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(54) Flooring panels.

(57) A flooring panel comprises a substantially rectangular tray (12) with free edges of all upstanding sides (12S) bent outwardly to form flanging (12F), a substantially rectangular load-sustaining board or block (16) substantially filling the tray (12) whose bottom and the adjacent major face of the board or block are bonded together (18B), and a substantially rectangular cover plate (14) extending over the tray (12) and the other major face of the board or block (16) and bonded (18C) to that face. The cover plate (14) at each of its edges (14E) is secured to the flanging (12F) whether by clenching (14R in Figure 2) or welding (25 in Figure 3).

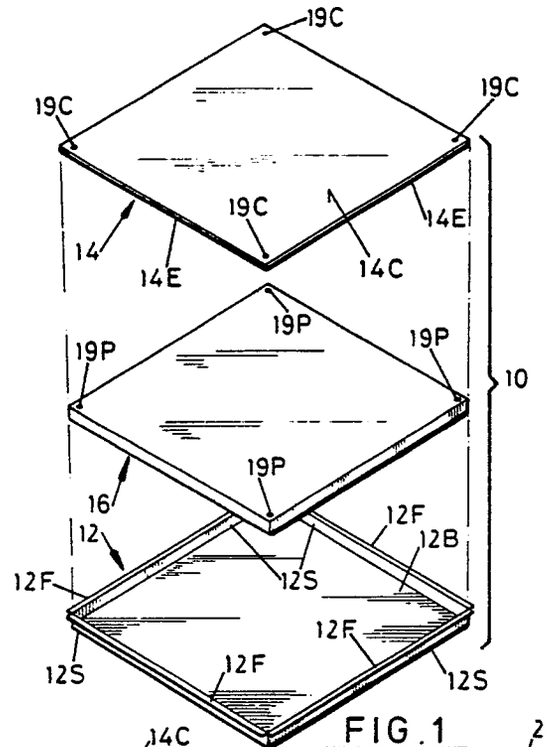

FIG.1

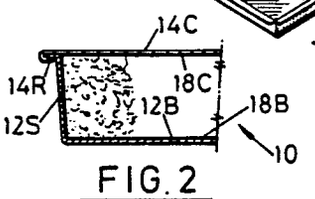

FIG.2

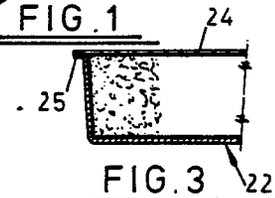

FIG.3

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Flooring Panels

This invention relates to flooring panels of the type used for access floors and normally provided with a metal finish, such flooring panels being supported above a subfloor on pedestals, normally at corners of rectangular, most often square, flooring panels.

The construction industry generally is extremely competitive these days, to the point that manufacturers of items used in that industry, including flooring panels as aforesaid, frequently have to trim their profit margins drastically in order to maintain viable volumes of production, even including in relation to what might, in other times, be considered to be prestige projects. Pursuit of the twin objectives of reduction in manufacturing costs whilst still meeting performance specifications thus becomes of further increased importance.

Work resulting in this invention started from detailed reappraisal of the existing commercially available such flooring panels, particularly those, including our own, that have already gone from all metal construction, in the interests of saving costs, to incorporation of wood, usually, particle board. This invention then arose from a clean-sheet approach to two problems identified as key factors.

One such factor concerns a problem which was, in fact, overcome by our own existing panel, but has been radically reconsidered. Thus, simplest flooring panel structures utilise a particle board within a metal tray having a base and upwardly sloping sides, and have a metal cover plate meeting free edges of those sides. Such panels are weak at their edges and there is undue reliance on adhesive bonding between interior surfaces of sides of the tray and edges of the particle board. The word "undue" is used advisedly, and not only because manufacturing tolerances make it extremely difficult to get such reliability of physical conformation of the board and the tray sides as to result in adequate repeatable strength of adhesive bonding. Also, it is further the case that edges of particle board are, of their very nature, simply not of adequate soundness and integrity for wholly satisfactory adhesive bonding. Whilst using such boards does lead to economies of manufacture, it remains the case that however accurately they are cut, and however accurate are junctions of edges of tray sides with the cover plate, there is an unavoidable likelihood of loadings, even nominal loadings, causing springing of tray sides outwardly at medial positions, a phenomenon known as "birds-mouthing" for obvious reasons.

