

A HANGER FOR HANGING CLOTHES AND THE LIKE

BACKGROUND OF THE INVENTION

This invention relates to a hanger for hanging clothes such as
5 trousers, skirts, towels and the like.

A hanger of prior art for hanging clothes such as jackets and trousers is described with reference to FIG. 13.

As shown in FIG. 13, the conventional hanger comprises a hanger main body A adapted for hanging jackets and the like, hang bar holders 3, 3,
10 and a hang bar 4. The hanger main body A includes a hanger hook 1 provided at a center portion thereof, and shoulder portions 2, 2 extending rightward and leftward from the center portion. The hang bar holders 3, 3 extend downward from a specified position of the respective shoulder portions 2, 2. The hang bar 4 extends bridgingly in a horizontal and fixed
15 state between the hang bar holders 3, 3. The hang bar 4 is adapted for hanging trousers, skirts, towels and the like (hereinafter merely referred to as "trousers").

The hang bar 4 is formed with a slip prevention member 4a whose outer surface is formed of rubber and the like having a large coefficient of
20 friction. The slip prevention member 4a prevents trousers in a hung state from slipping and falling off from the hang bar 4.

The conventional hanger has suffered from the following drawbacks due to the provision of the slip prevention member 4a. Specifically, in taking out trousers from the hanger, the slip prevention
25 member 4a causes a large friction against the trousers, resulting in a

difficulty in taking out the same, and a damage of the texture of trousers when the trousers are forcibly being taken out. Further, to avoid such drawbacks, a person is required to take a cumbersome operation of lifting up the trousers while taking out the same from the hanger to eliminate a friction
5 between the trousers and the slip prevention member 4a. This is not favorable in the aspect of easy operation of taking out clothes from the hanger.

There is an idea of rotatably supporting the hang bar 4 at the hang bar holders 3, 3 to eliminate the above drawbacks. However, such
10 arrangement may result in an inadvertent rotation of the hang bar 4 by the weight of trousers when trousers are hung in an unbalanced manner. Hence, there may frequently occur a falling off of the trousers when they are hung in an unbalanced state, which would impair the idea of providing the slip prevention member.

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SUMMARY OF THE INVENTION

It is an object of the present invention to provide a hanger which has solved the above problems residing in the prior art.

It is another object of the present invention to provide a hanger
20 which makes it possible to take out clothes easily while using a slip prevention member of a hang bar effectively.

The present invention is directed to a hanger comprising: a hang bar provided with a slip preventer having a large friction coefficient on an outside surface thereof; a support member for supporting the hang bar in a
25 horizontal state, an insertion portion provided on one of the hang bar and

the support member; a reception portion provided on the other of the hang bar and the support member, the reception portion being operable to engage with the insertion portion to support the hang bar rotatably about an axis of the hang bar; and a rotation resister mechanism provided between the
5 insertion portion and the reception portion for keeping the hang bar from rotating unless a specified external force is applied.

With this arrangement, the rotation resister mechanism generates a resistance to a rotation of the hang bar to keep the hang bar from rotating by the weight of clothes and allow the hang bar to rotate by an external force
10 of pulling the clothes from the hanger. Accordingly, the clothes in a hung state can effectively be prevented from falling off due to a slippage and can be easily taken out from the hanger with one hand by the virtue of rotation of the hang bar generated by applying an external force.

The rotation resister mechanism may be constructed by a dentate
15 surface formed on one of the reception portion and the insertion portion, and a resilient contact portion provided on the other of the reception portion and the insertion portion. The dentate surface has a number of teeth in a circumferential direction. The resilient contact portion is operable to elastically come into contact with the dentate surface to generate a
20 resistance to a rotation of the hang bar.

With this arrangement, compared to a case that a frictional member such as a rubber ring is interposed between the insertion portion and the reception portion, the rotation resister mechanism can set an accurate resistance to a rotation of the hang bar by adjusting the resilience of the

resilient contact portion and the dentate surface. Further, the set resistance can be maintained for a longer period.

Preferably, the resilient contact portion may be formed by a pair of ring-shaped springs arranged symmetrically. Each ring-shaped spring has
5 a projection operable to come into contact with the dentate surface.

Also, the resilient contact portion may be formed by a pair of plate-shaped springs arranged symmetrically. Each plate-shaped spring has a free end operable to come into contact with the dentate surface.

This construction assures even application force for the forward
10 rotational direction and the backward rotational direction of the hang bar. Accordingly, there is no likelihood that a difference occurs in the rotational resistance between the forward rotation and the backward rotation, and no likelihood that a rotational halt of the hang bar occurs in one of the opposite rotational directions.

15 The ring-shaped spring has a high resilience, which can thus ensure a longer life contact portion compared to those made of springs having an arm-like shape. Also, the plate-shaped spring can simplify the construction of the insertion and reception portions, thereby facilitating the production of hanger.

20 It may be appreciated that the insertion portion is made of a synthetic material and shaped into the form of a shaft, and the reception portion is made of a synthetic material and shaped into the form of a hollow cylinder. The insertion portion is integrally formed with the resilient contact portion. The reception portion is formed with a dentate surface in
25 an inner wall thereof.

With this construction, the dentate surface and the contact member can be simultaneously formed in the molding of the reception and insertion portions. Accordingly, compared to the case that the dentate surface and the contact portion are formed individually from the forming of the reception and insertion portions, the hanger can be produced more easily at a reduced cost.

The hanger may be provided with right and left side shoulder portions and a hanger hook. The support member may be provided with a hang bar holder extending downward from the right and left side shoulder portions. In this case, the insertion portion is provided on one of the hang bar holder and the hang bar, and the reception portion is provided on the other of the hang bar holder and the hang bar.

This arrangement makes it possible to hang not only trousers or skirts on the hanger bar but also jackets and the like on the right and left shoulder portions.

The support portion may be provided with a hang bar holder and an attachment member for attaching the hang bar holder to a stationary structure. In this case, the insertion portion is provided on one of the hang bar holder and the hang bar, and the reception portion is provided on the other of the hang bar holder and the hang bar.

