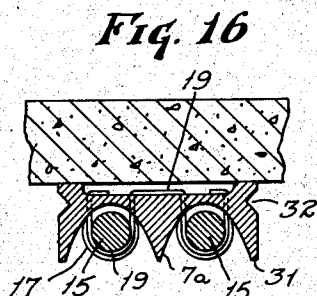


Fig. 16

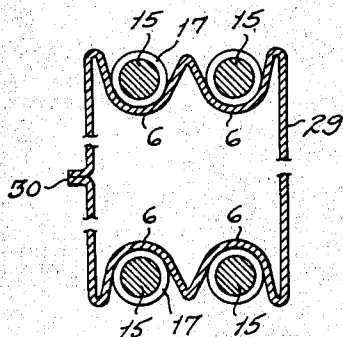


Fig. 17

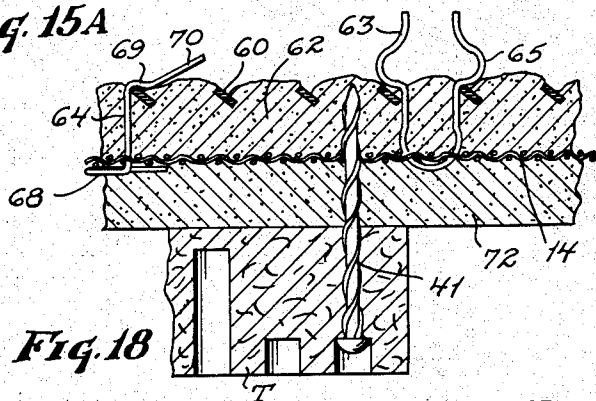


Fig. 18

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2,160,794

BUILDING CONSTRUCTION

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Application April 20, 1938, Serial No. 203,046

13 Claims. (Cl. 72-118)

This invention relates to an improvement in wall treatment; more particularly in methods and means for attaching decorative or acoustical or insulative treatment to walls of buildings. The term wall as herein used includes vertical, horizontal and variously inclined building wall parts.

An object is to provide a simple and effective attachment device for building wall covering members. More specific objects include the provision of an improved ground to which panelling, tile and the like can be secured quickly and stably by the use of nails.

Other objects and features of the invention will become apparent from the following description, relating to the accompanying drawings which show the preferred forms. The essential characteristics are summarized in the claims.

In the drawings, Fig. 1 is a fragmentary perspective view, showing a portion of a suspended ceiling with the treatment hereof in one form in place thereon; Fig. 2 is a fragmentary plan view of a portion of a ground strip embodying features of the invention; Fig. 3 is a relatively enlarged sectional view of a portion of the treatment, according to Fig. 1; Fig. 4 is a perspective detail view of an anchor rod in one form; Fig. 5 is a perspective view of the preferred form of nail usable to attach wall treatment to the ground strip; Fig. 6 is a fragmentary sectional view, as indicated by the line 6-6 on Fig. 3; Figs. 7 and 8, are respectively, longitudinal and transverse cross-sectional views of a modified ground strip; Fig. 9 is a fragmentary face view of a corner portion of a laminated panel, such as shown, for instance, in Figs. 3 and 6; Figs. 10 and 11 are detail views, showing a modified form of reticulated core for laminated sheet material; Figs. 12 and 13 are plan and sectional fragmentary views, respectively, of portions of an acoustical tile, and a tool-guiding device for use in attaching such tile to a building wall; Fig. 14 shows, in cross-section, a modification of the ground strip, adapted to be embedded in concrete, plaster, etc.; Fig. 15 is a view, similar to Fig. 14, showing the manner in which the ground strip can be anchored to tile or other masonry; Fig. 15a is a longitudinal sectional view through the ground strip, and nail clinch rod, as indicated on Fig. 15; Fig. 16 is a view similar to 14, showing a further modified form of ground strip and anchor rod thereof; Fig. 17 is an exemplary form of stud or beam, embodying the principles of the ground strip, and Fig. 18 is an assembly view, on the order of Fig. 3 showing a modified nail-

ing ground for attaching wall facing such as acoustical tile to walls.

