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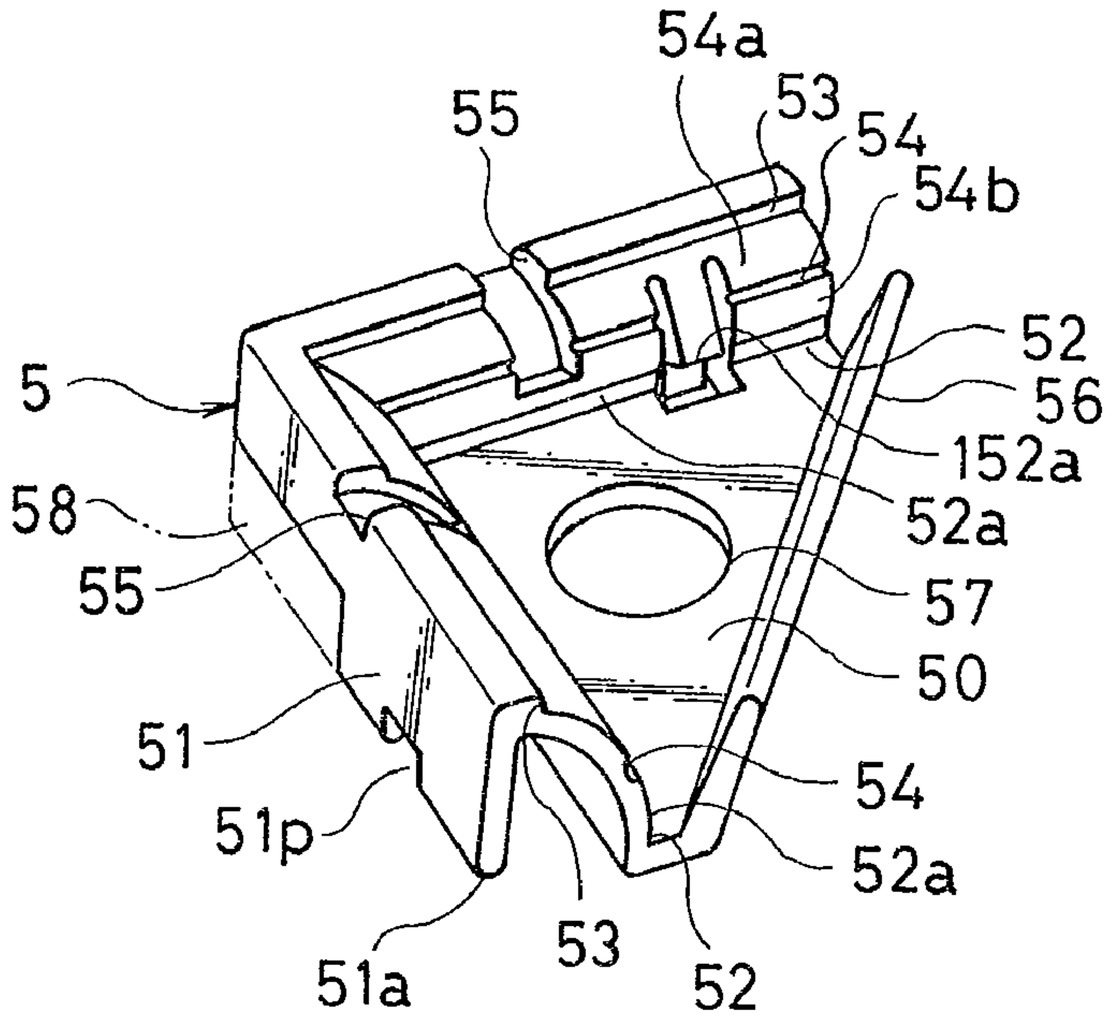
(54) **FERME OU PORTIQUE**

(54) **FRAME**



(57) A frame, including a plurality of frame elements and at least one connecting corner element on which the frame elements are mounted in intersected relation, is provided. Its readily accessed enclosure can accommodate therein an article, a glass plate to allow viewing of the article, a backing plate at the rear, and an illumination louver. At least one of the frame elements is mounted to the connecting corner element for relative angular movement therebetween, to facilitate easy opening of the enclosure and access to the space defined therein.

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ABSTRACT

A frame, including a plurality of frame elements and at least one connecting corner element on which the frame elements are mounted in intersected relation, is provided. Its readily accessed enclosure can accommodate therein an article, a glass plate to allow viewing of the article, a backing plate at the rear, and an illumination louver. At least one of the frame elements is mounted to the connecting corner element for relative angular movement therebetween, to facilitate easy opening of the enclosure and access to the space defined therein.

TITLE OF THE INVENTION

FRAME

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a frame in which a plurality of frame elements are angularly connected to each other through at least one connecting element to form an enclosure, to accommodate therein an article to be accommodated such as a picture, a photograph, a glass plate, a rear plate, an illumination louver, a smoothly planed board for a building interior trim, or the like.

Description of the Prior Art

A frame is disclosed in Japanese Patent Publication No. 26439/1964 in which a plurality of frame elements are connected respectively through a plurality of connecting elements to form an enclosure.

That is, the above Japanese Patent Publication No. 26439/1969 discloses the connecting elements which are formed respectively with connection engaging pawls which engage respectively with the frame elements. Each of the connection engaging pawls is formed on a surface of an L-shaped element in the form of a thin plate.

The connection element utilizes the connection engaging pawl to engage with the frame element. In the case where the article to be accommodated is mounted to or demounted from the interior of the frame in order to

form the latter, the connection engaging pawl of the connecting element must be operated each time to demount the frame element from the frame.

Japanese Utility Model Publication No. 273918/1973 discloses another connecting elements.

Disclosed in the above Japanese Utility Model Publication No. 273918/1973 is the connecting element in which a plain or flat plate is folded perpendicularly to form a connecting arm, and the connecting arm is formed with an inclined surface.

A dovetail groove in the frame element is inserted into the connecting arm, and an inclined surface of the connecting arm is tightened by screws from the side portion of the dovetail groove, so that the frame element is connected to the connecting element.

The connecting arm is inserted through the end of the dovetail groove of the frame, and an engaging pawl or a screw serves as a wedge and is engaged with the connecting arm, so that the frame element is connected to the connecting element.

Since the frame element is connected to and fixed to the connecting arm of the connecting element so that the frame is formed, the article accommodated in the frame can be taken out or removed such that the frame element is moved to its open position from the opposed connecting arms of the respective left- and right-hand connecting elements, and is separated from

the connecting arm of the connecting element.

Alternatively, the article to be accommodated can be removed in the following manner. That is, the frame element is moved to its open position from the opposed connecting arms of the respective left- and right-hand connecting arms. The dovetail groove is utilized to move the frame element from the left- and right-hand connecting arms to enlarge the frame. An engaging section of the frame element is removed from the front-face peripheral edge section of the article to be accommodated.

Subsequently, another article to be accommodated is inserted into a space within the frame between the frame elements thereof. The connecting arm of the connecting element is pushed into the frame element. The frame element is again connected and engaged by the connecting arm. Thus, the frame is formed.

Furthermore, a plurality of frame elements cooperating with each other to form a frame are disclosed in Japanese Utility Model Publication No. 24390/1975.

Disclosed in the above Japanese Utility Model Publication No. 24390/1975 is such an arrangement that, in order to mount and demount the article to be accommodated to and from each of the frame elements which cooperate with each other to form the frame, the frame element is composed of a pair of upper and lower

frame elements. The upper frame element is assembled to the lower frame element so as to be angularly movable thereto partially. The lower and upper frame elements are abutted against each other by a spring. The article to be accommodated is held between the upper and lower frame elements.

Replacement of the article to be accommodated with respect to the frame, which are formed by the frame elements, is practiced in the following manner. That is, the upper frame element is angularly moved upwardly through about 90 degrees to rise, as a fulcrum of a portion at which the lower and upper frame elements are assembled with each other for angular movement. The upper frame elements rise subsequently, to open the upper edges at the four sides of the frame. The article to be accommodated is mounted to and demounted from the open face.

Further, a record-jacket holding panel is disclosed in Japanese Utility Model Provisional Publication No. 161565/1988 in which a lower frame element and an upper frame element are connected to each other through a film hinge, to form a frame.

In the above Japanese Utility Model Provisional Publication No. 161565/1988, a plurality of frame elements are framed such that their respective end faces are abutted against each other, and a rear plate is held along the outer periphery of the rear plate. The frame elements have their respective front-face

elements and respective rear-face elements whose respective outer surface portions are connected to each other through a hinge. A spring is provided between the front-face element and the rear-face element. By the spring, the front-face element is biased such that record jackets superimposed upon the rear plate are clamped with respect to the rear plate. The front-face element is movable angularly about a hinge section against the spring. A record-jacket pushing bore is formed through the rear plate.

Mounting and demounting of the article to be accommodated to and from the frame are practiced from the frame front surface, as follows. That is, the front-face elements of the four-side frame elements rise upwardly about 90 degrees, and the upper edge of the frame is open.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a frame which is so simple in construction that, when an article to be accommodated is mounted and demounted, a plurality of frame elements are not removed from at least one connecting element, and that two frame elements having a lower frame element and an upper frame element are not connected to the connecting element, but each of the frame elements, that is a simple frame structure, is engaged with the connecting elements for angular movement.

In one aspect the invention provides a frame in which each of a plurality of elongate frame elements is mounted to at least one connecting corner element so as to be movable angularly about a longitudinal axis of the frame element. A side of the connecting element serves also as a falling-out preventing section with respect to a bearing section for the angularly movable frame element. Thus, when the frame element is moved angularly to its open position, the frame element does not fall down and, for this reason, it is possible to easily move an article to be accommodated into and out of the frame.

The invention provides a frame which is simple in construction, which involves no waste material, and which is easy to use in many applications. A frame according to the invention can be utilized, for example, for building fittings or fixtures, an exhibition case, a signboard, an illumination appliance, or the like. The following describes various aspects and features of particular embodiments of the invention.

In the invention, only fitting between two kinds of elements (including the frame element molding-processed in extrusion of aluminum or the like and the connecting element molded from elastic resin such as polycarbonate, polyacetal or the like) enables each frame element to be connected to the connecting element for angular movement, to form the frame. The frame element on one side of the frame is angularly moved outwardly to

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open one side edge of the frame. Thus, taking-in and -out of the article to be accommodated including the rear plate and the like can easily be done through the open location, without breaking the frame.

An intermediate partition is provided within the frame element to divide the space into two space sections. One of the two space sections is brought to a space for holding the front-face peripheral edge portion of the article to be accommodated. The other space section is brought to a space in which the connecting element is fitted.

An inward flange is provided at an outward end of the space in the frame element, in which the connecting element is fitted, so that a concave bearing section is formed.

A distance from the outward side of an angularly-movable shaft of the connecting element to an angular-movement stoppage section and a distance from a concave bearing section of the frame element to an engaging pawl is made equal to each other or is equalized each other, whereby an opening width of the fitting space in the frame element with respect to the connecting element is narrowed correspondingly to the projecting portion of the flange.

Further, the projecting dimension of the flange is equal to or larger than one half the thickness of the shaft at the forward end of the side plate.

The corner of the side plate of the connecting

element is cut out to form a convex shaft at the end of the side plate.

The convex shaft is provided at the forward end of the side plate which serves as a leaf spring.

A convex, concave or any other engaging section for prevention of getting-out is provided at a location engaged with the intermediate partition of the frame element or the connecting section between the shaft section and the connecting element.

An angular-movement stoppage section is provided at a position where the engaging pawl is abutted against the connecting element, and at a location where the frame element is moved to its closed position, or where the frame element is moved to its fully open position.

Another angular-movement stoppage section is provided on an angular-movement sliding contact face between the connecting element and the frame element. The angular-movement stoppage section is provided midway of angular movement of the frame element, a location where the frame element is open to the maximum, a location where the frame element is closed, or the like.

An angular-movement engaging pawl is provided on the outer periphery concentric with a center of the concave bearing section, that is, on the intermediate partition.

In the case where the article to be accommodated is held between the intermediate partition

of the frame element and the front-face engaging section, the intermediate partition is brought to a curved surface concentric with the concave bearing section.

The connecting element is arranged such that, when the frame element is moved to its open position, the rear-face section of the connecting element projects as compared with the position of the rear-face portion of the frame element.

A cut-out is provided at the end of the flange. The cut-out has such a dimension that its length is of the order to two times a distance from the center of the convex shaft section to the frame-element surface of the concave shaft section.

At this time, a step is provided above the cut-out of the frame element.

A tongue-like spring, which has, at its forward end, an inclined surface and which can be urged against a part of the connecting element, is formed at a position where the frame element is moved to its closed position, that is, at the angular-movement stoppage position.

The tongue-like spring provided on the connecting element has a forward end which may be brought to a hook-shaped engaging pawl.

In this case, the tongue-like spring is formed with a finger catch for releasing the hook-shaped engaging pawl.

In the case where an article to be accommodated, which is thinner than a predetermined dimension, is clamped, a spring is provided on the outer peripheral surface of the intermediate partition of the frame element at a location between the intermediate partition of the frame element and the front-face engaging section.

The front-face engaging section for holding the front-face peripheral edge section of the article to be accommodated is provided at the upper edge of the frame element.

The connecting element may be such that one of the connecting sections is brought to a pivotal connecting section, and the other connecting section is brought to a connecting section which is not pivotal.

At this time, a cap is mounted to an end of a space in the angularly moved frame, in which the article is accommodated.

The sliding contact surface between the connection engaging section of the frame element and the connection engaging section of the connecting element is inclined whereby the connection engaging section of the connecting element is fed axially outwardly of the frame element under the action which moves angularly the frame element outwardly.

In the connecting element, the connection engaging section, the side plate and the angular-movement stoppage section are united together, and a

triangular reinforcing plate is formed in unison at the angular-movement stoppage section which is arranged perpendicularly.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a part of one of a plurality of frame elements according to a first embodiment;

Fig. 2 is a perspective view of one of a plurality of connecting elements according to the first embodiment;

Fig. 3 is a cross-sectional view of a part of the first embodiment;

Fig. 4 is a cross-sectional view of a part of a second embodiment;

Fig. 5 is a cross-sectional view of a part of the first embodiment at another position;

Fig. 6 is a cross-sectional view of a part of a third embodiment;

Fig. 7 is a perspective view of a part of the first embodiment as viewed from the bottom;

Fig. 8 is a perspective view of the entire frame in which a part of the first embodiment is cut out and parts thereof are removed;

Fig. 9 is a cross-sectional view of the first embodiment, showing the relationship between the first embodiment and an article to be accommodated;

Fig. 10 is a cross-sectional view of Fig. 9

under another condition;

Fig. 11 is a cross-sectional view of Fig. 9 under still another condition;

Fig. 12 is a fragmentary partially cut-out perspective view of a frame element according to a fourth embodiment;

Fig. 13 is a cross-sectional view of the embodiment illustrated in Fig. 12;

Fig. 14 is a cross-sectional view of Fig. 3 under another condition;

Fig. 15 is a cross-sectional view of a fifth embodiment;

Fig. 16 is a cross-sectional view of Fig. 15 under another condition;

Fig. 17 is an exploded perspective view of a sixth embodiment;

Fig. 18 is an exploded perspective view of a seventh embodiment;

Fig. 19 is a partially cut-out perspective view of the entire embodiment illustrated in Fig. 18;

Fig. 20 is a cross-sectional view of an eighth embodiment;

Fig. 21 is a cross-sectional view of a ninth embodiment;

Fig. 22 is a perspective view of a connecting element according to a tenth embodiment;

Fig. 23 is a partially broken-away perspective view of an eleventh embodiment; and

Fig. 24 is a partially cut-out perspective view of a twelfth embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Figs. 1 and 2, there is shown a frame which is composed of a plurality of frame elements 1 (only one shown) molding-processed in extrusion of a blank such as aluminum or the like, and a plurality of connecting elements 5 (only one shown) molded by elastic resin such as polycarbonate, polyacetal or the like.