This construction ensures a multi-purpose hanger which enables hanging of a variety of strip-like articles such as towels and neckties in addition to trousers and skirts.

The hanger may be further provided with a widening prevention member between the hang bar holders to maintain the distance between the

hang bar holders constant. The widening prevention member prevents the hang bar holders from being spaced apart farther than the specified distance, thus eliminating the problem that the hang bar falls off due to a widening of the hang bar holders

5 The widening prevention member may be preferably provided with a right connecting rod attached to the right hang bar holder, a left connecting rod attached to the left hang bar holder, and a joint member for coupling the right and left connecting rods.

 This construction simplifies the assembly of the widening
10 prevention member. Specifically, after the hang bar is mounted to the hang bar holders, the right and left connecting rods are coupled to each other by the joint member. Accordingly, the widening prevention member can be assembled more easily.

15 BRIEF DESCRIPTION OF THE DRAWINGS

 FIG. 1 is a front view showing a hanger as a first embodiment according to the present invention, shoulder portions of the hanger being partially cut away to show an internal construction thereof;

 FIG. 2 is a perspective view fragmentarily showing a main portion
20 of the first hanger;

 FIG. 3 is a front view in section showing the main portion of the first hanger;

 FIG. 4 is an enlarged cross sectional view taken along the line IV-IV in FIG. 3;

25 FIG. 5 is a cross sectional view taken along the line V-V in FIG. 3;

FIG. 6 is an enlarged cross sectional view taken along the line VI-VI in FIG. 3;

FIG. 7 is a front view of a hanger as a second embodiment according to the present invention;

5 FIG. 8 is an enlarged cross sectional view of a main portion of the second hanger;

FIG. 9 is a cross sectional view taken along the line IX-IX in FIG. 8;

FIG. 10 is a front view showing a modification of the second
10 hanger;

FIG. 11 is an enlarged cross sectional view of a main portion of the modification of FIG. 10;

FIG. 12 is a perspective view of a hanger as a third embodiment according to the present invention; and

15 FIG. 13 is a perspective view of a hanger of the prior art.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

Embodiments of the present invention is described with reference
20 to FIGs. 1 to 12.

First Embodiment (see Figs. 1 to 6):

In this embodiment, a hanger adapted for hanging jackets and trousers (or skirts and the like, hereinafter merely referred to as "trousers") is shown.

Indicated at B is a hanger main body provided with a hanger hook 11 provided at a center portion thereof, and shoulder portions 12, 12 extending rightward and leftward from the center portion, respectively. Hang bar holders 13, 13 are provided below a lead end of the respective shoulder portions 12, 12 at a specified position corresponding thereto. The hang bar holders 13, 13 constitute a support member. A hang bar 14 in the form of a pipe is bridgingly provided in a horizontal state between the hang bar holders 13, 13.

As shown in FIGs. 1, 3, and 5, vertical walls 15, 15 extending downward by a specified length are formed on an inner surface of the respective lead ends of the shoulder portions 12, 12. Guide rails 16, 16 each in the form of a hook in cross section are provided at the vertical walls 15, 15, respectively. The guide rails 16, 16 are spaced apart by a specified distance in a width direction of the shoulder portions 12, 12. The vertical walls 15, 15 are formed with fitting holes 17, 17 in the form of a square through which the hang bar holders 13, 13 are attached to the shoulder portions 12, 12.

The hang bar holder 13 (13) is formed of a plastic material (e.g., polypropylene or ABS resin), and includes a reception portion 18 (18) having an axis extending transversely and a joint arm 19 (19) extending vertically upward from a specified position on an outer circumference of the reception portion 18 (18).

The joint arm 19 is formed with a U-shaped cutaway 21 therein. The cutaway 21 in the joint arm 19 defines an engaging piece 20. The engaging piece 20 is formed with a projection 20a at an upper end thereof,

and applied with a spring force biasing toward an axial direction of the hang bar 14. As shown in FIG. 3, when the engaging piece 20 (20) is elastically deformed and fitted in the fitting hole 17 (17) in a state that the joint arm 19 (19) is inserted between the vertical wall 15 (15) and the guide rail 16 (16),
5 the hang bar holder 13 (13) is fittingly mounted to the hanger main body B.

The reception portion 18 (18) of the hang bar holder 13 (13) is formed with a horizontal shaft 22 (22) at a center portion thereof, and is internally formed with a dentate surface 23 including a multitude of teeth 23a in a circumferential direction thereof. The teeth 23a have a triangular
10 form in cross section and are disposed equidistantly by a specified pitch around the circumference of the reception portion 18.

A pair of insertion members 24, 24 are mounted in both ends of the hang bar 14. The insertion member 24 is made of a plastic material, e.g., polypropylene.

15 The insertion member 24 (24) includes a first boss portion 26 (26) and a second boss portion 27 (27) with a flange portion 25 (25) interposed therebetween. By fittingly inserting the first boss portions 26, 26 into the opposite ends of the hang bar 14, the insertion members 24, 24 are mounted in the ends of the hang bar 14.

20 As shown in FIGs. 2 and 6, the first boss portion 26 (26) is externally formed with a groove 26a, while the hang bar 14 is internally formed with a rib 14a over an entire length thereof. When the rib 14a of the hang bar 14 is fitted in the grooves 26a, 26a of the first boss portions 26, 26, the insertion members 24, 24 are fixedly mounted to the hang bar 14 and
25 prevented from rotating independently of the hang bar 14.

The second boss portion 27 (27) is integrally formed with a pair of springs 28, 28 (28, 28) in the form of a ring. The pair of springs 28, 28 are arranged symmetrically and each serve as a resilient contact member. The second boss portion 27 (27) and the springs 28, 28 (28, 28) are altogether
5 fitted in the reception portion 18 (18) of the hang bar holder 13 (13).

