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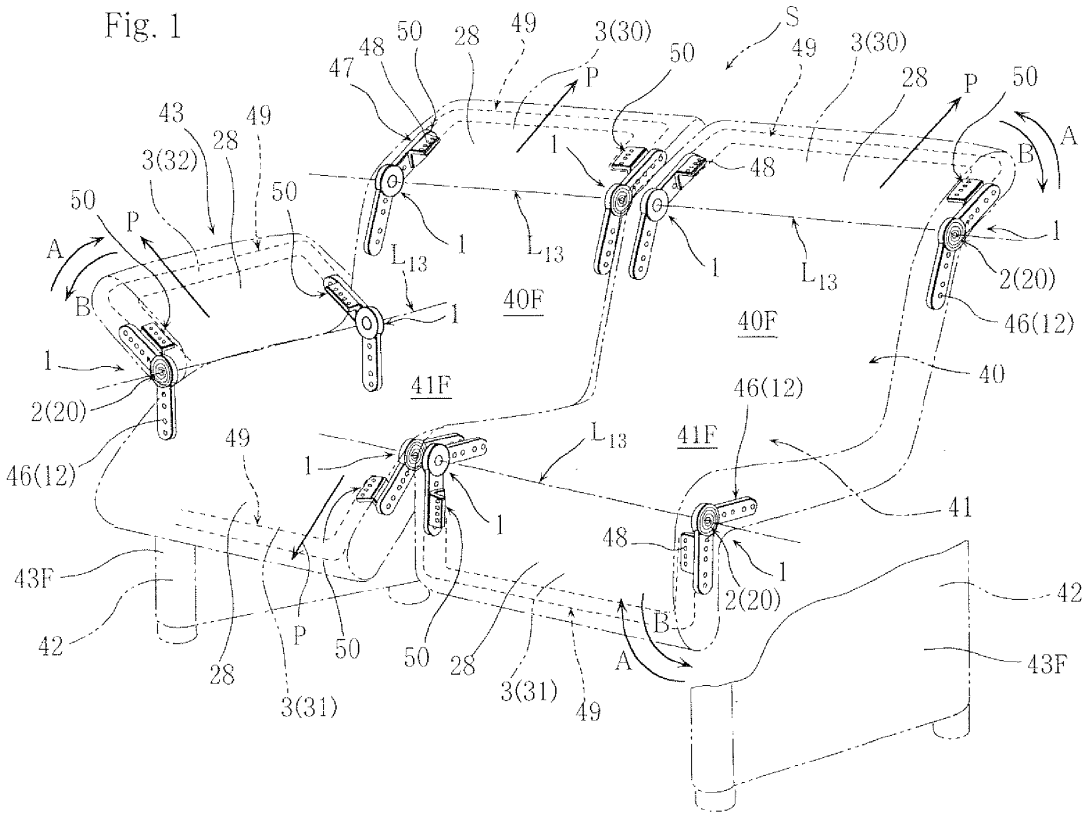
(54) **Angle-adjustable hinge**

(57) In an angle-adjustable hinge (1), used for a sofa (S) provided with a reclinable rest portion (3), making oscillation of the rest portion (3) in a standing direction possible, and stopping oscillation in an inclining direction with multi stage to keep a desired inclination angle, a wrinkle prevention mechanism (50) is provided, and an elastic member (2), giving rotation resistance moment (M) to restrict the oscillation of the rest portion (3) in the standing direction, is provided.

Fig. 1



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Description

[0001] This invention relates to an angle-adjustable hinge used for furniture such as sofas and chairs

[0002] Conventionally, angle-adjustable hinges to make headrests, armrests, and footrests mounted on furniture such as sofas and chairs reclinable are widely used.

[0003] The inventor of the present invention proposed an angle-adjustable hinge, making oscillation in a standing direction of a reclining part possible, stops oscillation in inclining direction to hold the reclining part with predetermined multi-stage inclination angles as disclosed in Japanese patent No. 4296223.