Each of the frame elements 1 is formed with an intermediate partition 11 at a side surface of a side plate 20. The intermediate partition 11 is curved downwardly along a longitudinal direction. A front engaging section 12 extending along the longitudinal direction is formed at an upper edge of the side plate 20. The intermediate partition 11 has its forward end which is provided with an engaging pawl 13.

The side plate 20 is provided with a support section 14 at a location below the intermediate partition 11. The support section 14 is adapted to support the outer side section of the connecting element 5. A flange 15 projects toward the forward end of the intermediate partition 11 from the lowermost edge of the side plate 20, through a step 19 (Fig. 7). Thus, a space A is defined between the side plate 20 and the intermediate partition 11.

The flange 15 is curved to form a concave

bearing section 15a. An antiskid engaging section 16 for a convex shaft section 51a of the connecting section 5 is provided adjacent a location above the concave bearing section 15a. A connection engaging section 17 engageable with a connection engaging section 55 of the connecting element 5 is provided on an inner surface of the intermediate partition 11.

Fig. 2 shows the connecting element 5 which has a side plate 51 consisting of a leaf spring extending perpendicularly. An inner surface of the side plate 51 at an upper edge thereof is formed with a first angular-movement stoppage section 53 at a position where the frame element 1 is moved to its open position. A pair of angular-movement sliding-contact surfaces 54a and 54b for guiding the engaging pawl 13 of the frame element 1 curved in concentric relation to the center of the concave bearing 15a are formed downwardly from the first angular-movement stoppage section 53. A second angular-movement stoppage section 54 located midway of angular movement of the frame element 1 is formed, in a concave manner, at a location between the angular-movement sliding-contact surfaces 54a and 54b. A third angular-movement stoppage section 52 is formed at a lower end of the angular-movement sliding-contact surface 54b at the time the frame element 1 is moved to its closed position. The connection engaging section 55 engageable with the connection engaging section 17 of the frame element 1 is formed at the upper surface of

the side plate 51 and at the upper surfaces of the respective curved surfaces 54a and 54b. A triangular reinforcing plate 50 is formed in unison with the third angular-movement stoppage section 52. The triangular reinforcing plate 50 has its inner edge which is formed with a support wall 56 for an article 3 to be accommodated (refer to Fig. 9). The triangular reinforcing plate 50 is provided therein with a bore 57 for wall surface fixing. A pivot section 51a is formed at a part of the lower edge of the side plate 51. In order to form the side plate 51 into a leaf spring, a corner portion of the outer side wall of the side plate 51 is cut out to form a cut-out 58. An inclined surface 52a for feeding the engaging pawl 13 of the frame element 1 into the third angular-movement stoppage section 52 is formed at the upper portion of the third angular-movement stoppage section 52. Further, an inclined surface 152a may be formed at a forward end of a tongue-like spring 152 which is provided at the curved surfaces 54a and 54b, to form an angular-movement engaging section.

Fig. 3 shows a condition under which the frame element 1 and the connecting element 5 are fitted in each other. Fig. 3 illustrates a partial cut-out 51p at the forward end of the side plate 51, and an inclined surface 152a at the forward end of the tongue-like spring 152.

Fig. 4 shows an embodiment which comprises an

angular-movement fixing engaging pawl 152b provided on the tongue-like spring 152 engageable with the engaging pawl 13 of the frame element 1, and a clamp wall 152h provided on the third angular-movement stoppage section 52.

Fig. 5 shows movement of the engaging pawl 13 of the frame element 1 from the inclined surface 52a to the first angular-movement stoppage section 53.

Fig. 6 shows an embodiment in which curvature of the side plate 51 is made large.

The frame elements 1 and the connecting elements 5 are used at the upper edges of the side plates 51 to form a rectangular frame illustrated in Fig. 8.

Regarding the rectangular frame, assembling of the frame elements 1 and the connecting elements 5, mounting of the article 3 to be accommodated, opening of the frame elements 1, and so on will be described in order.

The frame elements 1 are fitted in each other in such a manner that the side plates 51 of the connecting elements 5 illustrated in Fig. 2 are pushed until the third angular-movement stoppage sections 52 are engaged respectively with the engaging pawls 13 of the frame elements 1, from the open sections at the lower ends of the respective spaces A in the frame elements 1 illustrated in Fig. 1. In this manner, the frame elements 1 are connected to each other.

At this time, the side plate 51 is pushed by the flange 15, and is accommodated in the space A in the frame element 1 while being elastically deformed.

Further, the convex shaft section 51a of the side plate 51 is in sliding contact with the concave shaft section 15a of the frame element 1, and serves as a pivotal section for the frame element 1.

At this time, the connection engaging section 17 of the frame element 1 and the connection engaging section 55 of the connecting element 5 are fitted in each other simultaneously.

When the side plates 51 of the four connecting elements 5 are pushed respectively into the spaces A at both the ends of the four frame elements, assembling of the frame illustrated in Fig. 8 is completed.

Mounting of the article 3 to be accommodated is practiced in the following manner. That is, as shown in Fig. 9 or 11, the frame element 1 is moved angularly about the convex shaft section 51a of the connecting element 5 and is moved to its open position. The article 3 to be accommodated rests on the curved intermediate partition 11 of the frame element 1. The frame element 1 is again moved angularly about the convex shaft section 51a and is moved to its closed position as shown in Fig. 10.

At this time, the curved intermediate partition 11 of the frame element 1 is into sliding contact with the peripheral edge of the article 3 to be

accommodated at the rear face thereof, so that the article 3 to be accommodated is held between the intermediate partition 11 and the engaging section 12 of the frame element 11 at the front face thereof.

If the angle of the angular movement of the frame element 1 is made large and, as shown in Fig. 9, if frame element 1 is brought down such that the forward end of the front-face engaging section 12 is located below the forward end of the intermediate partition 11, the article to be accommodated can be taken into and out from the lateral side of the frame element 1.

Further, if the frame elements 1 at the adjacent two sides are moved to their respective open positions as shown in Fig. 8, it is possible to mount and demount the article 3 to be accommodated to and from the frame elements 1 from the above.

Stoppage of the angular movement of the frame element 1 with respect to the connecting element 5 is practiced by the engaging section 13 of the frame element 1 and the first through third angular-movement stoppage sections 53, 54 and 52 of the connecting element 5.

It is possible to optionally set resistance at stoppage by the spring strength of the side plate 51 and/or the spring strength of the intermediate partition 11 of the frame element 1.

The inclined surface 52a provided in front of the third angular-movement stoppage section 52 shown in

Fig. 5 serves to feed the engaging pawl 13 of the frame element 1 into the stoppage section 52.

The engaging section 13 of the frame element 1 is urged against the third stoppage section 52 by the inclined surface 52a, so that it is possible to prevent the frame element 1 from being inadvertently moved to its open position with respect to the connecting element 5.

The angle between the inclined surface 52a and the third stoppage section 52 is made acute, whereby it is possible to fixedly mount the frame element 1 to the connecting element 5 with a strong force.

Furthermore, as shown in Fig. 3, the steep inclined surface 152a is provided in front of a tongue-like spring 152 which is provided at the pair of curved surfaces 54a and 54b of the connecting element 5. The tongue-like spring 152 is urged toward the interior of the connecting element at sliding contact between the curved surfaces 54a and 54b and the engaging section 13. Thus, the engaging section 13 of the frame element 1 is engaged with the steep inclined surface 152a.

The strength of the engagement is adjusted by a raw material and a configuration of the tongue-like element 152, the angle of the inclined surface 152a, and the like.

The arrangement may be such that the forward end of the tongue-like spring 152 is not brought to the inclined surface 152a, but, as shown in Fig. 4, is

brought to an engaging pawl 152d, so that the forward end of the tongue-like spring 152 is brought to an antiskid engaging section in mesh with the engaging section 13.

Moreover, the arrangement may be such that the engaging pawl 152d and the inclined surfaces 52a of the curved surfaces 54a and 54b are used together, the engaging pawl 152d of the tongue-like spring 152 can be broken and cut at a cut-out 152e, the broken and cut frame element 1 is brought to a frame section which is movable angularly, and the frame element 1, in which the engaging pawl 152d of the tongue-like spring 152 is maintained as it is, is brought to an immovable frame section. In this manner, it is possible to optionally form the angularly-movable frame section and the angularly-immovable frame section by the same connecting element 5.

A fixing releasing pawl or a finger catch 152f for the engaging pawl 152d is provided at the lower end of the tongue-like element 152.

The arrangement may be such that another element (not shown) is assembled in substitution for the engaging pawl 152d provided at the tongue-like spring 152 according to the embodiment, to optionally practice switching of engaging and disengagement of the engaging section 13.

In order to enhance close contact between the corner of the frame element 1 and the corner of the

tablet, the frame element 1 having its corner cut through 45 degrees is mounted to the connecting element 5. When the frame elements 1 are moved angularly toward the outside from the condition that the cut surfaces of the frame elements 1 are abutted against each other, portions of the frame elements 1 getting inwardly of the convex shaft sections 51a impinge against each other and become immovable. Accordingly, in order to avoid such collision, as shown in Fig. 7, a cut-out 18 must be provided at the ends of the adjacent flange 15.

In the case where the tablet is seen as a commodity, the cut-outs 18 serve as such severe defects that bores are formed respectively at the corners of the tablet.

Close fitting at the corners of the tablet requires a close-fitting accuracy of the corners, as will be called life of the tablet.

Further, if the feeding force of the inclined surface 52a is made large and if the forward end of the convex shaft section 51a is moved outwardly together with opening of the shaft element 1 as shown in Figs. 5 and 6, the convex bearing section 15a of the frame element 1 is pushed outwardly by the spring action of the side plate 51.

In this manner, the spring force of the side plate 51 moves the concave bearing section 15a of the frame element 1 outwardly, as indicated by the phantom lines in Figs. 5 and 6, when the frame element 1 is

angularly moved outwardly so as to be opened.

When the concave bearing section 15a is moved outwardly under the spring force of the side plate 51, the impinging portion between the end face of the frame element 1 and the end face of the adjacent frame element 1 during angular movement thereof is reduced correspondingly to the outward movement. Accordingly, it will suffice that the cut-out 18 is small.

Moreover, in order to make the cut-out 18 further small, as shown in Fig. 6, a thin-wall section 151a should be provided at the forward end of the side plate 51 to reduce the convex shaft section 51a.

Alternatively, if a metallic spring of the order of 0.4 mm to 0.5 mm is assembled as the convex shaft section 51a, it is possible to further reduce the convex shaft section 51a.

Furthermore, if the sliding contact surface between the connection engaging section 17 of the frame element 1 and the connection engaging section 55 of the connecting element 5 is brought to a screw-feeding inclined surface, closing angular movement of the frame element 1 enables the connecting element 5 to be drawn into the space A in the axial direction of the angular movement.

Further, such angular movement as to move the frame element 1 to its open position enables the connecting element 5 to be fed outwardly of the angular movement shaft from the space A.

As a result, it is possible to move the center of the convex shaft section 51a outwardly of the surrounding of the frame elements 1.

Furthermore, as shown in Fig. 7, if the step 19 projecting upwardly of the cut-out 18 is provided so that it is made difficult to view the cut-out 18 from the forward portion of the tablet, the arrangement is further effective.

In the case where the article 3 to be accommodated is small in its thickness, there may be a fear that a gap occurs between the front-face engaging section 12 of the frame element 1 and the article 3 to be accommodated.

In order to avoid such fear, in an embodiment illustrated in Figs. 12 through 14, a leaf spring 61a mounted to the intermediate partition 11 is mounted to a space between the intermediate partition 11 and the front-face engaging section 12 of the frame element 1. With such arrangement, the article 3 to be accommodated is pushed from its rear face by the leaf spring 61a, while the frame element 1 is moved to its closed position from the condition that the article 3 to be accommodated rests on the intermediate partition 11, and is urged against the front-face engaging section 12 of the frame element 1. Thus, the above-described gap is prevented from occurring.

Furthermore, in an embodiment illustrated in Figs. 15 and 16, a leaf spring 61 folded in a thin

configuration and having a lower portion curved at n is fixedly mounted to a position between the intermediate partition 11 and the front-face engaging section 12 of the frame element 1. Thus, it is possible to produce similar functional advantages. The configuration and the mounting position of the connecting engaging sections 55 and 17 of the respective frame element 1 and connecting element 5 are determined depending upon the fact that the connecting section for preventing movement of the frame element 1 and the connecting element 5 in the angular-movement axial direction is brought to detachable type or fixing type.

In the case where the connection section is brought to detachable type, the left- and right-hand frame elements 1 adjacent the frame element 1 to be demounted are moved angularly to a predetermined angle and are moved to their open positions. The groove in the connection engaging section 55 of the connecting element 5 and the projection on the connection engaging section 17 of the frame element 1 are aligned with each other. The intermediate frame element 1 is pushed up and is released.

The predetermined angle is determined depending upon a feeling on the circumstances or knowledge of use such as the fully open position of the frame element 1, a position midway of the angular movement, or the like.

In connection with the above, it is further

convenient if a temporary stop is provided midway of the angular movement and is combined with means for perceiving each position.

Release between the frame elements 1 and the connecting elements 2 can also be done by the following method.

A lower end of the side plate 51, which serves as the convex shaft section 51a within the concave bearing section 15a of the frame element 1, is partially cut out, to form a partial cut-out 51p as shown in Figs. 2 and 3. A screwdriver has its forward end which is abutted against the partial cut-out 51p. A force is applied to the screwdriver with the edge of the flange 15 of the frame element 1 serving as a fulcrum. The side plate 51 is elastically deformed, and the convex shaft section 51a is detached from the concave bearing section 15a of the frame element 1.

As another embodiment (not shown), both the ends of the frame element 1 shown in Fig. 1 are cut at 45 degrees. A pair of V-shaped cut-into sections are formed into two intermediate locations from the interior under such a condition that the side plate 18 of the frame element 1 remains to be cut. The pair of cut-into sections are bent into such a configuration that three sides are surrounded. The couplings 5 shown in Fig. 2 are connected respectively to both end faces.

The connecting elements 5 are fitted respectively into the spaces A at both the ends of

another frame element 1 which has its length the same as that between the V-shaped cut-into sections. Thus, there is obtained a frame in which only one side of the frame is movable angularly.

In this case, it is also possible to angularly move the angularly-movable frame element 1 whereby the article 3 to be accommodated is drawn from the side face of the frame.

The foregoing will be described with reference to Fig. 8. The connecting elements g1 and g2 are omitted, and the interior of the single frame element 1 at the positions p1 and p2 are cut into a V-shaped configuration, and are bent.

An assembly, in which the connecting elements g3 and g4 are fitted in both ends of another frame element 1Q, is pushed into the ends p3 and p4 of the frame element, to form a frame.

As shown in Fig. 5, if the lower section of the connecting element 5 projects with respect to a horizontal position of a rear-face section 1a of the frame element 1 to provide a projection 58, it is possible to move the frame element 1 angularly without contact of the lower portion of the rear-face section 1a of the frame element 1 with the wall surface. In this case, it is possible to replace the article 3 to be accommodated by another one, while the connecting element 5 is mounted to the wall surface or the like.

An embodiment illustrated in Fig. 17 is such

that a connection engaging inclined surface 117a of a connection engaging section consisting of a fitting bore 117 having its upper section formed narrow, which is provided on the intermediate partition 11 of the frame element 1, is in sliding contact with a connection engaging section 155 which consists of a projection provided on the connecting element 5.

Angular movement of the frame element 1 causes the inclined surface 117a to clamp the connection engaging section 155 of the connecting element 5 at the connection engaging section 117 of the frame element 1, or to release the clamping.

In the embodiment, an inclined surface 352a is provided on a tongue-like spring 352 which is connected to the reinforcing plate 50 and which is formed with a cut groove at its three sides. The inclined surface 352a is engageable with the engaging pawl 13 which is provided on the intermediate partition 11 of the frame element 1.

Figs. 18 through 20 show an embodiment in the case where a frame element 1 is used whose each end is cut perpendicularly.

