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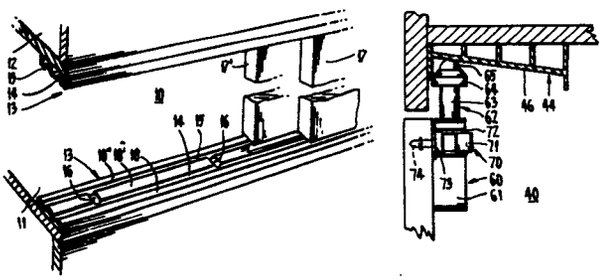
(54) Improvements in sliding doors.

(57) A sliding door assembly in which at least two panels (17, 17') can be located in tracks (14, 15) in track assemblies (13) and can move from track to track through cutouts (16) or which are located on various other profiles or ramps (44, 45) and have by-pass members 70 on their rear faces so that adjacent panels by compression of their support means (60) can be caused to move up an inclined plane (47) to pass behind an adjacent panel with the only contact being the by-pass members (70) against the face of the panel higher on the inclined plane (47).



EP 0 005 314 A1

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IMPROVEMENTS IN DOORS

This invention relates to improvements in doors and more particularly to improvements in sliding doors.

Sliding doors are used for many purposes from small cupboards, to wardrobes, to external doors, to doors spanning wide distances, such as in garages and doors which can occupy the whole side of a building, as in a produce store or a bond store. Normally the arrangement of sliding doors has been in one of several ways. Where there are only two doors they are conventionally on different tracks so that either door can be slid across or behind, the face of the other door. Where there are three doors, such as in a common type of wardrobe, there are normally two tracks and the centre door is on the front track and the other two doors are on the rear track. In this arrangement the central portion of the wardrobe can be moved to either side enabling access to the centre of the wardrobe and either of the outer doors can be slid inwardly to a position behind the centre door.

Where wide spans are required and particularly where the whole of the area, or any part of the area, may need to be exposed, it is conventional to provide as many tracks as there are door components so any individual door member can be moved, at least in one direction, to expose the area occupied by the door. In such arrangements the track lengths normally vary and the doors can slide to the inner ends of their tracks to reach their closed condition and each of the tracks terminate at the same position at their outer ends so that when the area is fully exposed the door panels are located one behind the other.

All such arrangements have difficulties. Firstly,

in every arrangement the door panels, when the door is closed, terminate at different levels and this, asthetically, is not pleasing.

Secondly, it is difficult to make a permanent seal between panels as there must be some form of rubbing seal, at least close to the end of the movement of the door. In indoor and furniture applications such seals are undesirable as they tend to mar the surface of the piece of furniture.

Thirdly, where multiple door panels are being used, there is the expense of having a large number of tracks and the effective further expense caused by the encroachment of the tracks into the area to which the door is fitted.

It is an object of the present invention to provide a sliding door in which these disadvantages are obviated or minimised.

It is a further object to provide sliding door assemblies which are relatively cheap to manufacture, which can readily be fitted and which can operate satisfactorily for substantial periods of time.

The invention includes a sliding door having at least two panels and a pair of parallel track assemblies at both the top and the bottom of the opening into which the panels are to be located, low friction means associated with, at least, the lower edge of each door panel, which means are adapted to be received in the track assemblies and which extend below the lower extremity of each panel, and means whereby the panel can be moved transversely across the track assemblies.

Thus, panels can be located in the same track and be flush, while on forward or rearward pressure one panel can enter another portion of the track assembly and can be moved longitudinally relative to the other panel or panels.

The movement between tracks can be effected in one of several ways.

Firstly, there may be cutouts between two tracks in the assembly and when the low friction means are in alignment with the cutouts the panel can be moved forwardly or rearwardly. In such an arrangement the panels may be spring biased in one direction so that on the panel reaching a position where the cutouts are aligned with the low friction means the panel

will be moved to a predetermined track.

In a second form, the track may be of such a section that on pressure the panel will move up the ramp and enter the second track. In such an arrangement the low friction means are sprung or are otherwise moveable to permit the effective overall height of the door to vary.

In a third form each track assembly is in the form of an inclined plane and each portion has on its rear surface a plurality of spacers which enables panels to move, one past the other without the necessity of defined tracks. More specifically, in this aspect we provide a sliding door having at least two panels and a pair of parallel track assemblies in the top and the bottom of the opening into which the panels are to be located wherein the tracks are each in the form of an inclined plane having means whereby it can be fixed to the opening, the planes being inclined to form an opening of maximum height at the front of the door and with the height being restricted at the rear of the door opening, low friction means at the lower edges of the panels, spring loaded low friction means at the upper edges of the panels and spacers on the rear of each panel and being so arranged as to ensure that contact between panels is restricted to contact between the spacers and the face of the adjacent panel.

In a fourth form the track assembly may be separated into two tracks by a spring loaded stem which extends through a longitudinal slot and which may be moved into its slot on transverse movement of a panel and which will re-extend after the panel has passed thereover.

The low friction means or guides may be castors or multiple castor assemblies, may be ball bearings or may simply be blocks of a low friction material such as polytetrafluorethylene (P.T.F.E. sold under the Registered Trade Mark TEFLON).

The section of the track may be modified as desired. Preferably it is of a section to closely correspond with the low friction means. For example, if the low friction means are ball bearings the tracks should be part circular, if blocks of P.T.F.E. square or rectangular, assuming the blocks are this shape and if castors, normally rectangular.

