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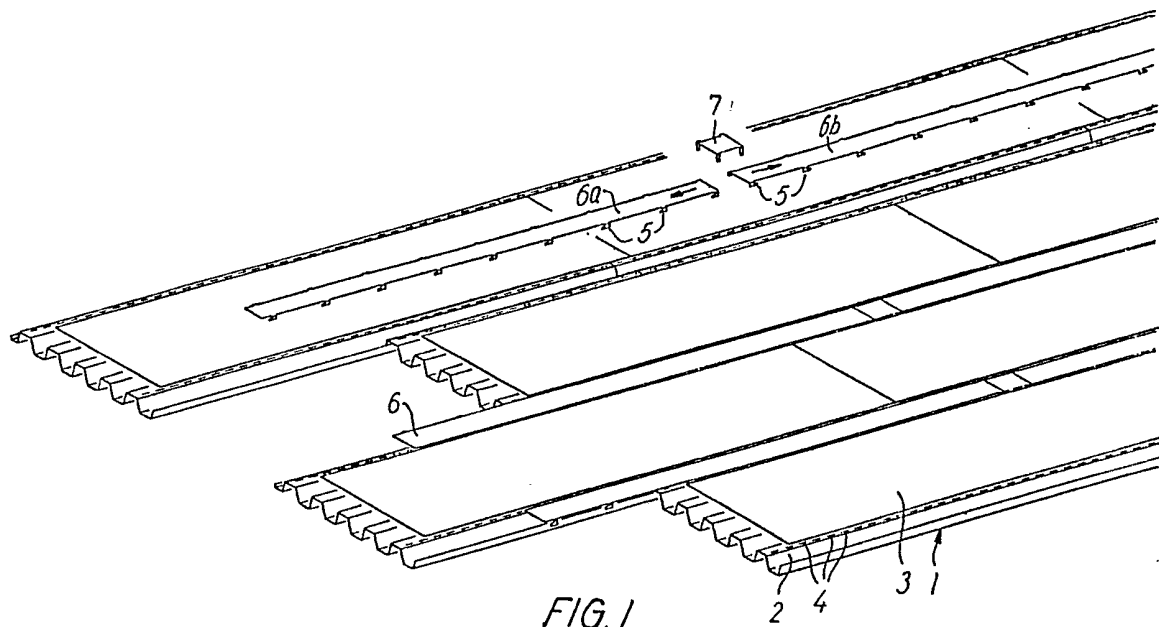
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(54) Panel assembly and connecting piece and method for assembling thereof

(57) A panel assembly is composed of cover panels (1) which are connected to each other along their parallel lateral edges, where they each have preferably oblong plots (4) which accommodate hook-formed coupling projections (5) on connecting pieces (6), which extend between at least two, preferably four cover panels (1) in bond, and which after insertion of the coupling hooks (5) in the slots (4) are displaced longitudinally into a locking position, in which there is engagement between the coupling hooks (5) and the slot edges. In order to obtain a stable assembly allowing easy replacement of single panels the open parts of the coupling hooks (5) on connecting pieces lying end to end turn alternately towards and away from each other, and after the insertion of the coupling hooks (5) into the slots (4) the connecting pieces (6) are moved towards and away from each other, respectively, in the resulting space between two connecting pieces (6) thus displaced away from each other an arresting piece (7) being inserted, which substantially fills out the space.