A specific problem solved by the present invention, is in connection with the application of acoustical tile to suspended ceilings. The embodiments shown are designed principally for that use. Other uses will be obvious.

Referring to Fig. 1, this shows a suspended ceiling construction employing spaced horizontal bars 1 of channel section, suspended as from a roof on hanger irons or wires 2, as usual. Crossing the channels 1 and secured thereto, as by tie-wire loops 3, are spaced ground strips 5, more clearly shown in Figs. 2, 3 and 6. The ground strips, see Fig. 3, are preferably made as double channels, with substantially semi-cylindrical troughs 6, separated by an intermediate web 7, of generally V-shaped section. There may be any greater number of troughs, or only one. The extreme walls of the strip may be partly supported and stiffened by flanges 8, the free edges of which can extend substantially flush with the outer bottom surfaces of the trough portions of the strips (actually the top surfaces in the position shown), so that each ground strip contacts with each bar 1, at four places. The entrance surfaces, leading into the troughs, can be flared as at 9, merging with the side flanges at continuous rounded surfaces 9a at each side of the strip as firm supports for panelling or the like. It is important that the troughs be made with unrestricted entrances for maximum effective nail receiving area.

Insofar as the operation of the ground strip 5 is concerned, the panelling 10 can be of any construction which will permit nails or screws to be driven therethrough, e. g., plasterboard, plywood, insulation board, etc. For supporting acoustical tile or the like, however, the panelling is preferably superimposed sheets or slabs of plasterboard 11 and 12, with an intermediate core 14, preferably of wire fabric somewhat stronger and of finer mesh than fly screen. The novel features and functions of such panelling and core, hereinafter more fully described, are claimed in my application Serial No. 238,863, filed November 4, 1938, as a division and continuation of this application.

To attach the panelling, each trough 6 is provided with a rod 15, secured in substantially uniform relationship to the channel walls, and spaced a substantial distance from the plane of the surfaces 9a. Figs. 2 and 6 show the rods supported in aligned openings of up-struck ears

16 partially sheared from the metal stock and adapted to receive and snugly hold the rods. The supports in each row are sufficiently close together so that the rod will not be bent immediately of adjacent supports by the load to be carried.

The rods 15 are preferably of circular section but can be polygonal, say diamond shaped or rectangular, as shown at 15a in Fig. 14. If polygonal, the rods are set so that one corner is disposed directly toward the open face of the trough.

The rods may be secured in the channels or troughs in a variety of other ways, not necessarily rigidly. For instance, annular flange effects 17, see Fig. 4, can be formed on or attached to the rods, (as by upsetting, or separate "washers" strung on) which flange effects can readily be welded in place in the troughs. The troughs may be periodically embossed as at 18, Figs. 7 and 8, forming cradle-like supports for the rods, onto which the latter can be welded. The supports can also be punched out of the channel bottoms (as straps) so as to overhang the rods to retain and/or center them as suggested in Fig. 15 at 18a; in which event the rods could be left loose in the channels or welded, as to the straps, or, as suggested in Fig. 15a, bottom portions 18b of the channel at each side of the hole from which the strap effect 18a is punched can be bent toward the strap to support the rod thereagainst. The rods could be bound in place, as by staples or wire strands 19, see Fig. 16, passing through the holes in the base portions of the channels.

The spacing supports for the rods, such as 16, 17, 18, etc., of the two channels are offset from each other so that in applying the securing members in pairs opposite each other, one or the other of such pair will be certain to clinch as will now be described.

The preferred fastening members for the panelling are horse-shoe type nails 20, Fig. 5, with special heads 21, of sufficient width so that they will not be likely to puncture or pull through the panelling which may be of relatively friable nature. The nails are of flattened, rectangular cross-section, as shown in Fig. 5 (cf. 20 in Fig. 2), and with a very gradual taper to the point, for easy piercing of the panelling and for easy bending of the points by the channels and/or rod 15 or 15a. The thin point enables relatively thin stock to be used for the channels without danger of puncturing their walls. The nails do not have to be flat on both sides, although this I believe is the most satisfactory shape. They can be D-shaped as shown at 20x, Fig. 2. The essential characteristic is thinness in one direction only, whereby the nails upon encountering the deflecting surfaces of the ground strip, will not be bent in a direction longitudinally of the strip.