In order that the invention may be more readily understood and put into practice we shall describe several embodiments of the invention as applied to door tracks and various possible modifications of these. Reference will be made to the accompanying drawings in which:-

Fig. 1 is a partly sectional, partly broken perspective showing one particular form of door and track assembly made in accordance with the invention;

Fig. 2 is a section of the assembly showing the arrangement of low friction means;

Fig. 3 is a perspective of a lower track assembly of a type similar to that shown in Fig. 1 but of different construction;

Figs. 4, 5, 6, and 7 are sections through various profiles of tracks which can be used with this or other embodiments of the invention;

Figs 8, 9, 10 and 11 are partial sections of a further embodiment of the invention showing diagramatically the manner of operation of the door of the invention;

Fig. 12 is a section along line 12-12 of Fig. 8 showing the arrangement where the door panels are in their forward, closed orientation;

Fig. 13 is a section along line 13-13 of Fig. 10 showing two doors when located one behind the other;

Fig. 14 is a view along line 14-14 of Fig. 13 showing the arrangement of the upper low friction means;

Fig. 15 is a perspective view of a low friction roller used as a spacer between adjacent door panels;

Fig. 16 is a broken view of a roller similar to that of the type illustrated in Fig. 15 but which is one of a group of rollers located along the length of a strip;

Fig. 17 is an alternative form of track adapted to permit the face of the door to terminate flush with the outer flange of the track;

Fig. 18 is a sectional end elevation showing a still further embodiment of the device;

Fig. 19 is a front elevation partly broken away showing a door having the arrangement of Fig. 18;

Fig. 20 shows an alternate form of track which can be useful in some applications; and

Fig. 21 shows an arrangement where at least one of the panels can be rotatable to permit, selectively, the faces of the panel to be outwardly directed.

The track assembly of the invention is applicable to many applications from small sliding door cupboards, such as medicine chests and kitchen cupboards, through a wide range of articles such as domestic wardrobes and domestic and industrial cupboards and can also be applicable for application to sliding doors from relatively small doors, such as would be used domestically to large indistrial doors which may have to be motorised. It can also be used, for example, for chalk boards and room dividers.

Turning now to Fig. 1, we shall, for simplicity, refer to the area being enclosed by the doors, area 10, as a cupboard, which cupboard may be provided with a floor 11 and a top member 12. Connected to the floor 11 and the top member 12 there are track assemblies 13 which can be identical and which, as illustrated in this figure, would be made of extruded plastics material or an extruded metal such as aluminium, but could be fabricated in any other way. Each of these track assemblies have two tracks 14,15 which run the length of the assembly and which are so spaced as to permit, as will be described hereinafter, a door panel to be located in each assembly with the panels being able to pass. Between the tracks 14,15 there are a number of cutouts 16 which are at a predetermined spacing, as will be described hereinafter. Each panel 17,17' has a height slightly less than the spacing

between the tracks or, more specifically, between the flanges 18, 18', 18'', being the flanges on each side and centrally of the tracks.

The door panels are provided with low friction means 19 at their lower edges which low friction means are complimentary to the track formation. As illustrated, these low friction means can be considered to be simply more or less spherical plastic members which extend below the lower surface of the panel or, alternatively, they could be single balls rotatably mounted in carriers or they could be ball bearings or any other required form of low friction device. The spacing of these along the width of the underside of the panel is the same as the spacing between the cutouts 16 in the track assembly. In their upper surface, as illustrated, the panels have spring loaded low friction means 20 which have low friction heads 21 which are connected to a shaft 22 which passes through a socket 23 and into a bore 24 in the door panel. Mounted about the shaft 22 and abutting the underside of the and the floor of the socket 23 there is an helical compression spring 25 which maintains pressure on the head 21 against the tracks 14,15. In order to maintain the low friction means 18 when the door is removed we provide a lock nut 26 which controls the available outward movement of the low friction member.

This arrangement, as with the low friction member 19, is purely exemplary as it would be possible to provide many alternative forms of upper connection which would operate satisfactorily.

It is preferred that means be provided whereby total overall height of the door can vary to enable the door to be located after the track assemblies are positioned and affixed to the cupboard opening, although it would be possible to locate the assembly as a whole and then affix the track assemblies at one end, move the panels to a position over the fixing and affix the track assemblies at the other end. This would, however, not be completely satisfactory.

As we have previously indicated, the low friction members 19 are spaced at distances equal to the spacing of the cutouts 16 and, similarly, the spacing of the low friction

means 20 is such that these are also equal to the spacing between the the cutouts on the upper track assembly.

The operation of the door of the present invention will be described more fully in relation to Figs. 8 to 11 which relate to an alternative embodiment of the door but, briefly, we provide a minimum of two panels, but normally three or more panels. The total number and width of the panels are such that all of the panels can be located in one of the tracks, in this case track 14, and when so located are closely abutting and are flush surfaced. This differs from previous conventional sliding doors where if, say, three doors were used, two would lie in one track, normally the rear track, and one in the other track and the panels can then be moved so that the single panel in one track can overlie or lie behind either of the other two panels whilst either of the other two panels can be brought in behind or in front of the single panel to thereby permit, at any time, accessibility to approximately one-third of the area of the opening of the cupboard.

In the arrangement of our invention, where three panels are used, each panel can be moved from its flush position to assume a position behind its adjacent or one of its adjacent panels. This is achieved as follows. The low friction means 19,20 are, when the panels are in alignment, directly in line with the cutouts 16 and thus rearward pressure on any one panel will cause it to pass rearwardly through the cutout 16 until it is received in the other track, in this case track 15. As there is sufficient spacing between the tracks 14,15 to permit movement of the doors, the door can then be slid along the track 15 to a position behind the, or one, adjacent, panel. When it is required to close the door it is only necessary to move the panel to its original position when the low friction means are again in alignment with the cutout portions 16 so the panel can move forward and present a fully flush surface. We do prefer, although this is not illustrated in the particular embodiment, to spring load the panels forwardly so that when they reach their required position they are automatically drawn into the forward track 14.

It will be seen that this arrangement permits any number of panels to be located in one of two tracks and as the number of panels increases so access to approximately one-half the opening can be obtained at any time.

The embodiment shown in Fig. 3 is simply a modification of that of Figs. 1 and 2 in that there are still a pair of tracks 27,28 which are spaced by upstanding members 29, thereby leaving recesses 30 which are effectively identical to the cutouts 16. This particular embodiment, which may be extruded or which can be formed by placing wooden laths on a flat surface, is particularly suitable for use with, say, roller bearings. In this embodiment, together with each of the other embodiments if so required both the upper and the lower low friction means can be spring loaded.

In each of these embodiments, if it is required to lock the panels, it is only necessary to ensure that the track assembly extends slightly further than is necessary in one direction and by simply causing the panels to move slightly in this direction, after they have passed through the cutouts 16 or the recesses 30 and are flush to then locate the panels. In this case the low friction members will no longer be in alignment with the cutouts or recesses, transverse movement cannot be obtained and the opening is locked.