The connecting element in the embodiment uses a pair of connecting sections, one being angularly movable, and the other being immovable angularly. A pair of caps 121 are mounted respectively to both the ends of the front-face engaging section 12 of the frame element 1 which is located at the front face of the

article 3 to be accommodated.

One of a pair of side plates 251 in the connecting element 5 serves as a spring element when the one side plate 251 is fitted in and engaged with an inside of a flange 215 which is formed at a lower end of one frame element 201.

A bore 217 formed in an intermediate partition 211 of the one frame element 201 serves as a connection engaging section which is capable of being fitted about a projection 255 formed on the one side plate 251 of the connecting element 5.

If the end of the frame element 1 is cut perpendicularly as is in the present embodiment, the corner of the frame element 1 is not brought to a sharp configuration.

Further, since the cap 121 is mounted to the end of the angularly movable frame element 1, it is possible to eliminate a further acute feeling.

An embodiment illustrated in Fig. 21 is brought to one in which the configuration of the frame element 1 is made flat and thin.

In the embodiments illustrated in Figs. 1 and 18, the space A of the frame element 1 and a holding space B for the article to be accommodated are arranged in the thickness direction of the frame.

To the contrary, the embodiment illustrated in Fig. 21 is such that the frame element 1 has a top plate 301 connected to the side plate 20, a partition plate

311 is provided on the top plate 301, and the space A and the clamping space B for the article to be accommodated are arranged horizontally.

The article 3 to be accommodated is clamped between a bottom wall 305 and a side wall 306 of the reinforcing plate 50 fitted in the bottom of the connecting element 5 and the front-face engaging section 12 provided on the inner edge of the top plate 301 of the frame element 1.

Fig. 22 shows an embodiment in which an inclined surface 55a for moving the connecting element 5 in the angular-moving axial direction of the frame element 1, accompanied with the angular movement of the frame element 1 illustrated in Fig. 17, is provided on the connection engaging section 55 of the connecting element 5.

In this case, the projection-like connection engaging section 17 of the frame element 1 may be one illustrated in Fig. 1.

Fig. 23 shows an embodiment in the case where the frame elements 1 according to the invention are mounted respectively to the connecting elements 5 formed at an edge of a box.

In the present embodiment, a plurality of pockets 252p are formed at the edge of the box, and a plurality of leaf springs 252 each having an inclined surface 252a are mounted respectively to the pockets 252p.

The inclined surface 252a serves similarly as the inclined surface 152a illustrated in Fig. 2.

Fig. 24 shows an embodiment of a frame which comprises a connecting element and a plurality of frame elements 301. In the connecting element, a plurality of holding projections 7 for the article 3 to be accommodated are formed respectively at the corners of a dish-like rear plate 6. The dish-like rear plate 6 has its edges each of which is provided with an engaging pawl 8 and a finger-catching recess 9 for removing the article 3 to be accommodated. Each of the frame elements 301 is provided with an engaging pawl 13 which is engageable with the engaging pawl 8 of the dish-like rear plate 6.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A frame comprising a plurality of frame members which are generally longitudinal and at least one corner connecting member, the at least one corner connecting member being directly coupled to the frame member in a manner allowing relative angular rotation between the corner connecting member and at least one frame member without disassembling the frame members and/or the corner connecting member from the frame as a whole, to allow an article to be accommodated in the frame or to be removed therefrom.

2. A frame according to claim 1, in which each said frame member comprises an engaging section adapted for operative engagement with the front face of said article, a side section, and at least one partition dividing the space partially enclosed by said front-face engaging section and by said side section into two distinct spaces, a first space partially enclosed by said front-face engaging section and said partition and being adapted to receive a peripheral edge of said article, and a second space partially enclosed by said partition and said side section; and in which a portion of the or a said corner connecting member is received in said second space.

3. A frame according to claim 2, in which said side section has a flange at an edge thereof opposite said

front-face engaging section, said flange having a concave bearing surface and extending inwardly of said side section towards said second space.

4. A frame according to claim 3, in which said frame member has mitred end faces; there is a step between said flange and said side plate; and said flange terminates short of said mitred end faces.

5. A frame according to claim 3 or 4, in which said corner connecting member has a side plate having an edge formed in a convex bearing section, and in which said convex bearing section is received in said concave bearing surface.

6. A frame according to claim 5, in which said side plate is profiled adjacent said convex bearing section to define a step adapted for abutting relation with said side section in a fully open position of said frame member and corner connecting member, allowing insertion of said article into said frame or removal therefrom.

7. A frame according to claim 5 or 6, in which said side plate is shaped to form a leaf spring.

8. A frame according to any one of claims 2 to 7, in which said corner connecting member has a convex bearing section and said partition has a concave section, said convex and concave sections being generally concentric.

9. A frame according to claim 8, in which one said section is provided with a stop adapted to define a fully open position for said frame member and corner connecting member, to allow said article to be inserted or removed.

10. A frame according to claim 8 or 9, in which at least one of said sections is provided with location means adapted to define a partially open position for said frame member and corner connecting member, to allow at least limited access to the interior of said frame for said article to be inserted or removed.

11. A frame according to claim 8, 9 or 10, in which at least one of said sections is provided with location means adapted to define a fully closed position for said frame member and corner connecting member.

12. A frame according to claim 11, in which a tongue-like spring is provided in said convex section; and said location means is formed at the forward edge of said tongue-like spring.

13. A frame according to any one of claims 2 to 12, in which a spring is located between said partition and said front-face engaging section, said spring being adapted to present a surface on which a said article to be accommodated may be placed in an open position of said frame member and corner connecting member, and being

further adapted, in a fully closed position of said frame member and corner connecting member, to bias said article against said front-face engaging section.

14. A frame according to claim 1, in which each said frame member comprises a side section and an engaging section extending from said side section and adapted for clamping engagement against a surface of said article; and the or each said corner connecting member is formed with or is solid with a rear wall adapted for engagement with a surface of said article opposite said first-mentioned surface, and further is formed with or is solid with a side wall adapted to lie alongside a side edge of said article mounted in said frame.

15. A frame according to any one of claims 1 to 14, in which at least one said frame member is incapable of angular rotation relative to its corresponding corner connecting member.

16. A frame according to claim 15, in which a cap or caps is/are mounted to end(s) of said frame member(s) to close interior space thereof at at least one corner of said frame.

17. A frame according to any one of claims 1 to 16, in which each said frame member and/or corner connecting member(s) comprises a longitudinal extrusion, and said

frame members and said corner connecting members(s) are keyed to prevent relative longitudinal axial sliding.

18. A frame according to claim 17, in which the or each said corner connecting member is provided with a slot or groove serving to provide keying with said frame member, said slot having angled sides.

19. A frame according to any one of claims 1 to 18, in which said frame members serve to define sides of said frame; the or each said corner connecting member includes location means serving to define a fully closed position for frame members relative thereto; and the or each corner connecting member comprises a reinforcing plate integral with said location means at a corner of said frame.

20. A frame, comprising:

a plurality of elongate frame elements each of a respective predetermined length; and

at least one connecting corner element, having intersecting sides formed to be shorter than said frame elements, to which sides said frame elements are respectively mounted angularly to each other;

wherein at least one of said frame elements is mounted to a corresponding side of said at least one connecting corner element for angular movement relative thereto, and

one of said frame elements is mounted to said at least one connecting corner element in an immovable manner.

21. A frame, comprising:

a plurality of elongate frame elements each of a respective predetermined length; and

at least one connecting corner element, having intersecting sides formed to be shorter than said frame elements, to which sides said frame elements are respectively mounted angularly with respect to each other, said sides defining with said frame elements means for engaging therewith in a manner permitting relative angular movement therebetween; wherein at least one of said frame elements is mounted to a corresponding side of said at least one connecting corner element for said angular movement relative thereto about a direction parallel to said corresponding side;

and wherein said at least one connecting corner element has a connection-engaging section, a side plate and an angular-movement stoppage section which are arranged on intersecting lines, said angular-movement stoppage section being formed integrally with a triangular reinforcing plate.

22. A frame, comprising:

a plurality of elongate frame elements each of a respective predetermined length; and

at least one connecting corner element, having intersecting sides formed to be shorter than said frame elements, to which sides said frame elements are respectively mounted angularly with respect to each other, said sides defining with said frame elements means for engaging therewith in a manner permitting relative angular movement therebetween;

wherein at least one of said frame elements is mounted to a corresponding side of said at least one connecting corner element for said angular movement relative thereto about a direction parallel to said corresponding side;

and wherein each side of said at least one connecting corner element comprises a side plate having a lower end formed with a convex shaft section.

23. The frame according to claim 22, wherein said side plate of said connecting corner element comprises a leaf spring.

24. The frame according to claim 22 or 23, further comprising a step between said convex shaft section and said side plate of said at least one connecting corner element.

25. A frame, comprising:

a plurality of elongate frame elements each of a respective predetermined length; and

at least one connecting corner element, having intersecting sides formed to be shorter than said frame elements, to which sides said frame elements are respectively mounted angularly with respect to each other, said sides defining with said frame elements means for engaging therewith in a manner permitting relative angular movement therebetween;

wherein at least one of said frame elements is mounted to a corresponding side of said at least one connecting corner

element for said angular movement relative thereto about a direction parallel to said corresponding side;
and wherein said at least one connecting corner element has a convex shaft section which is mounted to a concave bearing section of the frame element for relative angular movement therebetween.

26. A frame, comprising:
a plurality of elongate frame elements each of a respective predetermined length; and
at least one connecting corner element, having intersecting sides formed to be shorter than said frame elements, to which sides said frame elements are respectively mounted angularly with respect to each other, said sides defining with said frame elements means for engaging therewith in a manner permitting relative angular movement therebetween;
wherein at least one of said frame elements is mounted to a corresponding side of said at least one connecting corner element for said angular movement relative thereto about a direction parallel to said corresponding side;
wherein each of said frame elements is divided into first and second portions by a corresponding one of a plurality of intermediate partitions, said first portion being formed to define a first space for holding a front-face peripheral edge of an article to e accommodated, and said second portion being formed to define a second space in which said connecting corner element is fitted;
and wherein said at least one connecting corner element has a convex shaft section, and said corresponding intermediate

partition is curved concentrically with respect to a center of curvature of said concave bearing section.

27. A frame, comprising:

a plurality of elongate frame elements each of a respective predetermined length;

at least one connecting corner element, having intersecting sides formed to be shorter than said frame elements, to which sides said frame elements are respectively mounted angularly with respect to each other, said sides defining with said frame elements means for engaging therewith in a manner permitting relative angular movement therebetween,

an angular-movement stoppage section provided at an angular-movement sliding surface between said at least one connecting corner element and a frame element engaged therewith; and

a tongue-like spring provided on the angular-movement sliding surface of said at least one connecting corner element, and said angular-movement engaging section is formed at a forward end of said tongue-like spring;

wherein at least one of said frame elements is mounted to a corresponding side of said at least one connecting corner element for said angular movement relative thereto about a direction parallel to said corresponding side.

28. The frame according to claim 27, wherein said tongue-like spring can be pushed into an interior of said at least one connecting corner element.

29. A frame, comprising:

a plurality of frame elements;

at least one connecting element to which said frame elements are mounted angularly with respect to each other, wherein a least one of said frame elements defines with said connecting element a means for enabling relative angular movement therebetween and is mounted to said at least one connecting element for said angular movement, and wherein another one of said frame elements is mounted to said at least one connecting element in an angularly immovable manner; and

a cap which is mounted to an end of a space in the angularly movable frame element, said space being provided for holding said article to be accommodated.

30. A frame, comprising:

a plurality of frame elements; and

at least one connecting element to which said frame elements are mounted angularly with respect to each other, said connecting element having a convex bearing section; wherein at least one of said frame elements is mounted to said at least one connecting element for relative angular movement;

wherein a space is provided in the frame element into which said connecting element is fitted, a lower end of said space having an inward flange with a concave bearing section provided therein, whereby relative angular movement between said at least one connecting element and a

corresponding frame element is enabled by cooperation between said convex and concave bearing sections thereof; and wherein each of the frame elements has obliquely cut end faces, wherein said flange has both ends cut out and said flange is provided with a step with respect to a side plate.

31. A frame, comprising:

a plurality of frame elements;

at least one connecting element to which said frame elements are mounted angularly with respect to each other, wherein at least one of said frame elements defines with said at least one correcting element a means for enabling relative angular movement therebetween and is mounted to said at least one connecting element for said relative angular movement;

wherein each of said frame elements is divided into two portions by a corresponding one of a plurality of intermediate partitions, one of said two portions defining a space for holding a front-face peripheral edge of an article to be accommodated, and the other portion defining a space in which said at least one connecting element is fitted; and

a spring at an upper face of said intermediate partition of the frame element at a location between said intermediate partition and a front-face engaging section formed at an upper edge of said intermediate partition, wherein said spring pushes a rear-face peripheral edge portion of the article to be accommodated resting on said intermediate

partition, while the frame element is moved to its closed position, to bring said rear-face peripheral edge section into close contact with said front-face engaging section of the frame element.

32. A frame, comprising:
a plurality of elongate frame elements each of a respective predetermined length; and
at least one connecting corner element, having sides intersecting to form an outside corner and to be shorter than said frame elements, to which sides said frame elements are respectively mounted to be disposed angularly with respect to each other, said sides defining with said frame elements means for engaging therewith in manner permitting angular movement therebetween;
wherein at least one of said frame elements is mounted to a corresponding side of said at least one connecting corner element for said angular movement relative thereto about a direction parallel to said corresponding side;
and wherein one of said frame elements is mounted to said connecting element in an angularly immovable manner.

33. The frame according to claim 32, further comprising: a cap which is mounted to an end of a space in the angularly movable frame element, said space being provided for holding said article to be accommodated.

34. A frame, comprising:

a plurality of frame elements, each including an intermediate partition formed longitudinally along a side surface of a frame element side plate, a front engaging section formed along an upper edge of said side plate and defining a predetermined interval provided with respect to said intermediate partition for accommodating an object to be contained, and an engaging pawl provided at a front end of said intermediate partition; and

a plurality of connecting elements cooperating with said frame elements to define said frame, each connecting element including a frame element fitting section and an angular-movement stoppage section provided orthogonally to the frame element fitting section, the angular-movement section being formed for engaging with the engaging pawl provided at the front end of the intermediate partition of a cooperating frame element to hold said cooperating frame element in an engaged position with respect to the corresponding connecting element;

wherein an intermediate angular-movement stoppage section is formed in each connecting element and is oriented for engaging with the engaging pawl of a cooperating frame element at a predetermined location with respect to the angular-movement stoppage section.

35. A frame, comprising:

a plurality of elongate frame elements each of a respective predetermined length; and

at least one connecting corner element, having sides intersecting to form an outside corner and to be shorter than said frame elements, to which sides said frame elements are respectively mounted to be disposed angularly with respect to each other, said sides defining with said frame elements means for engaging therewith in a manner permitting angular movement therebetween;

wherein at least one of said frame elements is mounted to a corresponding side of said at least one connecting corner element for retention solely thereby and in a manner permitting said angular movement relative thereto about a direction parallel to said corresponding side.

36. The frame according to claim 35, wherein each of said frame elements is divided into first and second portions by a corresponding one of a plurality of intermediate partitions, said first portion being formed to define a first space for holding a front-face peripheral edge of an article to be accommodated, and said second portion being formed to define a second space in which said connecting corner element is fitted.

37. The frame according to claim 36, wherein said second space of each of the frame elements, into which said at least one connecting corner element is fitted, has a lower end provided with an inward flange having a concave bearing section.

38. The frame according to claim 36 or 37, wherein said corresponding intermediate partition is formed to have an angular-movement engaging section.

39. The frame according to claim 36, 37 or 38, further comprising an angular-movement stoppage section provided at an angular-movement sliding-contact surface between said at least one connecting corner element and a frame element engaged therewith.

40. The frame according to any one of claims 36 to 39, further comprising an angular-movement engaging section provided at an intermediate section of an angular-movement sliding surface between said at least one connecting corner element and a frame element engaged therewith.