At the right in Fig. 3, the nail 20 is shown with its point entering a trough at one side of a rod 15, and at the left the nail 20 is shown in clinched position, having encountered the curved wall of the trough for deflection thereby around the rod 15 as at 21. Such clinching is effected irrespective of the region in which the nail encounters the ground strip (providing this is between the two edges 9a) and practically irrespective of the angle at which driven through the panelling. In being clinched, the point of the nail continues to hug the peripheral surface of the rod, so that a very firm anchorage is effected between the panelling and ground

strip, when the nail is completely seated. The nail should be of such proportions and length that when fully seated, it fills the space radially between the rods and channel bottoms (see Fig. 6), so that the secured panelling cannot sag or rattle. The dividing ribs 7 terminate in a plane below (inwardly from) the surfaces 9a of the outer walls of the strip, so that if a nail point encounters the top of the rib 7, it will have a short portion projecting free from the panelling, and be more certain to be deflected one way or the other, and finally curled around a rod. The rods are spaced from the panelling for the same reason.

If the ground strip is made of sheet-metal, this should be hard enough to prevent penetration by the nail point, but can be of any thickness. 16-gauge cold rolled stock is a satisfactory material, as to stiffness and hardness for use as ceiling treatment support, as suggested in Fig. 1.

The spacing of the ground strips on the skeleton structure, such as 1, is determined partly in accordance with panel widths, so that joints occur approximately over the dividing members 7 of the strips 5 as suggested in Fig. 3, enabling both margins of such adjacent panels to be firmly supported. The nailing can be done from opposite angles toward the ground strip centers in a manner to draw the adjacent edges of the panels, together without affecting the clinching operation described.

Referring to the modified ground strip shown in Fig. 14 this illustrates that the strip can be embedded flush with the face of concrete, plaster or the like, indicated at 25. To hold the strip in place, the flanges 8 may be extended as at 26, and with one or more bends, or with the protuberances or through holes to provide the necessary keying of the material 25 thereto. In use on brick or tile (see Fig. 15) the ribs 7 may have through openings therein to receive shanks such as 27 of anchoring devices, which may carry expanding members, such for example, as the toggle head 29 illustrated. To receive such anchor, holes are made in the wall material, e. g., tile shell, or mortar, as at 28, and the anchors finally expanded in or beyond such holes.

Fig. 16 illustrates the ground strip made as a rolled or extruded section as of metal. In such case, the rib 7A can have a relatively sharp edge flush with the outer wall portion 31. Locking indentations 32 are shown on the sides for embedding into plaster, etc., in the manner suggested in Fig. 14.

Fig. 17 illustrates the embodiment of the essential principles of the ground strip into a hollow stud. As shown, the stud is made from a single piece of sheet-metal 29, with oppositely disposed trough effects 6, and rods 15, so that panelling can be anchored to both sides of the stud, as in erecting partitions. The seam at 30 can be closed, as by welding, or the formation of an interlocking bead, if desired, or the two edges can simply abut each other.

Referring further to the panelling construction, this for supporting acoustical tile, such as shown partially at T, preferably is made with $\frac{3}{8}$ " standard plasterboard or lath, so that paper of the usual envelope for the plaster core comes between adjacent plaster sheets and assists in providing an anchorage for fastening elements, such as nails or screws. Preferably the sheets 11 and 12 of the panelling slabs are laminated in relatively offset relationship to provide ship-lap joint effects where two slabs abut, as shown, 75

for instance, in Fig. 3. Such ship-lap effect would be present at the ends and sides of each slab and assist in erection of slabs as well known in ship-lap constructions; but at the joints which lie along the ground strips a specific advantage is had in that each fastener (e. g., 20, in one or more rows) will pass through marginal portions of both adjacent slabs if driven anywhere across the overlapped portions. Fig. 3 illustrates how wide apart the fasteners 20 may be placed and be effective in penetrating both slabs and interlocking with the ground strip. The core material 14 may pass across only one of the two projections forming the ship-lap edge, and be bound thereto if desired as by stapling; or the core material can extend entirely around the projecting edge of the sheet and be stapled or otherwise held in such fold. Thus, the panelling has uniform core 14 (e. g., one thickness of it) throughout the entire area of the panelling.

