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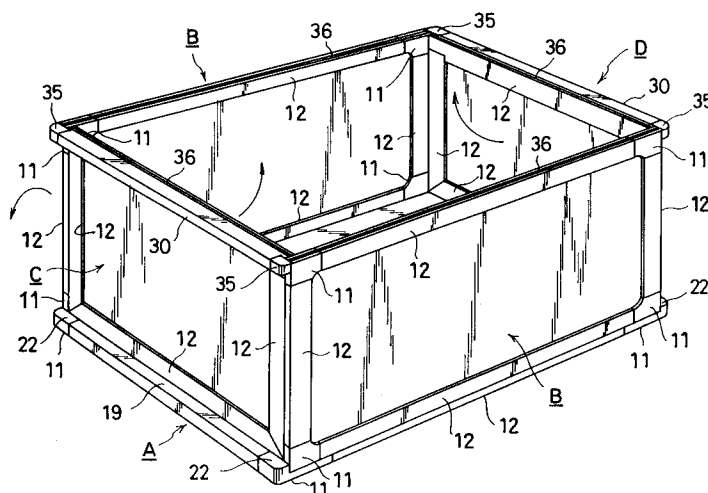
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(54) **Folding container.**

(57) A folding container comprises rectangular bottom (A), both side (B), front (C) and rear plates (D), in which the bottom and both side plates are coupled to one another such that the side plates can be rotated clockwise and counterclockwise by bringing a pair of support shafts (21) to fit into the lower edge front and rear end faces of the side plate. The front,

rear and both side plates are coupled to one another such that the front and rear plates can be rotatable about sideways running axes and the both side plates can be rotated clockwise and counterclockwise by bringing support shafts (36) to fit into the upper edge front and rear end faces of the side plates.

**FIG.1****EP 0 483 531 A1**

## BACKGROUND OF THE INVENTION

### Field of the Invention

The present invention relates to a folding container in which panel materials are used and more particularly to a folding container which can be folded flat when not used and can be assembled with ease for use.

### Related Background Art

As folding containers, conventionally there have been used a folding container which is obtained by setting up members which are molded by injection molding, a container obtained by coupling and setting up panel materials and the like. The former folding container prepared by injection molding is high in intensity so that it is used for transportation and conveyance of relatively heavy weight baggages. However, it has such drawbacks that the cost of plant and equipment for metal mold and the like is high and the container itself is costly. On the other hand, the latter folding container obtained by coupling together the panel material is low in cost. However, it has such drawbacks that it is inferior in air-tightness and hence it is not suitable for transportation and conveyance of heavy weight baggages and the like. For this reason, the folding container using the panel materials is being used in specific fields of clothing containing boxes, transport boxes for vegetables and fruits and the like.

As the panel materials constituting bottom plate, side plates, front plate and back plate in the conventional folding containers of the above mentioned type, this metal plates, corrugated card-boards, synthetic resin plates and the like are typically used. The folding container which can be folded into a flat form by turning and moving the both side plates in a lateral direction after the front and back plates have been sprung up inwardly is disclosed, for example, in Japanese Utility Model Publication No. 2-2338, Japanese Utility Model Publication No. 53-19877, Japanese Utility Model Laid-Open Publication No. 51-78838, Japanese Utility Model Laid-Open Publication No. 52-73127 and the like.

In addition, for reduction in weight and increase in intensity, a container of the type in which as shown in Fig. 14, a plastic hollow plate 1 which is prepared by welding or adhering surface sheets 4 and 5 to the both surfaces of an intermediate sheet 3 having follow swellings 2 of circular or other configuration formed on one surface or both thereof and made of polyethylene or other synthetic resin material is cut into rectangular pieces of predetermined size is sometimes used.

In a conventional folding container in which metal plates are used for sheet materials of respective surfaces, if the plate thickness is increased so as to resist load exerted when the containers are piled up, the entire weight is increased to cause inconvenience to transportation thereof and gaps are liable to be formed in junctions between individual plates and hence the air-tightness is lost and the appearance thereof becomes poor.

On the other hand, the corrugated card-board container, though it is lightweight, can not guarantee such high intensity as that attained by the container made of metal plates and is inferior in air tightness and waterproof.

In particular, the container as disclosed in the above-mentioned Japanese Utility Model Publication No. 53-19877 has such drawbacks that since a shaft member which is bent to a rectangular configuration so as to act as a pivot should be put on the entire circumference of an upper edge portion (and/or a lower edge portion of the container, the manufacture thereof takes much time and labor and the edge portions become bulky, which is unfavorable for appearance's shake.

On the other hand, the container consisting of synthetic resin plates has such drawbacks that since many large-sized metal molds should be prepared in accordance with the size of the bottom plate, the side plates and the like, the manufacture thereof is costly and the plate thickness should be increased in order to attain sufficient intensity, which leads to an increase in material cost.

Such an idea that a large-sized synthetic resin plate is cut into pieces of appropriate size to be used on individual surfaces of the folding container can be conceived of. However, cut ends look ugly and hence the appearance becomes poor, and it is difficult to couple together the individual plates, so that this idea is not practical.

The above-mentioned drawbacks can be greatly improved by a plate material 1 as shown in Fig. 14. However, the plate material 1 of the type as shown in Fig. 14, although it is highly resistive to tensile strength, is insufficient in resistivity to compressive force, flexural rigidity, buckling intensity and the like acting in a facial direction. In addition, the plate material 1 has also such drawback that exposed cut ends look ugly and it has difficulty in joining and connecting between an end of the plate material 1 and other members.

## SUMMARY OF THE INVENTION

The present invention has been contemplated in view of the above mentioned drawbacks associated with the prior art. Accordingly, an object of the present invention is to provide a folding con-

tainer which has sufficient intensity in spite of lightweight, is superior in air tightness, has good appearance and is easy to manufacture.

In order to attain the above mentioned object, according to the present invention, there is provided a folding container of the type consisting of rectangular bottom plate, side plates, front plate and rear plate and characterized in that

a) the bottom plate and the both side plates are coupled to one another such that a pair of support shafts which are formed at front and rear edges of the bottom plate so as to direct in forward and rearward directions are fitted onto front and rear ends at lower edges of the both side plates in such a manner that the both side plates can be rotated and moved clockwise and counterclockwise with respect to the bottom plate, and

b) the front and rear plates and the both side plates are coupled to one another such that support shafts which are provided at outer end of shaft rods which are provided at upper edges of the front and rear plates so as to direct sideways are fitted onto front and rear ends of upper edges of the both side plates in such a manner that the front and rear plates can be rotatably moved about axes directing sideways between upper portions of the both side plates and the both side plates can be rotatably moved clockwise and counterclockwise.

It is preferable that the support shaft of each shaft rod is provided so as to fit into a U-shaped bent portion of a frame rod at the lower or upper edge of the side plate.

It is also preferable that a tongue is provided on any one of a portion of an outer peripheral surface of the shaft of each shaft rod and an inner surface of the U-shaped bent portion of the frame rod on corresponding side plate and a concave groove which is in engagement with the tongue is provided in the other of the portion and the inner surface such that the support shafts of the shaft rod can not be slipped out of the both side plates.

It is also preferable that after the individual plates have been assembled, air tight seal members are provided on the lower edge of each side plate or the bottom plate, on the both side edges of the front and rear plates or the both side plates, and on the lower edge of each of the front and rear plates or the bottom plate.

It is further preferable that in the assembled state, seal member are provided at the upper edges of the both side plates, the front plate and the rear plate.

It is also preferable that receiving holes which are bent such that corner portions of the shaft rod can pass therethrough are provided in corner portions on the both sides of the upper shaft rod there

are provided end faces which are brought into sliding contact with the front and rear end faces of the side plate and end faces which abut against the left and right end faces of the front or rear plate on the both side corner portions of the upper shaft rod, and cover strips 35 which cover at least upper face and the outside of the corner portions are fitted onto the both side corner portions of the upper shaft rod.

It is also preferable that a cover strip which covers a corner portion of the lower shaft rod is formed integrally with a cover of a corner of the bottom plate.