41. The frame according to any one of claims 36 to 40, wherein the frame element has a side plate and an upper plate connected to said side plate, and wherein a clamping space for the article to be accommodated is formed between a front-face engaging section provided on an inner edge of said upper plate and a bottom plate and a side plate of said at least one connecting corner element.

42. The frame according to any one of claims 36 to 41, wherein the frame element and said at least one connecting corner element have respective connection-engaging sections for restricting relative movement between

the frame element and said at least one connecting corner element in an angular-movement axial direction.

43. The frame according to claim 42, wherein each of said connection-engaging sections has an inclined side surface.

44. A frame, comprising:

a plurality of frame elements, each including an intermediate partition formed longitudinally along a side surface of a frame element side plate, a front-engaging section extending over the intermediate partition and formed along an upper edge of said side plate and defining a predetermined interval provided with respect to said intermediate partition for accommodating an object to be contained, and an engaging pawl provided at a front end of said intermediate partition; and

a plurality of connecting elements each cooperating with two of said frame elements to define said frame, each connecting element including a frame element fitting section and an angular-movement stoppage section provided orthogonally to the frame element fitting section, the angular-movement stoppage section being formed for engaging with an engaging pawl provided at a front end of the intermediate partition of a cooperating frame element to hold said cooperating frame element in an engaged position with respect to the corresponding connecting element.

45. A frame according to claim 44, wherein an upper portion of the intermediate partition of each frame element is convexly curved.

46. A frame according to claim 44 or 45, wherein the angular-movement stoppage section of each connecting element is formed to extend from a connecting element side plate to a lower end of an angular-movement sliding contact surface.

47. A frame according to claim 44, 45 or 46, wherein a connection-engaging inclined surface is provided on one of each frame element and a cooperating connecting element, and a connection-engaging section is also provided on the other one of said cooperating frame element and connecting element to be slidably in contact with said connection-engaging inclined surface, so that said one cooperating frame element is allowed to move longitudinally with respect to said one connecting element cooperating therewith as said one cooperating frame element rotates against said one cooperating connecting element.

48. A frame, comprising:

a plurality of frame elements, each including an intermediate partition formed longitudinally along a side surface of a frame element side plate, a front-engaging section formed along an upper edge of said side plate to be extending over the intermediate partition and defining a predetermined interval provided with respect to said

intermediate partition for accommodating an object to be contained, and an engaging pawl provided at a front end of said intermediate partition; and

a plurality of connecting elements cooperating with said frame elements to define said frame, each connecting element including a frame element fitting section and an angular-movement stoppage section provided orthogonally to the frame element fitting section, the angular-movement stoppage section being formed for engaging with an engaging pawl provided at a front end of the intermediate partition of a cooperating frame element to hold said cooperating frame element in an engaged position with respect to the corresponding connecting element;

wherein each frame element is provided with a flange projecting inward from the side plate thereof to engage with a convex shaft section of a cooperating connecting element.

49. A frame, comprising:

a plurality of frame elements, each including an intermediate partition formed longitudinally along a side surface of a frame element side plate, a front-engaging section formed along an upper edge of said side plate to be extending over the intermediate partition and defining a predetermined interval provided with respect to said intermediate partition for accommodating an object to be contained, and an engaging pawl provided at a front end of said intermediate partition; and

a plurality of connecting elements cooperating with said frame elements to define said frame, each connecting element including a frame element fitting section and an angular-movement stoppage section provided orthogonally to the frame element fitting section, the angular-movement stoppage section being formed for engaging with an engaging pawl provided at a front end of the intermediate partition of a cooperating frame element to hold said cooperating frame element in an engaged position with respect to the corresponding connecting element;

wherein, said frame element fitting section of each connecting element comprises a convex shaft section formed at a lower end of a connecting element side plate, each frame element is formed to have a concave bearing section at the lower end of said frame element side plate, and the convex shaft section of each connecting element engages with the concave bearing section of a cooperating frame element.