It is preferable to provide a spring bias against which to move the panels as this will ensure that they are returned to their required position when the locking is released and the lock may be either in the form of a member which occupies the space opened at the end away from which the panels have been moved or, say, a locking pin which enters the track behind the panel and prevents movement there along. Again, these are only exemplary and many different forms of lock could readily be achieved once the panels have moved away from alignment with the cutouts and recesses.

The tracks of Figs. 4 to 6 have a great deal in common with those of Figs. 1 and 2 but, in this case, instead of providing the cutouts 16 or the recesses 30 we work on the compressability of the springs 25 to enable the panels to be moved from one track to the other.

Each of these extrusions has tracks 31 and 32 which are so formed that the total height of the doorway above these tracks is greater than it is in the intermediate position, and such that when the door is moved transversely the springs 25 are compressed and when they go over the minimum height portion they tend to be released and relieve their tension, thus providing energy to push the panel towards the other track.

In this embodiment it will be appreciated that the panels can move from track to track in any position, provided this is not obstructed by part of another panel so, we prefer, as will be described hereinafter, to provide low friction spacer means to ensure that panels do not scrape one along the other when they are being moved from track to track.

The extrusion of Fig. 5 is effectively identical to that of Fig. 4 but the extrusion is modified in having rectangular recesses which are adapted to receive roller bearings rather than being part cylindrical to receive balls or plastic low friction means.

The embodiment in Fig. 6 varies in that the movement in one direction is gradual because of the location of the ramp 34 and thus there is a self closing tendancy when moving from track 32 to track 31 once the high peak has been passed. Again, in this particular form we illustrate recesses 33 but the particular configuration can be used with any other form of low friction means.

Fig. 7 is, to all intents, practically identical to Fig. 4 but whereas the extrusion of Fig. 4 could well be of a plastics material that of Fig. 7 is more suitable for a metal having a higher strength and thus can have narrower wall thickness.

Figs. 8 to 11 illustrate the operation of a different embodiment of the invention which is similar to the operation of an embodiment using profiles of any one of Figs. 4 to 7. Generally, in this case, we have a cupboard 40 which has three panels 41, 41', 41''. In this case, as will be described hereinafter, the low friction means 42 are mounted on the rear of the door panels and also mounted on the rear of the door panels are low friction spacer means

43 which permit the face of one panel to run behind the rear of an adjacent panel with no damage to the panel face.

The particular embodiment uses a sloping profile track, as will be described hereinafter, but the operation would be the same for any one of the profiles of Figs. 4 to 7. If a panel is to be moved it is wholly or partially moved transversely rearwardly and then slid in the required direction. Thus, it will be seen that the panel 41' of Fig. 8 can be moved rearwardly and then can be moved along behind panel 41 with the contact between the two panels being restricted to the low friction spacer means. This movement can continue until the centre third of the cupboard is completely exposed and then, if required, the panel 41' can simply be moved in the opposite direction until it clears the spacer means 43 at which time it tends to move forwardly and finally to assume the condition illustrated in Fig. 8. To demonstrate the invention, however, we illustrate, in Fig. 10 the simplicity of simply moving panel 41 to the position originally occupied by panel 41' and when panel 41 reaches this position panel 41' will simply move forwardly to provide the original flush surface but with the panels in different orientations.

In order to more fully describe the arrangement of this particular embodiment reference will be made to Figs. 12 to 16.

Fig. 12 is a section along line 12-12 of Fig. 8 and shows the cupboard 40 to which there is connected the tracks 44,45 which, as can be seen, are mirror images and each of which has a continuous track surface 46,47 respectively, which surfaces are so arranged that they slope upwardly and downwardly respectively as they approach the opening to the cupboard. Thus, the total width of the opening increases from the rear of the track to the front of the track.

Connected to the lower edges of the doors there are low friction means 48 which comprises a compartment 49 which is open at the front 50 and in which there is located a low friction member 51 which comprised a leg 52 having on its lower end a ball receiving member 53 and a ball 54. The outer face 55 of the leg member is provided with serrations as is the adjacent inner face 56 of the compartment 49, the

arrangement being such that when the container is screwed to the rear of the panel, as by screws 57, the leg 52 is locked into a position by the co-operating serrations. The upper low friction means 60 also comprises an open fronted compartment 61 in which there is, again, provided a low friction assembly 62 comprising an upwardly directed arm 63, a ball receiving member 64 and a ball 65. In this case the arm 63 is constrained to move in an inner compartment bounded by side walls 66 and in which there is located an helical compression spring 67. Again, when the compartment 61 is fitted to the rear of the panel, as by a screw through apertures 68, the arm and its associated spring are retained. Thus, depending upon the height of the door, so the effective length of the leg 52 can be altered and the compression in the spring 67 can be varied for most effective operation. Also located on the back of the door panels there are spacers 70 which may take one of two forms. In the first of these, illustrated in Fig. 15, the spacer comprises a roller 71 of a low friction material which is carried by a pair of arms 72 which are located on a body 73, the assembly being provided with a spike 74 by means of which it can be fitted to the door panel.

In an alternative form, illustrated in Fig. 16, a similar roller 75 is rotatably mounted in similar arms 76 which themselves are connected to a strip 77 which may extend the width of the panel and which may be provided with the required number of spacers. This strip may have apertures 78 which permit fixing.

It will be seen that in this form of door the door panels are located in what is, effectively, an inclined plane and will normally move forwardly so that the panel occupies the open front of the cupboard. It can be shown that this forward position is the position of least energy as the potential energy of the spring is at its lowest level. If a panel is located partially or wholly behind a panel in the forward position, as is the case of panel 41' in Fig. 9, then it will tend to assume the position illustrated in Fig. 9 but a simple sidewise movement will readily cause it to assume the condition shown in Fig. 10, that is with the panel open. Because the rollers 71 and 75 of the spacers can be made of a relatively

soft and low friction material, such as nylon, there is little or no marking on the contacted panel face even after a large number of operations.