It is also preferable that a panel used for the container of the above mentioned type is constructed such that a metal frame rod which is U-shaped in cross section is fitted onto and fixed to a circumferential edge of a nonmetal plate material which is fragile against the compressive force acting in a facial direction.

It is also preferable that the frame rod comprises a base portion which is in opposition to the end of the plate material, a pair of side strips which extend from the both side edges of the base portion in the same direction so as to nipplingly hold the circumferential edge portion of the plate material, and projections which are provided at the tips of the side strips in opposition to each other in the form of burrs for upon cutting operation, and the projections are fixed onto the surface of the plate material so as to bite into the plate material.

It is also preferable that a pair of side strips which extend in the same direction from the both side edges of the base portion are provided on the outside of the frame rod and flexible covers provided with engagement strips which are in opposition to each other are put on the tips of the side strips such that the engagement strips are respectively brought into engagement with the leading edges of the frame rod.

In this case, it is preferable that the cover consists of straight covers for covering linear portions of the plate material and corner covers for covering corner portions of the plate material, horizontal and vertical portions of opposing engagement strips of the corner covers are respectively brought into engagement with orthogonal leading edges of the frame rod at the corner portions of the plate material and one straight cover is provided between two corner covers.

According to the folding container of the present invention, in the assembled state, after the front and rear plates have been flipped up inwardly centering on the upper shaft rod, the both side plates are rotated and moved in a lateral direction centering on the support shaft of the lower shaft rod, by which since the upper ends of the both side plates are coupled together via the front and

rear plate and the support shafts of the shaft rods extending from left and right ends thereof in forward and rearward direction, the both side plates fall down in a parallelly arranged state and hence the entire folding container is folded into a flattened configuration.

In the reverse order, after the side plates have been set upright simply by turning downward the front and rear plates between the both side portions, the container can be readily assembled into a box-shape configuration.

When the bottom plate, the both side plates, the front plate and the rear plate are composed of panels consisting of plate materials such as synthetic resin plates, corrugated card-board-like plates of paper or synthetic resin and the like, frame rods and flexible synthetic resin covers, sufficient intensity can be attained in spite of lightweight thereof and the covers are brought into close contact with one another when assembled, by which the air tightness can be increased and the appearance is improved.

In this connection, it is to be noted that the provision of seal materials on portions at which the bottom plate, the both side plate, the front plate and the rear plate are brought into abutment against one another allows further improvement in airtightness.

The projection on the frame rod is arranged to bite into the surface of the plate material, by which the frame rod is fixed to the plate material in a snap-in manner and hence will never be removed therefrom.

The frame rod is fixedly fitted onto the circumferential edge portion of the plate material, by which the compressive strength acting in facial direction of the plate material is increased and the end faces of the plate material are covered with the frame rod, by which good appearance can be ensured.

By applying a cover on the frame rod, the appearance can be further improved and the compressive strength in the facial direction is further increased.

The opposing engagement strips of the cover are brought into engagement with the leading edges of the frame rods, by which the removal of the cover from the frame rod can be prevented.

The cover is composed of straight covers for covering the linear portions of the plate material and corner covers for covering the corner portions of the plate material, the opposing engagement strips of the corner cover are brought into engagement with the orthogonal leading edges of the frame rods at the corner portions of the plate material, and the opposing engagement strips of the straight cover are brought into engagement with the leading edges of the frame rods between

the adjacent corner covers, by which the movement of the cover is avoided and the removal of the cover from the frame rod can be surely prevented.

The features, advantages and other objects of the present invention will become apparent from the following description and claims when read in conjunction with the accompanying drawings:

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of the folding container in the assembled state according to an embodiment of the present invention;

Fig. 2 is a perspective view of the folding container in Fig. 1 showing the folded state thereof;

Fig. 3 is an exploded perspective view of the essential parts of the folding container in Fig. 1;

Fig. 4 is an exploded perspective view of a rear corner portion of the container in Fig. 1;

Fig. 5 is a longitudinal sectional side view of a front lower corner portion of a side plate;

Fig. 6 is a longitudinal sectional view taken along the line VI-VI in Fig. 5;

Fig. 7 is a longitudinal sectional view of essential parts of an alternative embodiment of the present invention;

Fig. 8 is a partially cut away perspective view showing an example of the panel used in the container according to the present invention;

Fig. 9 is a longitudinal sectional view taken along the lines IX-IX in Fig. 8;

Fig. 10 is also a sectional view of the same parts as those shown in Fig. 9, showing an alternative embodiment of means for fixing a frame rod to a plate material;

Fig. 11 is a partially cut away perspective view showing another embodiment of the panel used in the container according to the present invention;

Fig. 12 is a sectional view taken along the lines XII-XII in Fig. 11;

Fig. 13 is an exploded perspective view of the corner portion shown in Fig. 11; and

Fig. 14 is a partially cut away perspective view of a conventional hollow plate material;

## DESCRIPTION OF PREFERRED EMBODIMENTS

Next, preferred embodiments of the present invention will be described with reference to the accompanying drawings.

As shown in Figs. 1 to 7, the folding container according to the present invention comprises a bottom plate "A", both side plates "B", a front plate "C" and rear plate "D". These plates "A" to "D" basically consist of panels as shown in Figs. 8 to 13. Therefore, firstly, the basic structure of the

panel for use in the container will be described in detail and secondary embodiments of the folding container employing the panels will be described.

#### Structure of Panel for Container

Figs. 8 and 9 show a first embodiment of a container panel 10 used in the container of the present invention.

In the drawings, 1 denotes a rectangular hollow plate material which is the same as that shown in Fig. 14, in which onto the both surfaces of an intermediate sheet 3 of a polyethylene or other synthetic resin material with hollow swelled-out portions 2 of circular or other configuration formed on one surface (or the both surfaces) thereof, surface sheets 4 and 5 of the same material as that the intermediate sheet or material which is different from that of the intermediate sheet are welded or adhered.

6 denotes a metal frame rod which is U-shaped in section. The frame rod includes a base portion 7 which is in opposition to an end face 1a of the hollow plate material 1 and pair of side strips 8 and 8 which project inwardly from the both side edges of the base portion 7.

On the opposing surfaces of a leading edge 8a of each side strip 8, there are remained burrs formed when the side strip was cut out in the form of projections 9 which are in opposite to each other.

An end of the frame rod 6 is cut off at an inclined angle of about 45° so as to be spreaded out from the leading edge 8a of the side strip 8 toward the base portion 7.

The frame rod 6 is preferably formed by processing a plate material made of iron and steel, aluminium and an alloy thereof, stainless steel or the like.

The frame rods 6, the entire length of each being almost the same as that of each side of the hollow plate material 1, are fitted onto the individual sides or a circumferential edge of the hollow plate material 1 such that the base portion 7 of each of the frame is brought into abutment against the end face 1a of the hollow plate material 1 the both side strips 8 and 8 thereof nip the plate material 1 therebetween and inclined end faces of the adjacent frame rods 6 are brought into close contact with each other.

Then, as shown in Fig. 9, the projection 9 bites into the surface of the plate material 1, by which each frame rod 6 is fixedly attached onto the plate material 1 to be formed into a panel 10.

In the above mentioned panel structure, the projection 9 of the frame rod 6 bites into the surface of the hollow plate material 1, so that the frame rod 6 will not be removed from the plate material 1 indiscriminately.

In addition, the circumferential edge portion of the plate material 1 is reinforced with the frame rods 6 which are fitted onto the circumferential edge portion thereof, by which the compressive strength acting in a facial direction of the plate material 1 is increased.

Further, the end faces of the plate material are covered with the frame rods 6, so that good appearance can be ensured.

In this connection, it is to be noted that in order to fix the frame rods 6 to the plate material 1, the inner surface of the frame rods 6 may be adhered to the plate material 1 with an adhesive in stead of or in addition to the biting of the projections 9 into the plate material 1.

As another alternative, as shown in Fig. 10, cut-upward strips 8b which are oriented inwardly each other may be provided on portions of the side strips 8 of the frame rod 6 so as to be pressed into the plate material 1.