The spring 28 has an ear-like shape, and is given a spring force in an outward direction. The spring 28 causes a resistance between a projection 28a (28a) formed at an intermediate portion of an outer rim of the spring 28 (28) and the dentate surface 23 of the reception portion 18, which
10 prevents a free rotation of the hang bar 14. Similarly to the shape of the teeth 23a, the projection 28a (28a) also has a triangular shape in cross section.

As shown in FIG. 6, the hang bar 14 is externally provided with a slip preventer 29 made of a material, e.g., butyl rubber, which has a large
15 friction coefficient.

The slip preventer 29 is externally formed with a number of ridges 29a extending in the longitudinal direction of the hang bar. The slip preventer 29 provided with the ridges 29a prevent trousers from slipping off from the hanger.

20 As mentioned above, the hanger as the first embodiment is formed in such a manner that the pair of springs 28, 28 (28, 28) provided on the side of the hang bar 14 and the dentate surface 23 (23) formed in the hang bar holder 13 (13) constitute a mechanism of applying a specified resistance to prevent a free rotation of the hang bar.

The above rotational resistance is determined mainly by the spring force of the springs 28, 28 and the height of the teeth 23a. The rotational resistance is set in a range within which the hang bar is not rotated by the weight of clothes in a hung state but rotated by an external force applied by
5 a user who tries to pull out the clothes from the hanger.

Accordingly, the slip preventer 29 having a large frictional resistance can reliably prevent trousers in a hung state from slipping off from the hanger when an user gives no pulling force to the trousers.

On the contrary, when trousers are to be pulled out from the
10 hanger by the user, the hang bar 14 is rotated by the pulling force of the user. This enables the user to easily take out the trousers with one hand.

Further, the dentate surface 23 and the springs 28, 28 provided with the projection constitute a mechanism of applying a resistance against a rotation of the hang bar. Accordingly, compared to a case that a
15 frictional member such as a rubber ring is interposed between the second boss portion 27 and the reception portion 18, the rotational resistance can more accurately be set by regulating the spring force of the springs 28, 28 and the height of the teeth 23a of the dentate surface 23. Further, the set rotational resistance can be maintained for a longer period.

20 Second Embodiment (see FIGs. 7 to 11):

A second embodiment is basically identical to the first embodiment. Accordingly, only differences between the first embodiment and the second embodiment will be described in the following description.

Indicated at C is a hanger main body made of a plastic material.
25 The hanger main body C is provided with a hanger hook 30 arranged at a

center portion thereof, and shoulder portions 31, 31 in the form of a pipe extending rightward and leftward from the center portion, respectively. The shoulder portions 31, 31 are integrally formed with hang bar holders 32, 32 at respective lead ends thereof.

5 The hang bar holder 32 (32) includes an arm portion 33 (33) extending downward by a specified length from the lead end of the shoulder portion 31 (31) and a reception portion 34 arranged horizontally from the lead end of the arm portion 33 (33). Similarly to the reception portion 18 of the first embodiment, the reception portion 34 is internally formed with a
10 dentate surface 35 including a multitude of teeth 35a in a circumferential direction thereof. The teeth 35a have a triangular form in cross section and are disposed equidistantly by a specified pitch around the circumference of the reception portion 34.

 A widening prevention member 36 is attached to an underside
15 surface of the hang bar holders 32, 32. The widening prevention member 36 extends below and in parallel with a hang bar 14 at a specified space. The widening prevention member 36 is provided to prevent the hang bar holders 32, 32 from shifting outward, i.e., to keep the distance between the hang bar holders 32, 32 constant.

20 The hang bar 14 of the second embodiment is in the form of a pipe and has a construction similar to that in the first embodiment. The hang bar 14 is provided with insertion members 37, 37 on the opposite ends thereof. The insertion member 37 is made of a plastic material, e.g., polypropylene (in FIG. 8, only one of the insertion members 37, 37 is
25 shown).

The insertion member 37 (37) includes a first boss portion 39 (39) and a second boss portion 40 (40) with a flange portion 38 (38) interposed therebetween. The first boss portions 39, 39 are fittingly inserted into the both ends of the hang bar 14 to thereby mount the insertion members 37, 37
5 to the hang bar 14.

As shown in FIG. 8, the first boss portion 39 (39) is externally formed with a groove 39a (39a), while the hang bar 14 is internally formed with a rib 14a over an entire length thereof. Similarly to the first embodiment, when the rib 14a of the hang bar 14 is fitted in the grooves 39a, 39a of the first boss portions 39, 39, the insertion members 37, 37 are
10 fixedly mounted to the hang bar 14 and prevented from rotating independently of the hang bar 14.

The first boss portion 39 is mounted with a stopper 41 in the form of a ring at a lead end thereof in a fixed state with respect to the axial
15 direction thereof. The ring stopper 41 is fixedly brought into contact with an opening end on an inward side of the reception portion 34, thereby preventing the insertion member 37 from sliding off from the reception portion 34.

The second boss portion 40 is integrally formed with a pair of
20 plate springs 42, 42 on an outer surface thereof. The plate springs 42 and 42 are arranged symmetrically with respect to the axis of the second boss portion 40. The plate spring 42 serves as a resilient contact member. On the other hand, as mentioned above, the reception portion 34 is formed internally with the dentate surface 35. The second boss portion 40 is fitted

in the reception portion 34 in a state that a lead end of the respective plate springs 42, 42 is elastically deformed against the dentate surface 35.

The second boss portion 40 is integrally formed with a closing portion 40a at a lead end thereof to close an opening in an outward side of the reception portion 34. The closing portion 40a prevents the insertion member 37 from sliding off outward from the reception portion 34.

In the second embodiment, the plate springs 42, 42 (42, 42) arranged on the side of the hang bar 14 and the dentate surface 35 (35) formed on the side of the hang bar holder 32 (32) constitute a mechanism of applying a specified resistance to prevent a free rotation of the hang bar 14. Thus, similarly to the first embodiment, the free rotation prevention effect is attainable.

Compared to the first embodiment, the plate spring 42 is used as a resilient contact member in the second embodiment. Accordingly, the insertion member 37 can be constructed in a more simplified manner and easily.