[0004] However, in furniture in which a conventional angle-adjustable hinge 55 is used, as shown in Figure 17, lax wrinkles 53 may be generated on a cover 52 when a reclinable rest portion 51 such as a headrest portion, an armrest portion, or a footrest portion in a inclined posture is made standing in a standing direction A.

[0005] For example, the wrinkles 53 tend to be generated especially in voluminous and luxurious furniture upholstered with leather, using comfortableness (seating comfortableness) is reduced and beauty of the furniture is greatly damaged by the generation of the wrinkles 53.

[0006] Therefore, it is an object of the present invention to provide an angle-adjustable hinge with which the cover of furniture provided with the (inclining) rest portion 51 can always keep a beautiful smooth face, namely, a tensioned face without generation of the wrinkles 53.

[0007] This object is solved according to the present invention by angle-adjustable hinge including features of claim 1 or claim 4. Furthermore detailed embodiments are described in the dependent claims 2, 3, and 5.

[0008] The present invention will be described with reference to the accompanying drawings, in which:

Figure 1 is a simplified perspective view of examples of positions to which an angle-adjustable hinge of the present invention is applied;
Figures 2A through 2D are explanatory views of function showing an embodiment of the present invention to serially explain function of a wrinkle prevention mechanism;
Figure 3 is a perspective view of the embodiment;
Figure 4 is a side view showing the maximum inclination state;
Figure 5 is a side view showing a state in which the angle-adjustable hinge is slightly standing from the maximum inclination state;
Figure 6 is a side view showing a state in which the angle-adjustable hinge is standing near a standing posture;
Figure 7 is a side view showing the standing posture;
Figure 8 is a side view showing a state in which a lock is released;
Figure 9 is a perspective view showing another embodiment;
Figure 10 is a left side view showing the maximum inclination state;
Figure 11 is a right side view showing the maximum inclination state;
Figure 12 is a left side view with partial cross section drawn omitting the wrinkle prevention mechanism;
Figure 13 is a front view with partial cross section drawn omitting the wrinkle prevention mechanism;
Figure 14 is a left side view to explain construction of a principal portion showing the maximum inclination state;
Figure 15 is a left side view to explain construction of the principal portion showing the standing posture;
Figures 16A through 16F are functional explanatory views of an angle-adjustment mechanism; and
Figure 17 is an explanatory perspective view showing a used state of a conventional example and problems of the conventional example.

[0009] Preferred embodiments of the present invention will now be described with reference to the accompanying drawings.

[0010] As shown in Figure 1, an angle-adjustable hinge of the present invention is used for furniture such as a sofa S provided with reclinable (inclinable) rest portions 3 and a chair (not shown in Figures). Plural angle-adjustable hinges 1 are used for the sofa S.

[0011] In the sofa S shown in Figure 1, a seat portion 41 and a backrest portion (back portion) 40 are held by left and right leg portions 42.

[0012] The backrest portion (back portion) 40 has a rest portion 3 inclinable around a horizontal oscillation axis L13, and the rest portion 3 is specifically a headrest portion 30. That is to say, the backrest portion 40 is composed of a fixation base portion 40F on a lower position and the inclinable headrest portion 30 on an upper position, and the headrest portion 30 (rest portion 3) is covered by a common cover 28 with the fixation base portion 40F.

[0013] The seat portion 41 has a rest portion 3 inclinable around a horizontal oscillation axis L13, and the rest portion 3 is specifically a footrest portion 31. That is to say, the seat portion 41 is composed of a fixation base portion 41F on a rear position of the sofa and the inclinable footrest portion 31 on a front (forward) position, and the footrest portion 31 (rest portion 3) is covered by the common cover 28 with the fixation base portion 41F.

[0014] An arm portion 43 has a rest portion 3 inclinable around a horizontal oscillation axis L13, and the rest portion 3 is specifically an armrest portion 32. That is to say, the arm portion 43 is composed of a fixation base portion 43F on a lower position formed with the leg portion 42 and the armrest portion 32 on an upper position inclinable outward, and the armrest portion 32 (rest portion 3) is covered by the common cover 28 with the fixation base portion 43F.