Figs. 11 to 13 show a second embodiment of the panel according to the present invention. In this respect, it is to be noted that the same reference numerals are assigned to the same members in the first embodiment and hence the detailed description thereof is omitted.

In this embodiment, after the frame rod 6 has been fitted onto each side of the circumferential edge of the hollow plate material 1 in the same manner as that in the first embodiment flexible corner covers 11 of synthetic resin are put on corner portions "P" thereof and likewise straight covers 12 of synthetic resin are put on linear portions "Q" between the adjacent corner covers 11 and 11.

Each of the corner covers 11 comprises an end strip 13 which is bent at right angles so as to cover a base portion 7 of each the vertical and horizontal frame rods 6 which are orthogonal to each other at the corner portion "P", a pair of side strips 14 of L-shaped or rectangular configuration in front view which are provided so as to extend inwardly from the both side edges of the end strip 13, and engagement strips 15 which are provided on inner edge portions of the side strips 14 in opposition to each other.

Distance "D1" between a horizontal portion of the end strip 13 of the corner cover 11 and a horizontal portion 15a of the opposing engagement strip 15 and a distance "D2" between a vertical portion of the end strip 13 and a vertical portion 15b of the engagement strip 15 are made almost

equal to a vertical length "L1" of the side strip 8 of the horizontal frame rod 6 and a horizontal length "L2" of the side strip 8 of the vertical frame rod 6.

In addition, the amount of projection "D3" of each engagement strip 15 from each side strip 14 is made almost equal to the thickness of each side strip 8 of each frame rod 6 (see Fig. 6).

The corner cover 11 is put on the corner portion "P" such that the end strip 13 and the side strips 14 are respectively brought into close contact with the outer surface of the base portion 7 of each frame rod 6 and the outer surfaces of the both side strips 8 of each frame rod 6 at each corner portion "P".

In this case, the horizontal portion 15a and the vertical portion 15b of the engagement strip 15 are respectively brought into engagement with the leading edge 8a of the side strip 8 of the horizontal frame rod 6 at the corner portion "P" and the leading edge 8a of the side strip 8 of vertical frame rod 6 at the corner portion "P", by which the forward or rearward, leftward or rightward and upward or downward removal of the corner cover 11 from the frame rod 6 can be prevented.

The straight cover 12 comprises a sheet end strip 16 which covers the base portion of the frame rod 6 on the linear portion "Q" and a pair of side strips 17 which project inward from the both side edges of the end strip 16. At the tip of each side strip 17, there is provided an engagement strip 18 so as to oppose to the engagement strip provided on the other strip 17.

When the end strip 16 and the side strips 17 of the straight cover 12 are respectively brought into close contact with the outer circumferential surface of the base portion 7 and the outer surfaces of the both side strips 8 of the frame rod 6 on the linear portion "Q", each of the engagement strips 18 is brought into engagement with the leading edge 8a of each of the side strips 8 of each of the frame rod 6.

At that time, the both end portions of the straight cover 12 are brought into close contact with the corresponding side strips 14 of the corner covers 11.

Owing to the close contact of the straight cover end portions with the corner cover side strips 14, the forward or rearward, leftward or rightward and upward or downward removal of the straight cover 12 from the frame rod can be prevented.

As has been described above, the plate material 1, the frame rods 6, the corner covers 11 and straight covers 12 constitute one sheet of container panels 10.

In order to remove the individual covers 11 and 12, the both side strips 14 and 17 are elastically deformed to be stretched and then the engage-

ment strips 15 and 18 are disengaged from the leading edges 8a of the side strips 8 of the frame rod 6.

In a case that the container panel is constructed as in the second embodiment, not only the operation and effects which are the same as those attained in the first embodiment can be attained but a such effects can be attained that the appearance is further improved owing to the provision of the covers 11 and 12 and the covers 11 and 12 can be surely mounted on the frame rod simply by engaging the engagement strips 15 and 18 of the covers 11 and 12 with the leading edges 8a of the side strips 8 of the frame rod 6.

In addition, the covers 11 and 12 can be readily attached and detached.

In this connection, it is to be noted that the panel used for the container of the present invention is not limited to the above mentioned embodiments but can be varied in a variety of ways as follows:

- a) As the material of the plate material 1, paper, wood or the like may be used instead of synthetic resin.
- b) The plate material 1 may be constructed by a veneer, a plywood, a corrugated plate, or a multi-layered plate consisting of a honey-combed core, a corrugated plate and other partition plates and the like.
- c) The corner covers 11 and the straight covers 12 may be made of polyethylene, polypropylene or other synthetic resin.
- d) The ends of the adjacent frame rods 6 may be butted against each other at an angle of 90° instead of the butting at the angle of 45° as mentioned above, put one upon the other, or fitted one onto (into) the other. As a further alternative, the ends may be fixedly adhered to each other by spot welding or the like in the piled up state.
- e) The corner covers 11 are omitted and the ends of the straight covers 12 are joined together as in the case of the above mentioned ends of the frame rods 6.

#### Embodiments of Folding Container

Next, an embodiment of the folding container according to the present invention in which the container panel as mentioned above is used will be described with reference to Figs. 1 to 7.

The folding container according to this embodiment comprises the bottom plate "A", the both side plates "B", the front plate "C" and rear plate "D". These plates "A" to "D" are basically constituted by the panels for container shown in Figs. 11 to 13.

As shown in Figs. 1 to 4, the synthetic resin corner covers 11 are put on the circumferential edge corner portions of the bottom plate "A" and the side plates "B".

Likewise, the synthetic resin straight covers 12 are put on the edge portions of the linear portions between the adjacent corner covers 11 and 11 for the bottom plate "A" and the side plate "B".

On the upper surface of the straight cover 12, at the front and rear edges of the bottom plate "A", tongues 19 which direct sideways are formed and a pivot portion 21a which constitutes the intermediate portion of a shaft rod 21 is fitted into a concave hole 20 in an inner surface of the tongue 19.

The both ends of the shaft rod 21 which project beyond the tongues 19 are respectively bent inward at right angles to act as support shafts 21b.

On the upper surfaces of four corner covers 11 on the bottom plate "A", there are projectingly provided cover strips 22 which cover the corner portions 21c between the pivot portions 21a and the support shafts 21b on the shaft rods 21, linked with the tongue 19 of the straight covers 12.

The corner portion 21c of the shaft rod 21 is fitted onto an engagement hole 23 provided in the inner surfaces of the cover strip 22.

As shown in Figs. 3, 5 and 6, the support shaft 21b of the shaft rod 21 passes through a shaft hole 24 pierced in the end face of the lower corner cover 11 on the side plate "B" and is fitted into a notch 25 (see Fig. 5) formed in the corner portion of the plate material 1 within the lower frame rod 6.

Lower ends of the front and rear end portions of the frame rod 6 are shaped into semicircular portions 26 into which the support shafts 21b can be fitted. On the essential parts of the semi-circular portion 26, there are formed semicircular tongues 28 which engage with annular concave grooves 27 formed in appropriate positions on the outer peripheral surface of the support shaft 21b when the support shaft 21b of the shaft rod 21 is fitted thereinto to prevent the slipping-off of the support shaft 21b out of the side plate "B" (see Figs. 5 and 6).

As an alternative, a tongue may be provided on the outer periphery of the support shaft 21b and a concave groove which can engage with the tongue may be provided in the semicircular portion 26 of the frame rod 6.

In the above-mentioned manner, the both side plates "B" and "B" are pivotally supported on the both side portions of the bottom plate "A" by means of the support shafts 21b of the shaft rods 21 so as to be rotatable clockwise and counter clockwise.

In case of the front plate "C" and the rear plate "D", the corner covers 11 for covering the plate material 1 are omitted. Instead, the both ends of

the lower straight cover 12 and the lower ends of the left and right straight covers 12 which direct in a vertical direction are obliquely cut out and the cut out portions are brought into abutment against each other, and rectangular notches 29 which direct outward are provided in the both end portions of the upper straight cover such that the upper ends of the left and right straight covers 12 which direct in the vertical direction are fitted into the notches 29.

On the upper portions of the upper straight covers 12 of the front plate "C" and the rear plate "D", tongues 30 which project outward and extend sideways are formed.