We have also found that this arrangement is cheap and easy to produce and the doors formed in this way are simple to operate.

The track assembly of Fig. 17 is very similar to that of Figs. 12 and 13 but differs in that at the end of the inclined plane there is a turned up portion 81 which is spaced from the forward flange 82. This turned up portion 81 acts as a stop for the ball, say 54, which means that the edge of the ball receiving member 83 no longer contacts the forward flange 84 and thus the door panel can be arranged to finish flush with the flange 82, thus removing the necessity for a plinth or the like at the lower end of the cupboard. Otherwise the operation of this embodiment is identical to that of the embodiment illustrated in Figs. 12 and 13.

The embodiment of Figs. 18 and 19 provides a very similar type of operation as does the previous embodiment but instead of having balls which can rotate in any direction we provide two sets of rollers which rotate about axes at right angles. The first rollers 90 are connected to the underside of the panels 91 and, effectively, extend across the width of the panels. The transverse panels 92 lie across the track assembly 93 and are sufficiently closely spaced so that there is always a plurality of them beneath each roller 90 so that the panel is at all times stable. In this case, when the panel is being opened or closed the roller 90 is effectively stationary whilst the rollers 92 rotate, whereas when the panel is being moved transversely, that is into a position where it can be opened or closed then the roller 90 rotates.

Fig. 20 is a sectional elevation of a form of track which can be used with any of the previous embodiments. In this case, as illustrated, the track comprises an inclined plane 95 although it does not have to be inclined and passing therethrough longitudinally is an upwardly directed stem 96 which is connected in the form of an inverted T to the base 97 which, in turn, is acted upon by compression springs 98

located in a container or recess 99. In this form of the invention, when the panel is moved rearwardly the low friction device causes depression of the stem 96 and the panel passes into what is effectively a second track and may be moved along this track. The tension of the spring 98 may be such as to provide little force against depression of the stem 96 but, nevertheless, when the panel is moving will tend to retain the panel in the area of the track bounded by the stem at the forward side but, on the panel stopping or being slightly drawn forward, the stem will again be moved downwardly and the panel will be able to move forwardly, largely under the frictional effect from the inclined plane and the tension spring in the upper low friction member.

Fig. 21 shows an embodiment which is most suitable to the arrangement of Figs. 1 to 3 but is still applicable to the other embodiments. In this case we wish to provide a panel 100 which can be rotated about a central axis to provide either a plain surface, not illustrated, or, say, a mirrored surface 101. Assuming the arrangement is similar to that of Fig. 1 we extend the cutouts 16 at 102 and 103 so they pass completely across the width of the track assembly. The panel 100 can be provided with a central pivot which can be engaged and the low friction means both top and bottom, although only the top low friction means 104 have been illustrated, pass through the expanded cutout portions to permit rotation about 180°. At the termination of rotation the low friction means 104 can re-enter the opposite extended cutout portion 102 and the panel becomes located in its original condition but with its opposite face being outwardly directed.

Also, should we desire we can make the width of the total track assembly greater than that which is necessary for receiving two door panels and in this way can stack doors to provide greater percentage opening.

Should we desire to lock the door of this embodiment we can either lock each panel, force the panels together and hold them in this orientation or form the edges of the panels so they can interengage.

Claims

1. A sliding door having at least two panels (17,17') and a pair of parallel track assemblies (13) at both the top and the bottom of the opening into which the panels are to be located, low friction means (19) associated with, at least, the lower edge of each door panel, which means are adapted to be received in the track assemblies (13) and which extend below the lower extremity of each panel, and means (16) whereby the panel can be moved transversely across the track assemblies.

2. A door as claimed in claim 1 wherein there are cutouts (16) between the two tracks (14,15) in the track assemblies (13) which cutouts have a depth substantially equal to the depth of the track which cutouts are spaced at distances equal to the spacing of the low friction means (19).

3. A door as claimed in claim 2 wherein there are low friction means (20) on the upper edge of each panel (17).

4. A door as claimed in claim 2 wherein the cutouts (16) are so located that each panel can be moved to one track and when so moved, they abut and close the opening.

5. A door as claimed in claim 1 wherein the low friction means (20) on at least one edge of the door are sprung (25) and the portion of the track assembly between the two tracks is so shaped as to permit the door to ride over this portion from one track (31) to the other (32).

6. A door as claimed in claim 5 wherein the portion between the two tracks is arcuate or of saw-tooth form.

7. A door as claimed in claim 1 wherein there is provided a longitudinal stem (96) extending through a slot in the track assembly, (95) the stem being spring loaded (98) so that, on contact by the low friction means it can be displaced downwardly to permit a door panel to move thereover.

8. A door as claimed in claim 1 wherein the door panels can be displaced longitudinally so the low friction means (19,20) are displaced from the cutouts (16) to thereby prevent transverse movement of the panels.

9. A door as claimed in claim 8 wherein there is a moveable stop at one side of the door and a lockable stop at the other.

10. A door as claimed in claim 1 wherein at least

one door panel (100) has a central extension at its top and bottom edges which enter a track and two low friction means (104), one on either side, and wherein the cutouts (16) are extended (102,103) to enable rotation of the panel about the central extension.

11. A door as claimed in claim 1 wherein the track assemblies (44) are each in the form of an inclined plane having means whereby it can be fixed to the opening, the planes being inclined to form an opening of maximum height at the front of the door and with the height being restricted at the rear of the door opening, low friction means (48) at the lower edges of the panels, spring loaded low friction means (60) at the upper edges of the panels and spacers (70) on the rear of each panel and being so arranged as to ensure that contact between panels is restricted to contact between the spacers (70) and the face of the adjacent panel.

12. A door as claimed in claim 11 wherein the low friction means (48) at the lower edges of the panels are connected to the rear of the panels and comprise a body, (49) a leg (52) extending from the body which leg has a low friction means (54) on its lower end, the leg and body having co-acting parts (55,56) whereby the extension of the leg can be varied.

13. A door as claimed in claim 12 wherein the leg has serrations (55) on one surface which can co-act with serrations (56) on the body, the arrangement being that when the two members (49,52) interengage and the body is fitted to the panel the length of the extension is fixed.