The other such factor is simply one of expense in overcoming the "birds-mouthing" phenomenon. Thus, we have ourselves proposed a profiled (crest-and-trough) section "tray" and a consequently reduced thickness of particle board. Then, specific panel edging that is oppositely flanged top and bottom in a generally Z-section is used with its upper flanged clenched into return bends of edges of the cover plate and its lower flange spot welded to trough bottoms of the tray. Technically, the strong connection between cover plate and tray bottom afforded by the Z-section panel edging is a vast improvement in relation to "birds-mouthing" problems. Economically, the offset of particle board reduction against more steel in the profiled tray bottoms, and the generally increased costs of fabrication arising from the Z-section panel edges members, makes competition in the present market place very difficult for reasons as aforesaid.

The solution afforded by this invention is remarkably simple, and can, doubtless will, be seen as combining features of both of the aforementioned panels. Importantly, however, it abandons conceptually vital features of both, namely reliance on side-wall/board edge bonding of the first-mentioned panels, and the profiled tray bottom of our existing panels. Comparative simplicity leads to substantial costs advantages compared with our existing tray, but, and most surprisingly, there can be no loss, actually increase, of strength in relation to materials used so far as comparable.

According to this invention, a flooring panel comprises a rectangular tray with free edges of all upstanding side-walls bent outwardly to form flanging, a rectangular cover plate secured at positions adjacent each of its edges to such flanging, and load-sustaining board substantially filling the tray and bonded thereto and to the cover plate at its major surfaces, say using contact adhesive.

Strength and performance will certainly not be decreased if there is also adhesive between edges of the board and the upstanding sides of the tray; indeed, overall structural integrity is improved in conjunction with said major face bonding and where, as is preferred, edges of the board match to sides of the tray including any inclination thereof outwards to aid removal from forming tools. However, there is no primary reliance on edge-to-edge bonding. Rather, it is the physical integrity of the combination of the cover plate and the tray, directly connected at flanging of the latter, allied with the use of bonding at major surfaces, that is seen as affording the basis of improvements attainable in terms of loadings and costs.

Suitable board includes resin-bonded particle board, say of wood chip type, silicate or fibre boards, plywood, blockboard, hardboard, etc. preferably as available at economic cost and with ade-

quate load sustaining properties for the construction details actually used.

Suitable adhesive preferably has a high resistance to creep, basically is hard but not brittle. Rubber-based adhesives are susceptible to creep and "give" and should be avoided.

Two alternatives have been considered for securing together the cover plate and the tray flanging. One is making return bends of edges of the cover plate to clench the flanging, then preferably pre-forming the cover plate with depending free edge portions, virtually as a very shallow inverted tray, and is generally preferred, if only from our established experience and expertise in producing such clenches. The other is to weld at the cover plate edge portions overlapping onto and confronting the tray edge flanging, preferably from the flanging side for appearance sake. Concern for appearance also works against the obvious clenching alternative of returning the flanging about edges of a flat cover plate. Moreover, additional welding of the preferred clenching alternative could be advantageous for increasing load ratings.

Both of such securement provisions are able to satisfy achievement of good electrical contact between metal trays and covers, thereby assuring equipotential bonding/connection conditions further applying to normal securement by metal screws through to metal support pedestals.

Specific implementation of embodiments of this invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is an exploded view of a flooring panel;

Figure 2 is a detail edge section of that panel; and

Figure 3 is a detail edge section of another flooring panel.

In the drawing, a flooring panel 10 comprises, for assembly, a lower tray 12 conveniently formed by pressing or drawing metal sheet and having a base 12B and upstanding side walls 12S whose free end portions are turned outwardly to present flanging 12F; an upper cover plate 14 having a main central 14C coextensive with the tray 12 including its flanging 12F and downwardly turned free edges portions 14E, i.e. as a rather shallow inverted tray also conveniently formed by pressing or drawing sheet metal; and a particle board 16 substantially to fill the space between the lower tray 12 and the upper cover plate tray 14.