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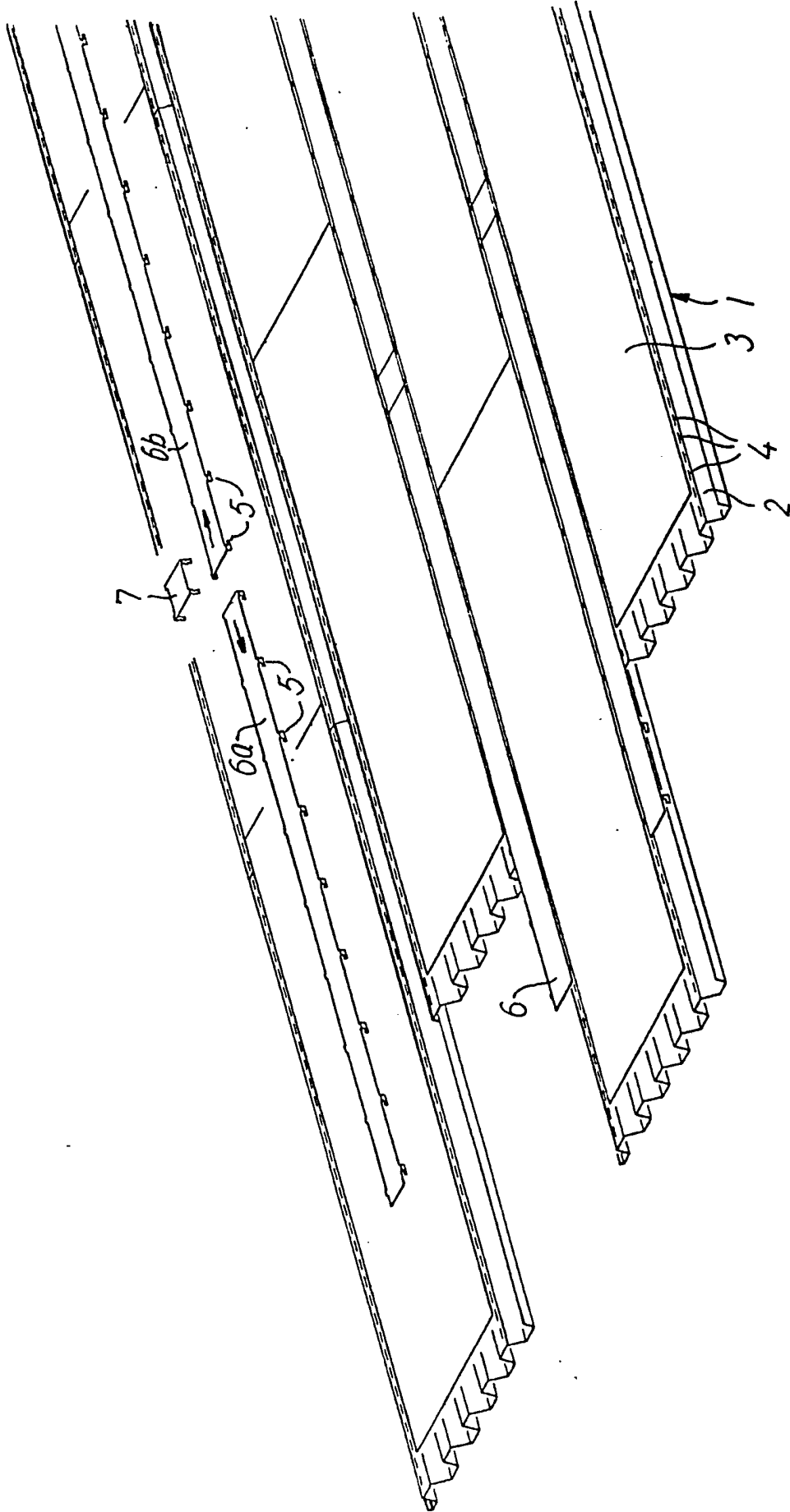
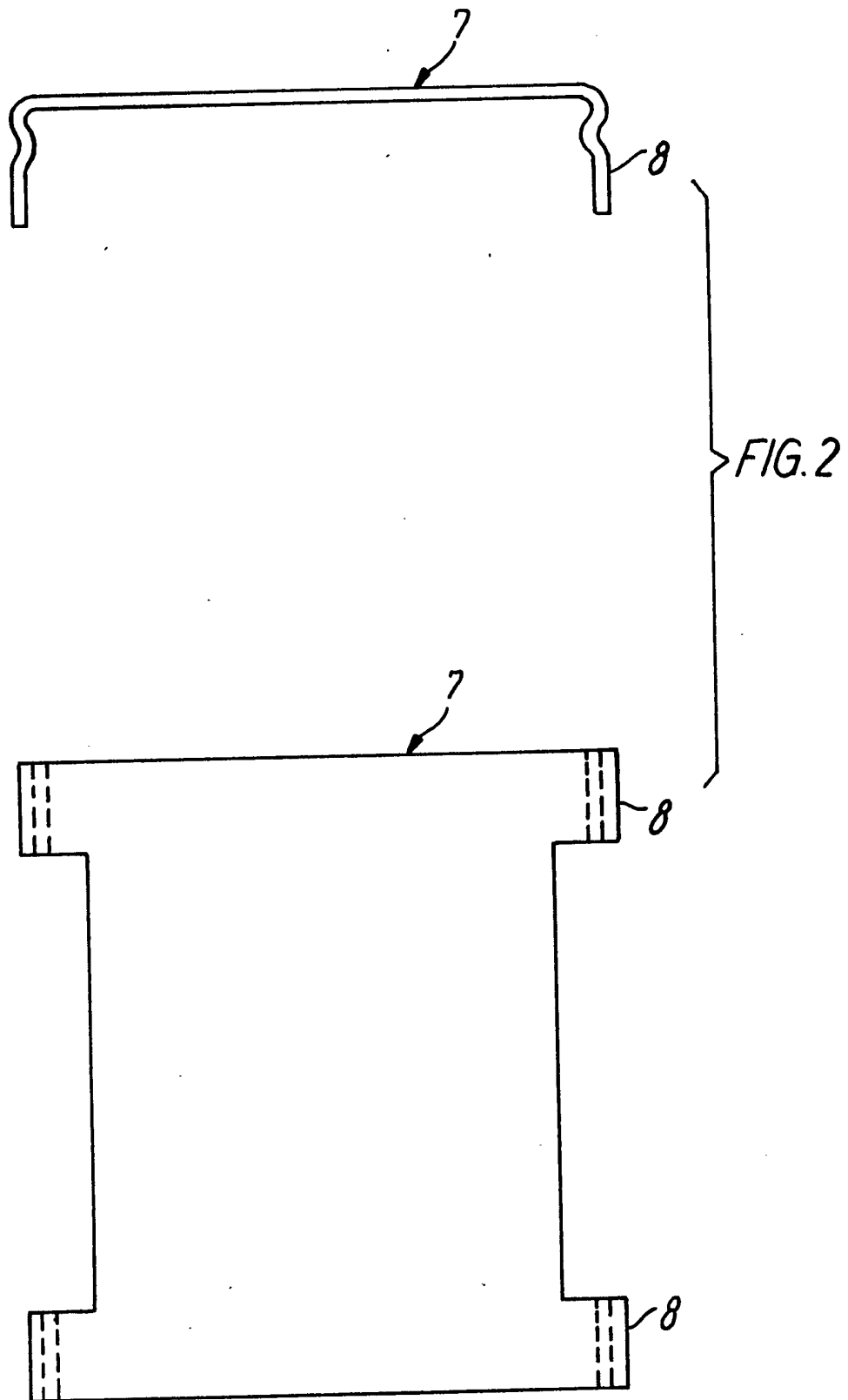