14. A door as claimed in claim 11 wherein the low friction means (60) at the upper edges of the panels are connected to the rear of the panels and comprise a body (61), an arm (63) extending from the body, which arm has a low friction means (65) on its lower end, the arm and body being interconnected by a compression spring (67) whereby the arm is biased outwardly from the body.

15. A door as claimed in claim 11 wherein the spacers (70) are low friction means extending rearwardly from the rear of the panels for a distance greater than the extension of any other part of the door.

16. A door as claimed in claim 15 wherein the spacers

are rollers (71) adapted to be fitted to the panels.

17. A door as claimed in claim 16 wherein the rollers (75) are fitted along a strip (77) adapted to be fitted to the rear of a door panel.

18. A door as claimed in claim 11 wherein at least the lower track (80) has adjacent its outer end a longitudinal upward return (81) of such dimension as to retain the low friction means and to provide them with a running surface whilst restraining them from reaching the front of the track.

19. A door as claimed in claim 18 wherein there is an upward flange (82) at the front of the track (80) and wherein the door, when in its forward position, terminates behind this.

20. A sliding door as claimed in claim 1 wherein each panel has a roller (90) or rollers extending longitudinally under its lower edge and the lower track (93) is in the form of an outwardly and downwardly directed inclined plane having a plurality of rollers (92) transverse to the longitudinal axis and extending across the width of the track, the rollers (92) having a spacing such as to stably receive the roller(s) (90) of each panel.

21. A sliding door as claimed in claim 11 wherein means are provided to lock the panels when they lie in a single plane.

22. A sliding door as claimed in claim 21 wherein the means comprises moving the panels together and preventing movement of one end panel.

23. A sliding door as claimed in claim 11 wherein the side edges of the panels are formed to interengage and each panel is provided with a locking means so if it should be an end panel it can be retained in position to restrain movement by the other panels.

24. A sliding door as claimed in claim 1 wherein the width of the track is sufficient to receive a plurality of door panels, one behind the other.

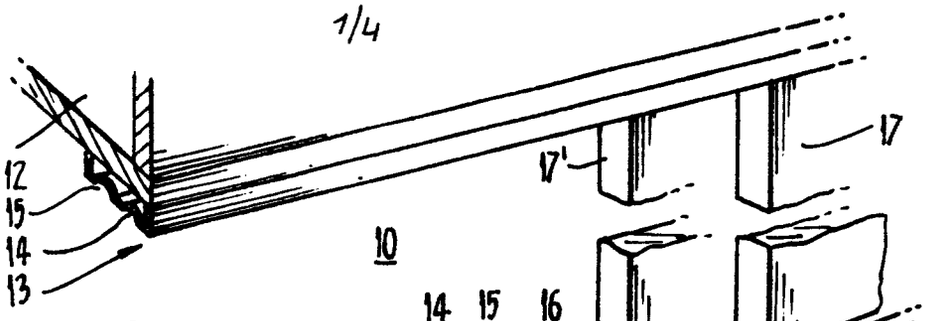
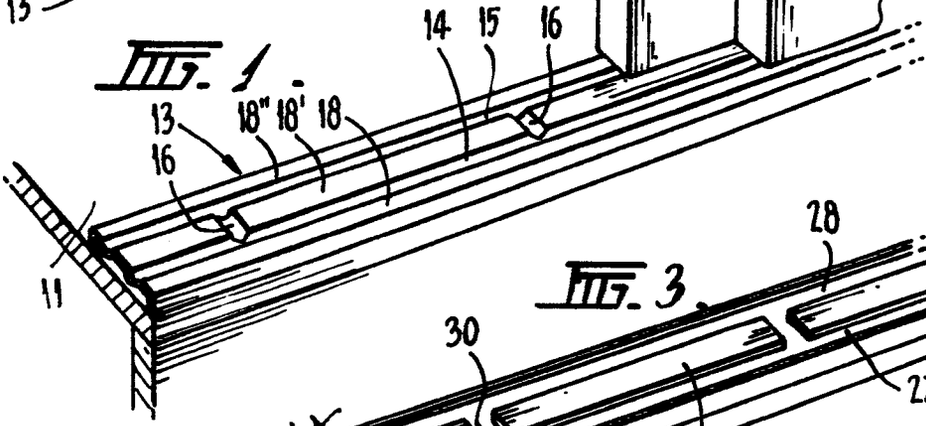


FIG. 1.



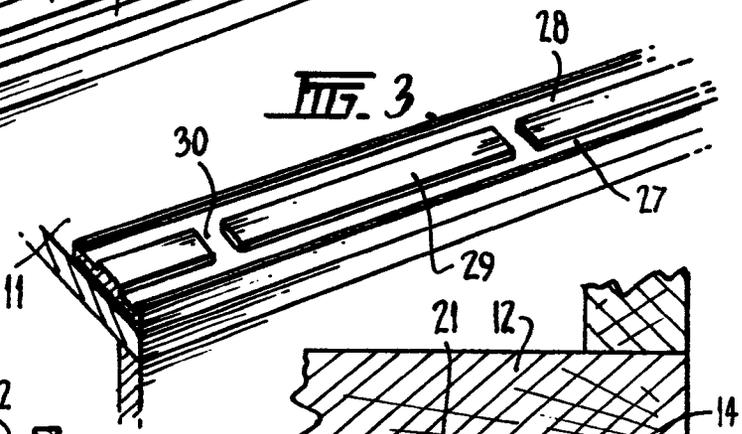


FIG. 3.

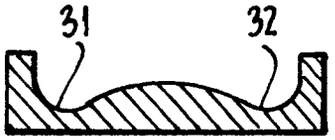


FIG. 4.

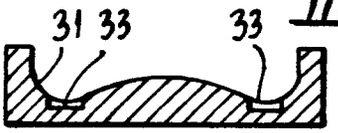


FIG. 5.

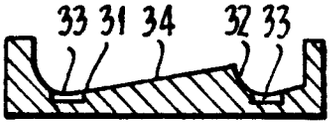


FIG. 6.

FIG. 7.