Further, the widening prevention member 36 of the second embodiment makes it possible to prevent a deformation of the hanger in a direction of widening the distance between the hang bar holders 32, 32. Thereby, eliminated is the drawback that the insertion members 37, 37 are separated from the hang bar 14, resulting in a falling off of the hang bar 14 from the hang bar holders 32, 32.

FIGs. 10 and 11 show a modification of the second hanger. In this modification, the widening prevention member 36 comprises connecting rods 36a, 36a respectively extending inward from the hang bar holders 32,

32, and a joint member 36b for coupling the connecting rods 36a, 36a. The connecting rods 36a, 36a are formed integrally with the hang bar holders 32, 32, respectively.

The connecting rod 36a (36a) is formed with a projection 36c (36c) at a free end thereof. The joint member 36b is formed with fitting holes 36d, 36d in positions corresponding to the projections 36c, 36c of the connecting rods 36a, 36a. The connecting rods 36a, 36a are pressingly inserted into the joint member 36b from their respective free ends and the projections 36c, 36c of the connecting rods 36a, 36a are fixedly fitted in the fitting holes 36d, 36d of the joint member 36b, respectively. Consequently, the connecting rods 36a, 36a are coupled to each other via the joint member 36b.

With this arrangement, after the hang bar 14 is mounted to the hang bar holders 32, 32, the widening prevention member 36 can be mounted to the hanger by coupling the connecting rods 36a, 36a via the joint member 36b. Accordingly, the hang bar 14 can be mounted to the hang bar holders 32, 32 more easily.

Third embodiment (see FIG. 12):

Next, a third hanger of the present invention is described. The third hanger is a multi-purpose hanger mountable onto a wall for hanging a variety of strip-like articles such as trousers, towels, and neckties.

It should be appreciated that elements of the third hanger identical to those of the first hanger are indicated at the same reference numerals as the first hanger, and a description on the identical elements is omitted.

A reception portion 18 (18) of a hang bar holder 13 (13) is provided with an arm 43 (43) extending rearward from an outer surface thereof to thereby form a support member for supporting the hang bar 14 horizontally. The arm 43 (43) is attached with a stay 43a (43a) at a free
5 end thereof. When the stay 43a (43a) of the arm 43 (43) is mounted to a wall by screws (adhesive members, or nails), the multi-purpose hanger of the third embodiment is constructed.

In the foregoing embodiments, the reception portion 18 (34) is formed in the side of the hang bar holder 13 (32) and the second boss portion
10 27 (40) of the insertion member 24 (37) is formed on the side of the hang bar 14. Conversely, it may be appreciated that the reception portion is formed in the side of the hang bar and the insertion member is formed on the side of the hang bar holder.

In the foregoing embodiments, the pair of springs 28, 28 in the
15 form of a ring are provided symmetrically on the insertion member 24, or the pair of plate springs 42, 42 are provided in radially opposite directions on the insertion member 40 to serve as a resilient contact member.

Alternatively, three or more spring members may be provided on the insertion member 24 (40). Further, a single spring member may be
20 provided on the insertion member 24 (40).

The resilient contact member may be formed into a curved arm-like shape. Also, a plate spring or springs may be attached at specified positions on the outside of the insertion member.

Alternatively, it may be appreciated that a resilient contact member is formed on an inner surface of the reception portion and a dentate surface is formed around an outer circumference of the insertion member.

In the foregoing embodiments, the slip preventer 29 made of a
5 material having a large friction coefficient is fittingly placed over the outside of the hang bar 14. Alternatively, a slip preventer may be formed directly in the outside of the hang bar 14.

Although the present invention has been fully described by way of example with reference to the accompanying drawings, it is to be understood
10 that various changes and modifications will be apparent to those skilled in the art. Therefore, unless otherwise such changes and modifications depart from the scope of the present invention, they should be construed as being included therein.

WHAT IS CLAIMED IS:**1. A hanger comprising:**

a hang bar provided with a slip preventer having a large friction coefficient on an outside surface thereof;

5 a support member for supporting the hang bar in a horizontal state,

an insertion portion provided on one of the hang bar and the support member;

a reception portion provided on the other of the hang bar and the support member, the reception portion being operable to engage with the
10 insertion portion to support the hang bar rotatably about an axis of the hang bar; and

a rotation resister mechanism provided between the insertion portion and the reception portion for keeping the hang bar from rotating unless a specified external force is applied.

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2. A hanger according to claim 1, wherein the rotation resister mechanism includes:

a dentate surface formed on one of the reception portion and the insertion portion, the dentate surface having a number of teeth in a
5 circumferential direction;

a resilient contact portion provided on the other of the reception portion and the insertion portion, and operable to elastically come into



contact with the dentate surface to generate a resistance to a rotation of the hang bar.

10

3. A hanger according to claim 2, wherein the resilient contact portion includes a pair of ring-shaped springs arranged symmetrically, each ring-shaped spring having a projection operable to come into contact with the dentate surface.

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4. A hanger according to claim 2, wherein the resilient contact portion includes a pair of plate-shaped springs arranged symmetrically, each plate-shaped spring having a free end operable to come into contact with the dentate surface.

5

5. A hanger according to claim 2, wherein:

the insertion portion is made of a synthetic material and in the form of a shaft, the insertion portion is integrally formed with the resilient contact portion; and

5

the reception portion is made of a synthetic material and in the form of a hollow cylinder, the reception portion is formed with a dentate surface in an inner wall thereof.

6. A hanger according to claim 1, further comprising a hanger main body including right and left side shoulder portions and a hanger hook, wherein:



the support member includes a hang bar holder extending
5 downward from each of the right and left side shoulder portions;
the insertion portion is provided on one of the hang bar holder and
the hang bar; and
the reception portion is provided on the other of the hang bar
holder and the hang bar.

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7. A hanger according to claim 6, further comprising a widening
prevention member provided between the hang bar holders to maintain the
distance between the hang bar holders constant.