FIG. 1



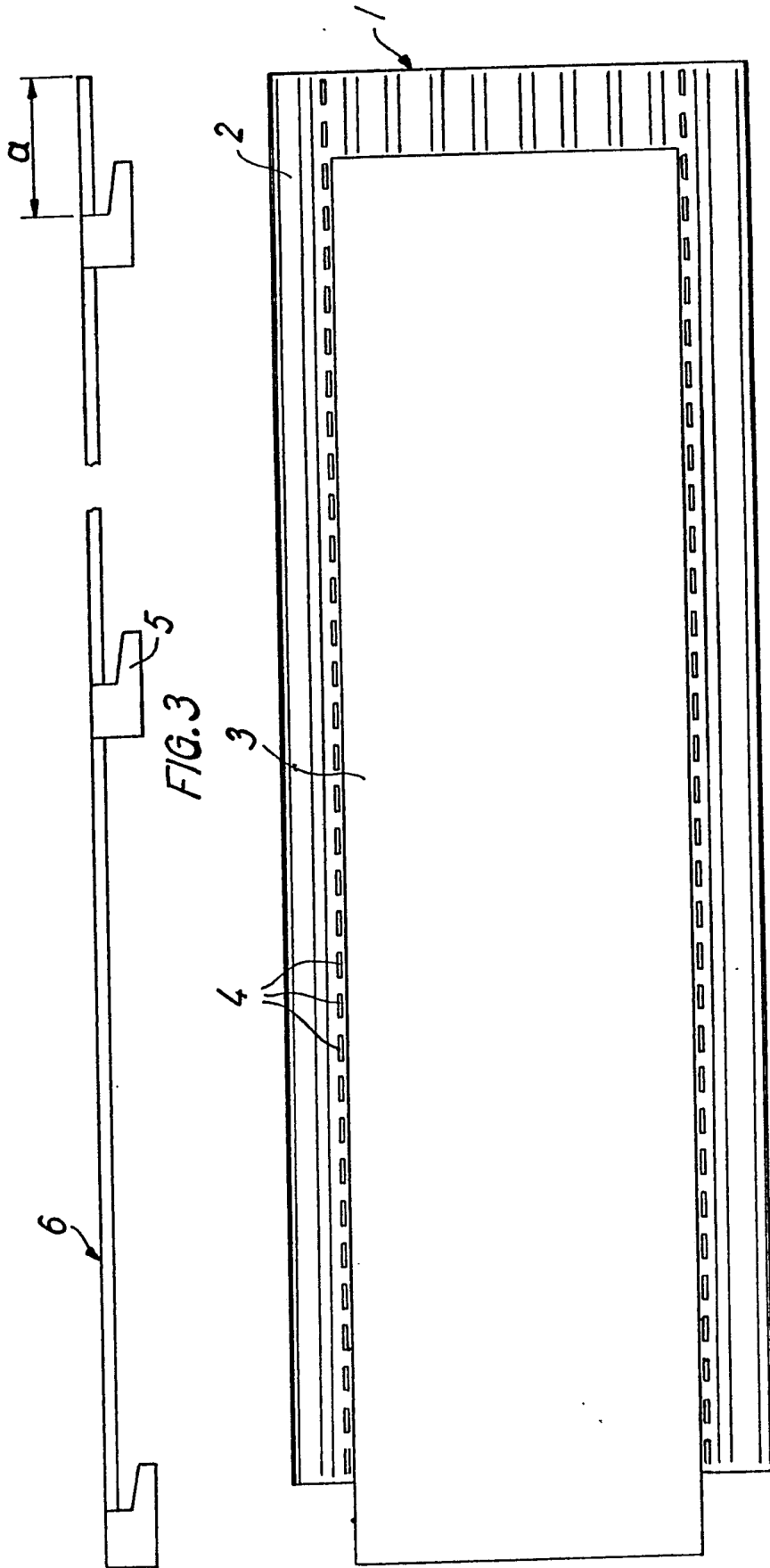


FIG. 4

FIG. 3

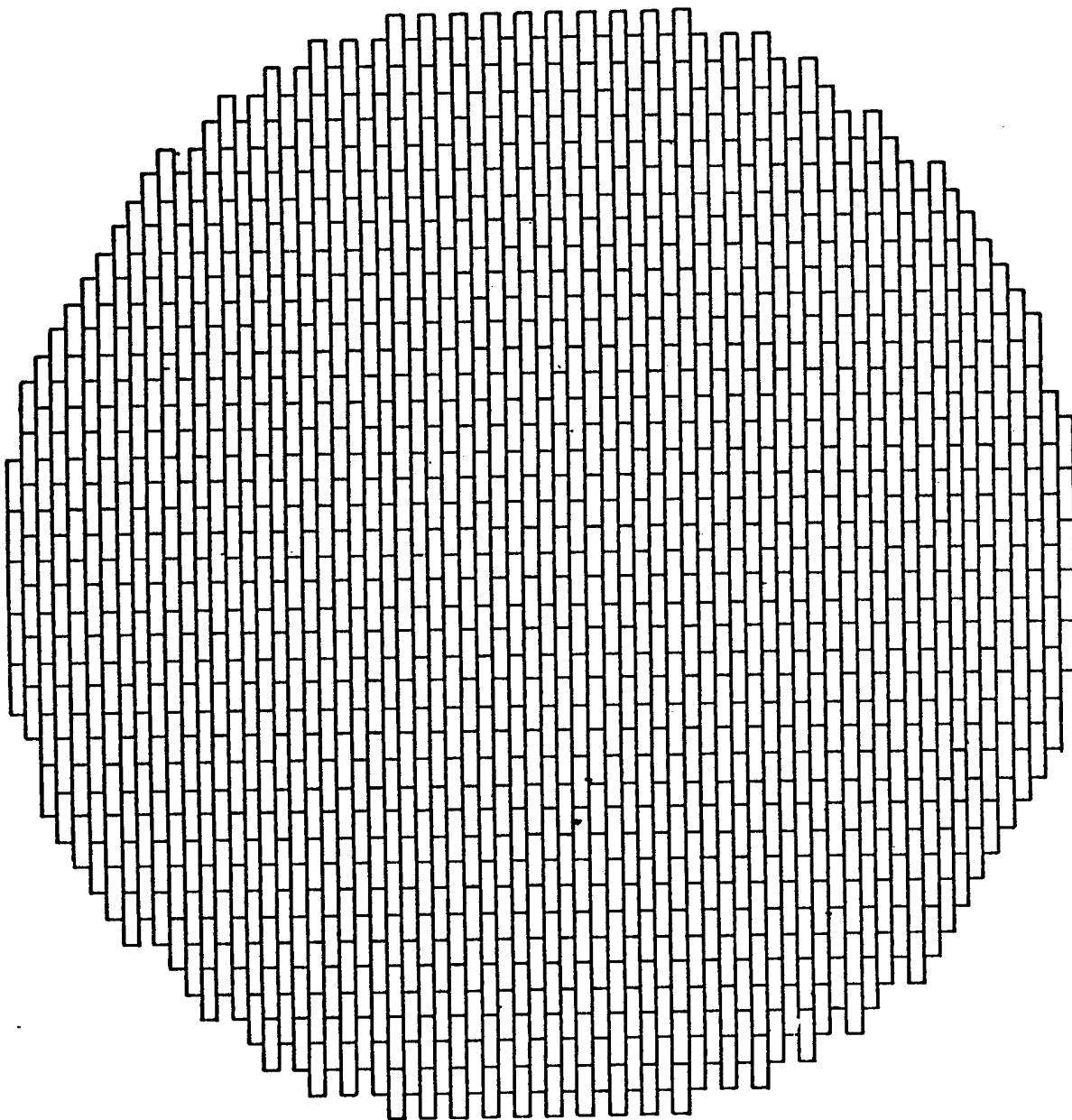


FIG. 5

SPECIFICATION

Panel assembly and connecting piece and method for assembling thereof.

5 The invention relates to a panel assembly composed of cover panels which are connected to each other along their parallel lateral edges where they each have preferably oblong e.g. slot-formed windows, which accommodate hook-formed coupling projections on connecting pieces which extend between at least two, preferably four cover panels in bond, and which after insertion of the coupling hooks in windows are displaced longitudinally into a locking position there being engagement between the coupling hooks and the window edges.

15 Panels of the kind in question can for instance be used as floor coverings, e.g. direct on a loose foundation such as sand, but can also be used for rapid establishment of stable trafficable foundations in an otherwise non-trafficable or poorly trafficable terrain, e.g. runways or ramps for aeroplanes and/or helicopters, e.g. in war or catastrophe areas.

20 From the German design specification No. GM 76 21 874 a panel assembly is known of the kind dealt with above, in which a good stability is obtained by the connecting pieces being parallelogram-formed and in assembled state being adjoined by sloping butt edges. Owing to the parallelogram form, each connecting piece has two extremely pointed corners, which requires considerable care both during transport to the place of use and when the pieces are being laid out, and the particular way in which the parallelogram-formed connecting pieces are mounted means that replacement of a single cover panel or of a few cover panels, e.g. in the case of damage, necessitates the removal of a disproportionately large number of connecting pieces, viz. at least two whole rows.

35 It is an object of the invention to furnish a simply mountable and stable assembly of cover panels having connecting pieces without sharp corners, which connecting pieces can be released singly in the case of replacement of single panels.

40 To obtain this, a panel assembly of the kind initially dealt with according to the invention is characterized in that the open parts of the coupling hooks on connecting pieces extending end to end alternately face and turn away from each other, that after the insertion of the coupling hooks into the windows the connecting pieces are moved towards and away from each other, respectively, and that into the resulting space between two connecting pieces thus displaced away from each other there is inserted an arresting piece which substantially fills out the space.