The principal nail-hold or screw-hold is afforded by the core 14. The fastening member shown in Fig. 3 is a helically fluted nail (drive-screw) which may be driven with a hammer. Such nails, when driven through the core 14 and into the inner plaster board or lath layer 11, approximately 12" apart, are more than adequate to support the heaviest acoustical tile in use at the present time. Ordinary screws will, of course, hold even better. Barbed nails, such as illustrated at 42 in Fig. 6, can also be used; the barbs interlocking with the strands of the core.

The core sheet 14, whether of wire mesh or other material, can be cemented in place or the parts of the panel can be held by wire staples 43, see Figs. 6 and 9. No firm bonding between the panel parts is necessary because the nails 20, etc., are adequate to hold the parts together once the panelling is secured to the ground strips.

Instead of wire mesh, for the core 14, I may use plain sheet-metal (to be punctured by the members 40, 42, etc.) or apertured sheet-metal, say of the expanded-metal type such as shown at 45 in Figs. 10 and 11, can be used. The core can also be heavy cloth fabric, treated as by impregnation with a thermal-setting resin, so that it is relatively tough and strong. The wire fabric has the advantage of relatively low cost, and can easily be laminated between plasterboard sheets by cement which reaches through the mesh and bonds with the sheets 11 and 12.

In attaching acoustical tile of the Acousti-Celotex type, the nails or fasteners, e. g., 41 or 42 pass through the usual openings 52 of such tile which are near the corners. Figs. 12 and 13 show a tool guide 50, having locating pins 51, for engagement with two of the openings 52 of the tile. This can be used to guide the tool, such as a screw-driver 53 or a nail-set, in locating the fasteners centrally of the holes 52 which are intermediate those engaged by the pins 51. The tool may hold the fasteners magnetically to assist in rapid setting of the tile. This tool is shown and claimed only in my copending application Serial No. 250,599, filed January 12, 1939.

Referring to Fig. 18, the character 60 denotes any suitable ground for plaster, such for example, as expanded sheet-metal lath. This can be wired onto the skeleton members, such as 1, or studs in the case of a vertical wall (or nailed on, if the studs or skeleton structure are wood). The plaster is keyed through the openings in the metal lath, as usual.

In accordance with this modification, a bond coating of plaster 62 is applied to the expanded

metal, and then before the bond casting has set, a wire screen or other tough fabric web 14 is laid on the plaster and secured simply by pressing it into the plaster or by means of clips, such as shown at 63 or 64. The clips 63 may be in the nature of wire or flat strip staples having diverted portions 65 adapted to expand beyond the openings of the expanded metal in order to hold the core material in place until the plaster of the bond coat has set.

Another fastener is shown at 64 having a T head 68 and single shank at right angles thereto which has a hook effect 69 to engage the metal lath, and, beyond the hook, a diagonally extending free end 70 by which the fastener is first inserted into the plaster and through the openings in the metal lath. After such insertion the fastener is moved to the position shown, and turned about the axis of the shank portion adjacent the T head or moved about in the wet plaster until the hook effect is felt to be in engagement with the metal lath at one edge of the opening through which inserted.

The fabric core material 14 assists in forming a firm bonding between the finish coat 72 of plaster and the bond coat 62. The tile are attached the nail or screw-holding ground, formed as above described, either by barbed nails or helical nails of the drive-screw type or ordinary screws; a helical nail 41 being illustrated in Fig. 18.