[0015] As described above, these portions are covered with the (continuous) common cover 28 entirely from the

fixation side (the fixation base portions 40F, 41F, and 43F) to the rest portions 3.

[0016] The angle-adjustable hinge 1 is constructed as to make the rest portion 3 oscillatable in a standing direction A and stop oscillation in the inclining direction B with multi stage to hold a desired inclination angle.

[0017] The angle-adjustable hinge 1 shown in Figure 1 corresponds to the hinge shown in Figures 9 through 13, and the hinge shown in Figures 3 through 7 can be disposed on the same positions in Figure 1 when desired.

[0018] The difference between the embodiment of Figures 3 through 7 and the embodiment of Figures 9 through 13 mainly exists in that an elastic member 2, giving rotation resistance moment M (refer to Figure 12) to restrict the oscillation of the rest portion 3 in the standing direction A, exists or not.

[0019] And, the greatest characteristic of the angle-adjustable hinge 1 relating to the present invention is that a wrinkle prevention mechanism 50 to restrict lax wrinkles on the common cover 28 along with the oscillation in the standing direction A of the rest portion 3 is provided. The wrinkle prevention mechanism 50 is simplified in Figure 1, and only a bracket 48, to which an inner frame 49 (shown with dotted lines) is fixed, is drawn (the mechanism 50 will be described later in detail with Figures 2 through 11).

[0020] Figure 12 and Figure 13 are drawn omitting the wrinkle prevention mechanism 50. As shown in Figure 12 and Figure 13, and in Figures 14 through 16, the angle-adjustable hinge 1 of the present invention is provided with a pair of parallel wall portions 12a formed circular around the oscillation axis L13 as the center, 4 wedge-shaped window portions 5 disposed on each of the wall portions 12a in rotation symmetry of which axis of symmetry is the oscillation axis L13, a pair of floating wedge members 4, movable within the wedge-shaped window portion 5, disposed on positions rotation-symmetric for 180° of which axis of symmetry is the oscillation axis L13, and each of which has a toothed face 4a on one side, a pair of arc-shaped gear portions 11b disposed between the wall portions 12a and formed around the oscillation axis L13 as the center as to have outer teeth to engage with the toothed face 4a, and spring wires 6 always elastically pushing the floating wedge members 4 to the pair of arc-shaped gear portions 11b.

[0021] The wall portions 12a are extended from the attachment piece portion 12, formed as facing plates between which the gear portions 11b can be inserted, and penetrated by a center hole concentric with the oscillation axis L13.

[0022] In the wedge-shaped window portion 5, an inner side near the oscillation axis X is an arc face 5b, and an arc-shaped wedge face 5a is formed on an outer side. Each wedge face 5a is formed around a guiding axis Y as the center eccentric with the oscillation axis L13 and disposed rotation symmetric for 90° of which axis of symmetry is the oscillation axis L13. That is to say, as approaching in clockwise direction in Figure 14, the gap between the wedge face 5a and the gear portion 11b gradually becomes small (diminishes). And, a floating staged portion 8 is formed protruding from the arc face 5b on the inner side to guide the floating wedge member 4. And, a retreat space 9 for storing the floating wedge member 4 not engaging with the gear portion 11b (in engagement released state) is provided.

[0023] Each of the floating wedge members 4 is respectively inserted to each of the wedge-shaped window portion 5 disposed on the positions in rotation symmetry for 180°. The floating wedge member 4 is formed slightly larger than the gap dimension between the wall portions 12a, and protruding both end side portions from outer faces of the wall portions 12a when inserted to the wedge-shaped window portion 5. One face side of the floating wedge member 4 is the toothed face 4a, and an arc-shaped contact face 4b is formed on another face side to contact the wedge face 5a. The floating wedge member 4 has a guiding sloped face 14 to contact the floating staged portion 8 and guide itself toward a direction parting from the gear portion 11b. The guiding sloped face 14 is formed on a rear edge portion of the toothed face 4a.