55 Great stability of the assembly is here obtained by the connecting pieces "facing each other" in pairs, which results in an extremely homogenous assembly which is especially resistant to displacement effects, e.g. emanating from accelerating or braking vehicles. The special mounting according to the invention also results in defect single panels being immediately replaceable by the removal of, at a maximum, four connecting

65 pieces. When an arresting piece has been removed, it is thus immediately possible to displace the two adjoining connecting pieces longitudinally.

70 The invention also relates to a connecting piece for the assembly of cover panels as indicated above and of the kind having along parallel lateral edges rows of preferably oblong, e.g. slot-formed, windows, where parallel cover panels or parallel rows of cover panels are connected to each other by means of connecting pieces having along parallel lateral edges longitudinally extending rows of coupling hooks which are inserted into windows on two parallel rows of cover panels, whereafter the connecting pieces are displaced longitudinally into a locking position there being engagement between the coupling hooks and the window edges.

80 Such connecting piece is expediently characterized in that the bottom of the outer coupling hooks in the direction of displacement on each connecting piece is at such distance from the end edge of the connecting piece that the end edges on connecting pieces moved towards each other substantially bear against each other in the locking position.

85 This condition can be fulfilled if the bottom of the outer coupling hooks in the direction of displacement on the connecting piece is at a distance from the end edge of the connecting piece corresponding to or slightly, e.g. 1-2 mm, less than the difference between half the window pitch in the cover panels or a whole multiple thereof and half the window length.

90 Moreover, the invention relates to a method for assembling a panel assembly as indicated above by laying out cover panels of the kind having along at least two opposite and parallel lateral edges preferably oblong windows for accommodation of coupling hooks on connecting pieces, which cover panels are laid out in parallel rows, whereafter the panels in two rows are connected to each other by means of connecting pieces whose coupling hooks are inserted into the windows of the panels, whereupon the connecting pieces are longitudinally displaced into engagement between the coupling hooks and the window edges. The method according to the invention is characterized in that the connecting pieces in each row are laid with the open part of the coupling hooks facing alternately in the one or the other direction, that the connecting pieces are longitudinally displaced in the direction in which the open part of their coupling hooks faces, and that the spaces thereby produced between every two connecting pieces, the open parts of whose coupling hooks turn away from each other, are filled out by an arresting piece.

110 Each arresting piece is thus made to hold two connecting pieces in engagement with windows in preferably four cover panels in opposite directions, which in a simple manner results in a stable and homogenous assembly of the cover panels and an effective interlocking of these. A possible displacement strain on a connecting piece away from the locking position will via the arresting piece be absorbed by the adjacent connecting piece which faces the opposite way and is thus merely pressed

further against its locking position in which it is already to be found. The arresting pieces can be inserted into and removed from the spaces between the connecting pieces by a movement at right angles to the plane of the covering by means of simple tools, e.g. a hammer and screwdriver, respectively, so that single cover panels can be removed and replaced by new ones by removal of a few arresting pieces, e.g. at a maximum four arresting pieces when cover panels and arresting pieces are placed in bond, so that a cover panel can be released by disconnecting of four connecting pieces.

The invention is explained below in more detail, for example, with reference to the drawing in which

Fig. 1 shows a covering of the invention composed of single panels, e.g. a floor covering, partially established,

Fig. 2 an arresting piece for use in the assembly shown in Fig. 1,

Fig. 3 a connecting piece,

Fig. 4 a more detailed drawing of a cover panel, and

Fig. 5 an example of a completed covering which can for instance be used as a helicopter platform.

In Figs. 1 and 4 the separate rectangular cover panels 1 are formed by a base plate 2, here having a form like a trapezoid profile, onto which is firmly welded a steel plate 3 which has preferably a non-skid surface, not shown.

Along the length edges each of the cover panels 1 has a row of slot-formed holes 4 which can be completely identical in all panels.