FIG.1

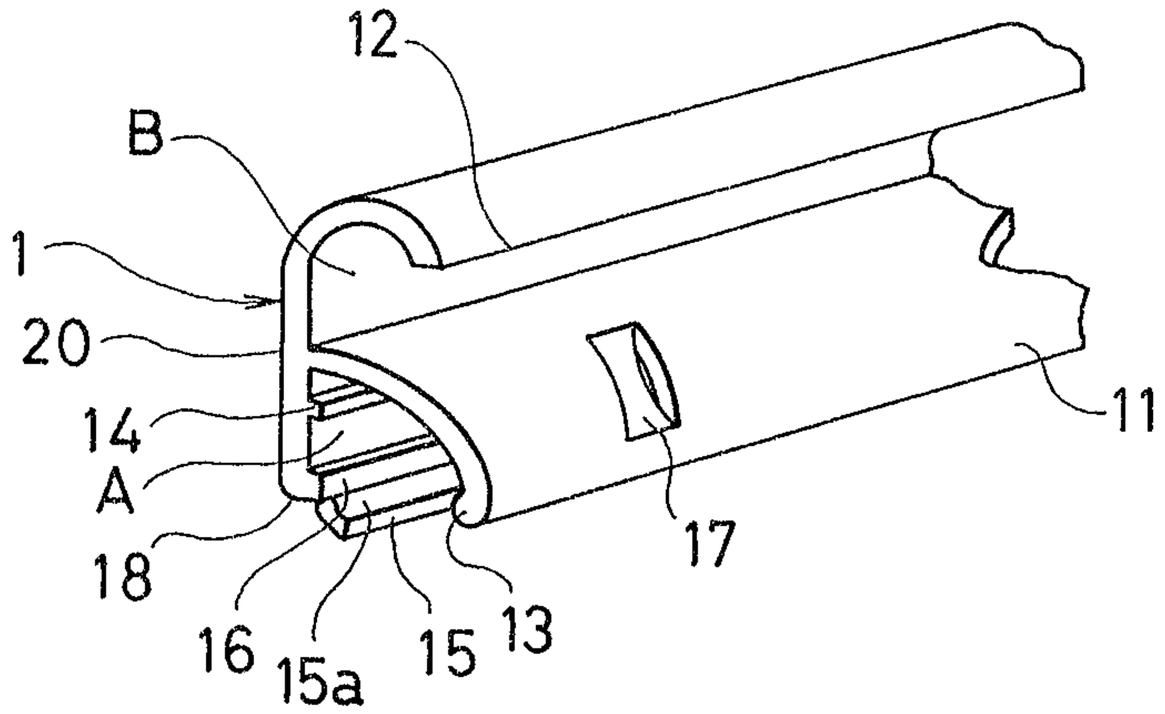

FIG.2

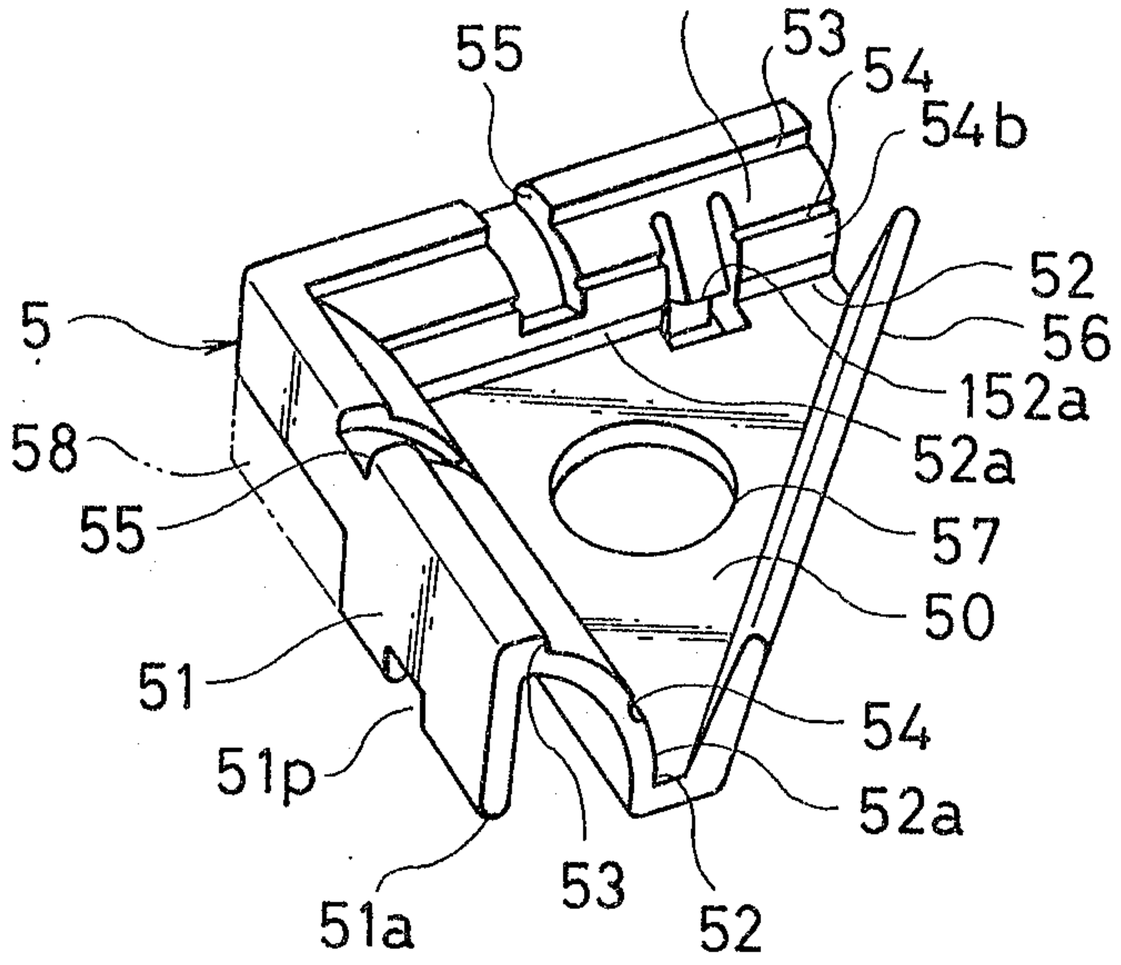

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FIG.3

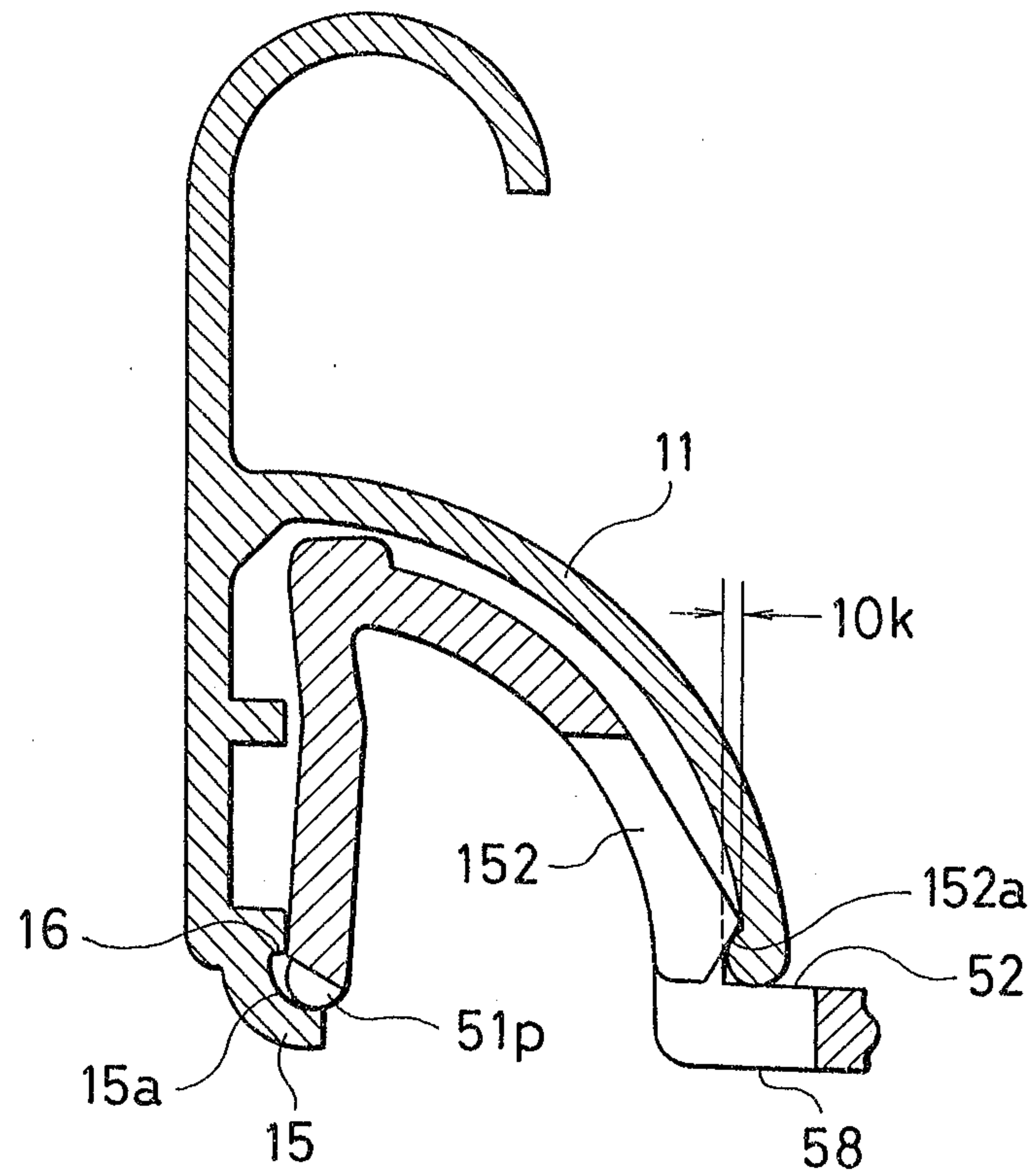

FIG.4

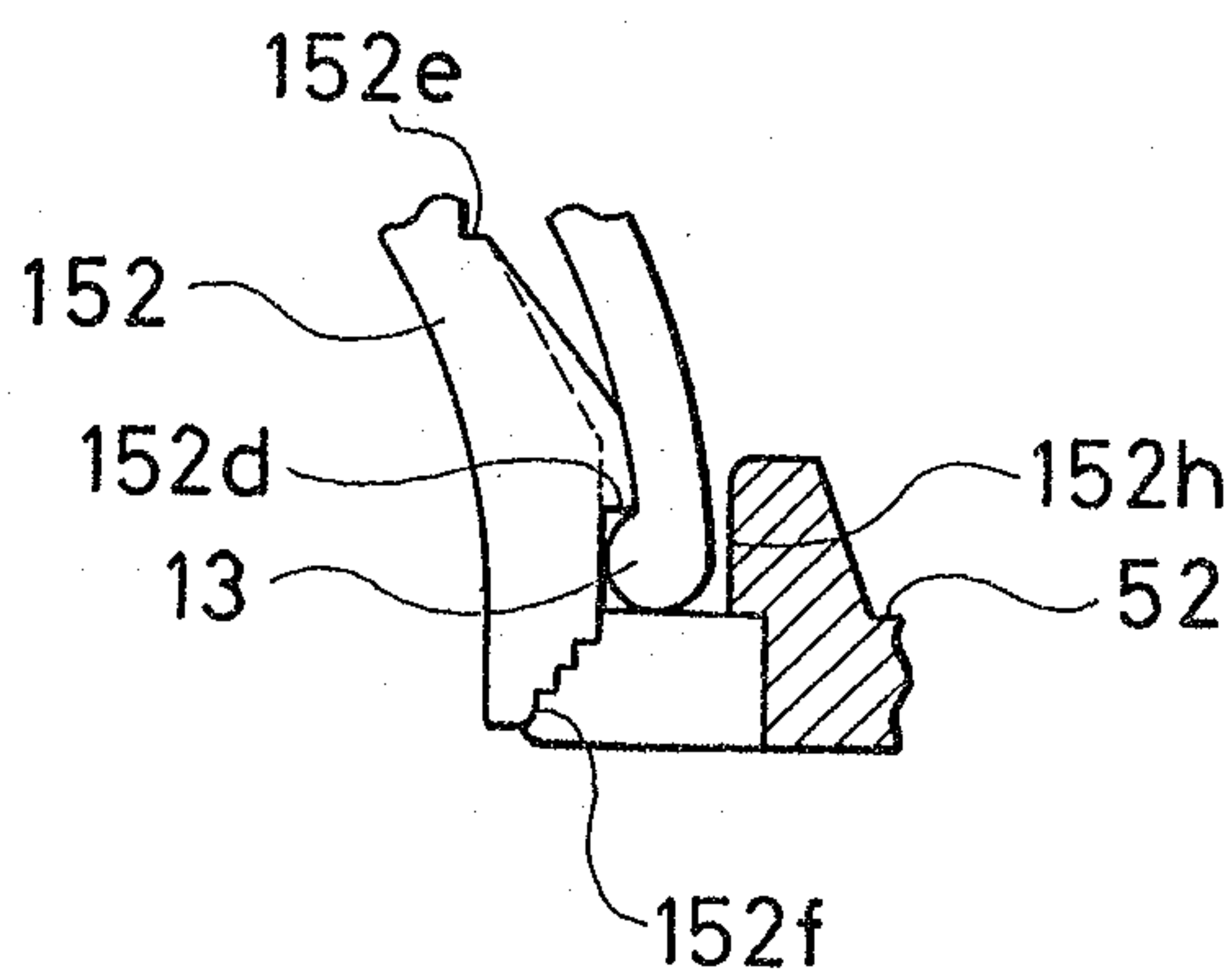

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FIG.5

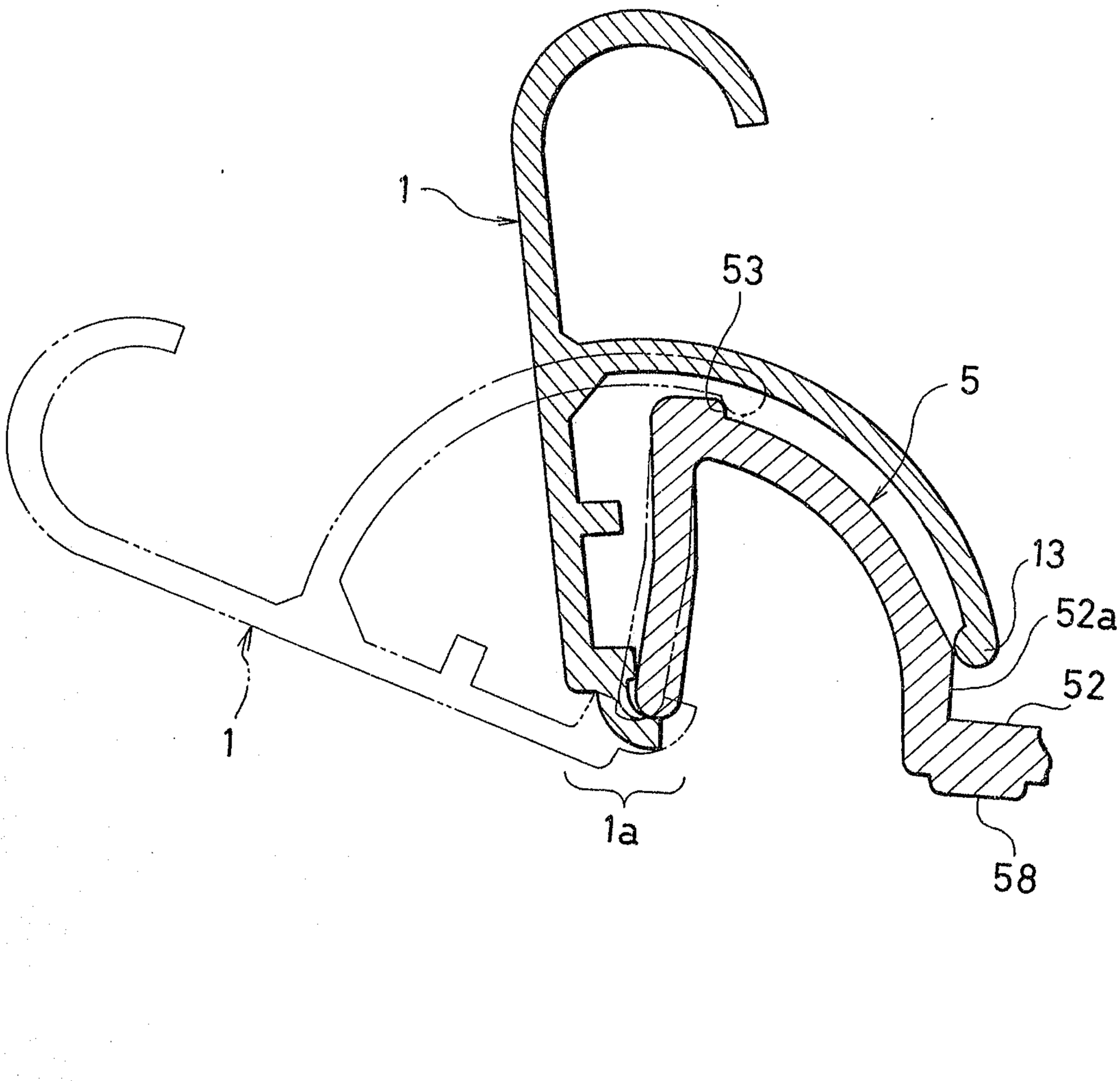

FIG.6

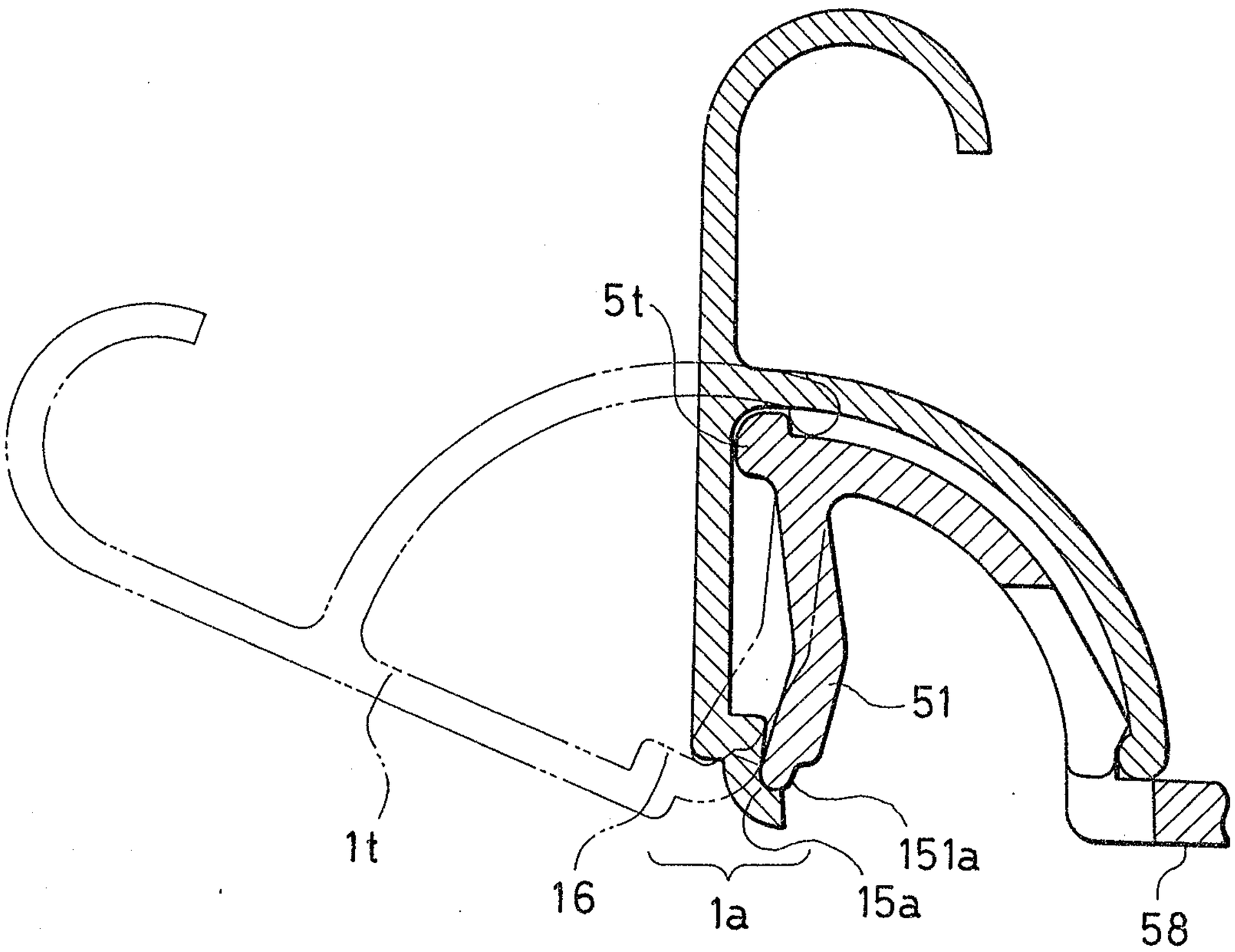