[0024] The pair of gear portions 11b is attached as to oscillate around the oscillation axis L13 between the wall portions 12a. The gear portions 11b are formed as outer teeth on escape window portions 18, formed through the oscillation piece portion 11 to insert the floating wedge member 4, on positions in rotation symmetry for 180° of which axis of symmetry is the oscillation axis L13. The configuration of the gear portion 11b hardly generates stress concentration on the base end portion of the oscillation piece portion 11. And, in the gear portion 11b, a push-in protrusion 15 to push the floating wedge member 4 to the retreat space 9 is formed on an end portion side (end portion side of engagement), and a push-out protrusion 16 to push the floating wedge member 4 out of the retreat space 9 on another end portion side (initial portion side of engagement).

[0025] The spring wire 6 is cut into a predetermined length and formed straight. An end of the spring wire 6 is straight and another end is bent into a hook or a circle to fit to a supporting portion 17. The spring wire 6 is touching the contact face 4b and elastically deformed into arc shape, and always elastically giving resilient force to the floating wedge member 4.

[0026] The contact face 4b is formed as to be guided to the wedge face 5a to dispose the floating wedge member 4 between the gear portion 11b and the wedge face 5a when the gear portion 11b oscillates and the floating wedge member 4 is moved by engagement of the toothed face 4a with the gear portion 11b. That is to say, the floating wedge member 4 restricts the toothed face 4a to engage with the gear portion 11b, the contact face 4b to contact the wedge face 5a, and the gear portion 11b (the oscillation piece portion 11) to oscillate in one direction (the inclining direction B).

[0027] The wall portions 12a are embraced by the thin circular (disc-shaped) cover members 7 from the oscil-

lation axis L13 direction. The connecting pin member 13 concentrically connects the wall portions 12a, the gear portions 11b, and the cover members 7. That is to say, the connecting portion 10 is composed that the wall portions 12a, the wedge-shaped window portions 5, the floating wedge members 4, the gear portions 11b, and the spring wires 6 are assembled and stored between the cover members 7.

[0028] A thickness dimension d of the elastic member 2 is set to be 15% to 100% of a thickness dimension W0 of the connecting portion 10 (refer to Figure 13). When the thickness dimension d of the elastic member 2 is smaller than 15% of the thickness dimension W0 of the connecting portion 1.0, sufficient strength and rigidity of the elastic member 2 can't be secured and the final inclination state of the rest portions 3 can't be stably kept. And, when the thickness dimension d of the elastic member 2 is larger than 100% of the thickness dimension W0 of the connecting portion 10, width dimension of the angle-adjustable hinge 1 becomes excessively large, and attachment of the hinge to the sofa S may be restricted.

[0029] The inner mechanism of the connecting portion 10 of the angle-adjustable hinge 1 may be a hinge (although not shown in Figures) having a ratchet mechanism by engagement of a claw and gear teeth, and may be modified within the scope of the present invention.

[0030] And, the angle-adjustable hinge 1 of the present invention, in the embodiment of Figures 2 through 8 and also in the embodiment of Figures 9 through 13, is provided with an oscillation arm 47 attached to the rest portion 3 (as shown in Figure 1), an attachment arm 46 fixed to the fixation base portions 40F, 41F, and 43F, and a connecting pin member 13 to connect the both arms 46 and 47.

[0031] The attachment arm 46 has the attachment piece portion 12 of which base end is connected to the connecting pin member 13 as not to rotate, and the cover member 7 fixed to the base end of the attachment piece portion 12. That is to say, the cover member 7 and the attachment piece portion 12 of metal strip are connected (unitedly) as not to rotate.

[0032] The oscillation arm 47 is provided with an oscillation piece portion 11 of which base end 45 is connected to the pin member 13, the bracket 48 to which the inner frame 49 of the rest portion 3 is fixed, and parallel link pieces 34 and 35 forming a parallel link mechanism H by connecting the bracket 48 and the oscillation piece portion 11.