8. A hanger according to claim 7, wherein the widening
prevention member includes:

a right connecting rod attached to the right hang bar holder;
a left connecting rod attached to the left hang bar holder; and
5 a joint member for coupling the right and left connecting rods.

9. A hanger according to claim 1, wherein:
the support portion includes a hang bar holder and an attachment
member for attaching the hang bar holder to a stationary structure;
the insertion portion is provided on one of the hang bar holder and
5 the hang bar; and
the reception portion is provided on the other of the hang bar
holder and the hang bar.



10. A hanger according to claim 9, further comprising a widening prevention member provided between the hang bar holders to maintain the distance between the hang bar holders constant.

11. A hanger according to claim 10, wherein the widening prevention member includes:

a right connecting rod attached to the right hang bar holder;

a left connecting rod attached to the left hang bar holder; and

5 a joint member for coupling the right and left connecting rods.



ABSTRACT**A HANGER FOR HANGING THE CLOTHES AND THE LIKE**

A hanger includes a hang bar provided with a slip preventer having a large friction coefficient on an outside surface thereof and a support member for supporting the hang bar in a horizontal state. An insertion portion is provided on one of the hang bar and the support member and a reception portion is provided on the other of the hang bar and the support member. The reception portion is operable to engage with the insertion portion to support the hang bar rotatably about an axis of the hang bar. A rotation resister mechanism is provided between the insertion portion and the reception portion for keeping the hang bar from rotating unless a specified external force is applied.

(Selected Drawing: Fig. 2)