I claim:

1. In building construction, a member adapted to form part of a wall, and having an outwardly facing channel with an unrestricted entrance and with oppositely sloping effective bottom surfaces, a rod disposed in the channel lengthwise of it, means periodically preventing the rod from movement transversely of itself out of the channel, while generally exposing the rod at the channel face, whereby elongated fastening members can be driven into contact with the sloping surfaces between the rod and channel and clinched about the rod.

2. A construction, according to claim 1, wherein the effective bottom portion of the channel is semi-cylindrical in shape and said means fixedly secures the rod in the channel in such position as to maintain said rod spaced a predetermined minimum distance from the walls of said channel at least at two points spaced circumferentially of the rod.

3. In building construction, a member having an outwardly facing channel, the effective bottom surfaces of which slope in opposite directions, a rod disposed in the channel lengthwise of it, means preventing movement of the rod out of the channel, and elongated fastening members adapted to be driven between the rod and channel and to be clinched about the rod when so driven, said fastening members at the clinching portions being of generally flattened section whereby they are self-guiding in contact with the rod and channel surfaces for travel transversely of the elongated member.

4. A construction, according to claim 3, wherein the clinching portion of the fastening member tapers gradually substantially to a point, and is flat on opposite major side surfaces, which surfaces, in the clinched position of the fasteners, lie between the rod and channel surfaces in firm contact with both.

5. A ground strip, the front face of which has two channels, each with oppositely sloping bottoms, said channels being disposed side-by-side

and separated by an intermediate wall of diminishing thickness toward its free edge, rods extending longitudinally in the channels, the major exposed surfaces of which rods slope in opposite directions, and means connecting the rods and strip to maintain the rods against movement out of the channels, whereby bendable nails which are driven through a member to be fastened to the strip and toward said front face will be clinched about one of the rods substantially irrespective of the position in which the nails encounter said face of the strip.

6. A ground strip comprising two channels with generally rounded troughs disposed side-by-side, and having an interconnecting wall with a relatively thin outward extremity, rods supported in respective channels in spaced relationship to the inner surfaces thereof, said interconnecting wall terminating in a plane below the plane of the outward extremities of the other channel walls.

7. An attaching member for wall treatment comprising a sheet-metal strip in the form of a channel with oppositely sloping bottom surfaces, the strip having reversely bent flange extensions to form base supports at opposite sides of the channel, and a rod secured in the channel in spaced relation to all wall portions of the channel for the greater portion of the extent of the rod so as to serve as a clinch hold for nails which may be driven through such wall treatment into the channel.

8. An attaching member of the class described, comprising a sheet-metal strip formed to provide two channels, each having oppositely sloping bottoms and the two having a common rib-like wall, rods secured in each channel, extending lengthwise thereof as a clinch hold for nails, and re-

versely bent flanges on the two sides of the strip, to form supporting base members.

9. A nailing ground, comprising a sheet-metal strip in the form of a channel having oppositely sloping bottom surfaces adapted to deflect nails, spaced means struck inwardly from a wall of the channel, and a rod secured to said means and about the entire periphery which nails deflected by said surfaces can extend for clinching.

10. A nailing ground strip, adapted to be secured in fixed relation to a wall, said strip comprising a trough-shaped sheet-metal strip with inwardly bent apertured ears at spaced intervals partially severed from the wall of the strip, and a rod extending through the apertures and held thereby against movement out of the trough.

11. A nailing ground, comprising a sheet-metal trough with oppositely sloping bottom surfaces, said trough having projections struck inwardly from its walls in spaced relationship to each other along the trough, and a metal bar welded to the projections and spaced thereby from the side and bottom walls of the trough.

12. A nailing ground, comprising a strip having a trough with oppositely sloping bottom surfaces, a rod having projections on it, at longitudinally spaced intervals, projections which are secured to wall portions of the trough, as by welding to space the rod generally from all surfaces of the trough.

13. A nailing ground, comprising a trough, with a wide open face and oppositely sloping bottom surfaces, a rod in the trough extending longitudinally thereof, means for securing the rod in centered relationship to the side walls of the trough, outer side portions of the trough being diverted in a manner to provide keying surfaces when the ground is embedded in concrete, plaster, or the like.

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