A pivotal portion 32a which is the intermediate portion of the shaft rod 32 which extends sideways is rotatably fitted into a concave hole 31 within each tongue 30.

The both ends of the shaft rod 32 which project outward beyond the both ends of the tongue 30 are bent outward at right angles to act as support shafts 32b.

Each of the support shafts 32b of the shaft rod 32 is fitted into a shaft receiving hole 24 in the corner cover 11 in symmetrical with the support shaft 21b of the lower shaft rod 21 of each side plate "B" in a vertical direction.

That is, each of the support shafts 32b passes through the shaft receiving holes 24 pierced in the front and rear end faces of the upper corner cover 11 of the side plate "B" and is fitted into the rectangular notch 25 (see Fig. 5) provided in the upper frame rod 6 at the corner of the plate material 1.

The upper portion of each side plate "B" into which the support shaft 32b is fitted is constructed in the same manner as the lower portion thereof, so that the same reference numerals are merely assigned to same constitutional elements and the detailed description thereof is omitted.

A cover strip 35 which is of an outward quadrant-shaped configuration in plan is covered over a corner portion 32c between the pivotal portion 32a and the support shaft 32b of the upper shaft rod 32.

Therefore, a curved receiving hole 33 is pierced in the lower surface of the cover strip 35 such that the corner portion 32c of the shaft rod 32 can be fitted thereinto through a slit 34.

One end face 35a of the cover strip 35 abuts against the front or rear end face of the side plate "B" and the other end face 35b which is perpendicular to the end face 35a abuts against an end face of the upper tongue 3 of the front plate "C" or the rear plate "D".

At least upper and outer side surfaces of the corner portion 32c of the shaft rod 32 are covered with the cover strip 35.

Accordingly, the front plate "C" and the rear plate "D" can be rotated about the pivotal portions 32a of the shaft rods 32 between the upper portions of the both side plates "B" and "B" and the both side plates "B" and "B" are coupled so as to be rotatable clockwise and counterclockwise in parallel with each other.

The tongues 19 of the front and rear straight covers 12 of the bottom plate "A" are brought into abutment against the both surfaces the lower ends of the front plate "C" and the rear plate "D" when the front plate "C" and the rear plate "D" are rotated about the pivotal portion 32a of the shaft rod 32 to positions in which these plates are oriented just downward to incidentally act as stoppers which avoid further outward rotation of the plates.

In the assembled state as shown in Fig. 1, lip-shaped air tight seal members 36 made of elastomer such as rubber or the like are provided between the bottom plate "A" and each of the side plates "B", the front plate "C" and the rear plate "D", and the side edges of the both side plates "B" and the side edges of the front plate "C" and the rear plate "D".

A base portion 36a of the seal member 36 is fitted into a receiving groove 37 (see Fig. 6) provided in each corner cover 11 and held therein.

Also in the assembled state, seal members 36 which are the same as the above mentioned ones are provided in the same manner as the above on the upper edges of the both side plates "B", the front plate "C" and the rear plate "D".

As has been described above, in the folding container according to the present invention, the upper ends of the both side plates "B" and "B" are coupled to each other through the support shafts 32b and 32b of the shaft rods 32 which project inward from the left and right end of the front plate "C" and the rear plate "D".

Accordingly, after the front plate "C" and the rear plate "D" are sprung up inwardly about the pivotal portions 32a of the upper shaft rods 32 thereof as shown by arrows in Fig. 1 from the assembled state shown in Fig. 1, the side plates "B" and "B" are rotated in one direction about the support shafts 21b of the lower shaft rod 21 thereof, by which the both side plates "B" and "B" fall down still in parallel with each other and hence the entire folding container is folded into a flattened state as shown in Fig. 8.

Simply by rotating downward the front plate "C" and the rear plate "D" between the both side plates "B" and "B" until the lower ends thereof are brought into abutment against the tongue of the bottom plate "A" after the both side plates "B" and "B" are risen almost perpendicular to the bottom

plate "A" from the folded state shown in Fig. 2, these plates can be readily assembled to the box-shaped configuration as shown in Fig. 1.

When the plates are assembled as shown in Fig. 1, the flexible synthetic resin corner covers 11 and straight covers 12 which are applied on the metal frame rods 6 are respectively brought into abutment against each other at butt portions of the bottom plate "A", the both side plates "B" and "B", the front plate "C" and the rear plate "D", so that the possibility of the deformation of the butt portions is little and good air tightness can be attained.

In addition, the provision of the seal members 36 on the butt portions thereof further improves air tightness.

Accordingly, by bringing a lid (not shown) into close contact with the opening of the folding container according to the present invention through the seal members 36, the inside of the container can be completely closed up tightly to the state that the container is made suitable to the storage of medical supplies, precision machines, clothes and the like which are susceptible to the intrusion of dust and moisture.

The bottom plate "A", the both side plates "B" and "B", the front plate "C" and rear plate "D" are constituted by panels consisting of the nonmetallic plate materials 1, the metallic frame rods 6, the flexible corner covers 11 and straight covers 12, by which the light weight, sufficiently strong and good looking container can be obtained.

The folding container according to the present invention may be varied and embodied, for example, in the following manner:

A) As shown in Fig. 7, metal or hard synthetic resin reinforcing members 38 which have an H-shaped or other configuration in section may be inserted into the tongues 30 of the upper straight covers 12 of the front plate "C" and the rear plate "D" between the shaft rods 32 and the frame rods 6 thereof.

B) Instead of the provision of the notches 25 in the upper and lower edges of the plate material 1 of the side plate "B", the frame rod 6 may be fixedly attached to the plate material 1 by leaving space which is sufficient to insert the support shafts 21b and 32b of the shaft rod 21 and 32 thereinto between the upper and lower edges of the plate material 1 and the semicircular base strip of the frame rod 6 which is shaped into the U-shaped configuration.

C) Instead of the provision of the shaft rods 21 and 32, a pair of shaft rods which are curved into L-shaped configuration may be used such that one ends thereof are rotatably fitted into the both end portions of the concave hole 2 in the tongue of the bottom plate "A" and the concave



holes 31 in the tongues of the front plate "C" and the rear plate "D" so as to prevent the slipping-off thereof from the concave holes 31.

D) The plate material 1 may be made of synthetic resin such as materials other than paper, wood or the like, or a mixed material thereof.

E) The plate material 1 may be constituted by a veneer, a plywood, a hollow plate, a corrugated card-board, a multi-layered plate consisting of a honeycomb core, a corrugated plate and other partition plates.

F) Small window which is air tight upon closing thereof, knob and card case may be provided on (in ) the front plate "C", the rear plate "D", or the side plate "B".

G) The inner surface of the container may be throughly or partially covered with an electroconductive plate material, foil or a film to be grounded to the earth to be used as a case for storing semiconductors and other electronic instruments and appliances which are susceptible to static electricity.

H) The ends of the frame rods 6 which are adjacent to each other may be butted against each other at 45°, at other inclined angles, or at 90°, superposed one upon the other, or fitted one into (onto) the other.

I) The corner covers 11 are omitted and the ends of the straight covers 12 may be joined to one another in the same manner as the above-mentioned ends of the frame rods 6. And, the ends may be fixed to one another by spot welding or the like in the superposed state.

As is apparent from the above, according to the folding container of the present invention, the following effects can be attained:

a) The bottom plate, the both side plates, the front plate and the rear plate are constituted by the panels in which the frame rods and the flexible covers are covered on the circumferential edges of the nonmetallic plate materials, by which the light weight, sufficiently strong and good looking container can be obtained.

b) Upon the assembly of the folding container, at each of the abutted portions of the bottom plate, the both side plates, the front plate and the rear plate, the flexible covers which cover the metal frame rods which are fitted into the edges of the plate materials are brought into abutment against each other, so that the possibility of the deformation of the butted portions is little and favorable air-tightness can be attained.

c) In the assembled state, with the provision of the seal members on the lower edge of each side plate or the bottom plate, on the both side edges of the front and rear plates or the side

plates, and on the lower edges of the front and rear plates or the bottom plate, the air-tightness can be further improved.

d) With the provision of the seal members on the upper edges of the side plate, the front plate and the rear plate in the assembled state the air-tightness between the lid and the folding container is maintained when the lid is put on the folding container, by which the inside of the folding container is completely closed up tightly.

e) With the provision of the upper and lower cover strips, the corner portions 21c and 32c of the shaft rods are not exposed to the outside, by which the appearance is further improved.