FIG. 1

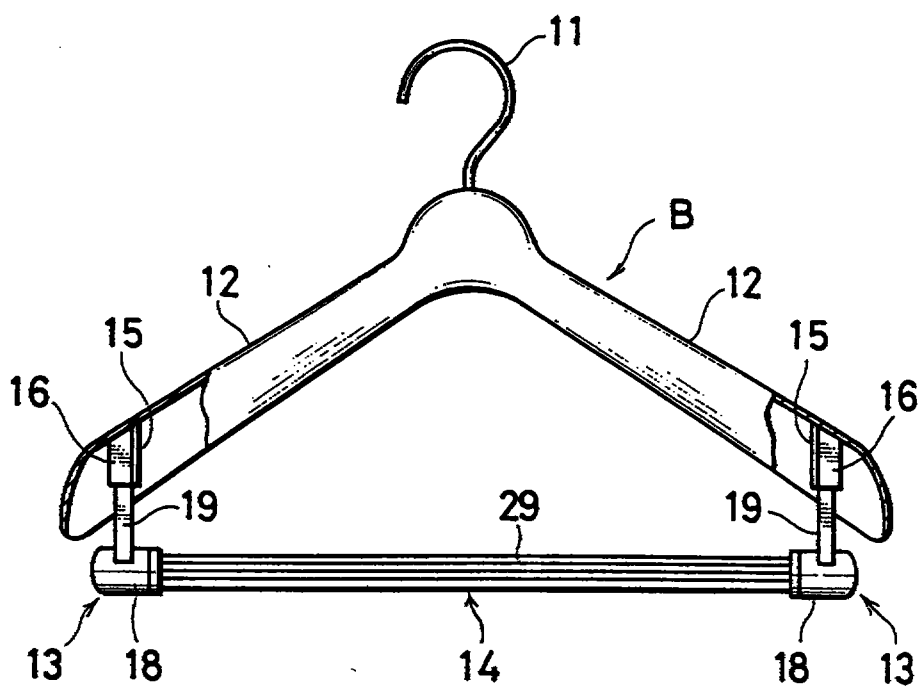


FIG. 2

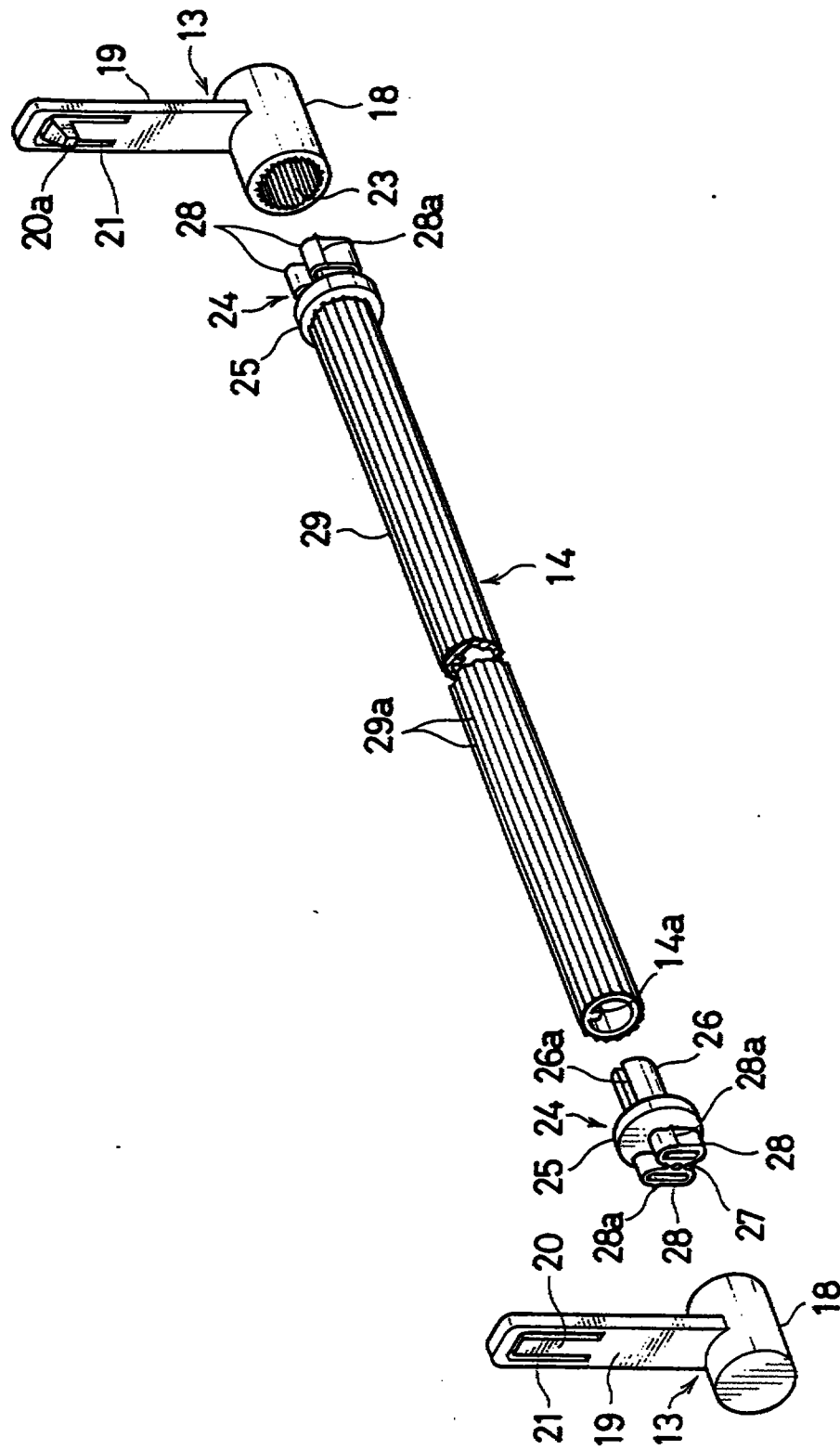


FIG. 3

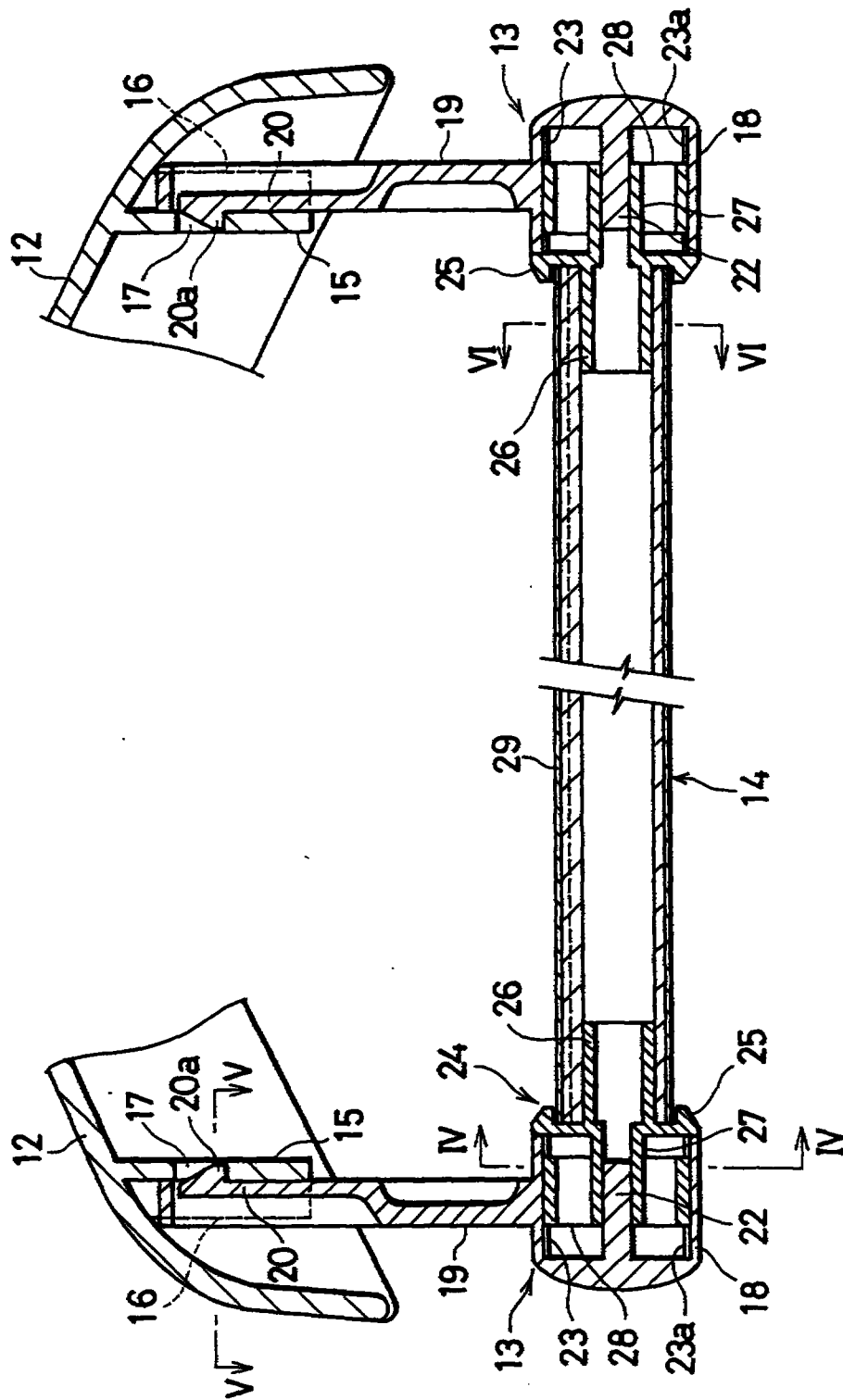


FIG. 4

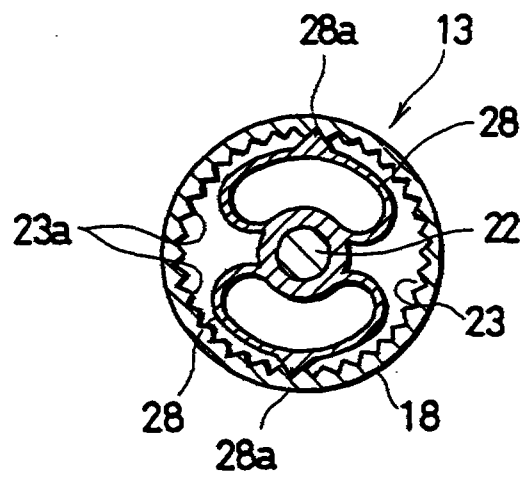


FIG. 5