FIG.7

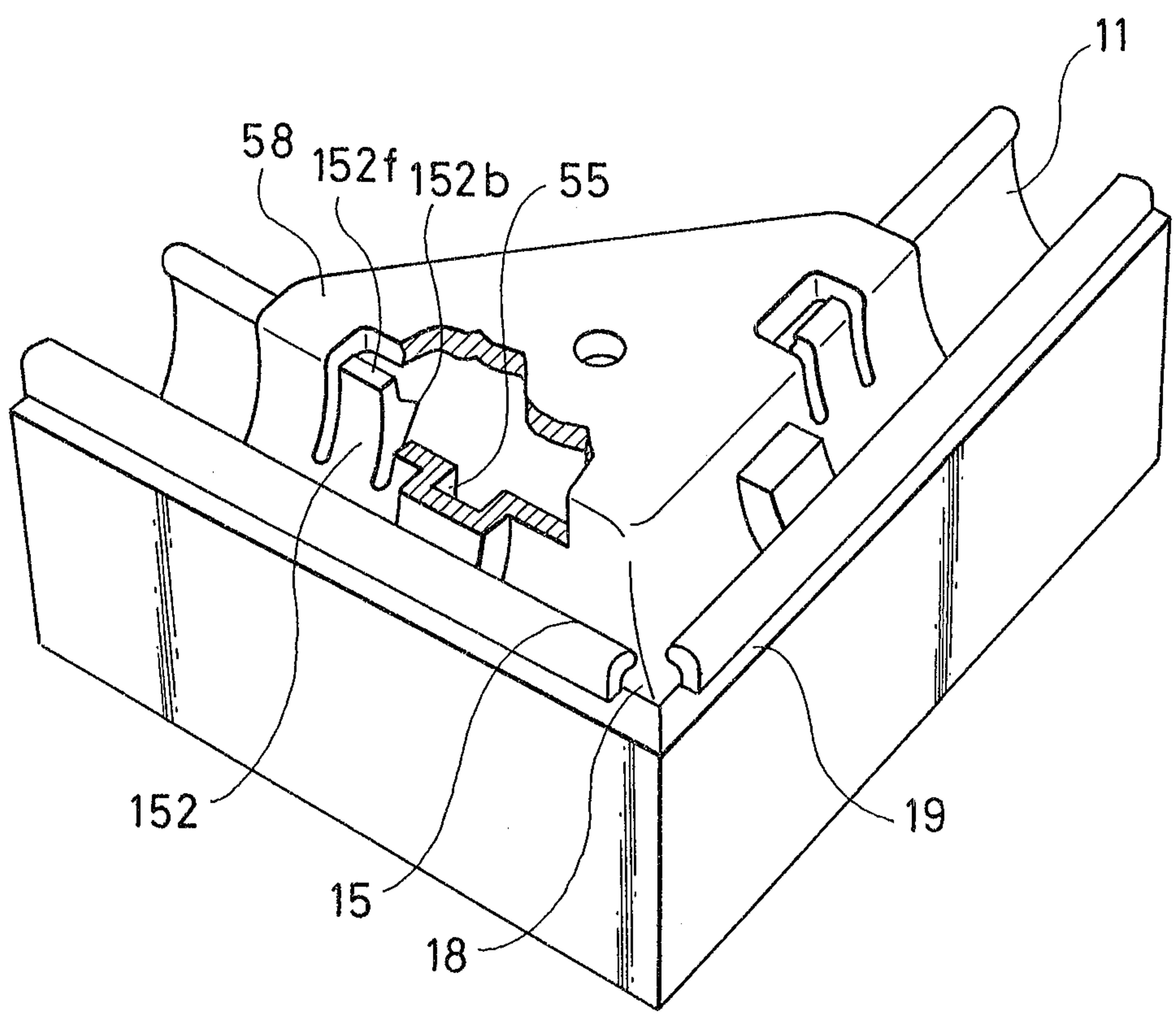

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FIG.8

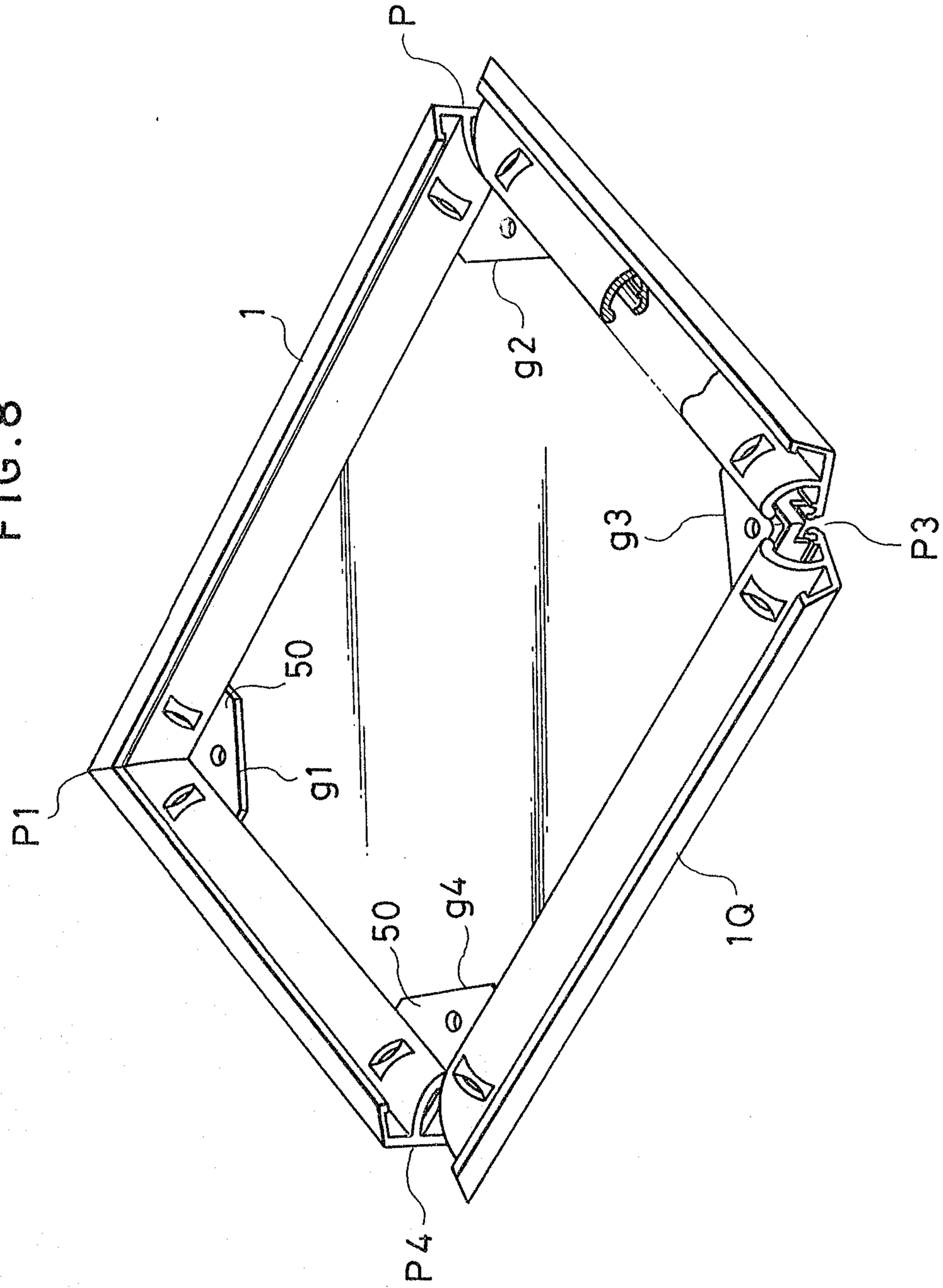

FIG.9

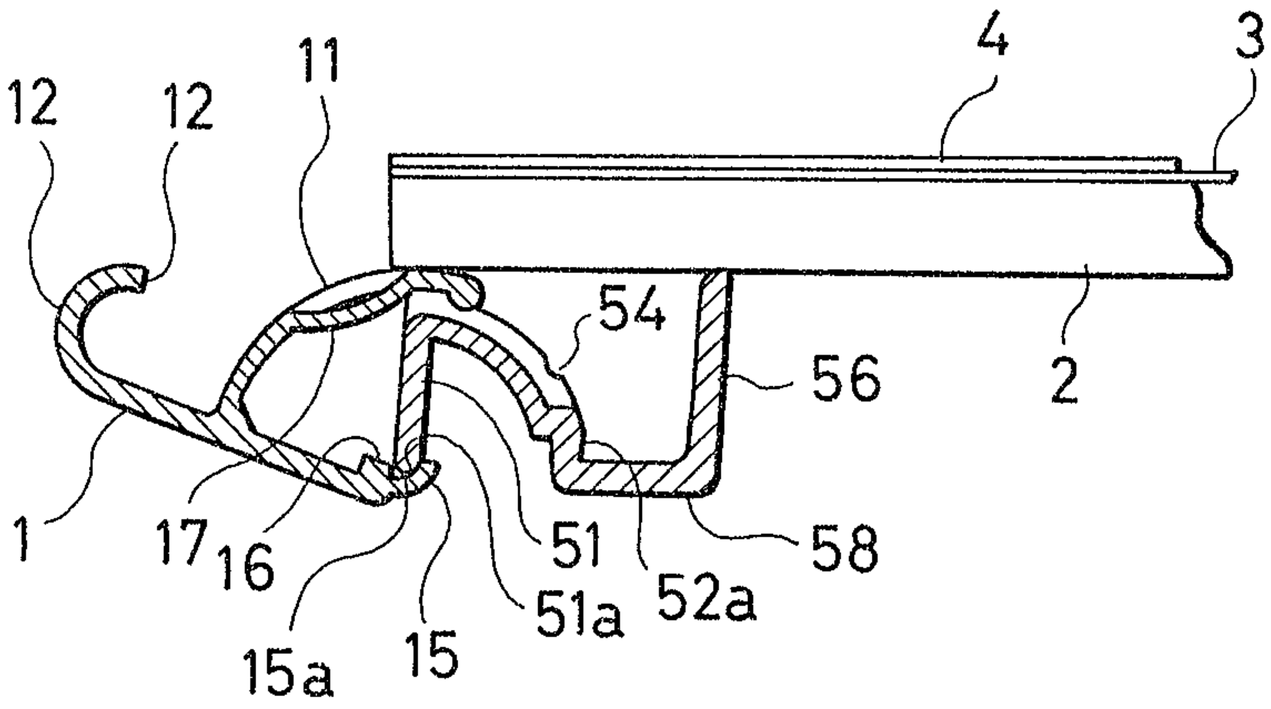

FIG.10

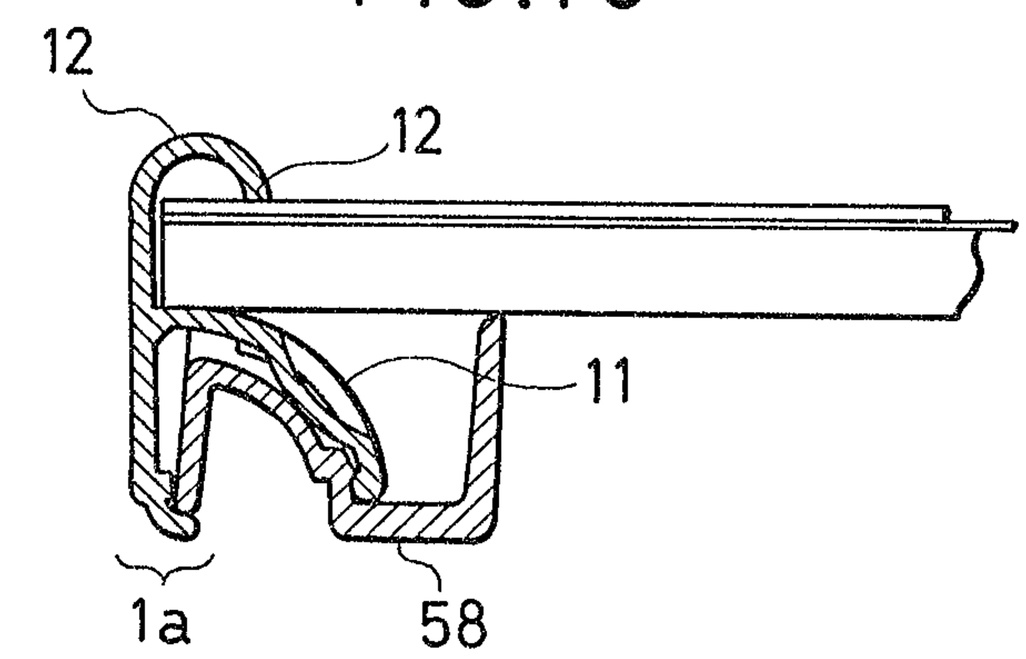

FIG.11

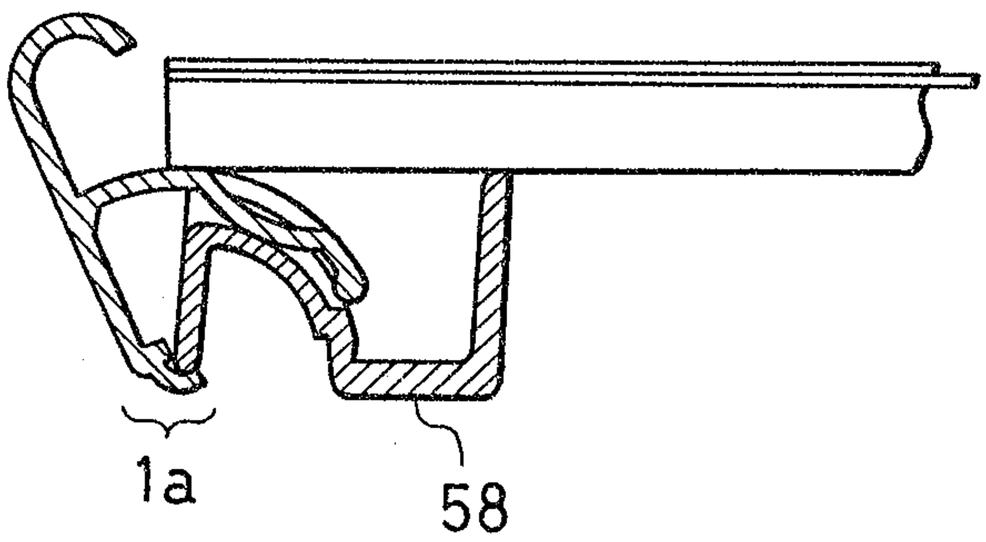

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FIG.12

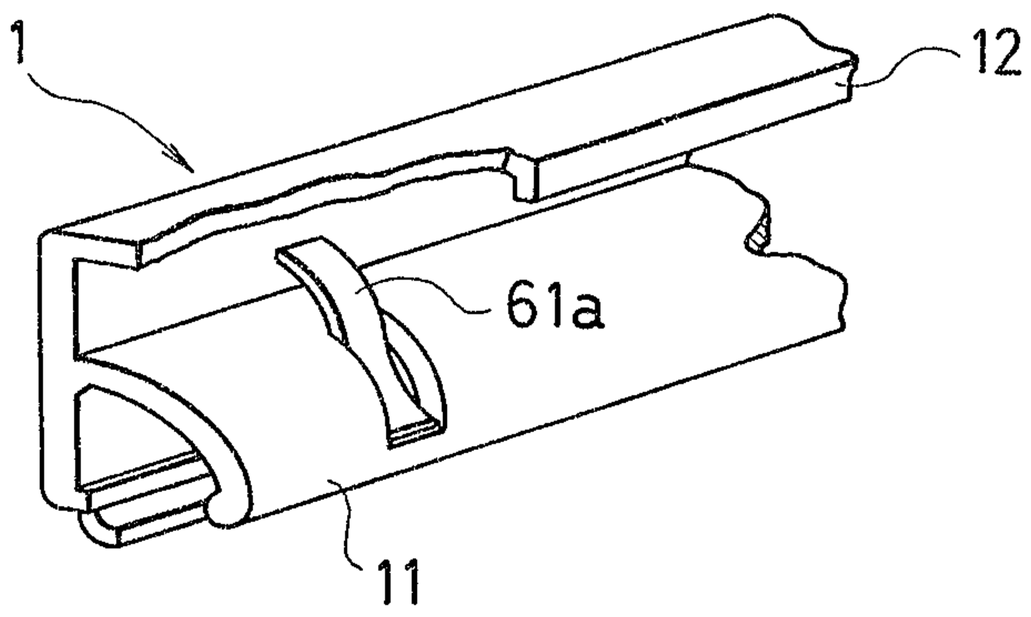