## Claims

1. A folding container which comprises a rectangular bottom plate, both side plates, a front plate and a rear plate, characterized in that:

a) said bottom plate and said both side plates are coupled to one another in such a manner that a pair of forward and rearward directing support shafts which are provided at front and rear edge portions of said bottom plate are fitted into front and rear end faces of the lower edges of said both side plates, by which said both side plates can be rotated and moved clockwise and counterclockwise with respect to said bottom plate; and

b) said front plate and rear plate and said both side plates are coupled to one another in such a manner that forward and rearward directing support shafts which are formed at outer ends of sideways running shaft rods provided at upper edges of said front and rear plates are fitted into upper edge front and rear end faces of said both side plates, by which said front and rear plates can be rotated and moved about axes which run sideways between upper portions of said both side plates and said both side plates can be rotated and moved clockwise and counterclockwise.

2. A folding container as defined in claim 1, wherein reinforcing frame rods are fitted onto circumferential edge portions of rectangular plate materials which constitute said bottom plate, said both side plates, said front plate and said rear plate.

3. A folding container as defined in claim 2, wherein flexible covers are fixedly fitted onto said frame rods.

4. A folding container as defined in any one of claim 1 to 3, wherein support shafts for pivotally supporting said side plates on said bottom plate are formed so as to be bent toward outer ends of sideways running shaft rods which are provided at front and rear edges of said bottom plate. 5
5. A folding container as defined in any one of claims 2 to 4, wherein said shaft rods are fitted into reinforcing ribs formed on said frame rods. 10
6. A folding container as defined in any one of claims 1 to 5, wherein means for preventing slip-off is provided between each support shaft and said side plate corresponding thereto. 15
7. A folding container as defined in any one of claims 1 to 5, wherein seal members are fixedly fitted into individual edges of the container. 20
8. A folding container as defined in any one of claims 1 to 6, wherein corner members are fixedly fitted onto corner portions of the shaft rod. 25

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FIG.1

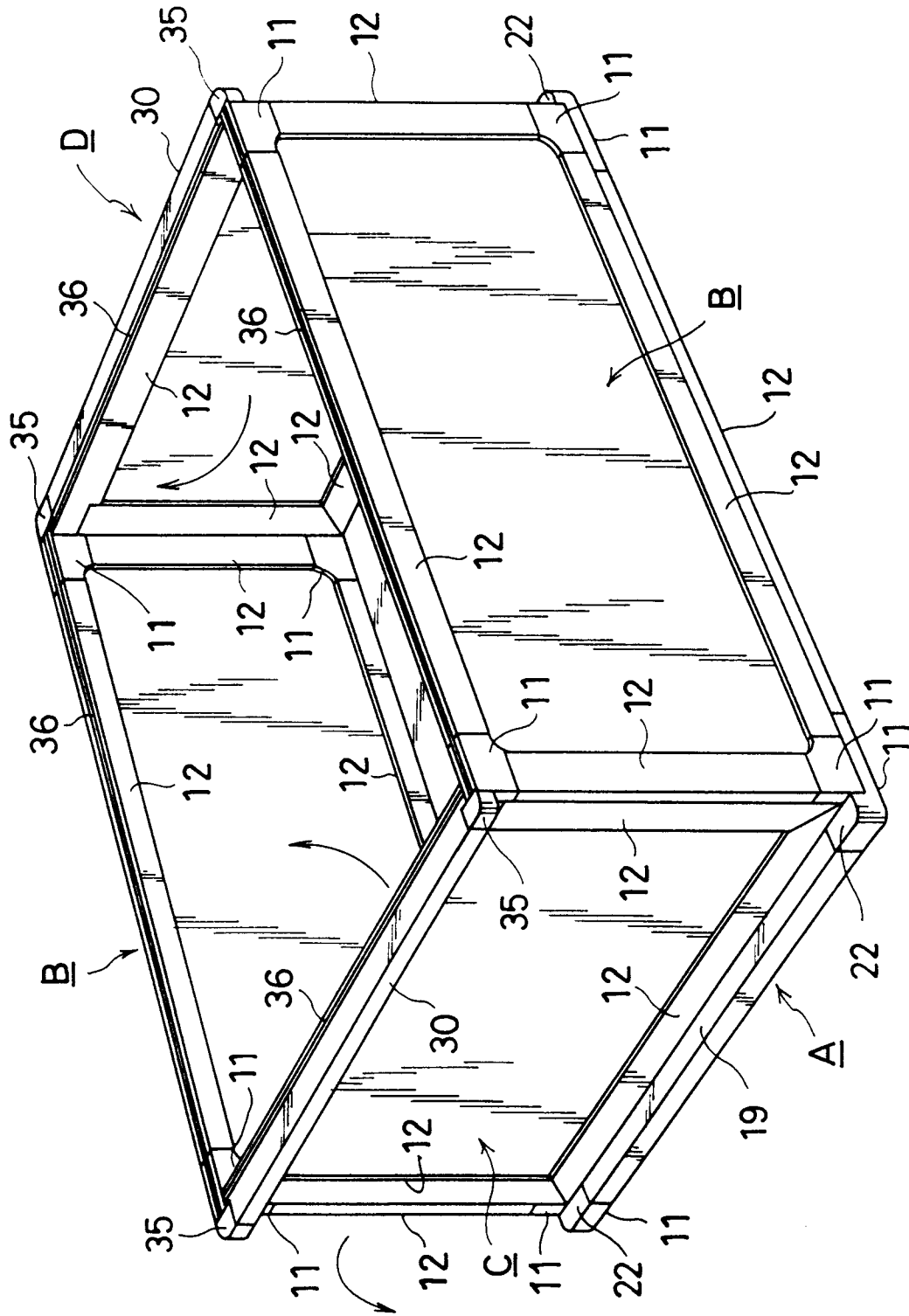
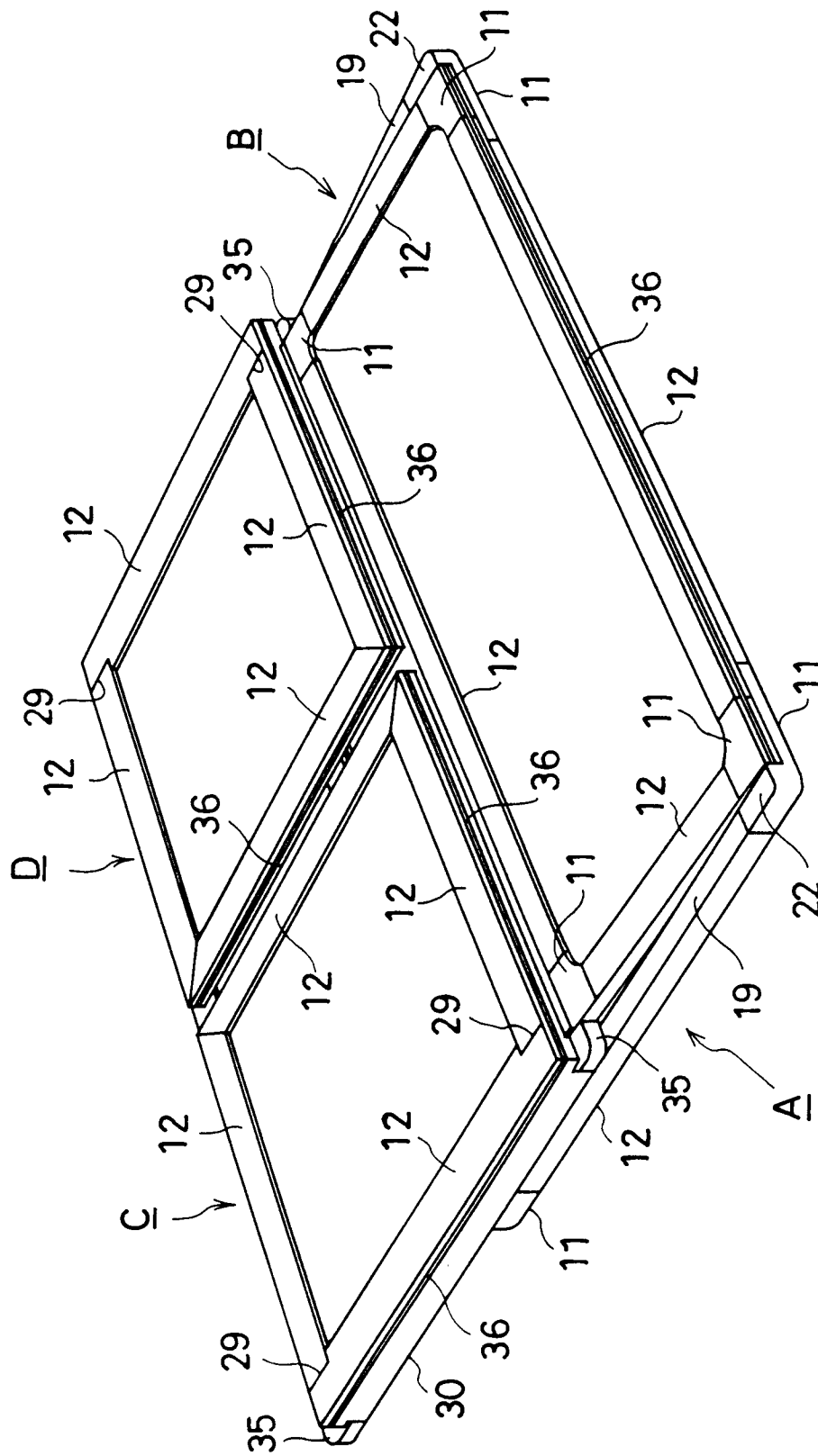