When being laid out, preferably on a base of sand or similar material into which the profile sheets 2 can penetrate and be anchored when loaded, the panels 1 are placed in parallel rows, preferably with mutual displacement in the longitudinal direction as shown in Fig. 1, the distance between the rows being such that the distance between the rows of windows 4 corresponds to the distance between two rows of coupling hooks 5 along either side of an elongated and likewise rectangular connecting piece 6. To obtain this distance between the panels 1 loose distance pieces can be used in an ordinary known manner during the laying-out, or the distance between the rows of coupling hooks 5 can be dimensioned so as to correspond to the distance between the window rows 4, when the panels 1 are laid out as shown in Fig. 1, i.e. with the free lateral edges of the panels in the form of the outer trapezoid profile parts engaged with each other.

When two or more rows of cover panels 1 are thus laid out, the panels in a row are connected with each other and with panels in the adjacent row by means of the connecting pieces 6 which, as can be seen from Fig. 1, are mounted with the coupling hooks 5 facing in opposite directions in the windows 4, whereupon each pair of connecting pieces with coupling hook openings turning away from each other such as the connecting piece pair 6a, 6b in Fig. 1 are moved away from each other as indicated by arrows in Fig. 1, and the space between the connecting pieces which preferably comprise one or two windows on either side is filled out by an

arresting piece 7 such that the connecting pieces are locked in the engagement position.

The arresting piece 7 has no coupling hooks but merely a pair of holding flaps 8 on either side with which to engage with the lateral edges on the cover profiles, preferably by being inserted into windows 4, from where they can again be removed, if desired, when disassembling the panel cover or when replacing single panels. It can be seen from Fig. 1 that a single panel can be dismantled, e.g. with a view to replacement, by the removal of four arresting pieces 7, thus enabling a longitudinal displacement of four connecting pieces to a position in which their coupling hooks are out of engagement with the window edges, and the appertaining cover panel can be removed.

It can be seen in Figs. 1 and 4 that the tread sheets 3 which are attached to the trapezoid profiles 2 at one end end a short distance from the end edge of these profiles and that at the other end they project a corresponding distance or a slightly shorter distance over the profile end. Direct openings through the completed cover at the joints between the cover panels 1 are thus avoided so that intrusion of material, e.g. sand, from the terrain when the cover is loaded is to a great extent avoided.

Fig. 2 shows in more detail an arresting piece 7 with holding flaps 8 which have a fold by which they can engage with the edge of a window 4. The folds have suitably rounded corners so that after having been mounted, e.g. hammered down, the arresting pieces can easily be dismantled, e.g. by a screwdriver being used as a lever. The holding flaps 8 can be resilient, e.g. by the arresting piece as a whole being made of spring steel.

A connecting piece 6 is shown in more detail in Fig. 3. The coupling hooks 5 along both the longitudinal sides of the connecting piece have mutual distances corresponding to a whole multiple of the window pitch in the panels. The left coupling hooks in Fig. 3 are formed at the outer end of the connecting piece, whereas the opposite coupling hooks, to the right in Fig. 3, are provided at some distance from the end edge of the connecting piece. By suitable dimensioning of this distance it can be obtained that the end edges of connecting pieces which on mounting are displaced towards each other can be made to bear against each other or to form a very narrow gap between each other. If the distance a between the bottom of the coupling hooks and the end edge of the connecting piece corresponds to or is slightly, e.g. 1—2 mm, less than the difference between half the centre-to-centre distance between the windows 4 in the cover panels or a whole multiple thereof and half the window length, the end edges of two connecting pieces displaced towards each other can be made to lie very close together in mounted state.

A covering according to the invention can be formed with arbitrary configurations, and Fig. 5 shows by way of example a substantially round cover which can for example be used as a starting or landing ramp for helicopters.

The cover panels described above are as stated particularly suited for the establishment of

trafficable coverings in terrain, e.g. on sand, earth or another loose base, but the special assembly principle according to the invention by which the connecting or assembly pieces in a row are laid with the coupling hooks facing in one or the other direction alternately, are displaced in pairs away from each other into engagement between the coupling hooks and the edges of the windows along the lateral edges of the cover panels and are locked in these displaced positions by means of special arresting pieces in the spaces produced by the displacement between every two assembly pieces, can of course also be used for the establishment of other covering surfaces by the coupling together of cover panels with or without a trapezoid profile as a base or with another profile as a base, e.g. on building sites, in workshops, etc.

Panels 1, connecting pieces 6 and arresting pieces 7, which can be mutually completely identical to each other, can be made of metal, e.g. steel or aluminium, or — for less stressing purposes — for example, of plastic, possibly a fibre-reinforced plastic material.