FIG.13

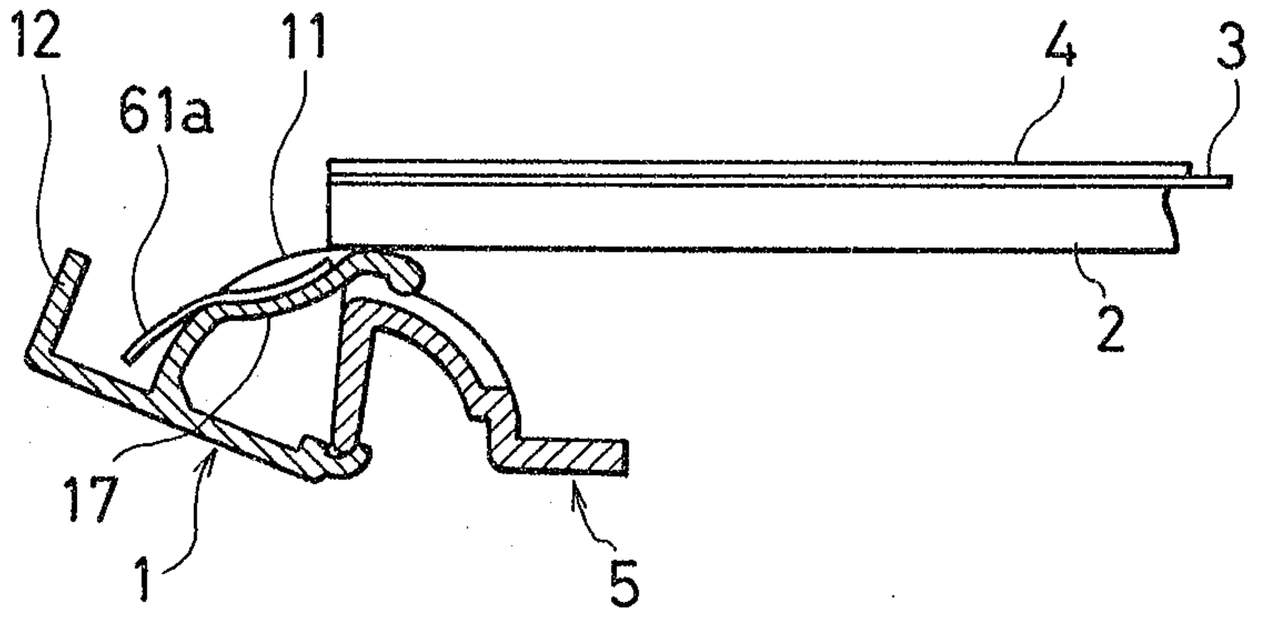

FIG.14

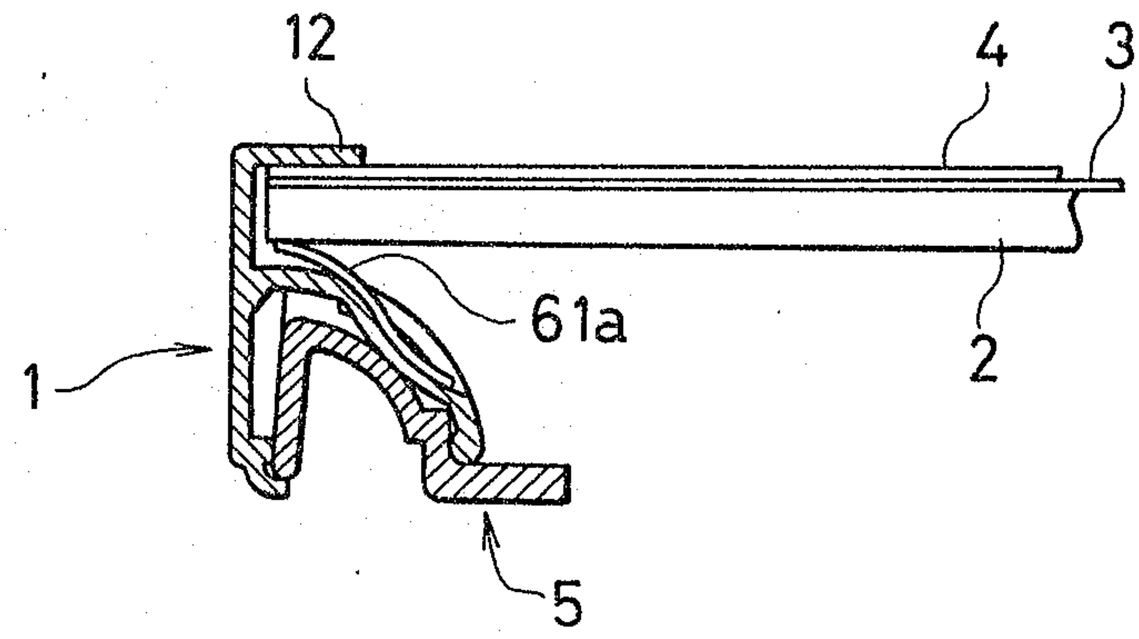

FIG.15

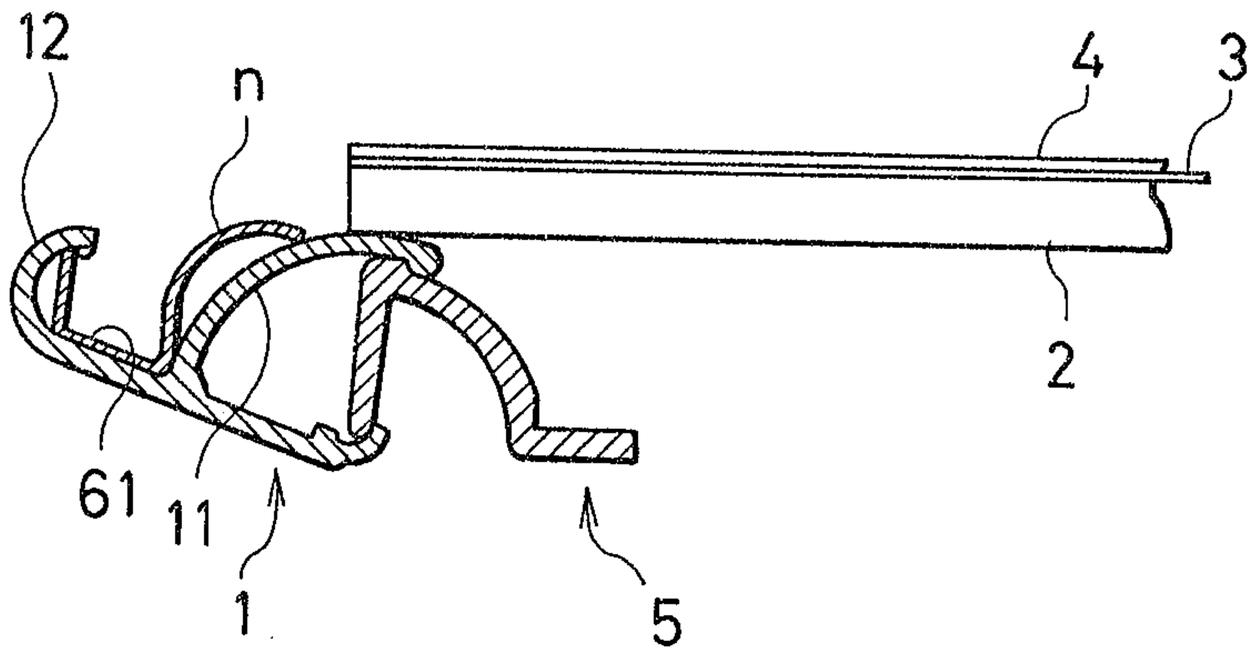

FIG.16

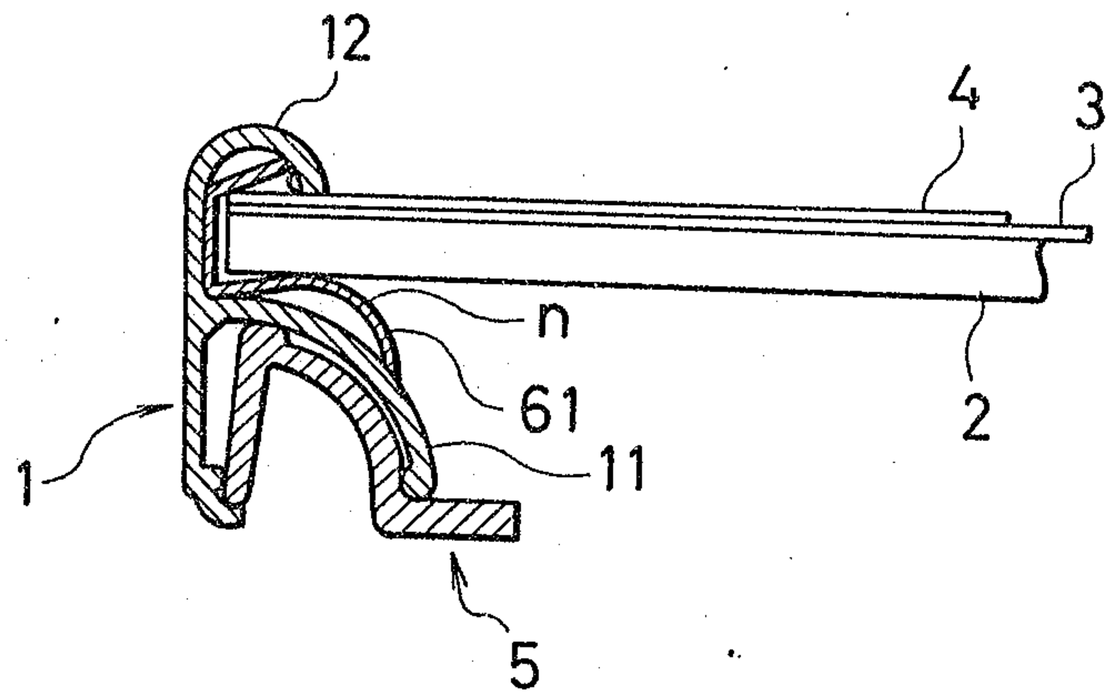

FIG.17

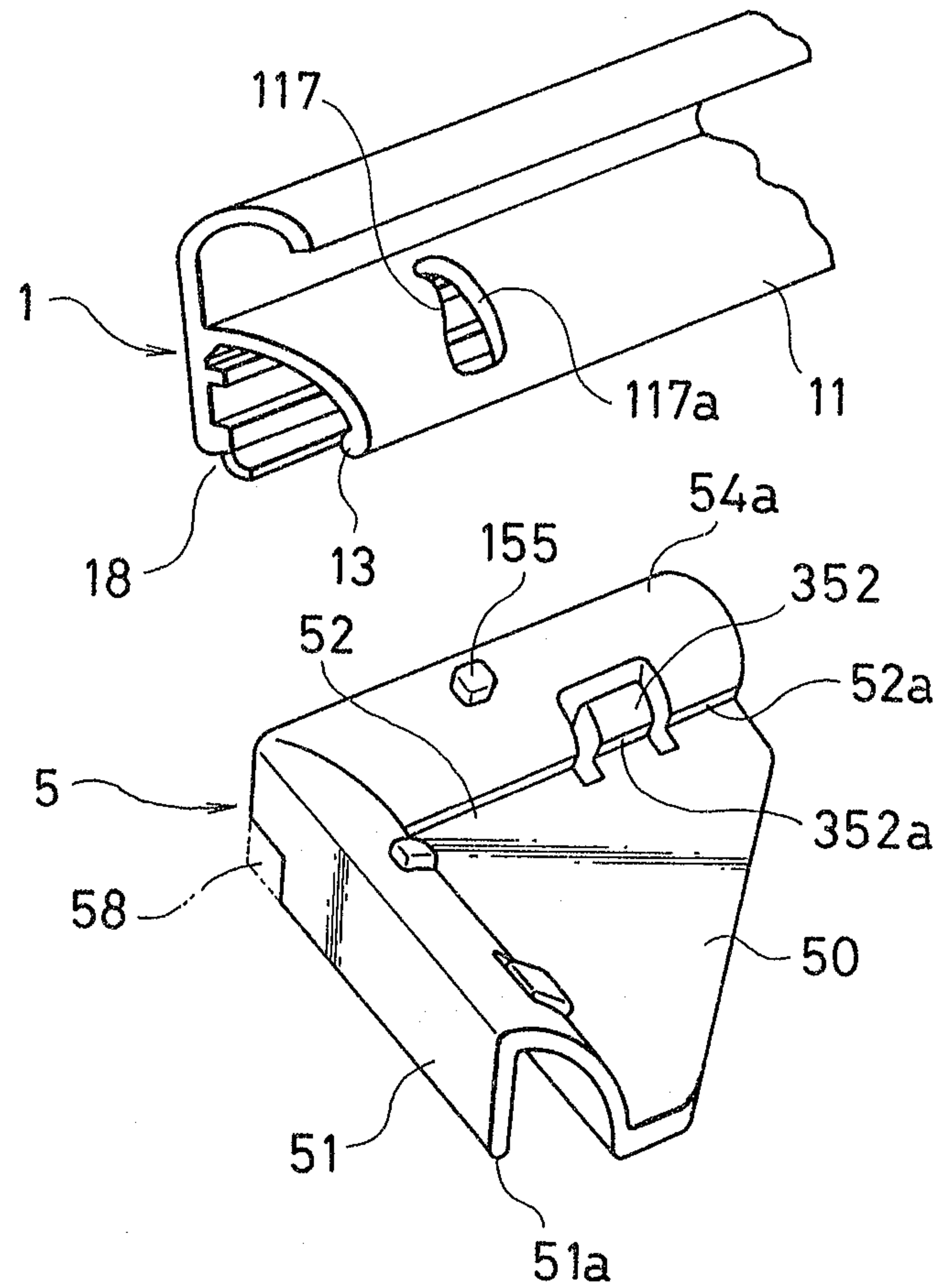

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FIG.18

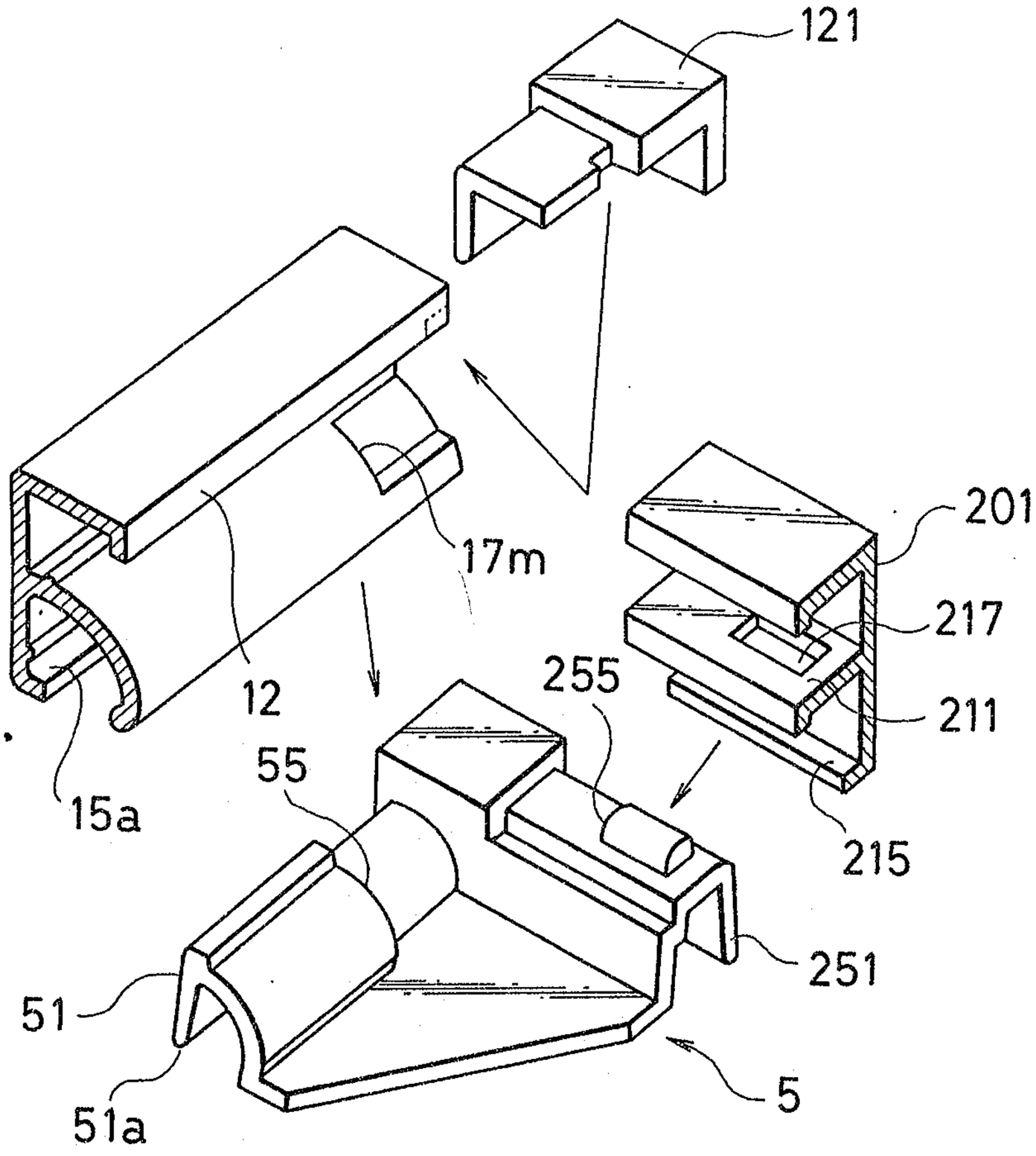

FIG. 19