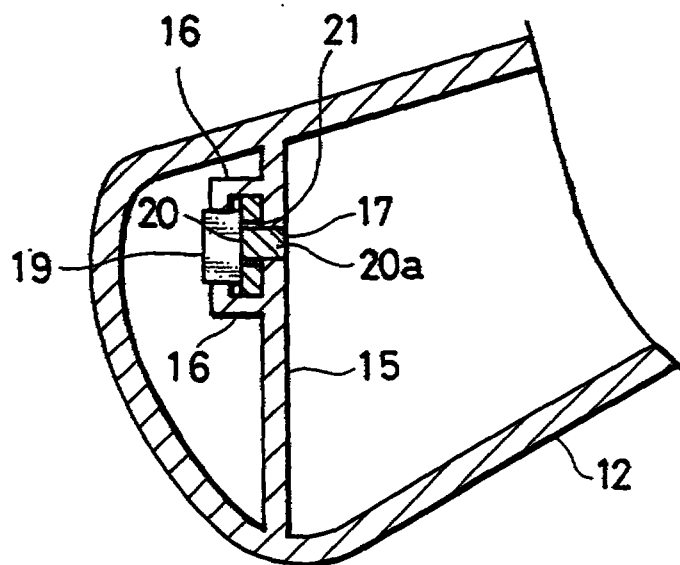


FIG. 6

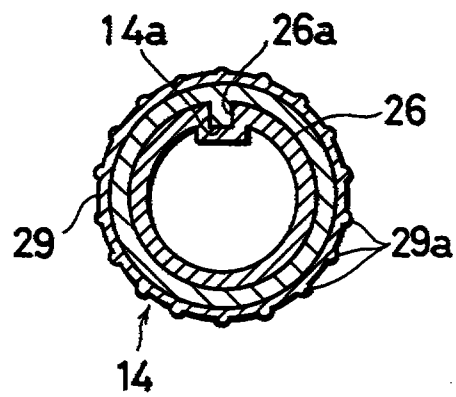


FIG. 7

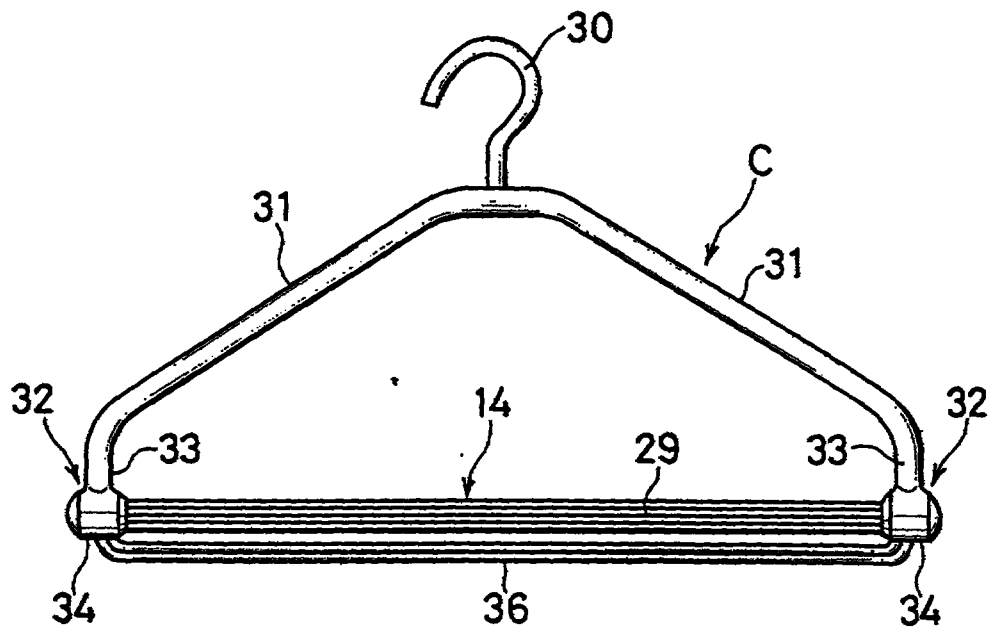


FIG. 8

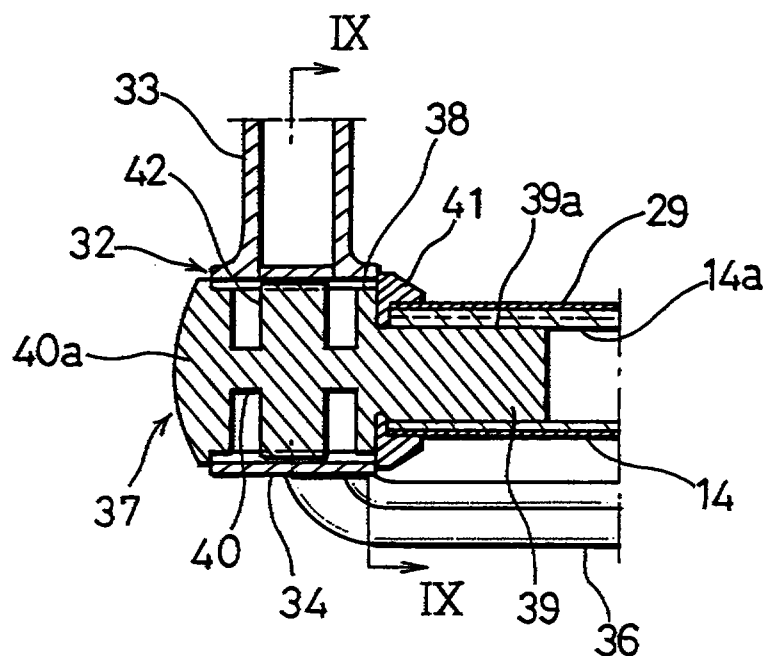
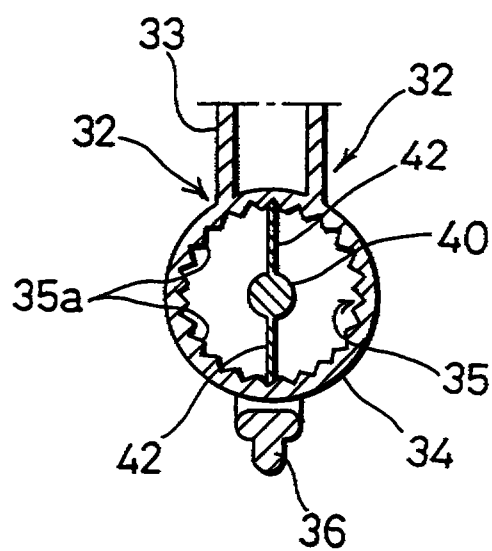