[0033] The parallel link mechanism H is composed of the bracket 48, the oscillation piece portion 11, and the link pieces 34 and 35 mutually connected with 4 pins 57, 58, 59, and 60. The bracket 48 always keeps parallel to the oscillation piece portion 11, and freely goes back and forth between the base end 45 side and the forth end 44 side of the oscillation piece portion 11 as shown in Figures 2A, 2B, 2C, and 2D.

[0034] And, the wrinkle prevention mechanism 50 is provided with the bracket 48, the link pieces 34 and 35 connecting the bracket 48 and the oscillation piece portion 11, and a connecting arm 37 to connect the link piece 34 and the cover member 7.

[0035] The connecting arm 37 has function to augment arm length L47 of the oscillation arm 47 by moving the bracket 48 in a forth end direction P, namely, direction toward the forth end 44, along the oscillation of the rest portion 3 in the standing direction A.

[0036] In the present invention, the arm length L47 of the oscillation arm 47 means a distance (dimension) from the axis of the connecting pin member 13, namely, the horizontal oscillation axis L13 as the center, to a tip end portion 48A of the bracket 48.

[0037] To describe concretely further, the connecting arm 37 is composed of a curved plate piece of which base end is connected to the cover member 7 of thin disc with a pin 38 as to freely oscillate, and of which forth end is connected to a middle position in a longitudinal direction of the link piece 34 (on a near side to the connecting pin member 13) with a pin 39 as to freely oscillate.

[0038] The connecting position of the pin 38 on the base end is, relating to the axis L13, set to be opposite to the bracket 48, namely, opposite direction to the forth end, and opposite to the attachment piece portion 12.

[0039] With the pins 38 and 39 disposed as described above, the connecting arm 37 oscillates the arm 34 forming a part of the parallel link mechanism H, moves the bracket 48 forming another part of the parallel link mechanism H in the forth end direction P as serially shown in Figures 2A, 2B, and 2C or as serially shown in Figures 4, 5, 6, and 7, gradually increases the arm length L47, moves the inner frame 49 of the rest portion 3 fixed to the bracket 48 in the arrow P direction in Figure 1, and pulls the (common) cover 28 when the rest portion 3 moves in the standing direction A to prevent the lax wrinkles 53 (refer to Figure 17) from being generated on the cover 52.

[0040] As clearly shown by Figures 2A through 2D, or Figures 4 through 7, the cover member 7 is a thin disc having no protruding portion (rising portion) on the periphery, and having an advantage that the inner face (reverse face) of the cover 28 is not damaged. Further, the connecting arm 37 is, when observed in the direction parallel to the horizontal oscillation axis L13, always overlapped with at least one of the cover member 7 of disc and the oscillation piece portion 11 and oscillating in the directions of the arrows A and B. That is to say, the cover 28 is prevented from being damaged on the inner face (reverse face) because the connecting arm 37 relating to the present invention has a curved or L-shaped (bent) configuration, and the dimensions and the connecting positions (the positions of the pins 38 and 39) of the arm 37 are set as the arm 37 is always overlapped with the cover member 7 or the oscillation piece portion 11.

[0041] To add the description relating to another embodiment of the present invention, in Figures 9 through 13 and Figure 1, an elastic member 2 giving rotation resistance moment M to restrict the oscillation of the rest

portion 3 in the standing direction A, concretely a spiral spring 20 is disposed on a face opposite to the face of the cover member 7 on which the connecting arm 37 is disposed. As clearly shown in Figure 9, the thickness dimension in the direction parallel to the axis of the pin member 13 is reduced and compactification of the hinge is achieved.

[0042] And the elastic member 2 restricts the oscillation in the standing direction A with resistant force as to hold the rest portion 3 in the final inclination state resisting against the tension generated by some load received by the cover 28 and working on the rest portion 3 in the final inclination state.