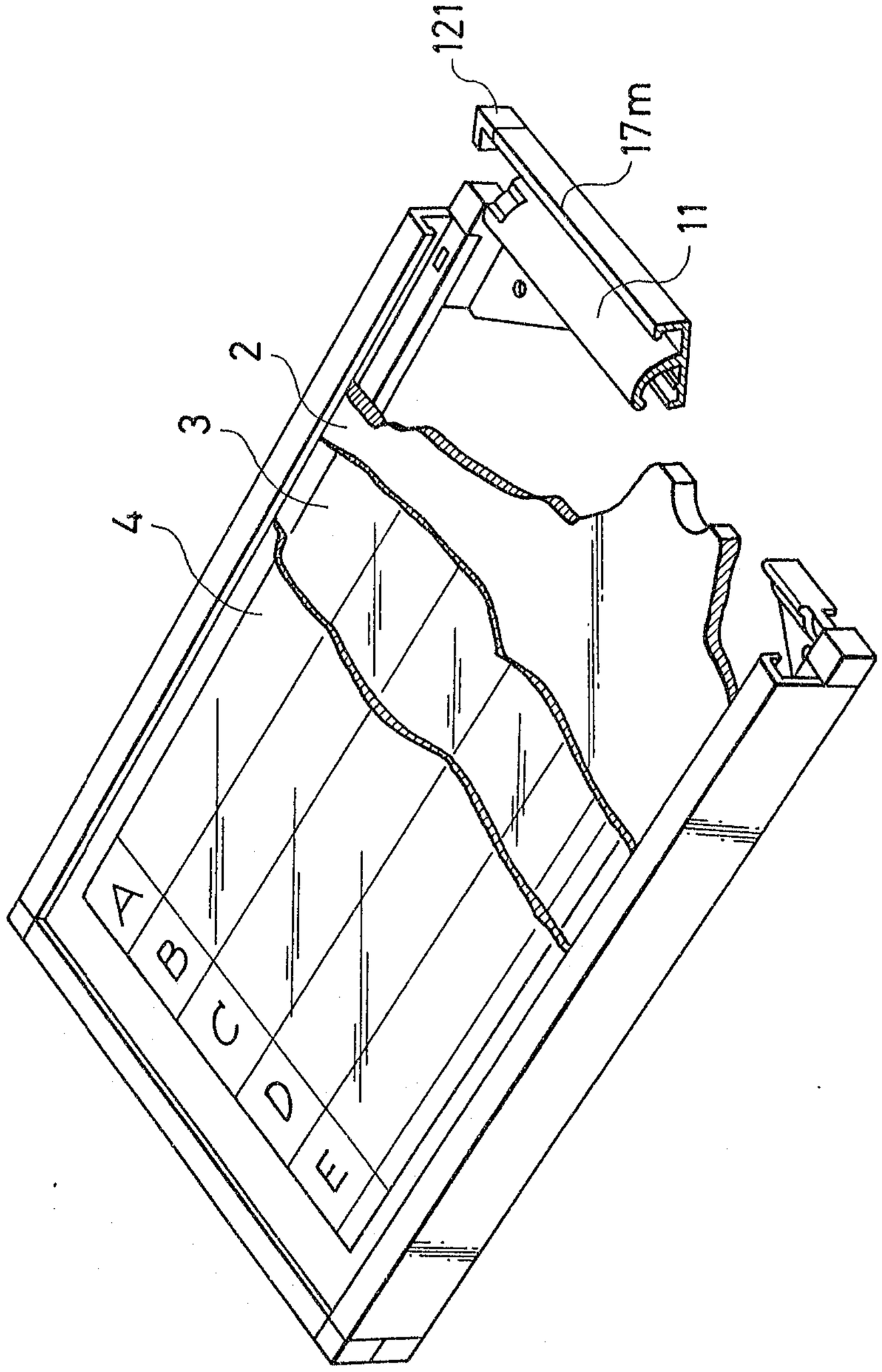

FIG.20

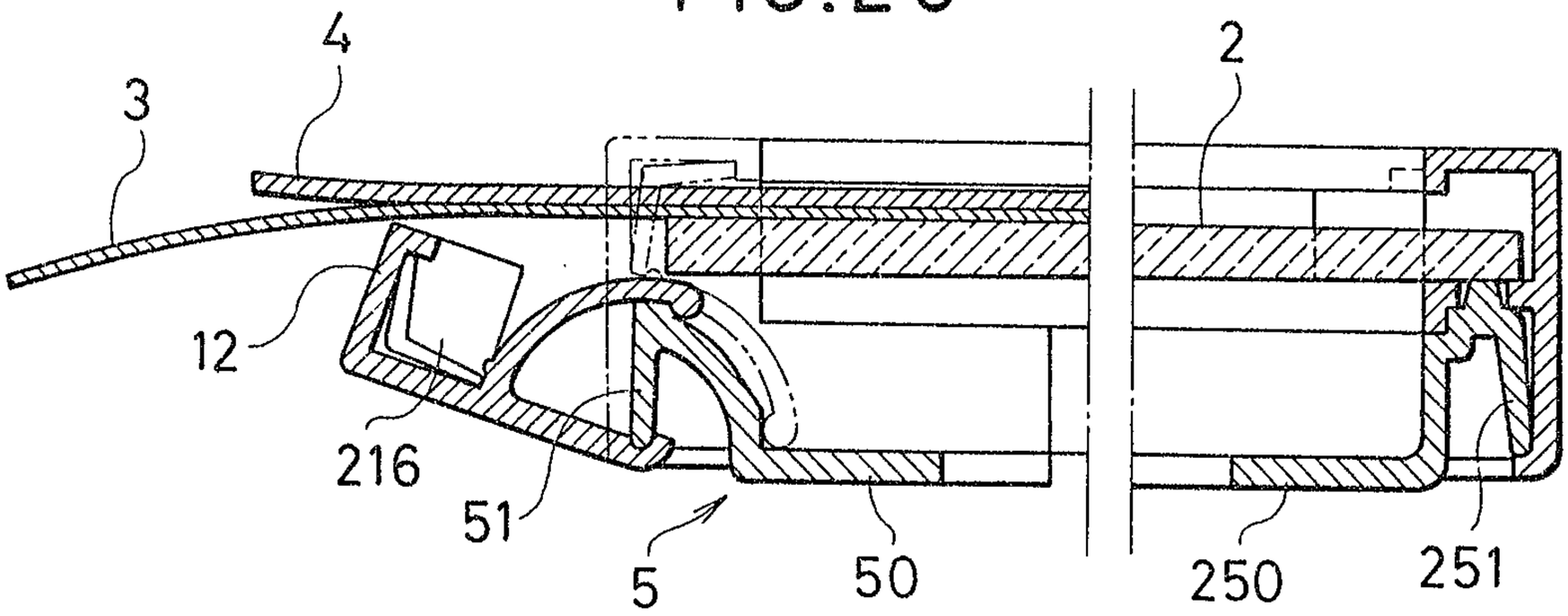

FIG.21

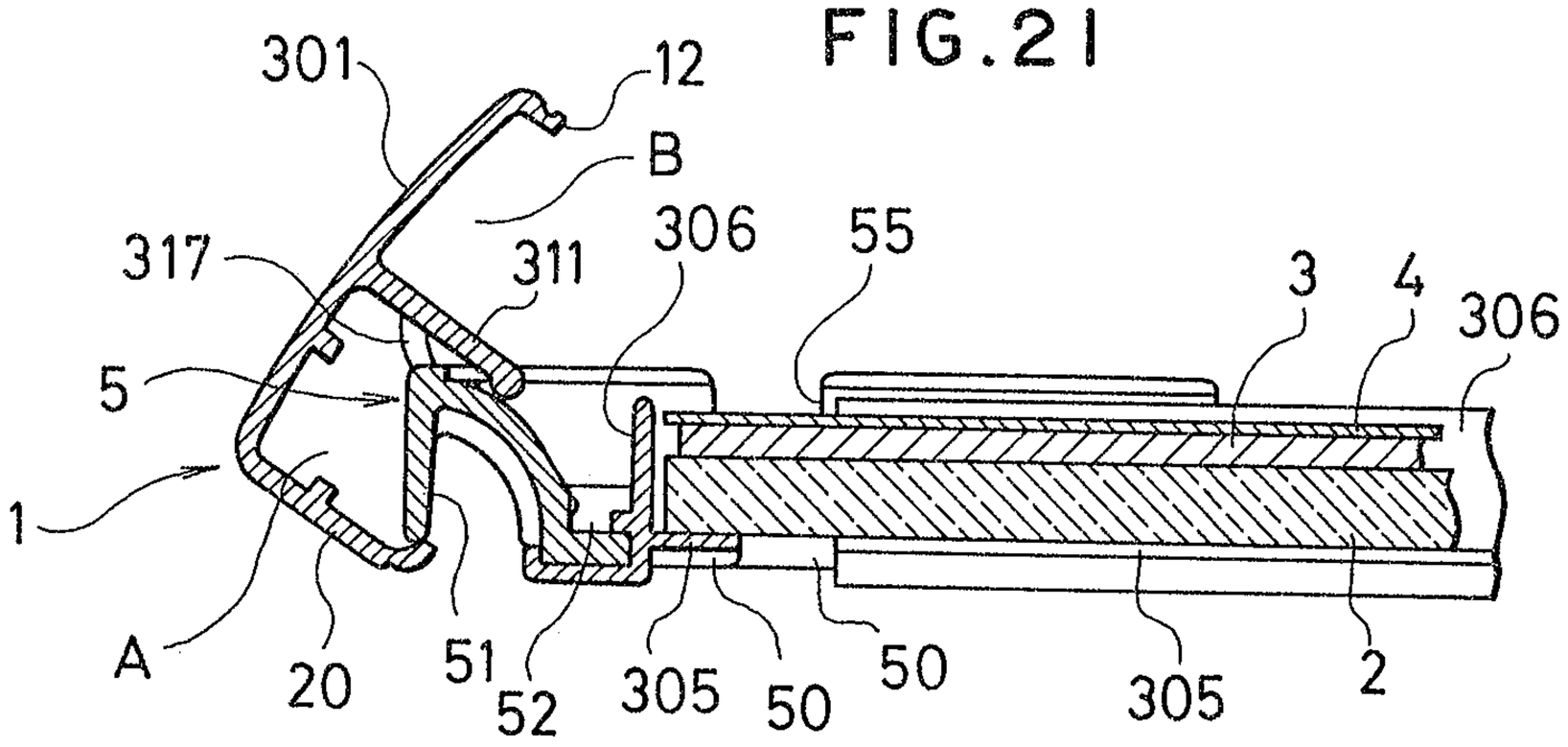

FIG.22

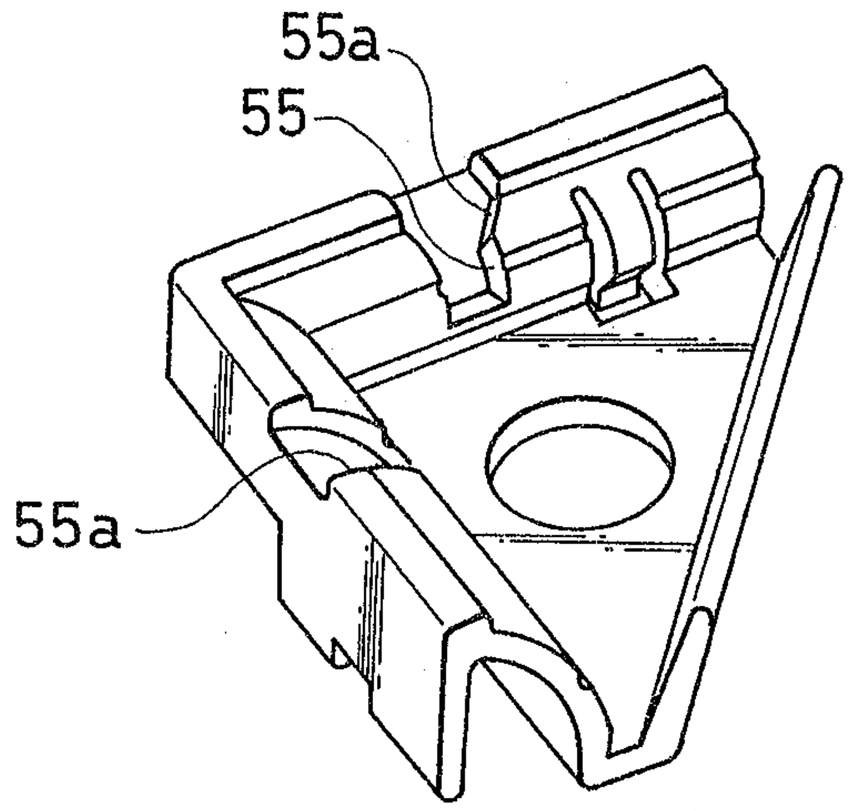

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FIG.23

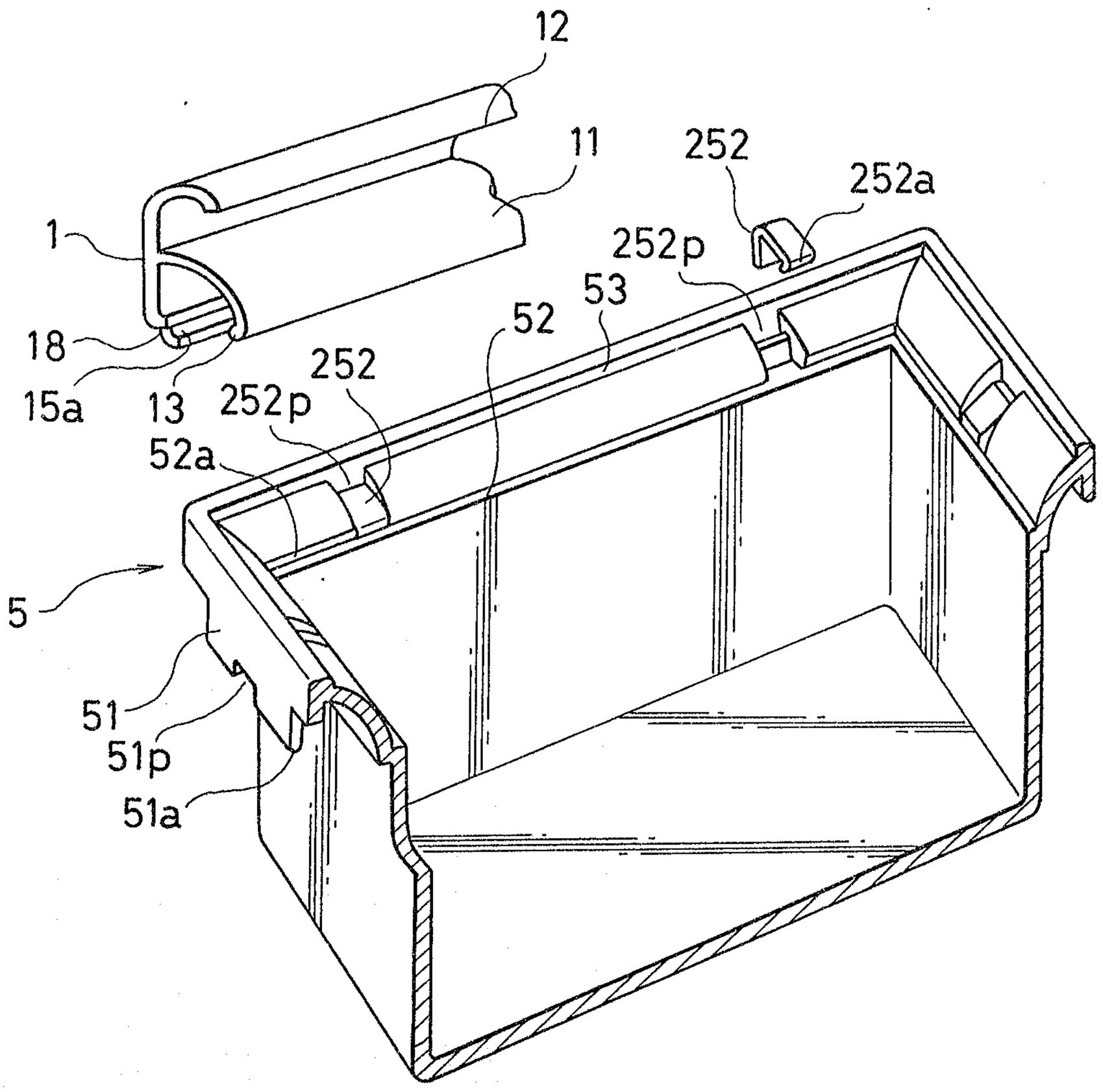
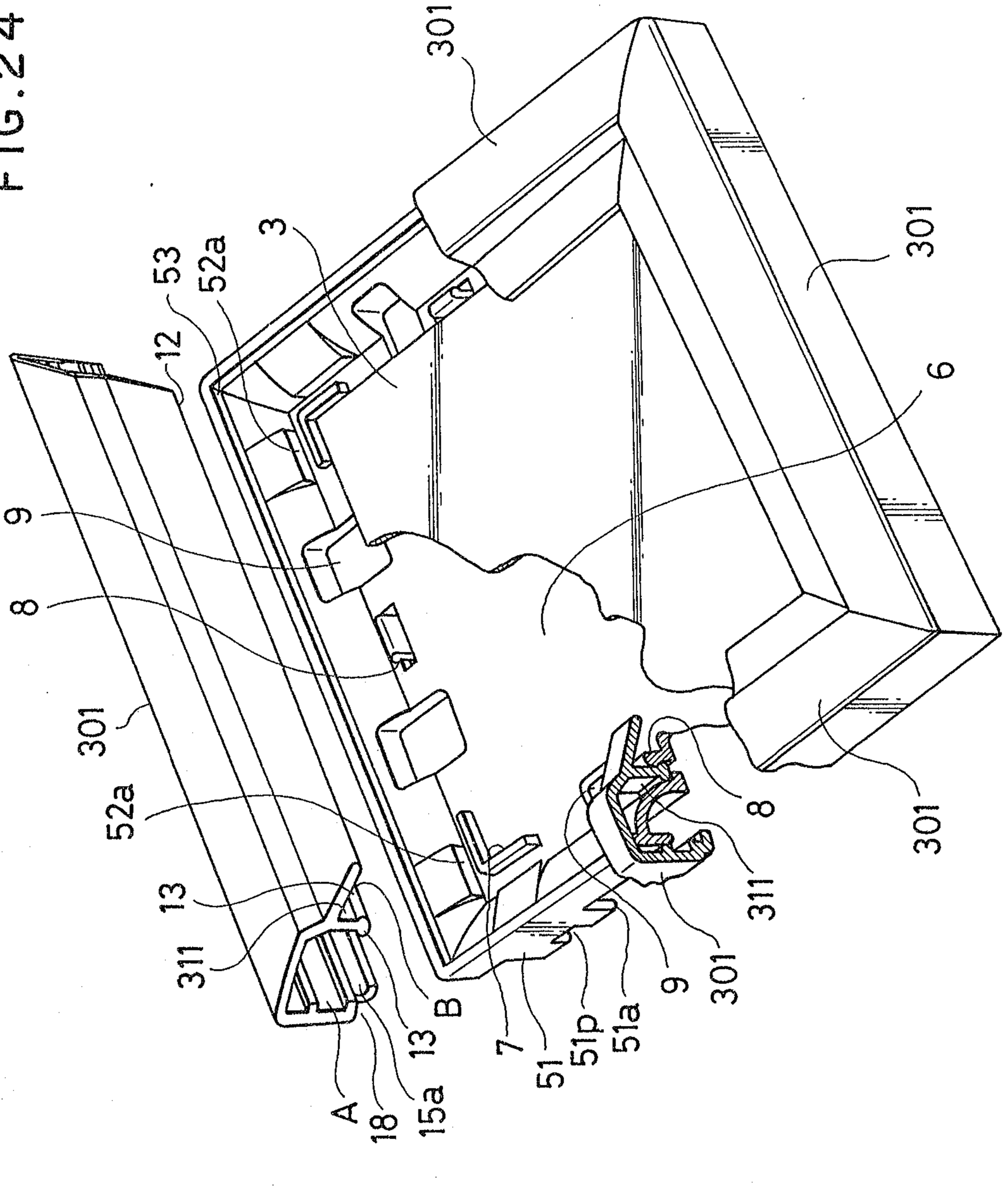


FIG.24


301
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