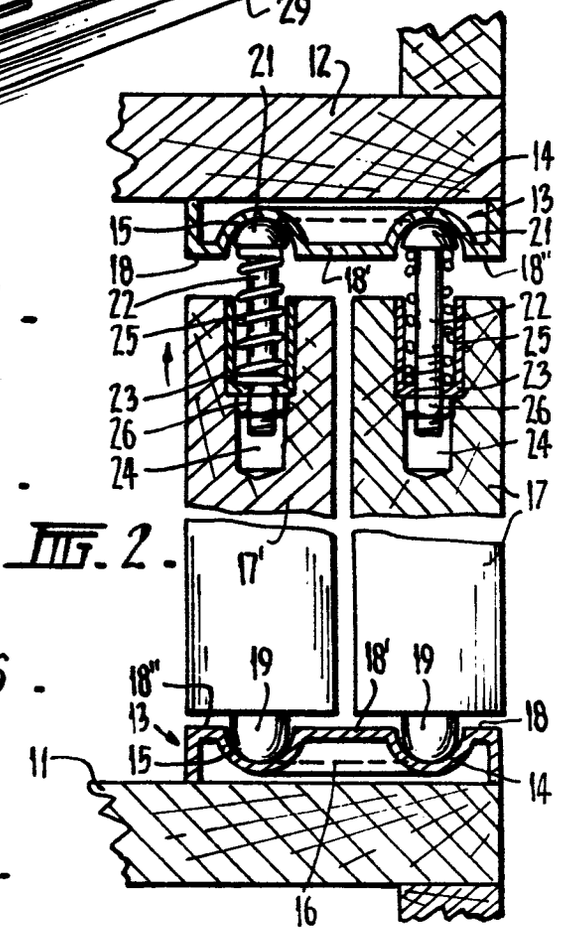
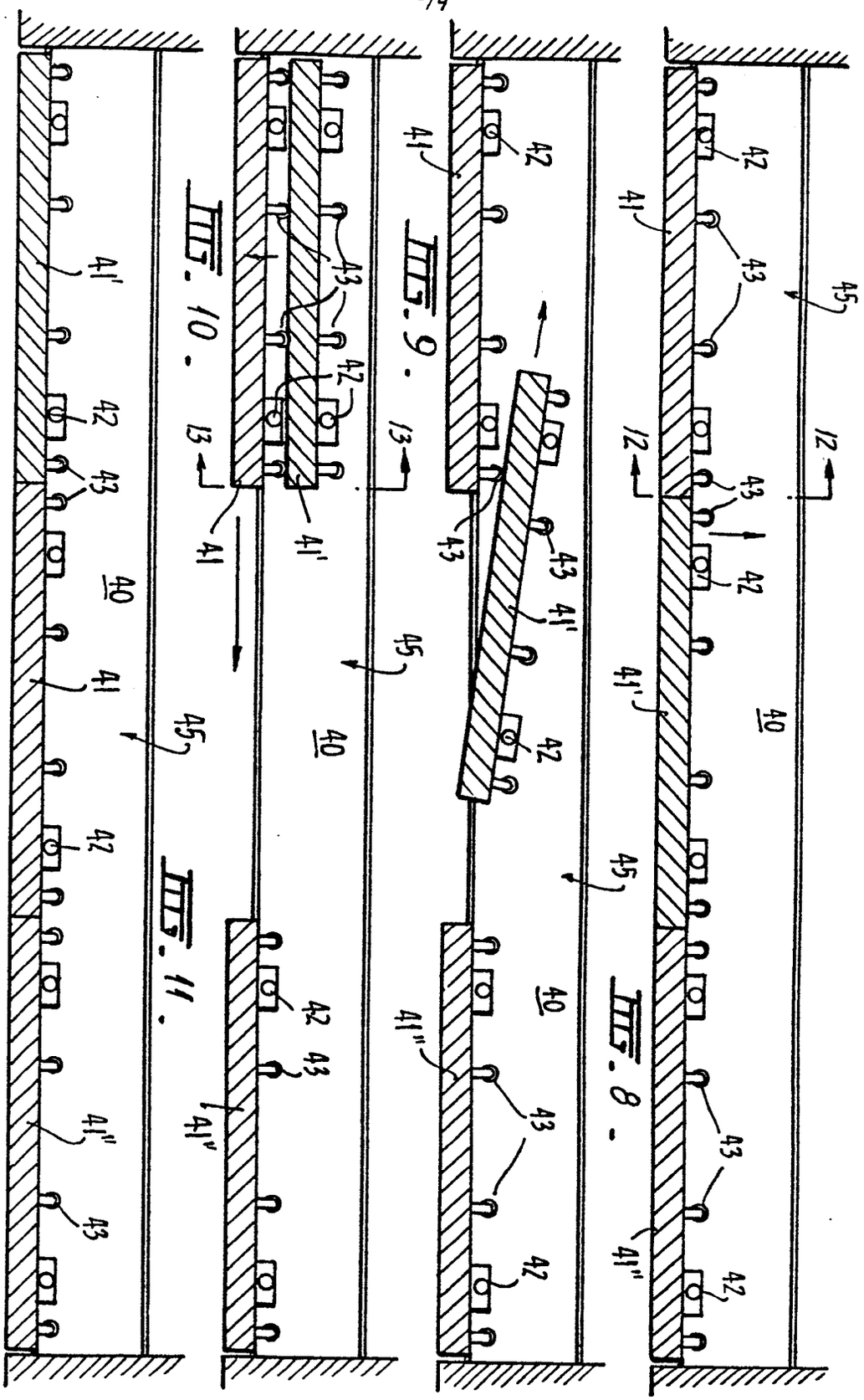


FIG. 2.