In assembly, we use contact adhesive 18B and 18C between major surfaces of the board 16 and interior surfaces of the lower tray 12 and the upper tray 14. Adhesive layer 18B is shown extending up sides 12S of the tray 12.

Completion of assembly is by forming return bends 14R in the initially depending edges (14E) of the cover tray 14 (see Figure 2) in a manner clenching about the flanging 12F of the lower tray 12.

Adjacent to corners of the cover plate 14 and particle board 16, Figure 1 shows registering holes 19C and 19P, and there will be corresponding holes (not shown) in the base of tray 12, so as to enable mounting of the panel 10 at its corner onto a pedestal (not shown).

Outwardly sloping of sides 12S of the tray aid removal from forming tools, and it is then preferred that close conformity of the board 16 to the trays 12, 14 then involves chamfering edges of the board 16, itself aiding assembly of the board 16 into the tray 12 with adhesive applied to either or both.

A standard size for metal encased flooring panels 10 hereof is 600 mm x 600 mm (though that should obviously not be taken as limiting), and we find that using galvanised steel of about 0.5 mm thickness for the cover tray 14, and of about 0.7 mm to about 1.2 mm thickness for the lower tray 12, and having the two trays encase particle board (Class II) of 30 mm thickness, results in capability of achieving "point" loadings (on a 25 mm square) of from about 3 Kilonewtons to about 4.5 Kilonewtons, which those skilled in the art will, we believe, find impressive, and surprising from such a simple construction.

An alternative way of achieving connection between a cover plate 24 and a flanged tray 22 is indicated in Figure 3, where the cover plate 24 is flat through to the edges (effectively omitting the edge-adjacent down turns 14E) and is welded, see 25, to the flanging 22F, preferably from the flanging side.

It will be appreciated that welding could additionally be employed in the clenching embodiment of Figure 2, say to increase strength and achieved integrity still further. Then, of course, doing so from the flanging 22F could give substantial freedom from any unsightly appearance of the top panel surface due to welding.

Intimate contact between the tray 12, 22 and the cover plate 14, 24, i.e. free of any insulation between (as might occur if adhesive was used), assures good electrical connection, including through to supporting pedestals, and thus affords equipotential bonding.

Claims

1. A flooring panel comprising a substantially rectangular tray (12) with free edges of all upstanding sides (12S) bent outwardly to form flanging (12F), a substantially rectangular load-sustaining board or block (16) substantially filling the tray (12)

whose bottom and the adjacent major face of the board or block are bonded together (18B), and a substantially rectangular cover plate (14) extending over the tray (12) and the other major face of the board or block (16) and bonded (18C) to that face, the cover plate (14) at each of its edges (14E) being secured to the flanging (12F).

2. A flooring panel according to claim 1, wherein bonding (18B, 18C) of the major faces of the board or block (16) to the bottom (12B) of the tray (12) and to the cover plate (14) is by way of contact adhesive.

3. A flooring panel according to claim 1 or claim 2, wherein edges (14E) of the cover plate (14) return (14R) under the flanging (12F) in affording clenching securement thereto.

4. A flooring panel according to any preceding claim, wherein edges (14E) of the cover plate (14) are welded (25) to the flanging (12F).

5. A flooring panel according to any preceding claim, wherein the tray (12) and the cover plate (14) are both of metal and are in mutual electrical contact as secured together.