FIG. 2



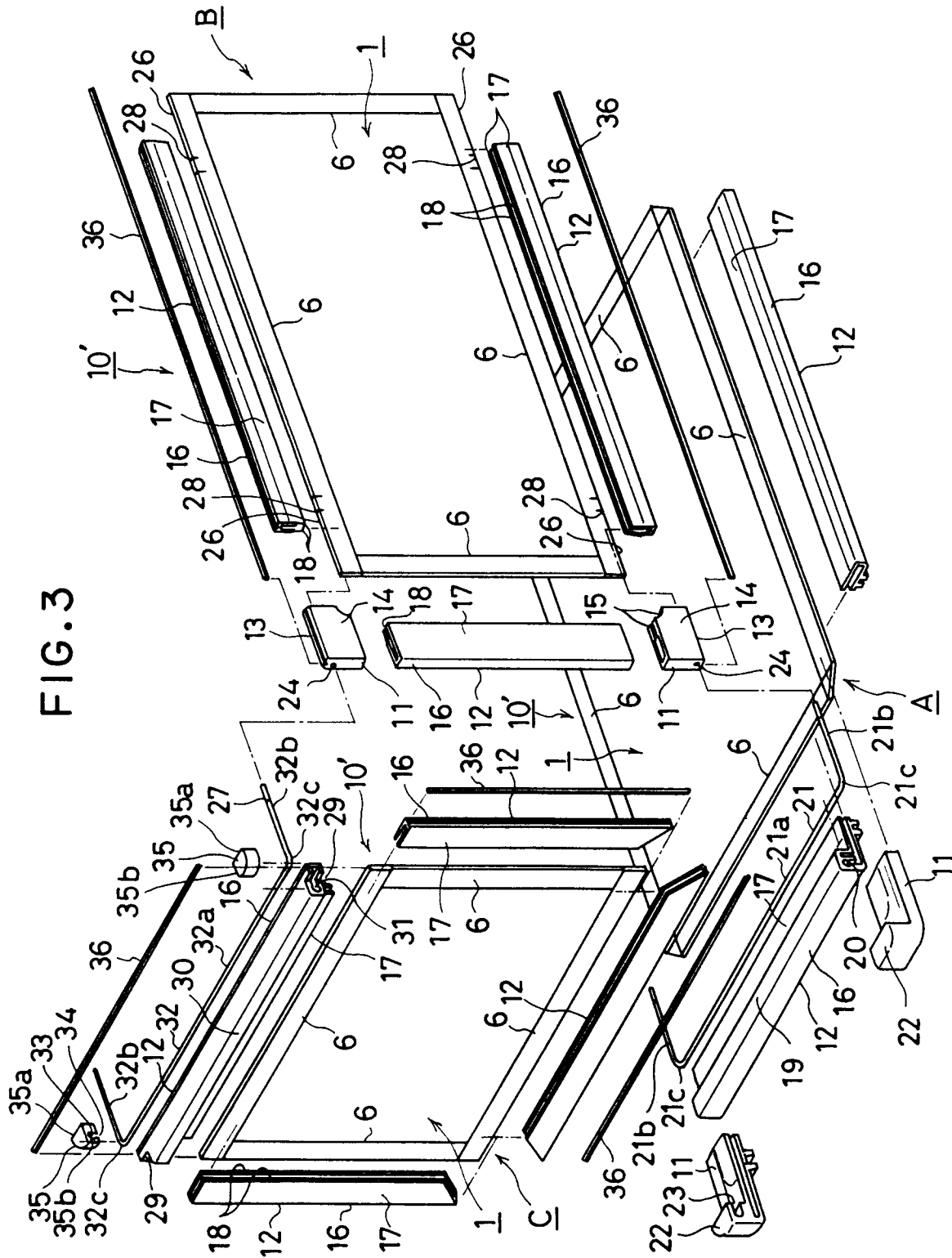
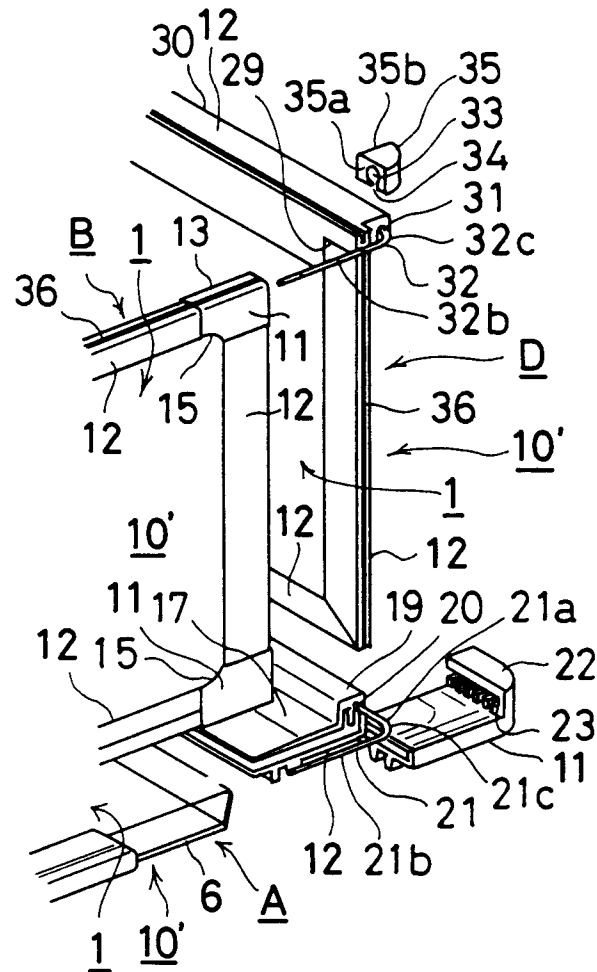