Фиг. 8

Фиг. 9

Фиг. 10

Фиг. 11

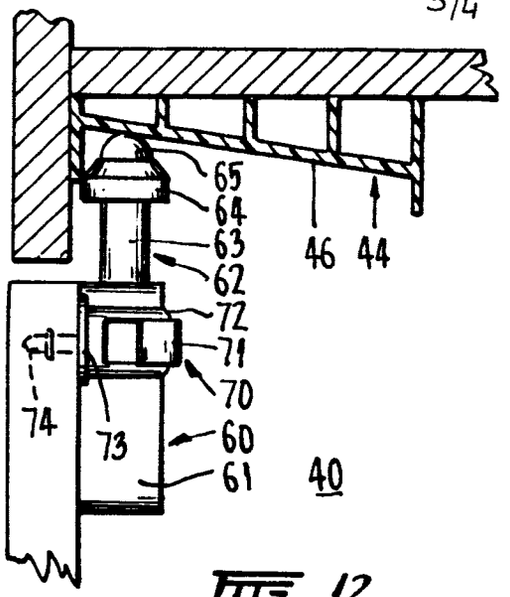


FIG. 12.

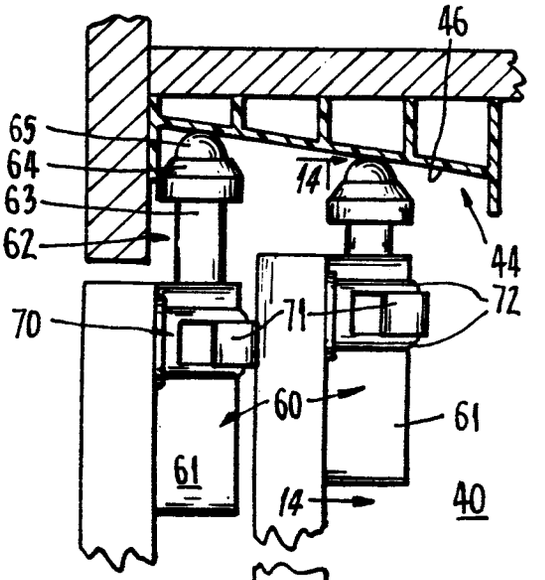
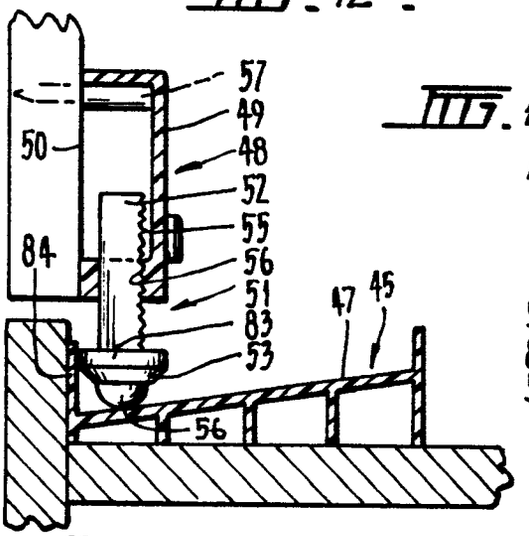
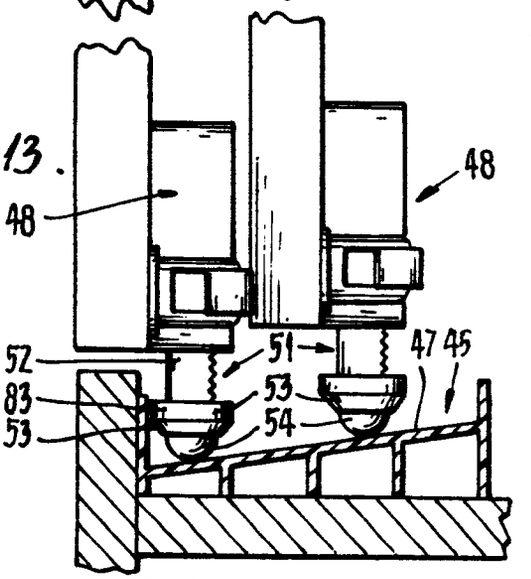


FIG. 13.





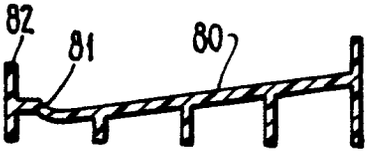


FIG. 17.

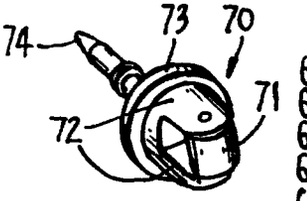


FIG. 15.

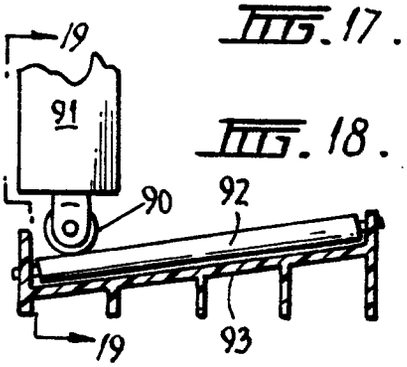


FIG. 18.

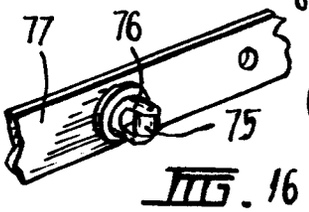


FIG. 16.

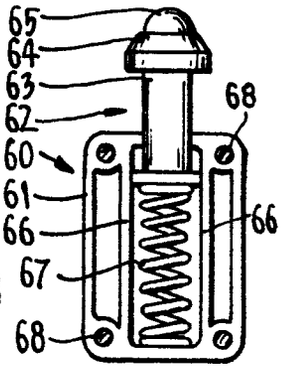


FIG. 14.

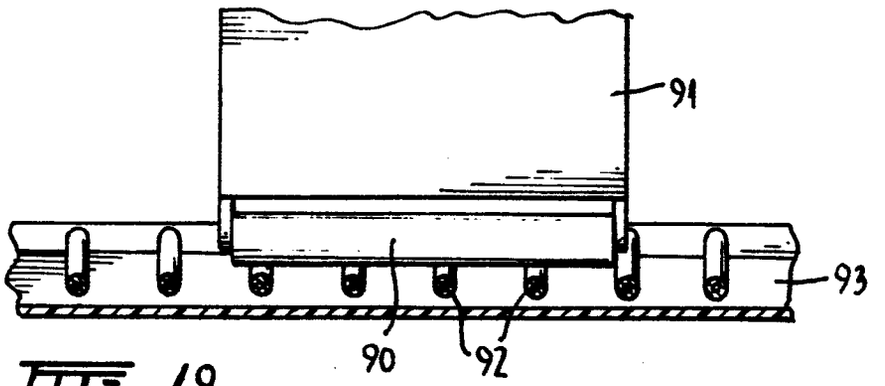


FIG. 19.