As regards the separate parts of a panel assembly according to the invention, it applies generally that the distance between the coupling hooks 5 on the connecting piece 6 must be equal to or a whole multiple of the distance between the windows 4 in the cover panels 1, that the window length must be equal to or preferably slightly greater than the hook length, and that the above-mentioned distance a between the bottom of the outer coupling hooks 5 in the direction of displacement on each connecting piece 6 and the latter's end edge, if the window length is only slightly greater than the hook length, can with a fairly good approximation be expressed as the difference or slightly less than the difference between half the hook distance or the reciprocal of a whole multiple, i.e. a fraction having the numerator 1, thereof and half the hook length. If the difference between the window length and the hook length is considerable, the thus calculated distance a is reduced by half the difference.

CLAIMS

1. Panel assembly composed of cover panels which are connected to each other along their parallel lateral edges where they each have preferably oblong e.g. slot-formed windows, which accommodate hook-formed coupling projections on connecting pieces which extend between at least two, preferably four cover panels in bond, and which after insertion of the coupling hooks in windows are displaced longitudinally into a locking position there being engagement between the coupling hooks and the window edges, characterized in that the open parts of the coupling hooks on connecting pieces extending end to end alternately face and turn away from each other, that after the insertion of the coupling hooks into the windows the connecting pieces are moved towards and away from each other, respectively, and that into the resulting space between two connecting pieces thus displaced away from each other there is inserted an arresting piece which substantially fills

out the space.

2. Panel assembly according to claim 1, characterized in that the arresting pieces are secured in the spaces between connecting pieces displaced away from each other by means of preferably resilient holding flaps which engage with their respective windows.

3. Panel assembly according to claim 1 or 2, characterized in that end edges facing each other on connecting pieces displaced towards each other substantially bear against each other in the locking position.

4. Panel assembly according to one or more of claims 1—3, characterized in that the bottom of the outer coupling hooks in the direction of displacement on each connecting piece is at a distance from the end edge of the connecting piece corresponding to or slightly less than the difference between half the distance between the windows in the cover panels or a whole multiple thereof and half the window length.

5. Panel assembly according to one or more of claims 1—4, characterized in that the single cover panels are formed by a base, e.g. a wavy line or trapezoid profile, and a cover sheet attached thereto which is displaced longitudinally in relation to the base.

6. Connecting piece for the assembly of cover panels as indicated in one or more of claims 1—5 and of the kind having along parallel lateral edges rows of preferably oblong, e.g. slot-formed, windows, where parallel cover panels or parallel rows of cover panels are connected to each other by means of connecting pieces having along parallel lateral edges longitudinally extending rows of coupling hooks which are inserted into windows on two parallel rows of cover panels, whereafter the connecting pieces are displaced longitudinally into a locking position there being engagement between the coupling hooks and the window edges, characterized in that the bottom of the outer coupling hooks in the direction of displacement on each connecting piece is at such distance from the end edge of the connecting piece that the end edges on connecting pieces moved towards each other substantially bear against each other in the locking position.

7. Connecting piece according to claim 6, characterized in that the bottom of the outer coupling hooks in the direction of displacement on each connecting piece is at a distance from the end edge of the connecting piece corresponding to or slightly less than the difference between half the distance between the windows in the cover panels or a whole multiple thereof and half the window length.

8. Method for assembling a panel assembly according to one or more of the claims 1—5 by laying out cover panels of the kind having along at least two opposite and parallel lateral edges preferably oblong windows for accommodation of coupling hooks on connecting pieces, which cover panels are laid out in parallel rows, whereafter the panels in two rows are connected to each other by means of connecting pieces whose coupling hooks

5 are inserted into the windows of the panels, whereupon the connecting pieces are longitudinally displaced into engagement between the coupling hooks and the window edges, characterized in that the connecting pieces in each row are laid with the open part of the coupling hooks facing alternately in the one or the other direction, that the connecting

10 pieces are longitudinally displaced in the direction in which the open part of their coupling hooks faces, and that the spaces thereby produced between every two connecting pieces, the open parts of whose coupling hooks turn away from each other, are filled out by an arresting piece.