FIG. 9



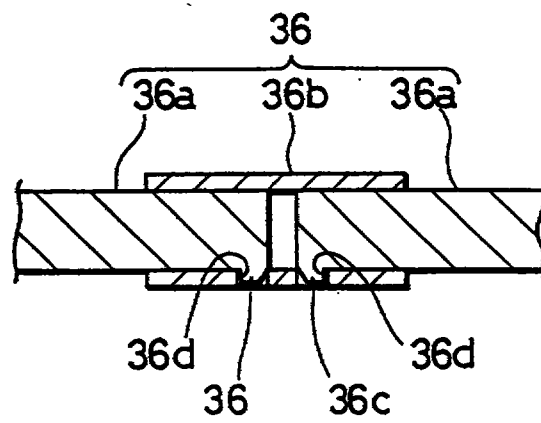


FIG. 12

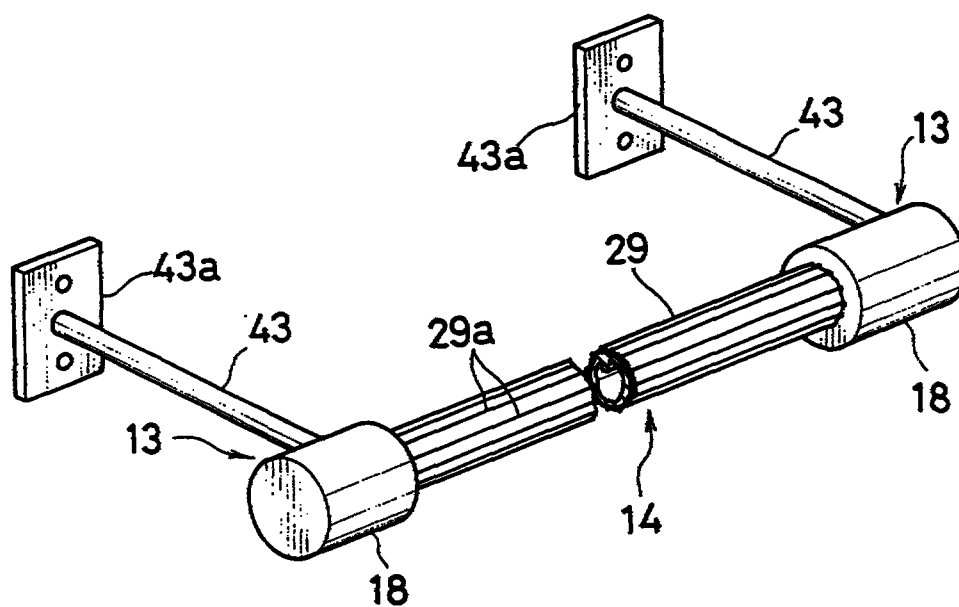
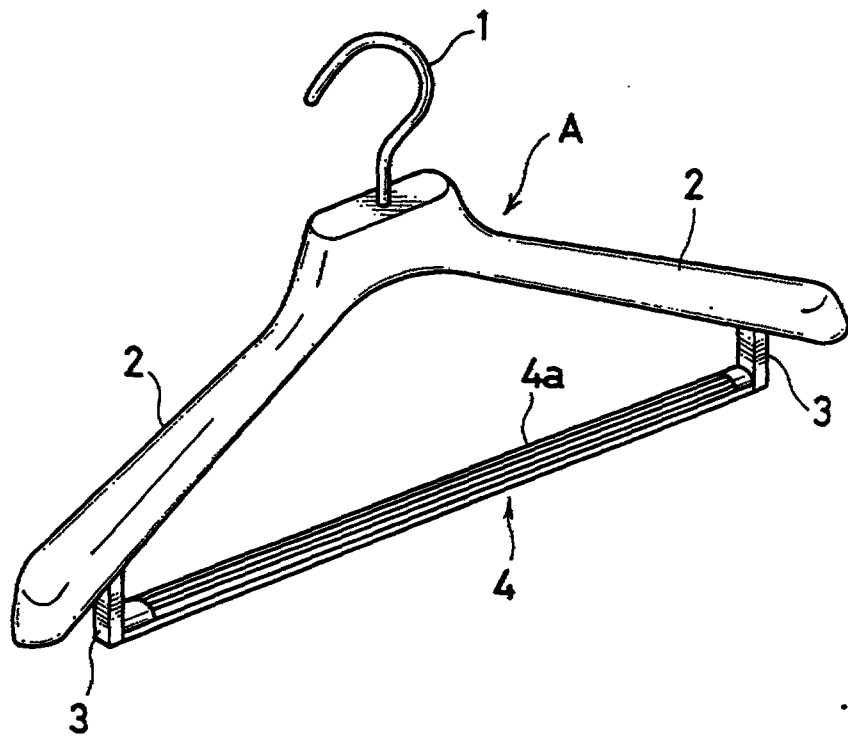


FIG. 13



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