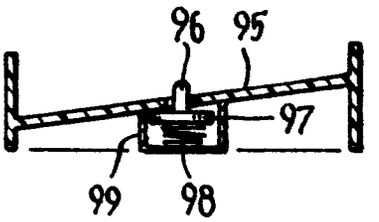


FIG. 20.

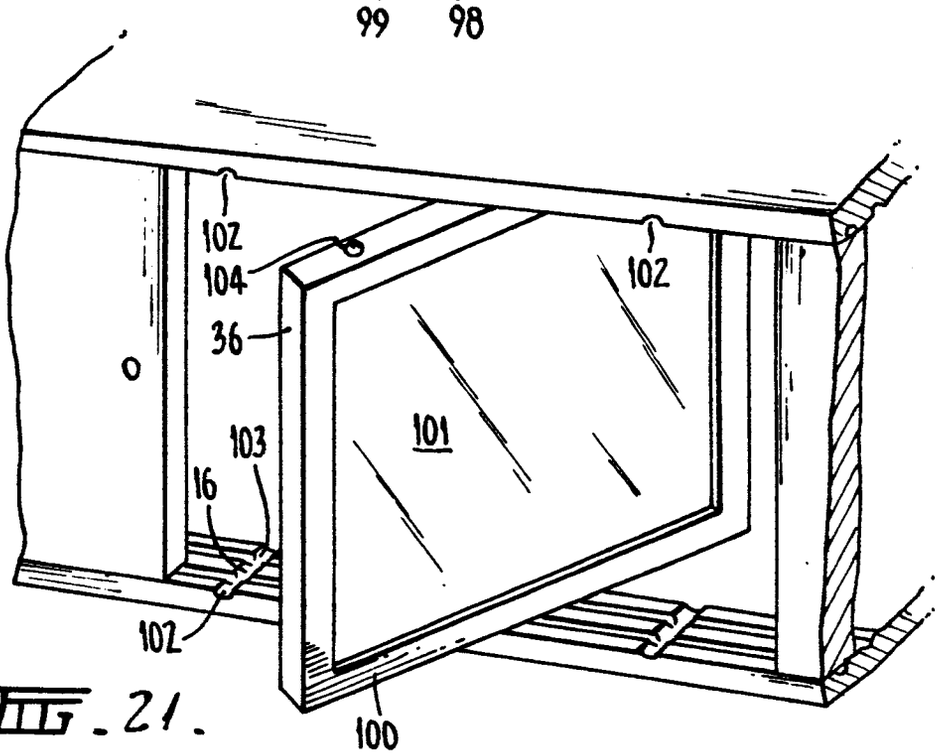


FIG. 21.

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EUROPEAN SEARCH REPORT

Application number EP 79 30 0380

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	CH - A - 178 772 (HENGSTLER) * page 1, column 1, lines 1-25; column 2, lines 1-25; page 2, column 1, lines 1-48; figures 1-4 *	1,2,3, 4,10, 21,22, 23,24
X	DE - C - 94 686 (LENZ & STUMPF) * page 1, column 1, paragraph 5; column 2, paragraph 1; figures 1-4 *	1,2,4, 21,24
X	GB - A - 674 995 (T.M.M.) * page 1, lines 35-55; page 2, lines 1-33 and 46-130; page 3, lines 1-10; figures 1-13 *	1,3,5, 12,13
X	US - A - 3 226 777 (KOLLSMANN) * column 3, lines 15-75; column 4, lines 1-47; figures 1 and 2 *	1,3,5, 11,14, 15,24
X	US - A - 3 138 830 (SCHARGE) * column 1, lines 50-64; column 2, lines 1-64; column 3, lines 1-50; figures 1-5 *	1,5, 11,14, 18
	GB - A - 1 397 774 (CRITTALL-HOPE) * page 2, lines 47-130; page 3, lines 1-6; figures 1-7 *	1,3,4, 8,9, 21,22, 23

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CLASSIFICATION OF THE APPLICATION (Int. Cl.²)

E 06 B 3/50

TECHNICAL FIELDS SEARCHED (Int.Cl.²)

E 06 B
E 05 D

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9-08-1979	DEPOORTER

EPO Form 1503.1 06.78

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Application number
EP 79 30 0380

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	US - A - 3 367 731 (KAFFERLIN) * column 1, lines 50-64; column 2, lines 1-29; figures 1 and 2 *	1,11, 19	
	FR - A - 1 219 364 (BONNET) * page 1, column 1, paragraphs 3 to 5; column 2, paragraphs 1 to 8; page 2, column 1, paragraphs 1 to 5; column 2, paragraphs 1 and 2; figures 1 to 9 *	1,15, 16	TECHNICAL FIELDS SEARCHED (Int. Cl.³)
	FR - A - 2 294 312 (SIMONIN) * page 2, lines 14-40; page 3, lines 1-5; figures 1-3 *	1,20	
	BE - A - 655 019 (ALEXANDRE) * page 5, paragraphs 5 to 7; page 6, paragraphs 1 to 5; page 7, paragraphs 4 to 6; page 8, paragraphs 1 to 5; figures 1 to 5 *	1,20	
	US - A - 2 842 810 (GANGL) * column 2, lines 53-72; column 3, lines 1-15; figures 1 to 13 *	6,11	
		./.	

European Patent Office

EUROPEAN SEARCH REPORT

Application number
EP 79 30 0380
-3-

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.²)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	FR - A - 2 244 059 (PLANACORD) * page 3, lines 11-40; page 4, lines 1-12; page 6, lines 9-23; figures 1,2 and 7 *	10	
	GB - A - 691 330 (ECKINGTON) * page 1, lines 48-50 and 75-90; page 2, line 1; figures 1-3 *	17	TECHNICAL FIELDS SEARCHED (Int. Cl.²)