6. A flooring panel according to any preceding claim, wherein the board or block (16) is of bonded particle type.

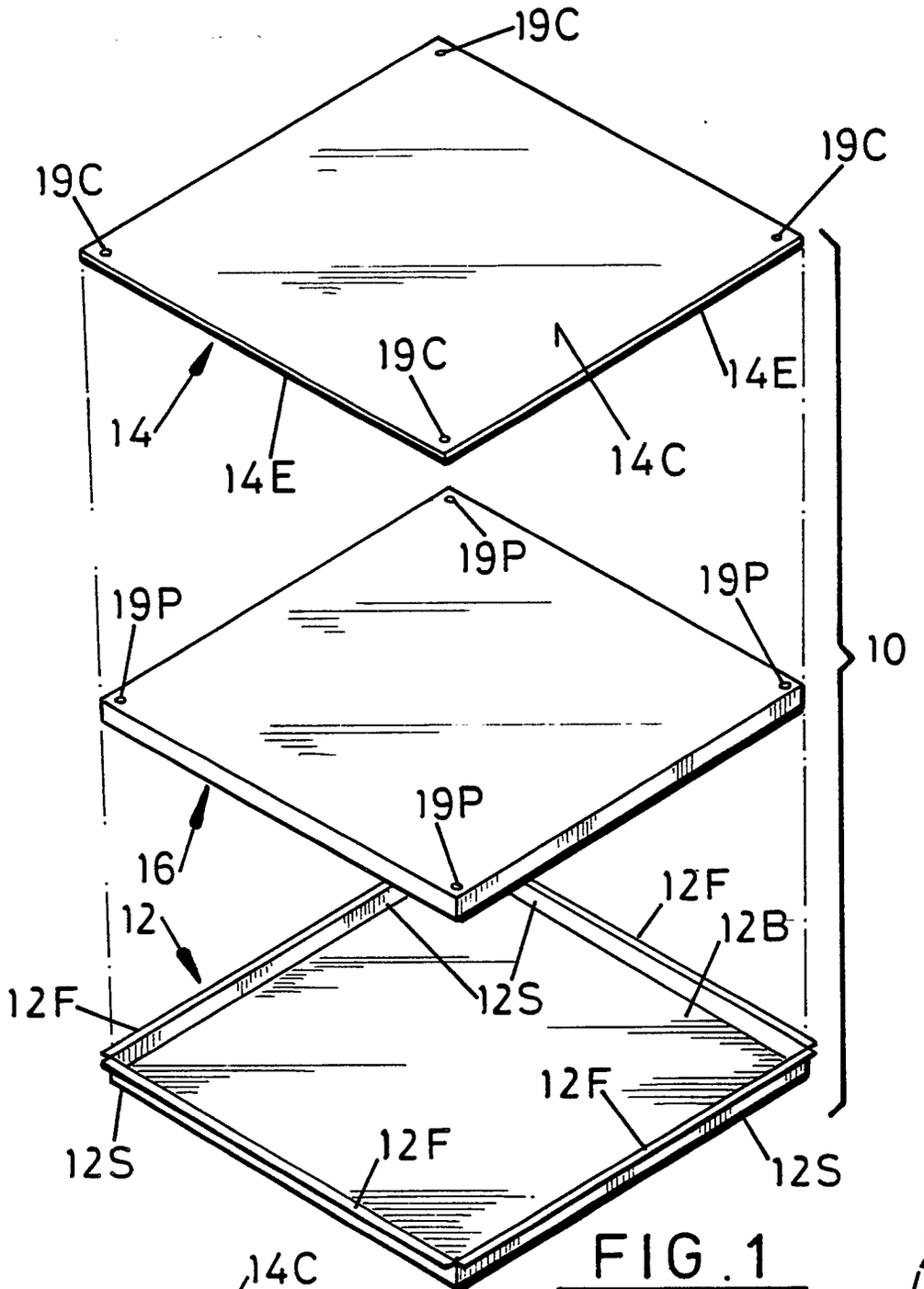

FIG. 1

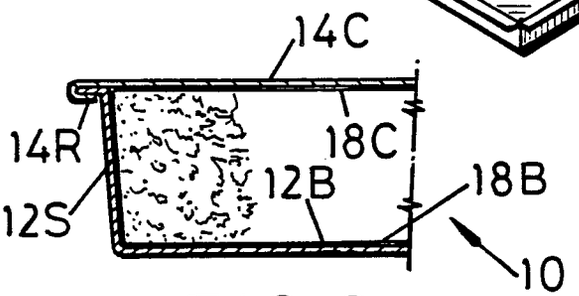

FIG. 2

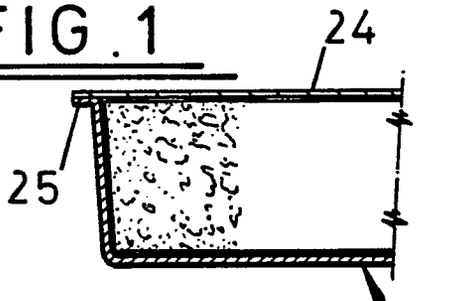

FIG. 3