FIG. 4



**FIG.5**

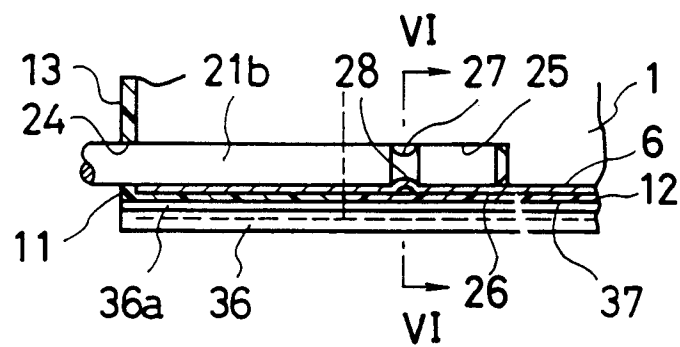


FIG.6

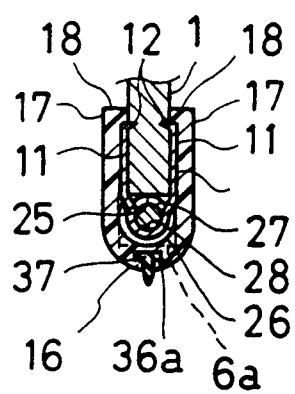


FIG.7

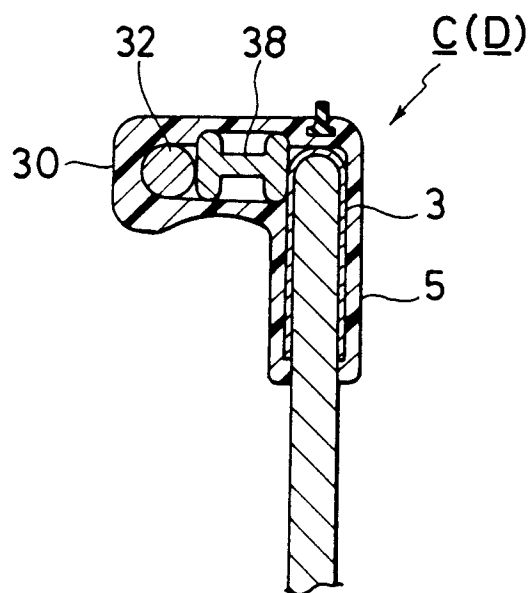


FIG.8

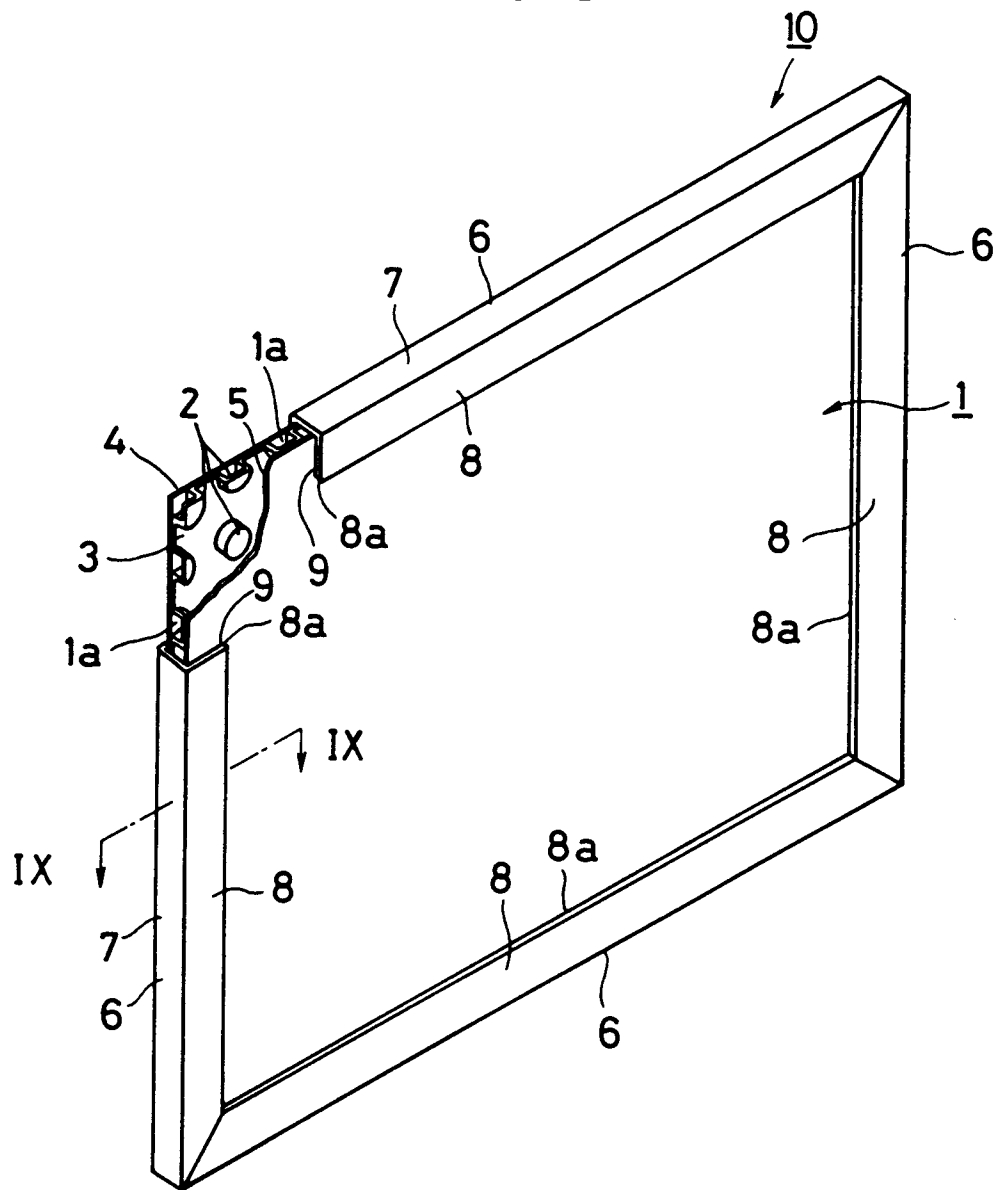


FIG.9

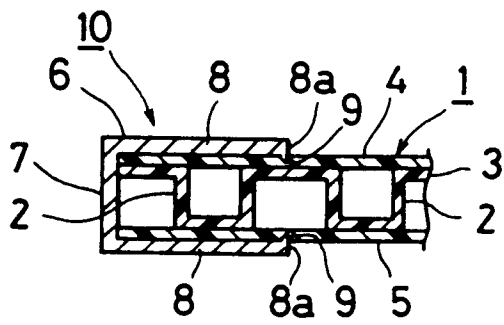


FIG.10

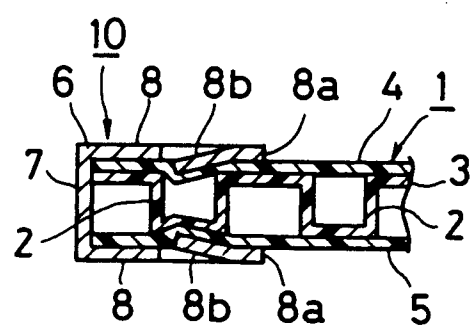




FIG.11

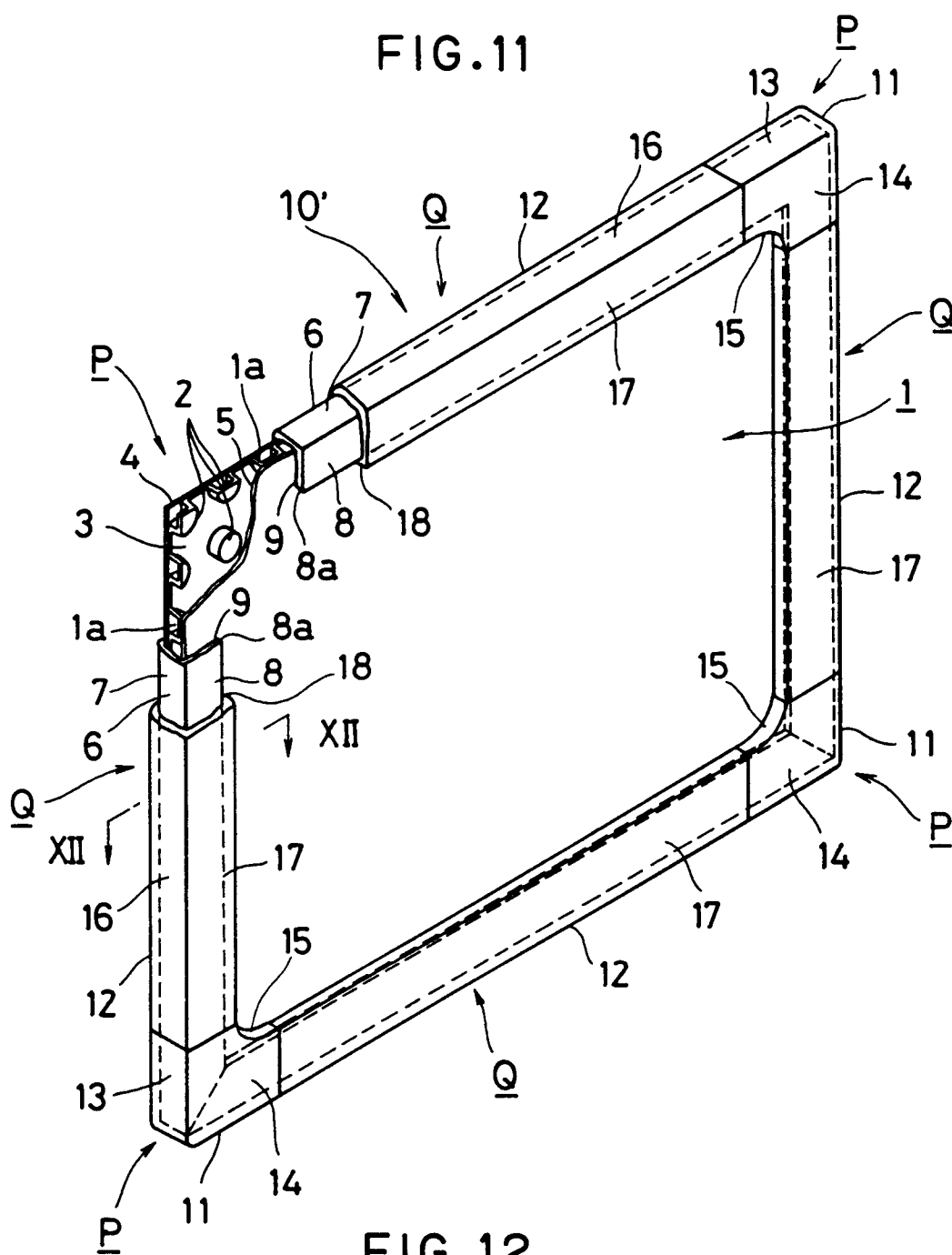


FIG.12

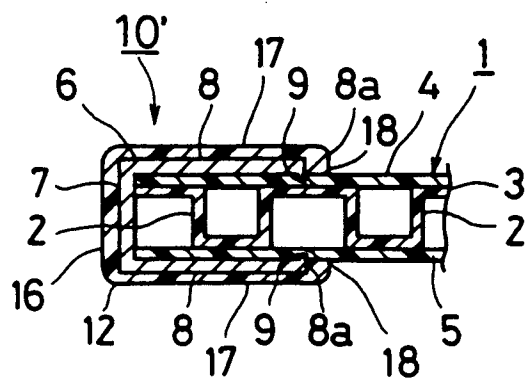


FIG. 13

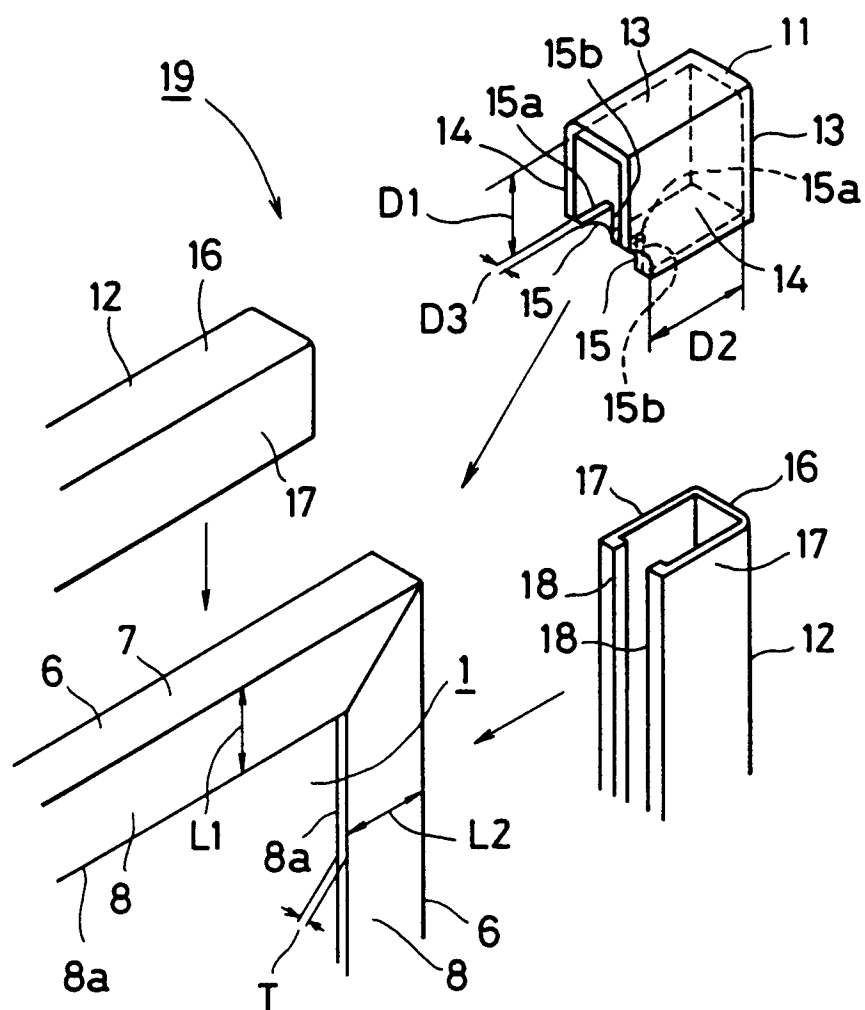
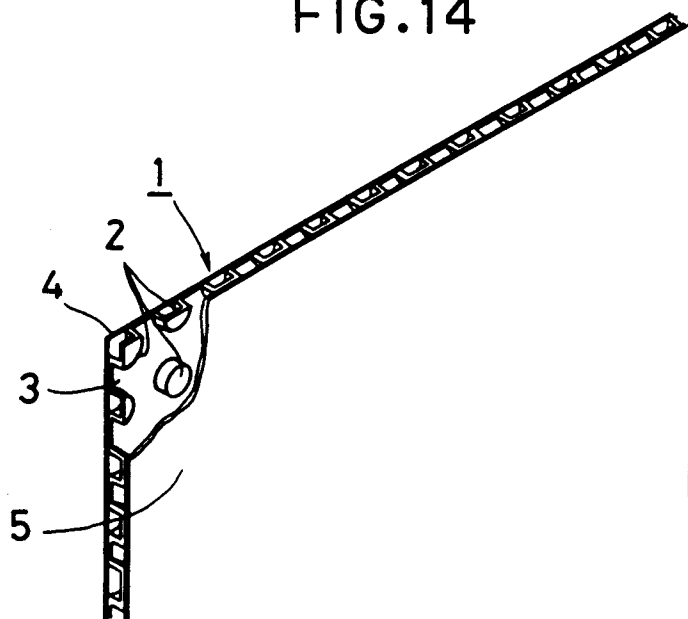


FIG.14





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## EUROPEAN SEARCH REPORT

Application Number

EP 91 11 6660

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	FR-A-2 351 865 (SOLER) * claim 1; figures 4,8 * ---	1	B65D6/00
A	US-A-4 630 747 (CHIANG) * claims 1,2; figures 6-9 * ---	1	
A	US-A-4 491 231 (HEGGELAND) * claim 1; figures 1-4 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 24 JANUARY 1992	Examiner ANDEREGG P-Y, F.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document			