[0043] In the present invention, "stop oscillation with multi stage" means that 7 or more stages of posture holding angles are set with uniform pitch within a range from the final inclination state to a final standing state toward which the rest portion 3 is oscillated in the standing direction A, and the rest portion 3 oscillated in the standing direction A is restricted gradationally as not to return toward the inclining direction B.

[0044] To explain this concretely with an example of the headrest 30, within a range from the final inclination state in which the headrest portion 30 is made horizontal to a vertical posture, posture holding angles of, for example, 16 stages with uniform pitch are set to restrict the headrest portion 30 oscillated forward (in the standing direction A) as not to return backward (in the inclining direction B) gradationally. And, to explain this concretely with an example of the footrest 31, in the angle-adjustable hinge, within a range from the final inclination state in which the footrest portion 31 is made vertical to a horizontal posture, posture holding angles of, for example, 16 stages with uniform pitch are set to restrict the footrest portion 31 oscillated upward (in the standing direction A) as not to return downward (in the inclining direction B) gradationally.

[0045] To make an additional explanation further, as shown in Figures 12 and 13, an oscillation piece portion 11 attached to the rest portion 3 through the parallel link mechanism H, an attachment piece portion 12 fixed to a fixation side of the sofa S, and a connecting pin member 13 assembled with the attachment piece portion 12 unrotationally to connect the oscillation piece portion 11 and the attachment piece portion 12, are provided. The connecting pin member 13, fitting to the attachment piece portion 12, connects the oscillation piece portion 11 as to freely oscillate around an oscillation axis L13. An end of the connecting pin member 13 is made into a head 33 of large diameter, and a hitching groove 13a at right angles with the oscillation axis L13 is formed on the head 33. Another end of the connecting pin member 13 is having small diameter, and stopped by caulking in assembled state.

[0046] The elastic member 2 is the spiral spring 20 composed of a spiral metal spring of which outer end portion 22 bent in L-shape is hitched to a hitching portion 11a protruding from a position near a base end portion of the oscillation piece portion 11, and of which inner end portion 21 bent approximately into right angle is hitched to the hitching groove 13a of the connecting pin member 13. The spiral spring 20 is elastically giving resistant force as the rotation resistance moment M to the oscillation piece portion 11 as to restrict the oscillation in the standing direction A of the oscillation piece portion 11 as the rest portion 3 does not stand even if the cover 28 in tension receives load further in the rest portion 3 in the final inclination state.

[0047] The configuration of the bracket 48 is an inverted L when observed in the longitudinal direction of the oscillation piece portion 11, attachment holes 36 to fix the inner frame 49 (with screws, bolts, or rivets not shown in Figures) are formed on an upper wall of the bracket 48 as shown in Figures 3 and 9, and a U-shaped notched concave portion 29 to which the pin 39 fits is formed on a vertical wall of the bracket 48 as shown in Figures 5 and 6. The hinge is made very compact when the pin 39 fits the notched concave portion 29 (refer to Figures 2A, 3, and 10).

[0048] The method of use (working) of the above-described angle-adjustable hinge of the present invention is now described.

[0049] First, the cover 28 is set from the fixed side of the sofa S to the rest portion 3 in production process of the sofa S shown in Figure 1 or upholstering of the cover 28. In this case, the angle-adjustable hinge 1 to attach the rest portion 3 to the fixed side of the sofa S restricts the oscillation of the rest portion 3 in the standing direction A with the rotation resistance moment M by the elastic member 2 (refer to Figures 10 and 12). When the rest portion 3 is stood up in use, wrinkles are reduced even if the cover 28 slacks because the cover 28 is set with appropriate tension while the rest portion 3 keeps the final inclination state. In the embodiment of Figures 9 through 13 of the present invention, the wrinkle prevention mechanism 50 is added further, the cover 28 gives smooth and beautiful expression when used with the rest portion 3 in the standing state without generating the wrinkles 53 (conventional as shown in Figure 17).

[0050] Next, in the sofa S in which the rest portion 3 is oscillated in the inclining direction B to the limit of movable range, namely, to the final inclination state, when a person gives load to the seat portion 41 and the backrest portion 40 by sitting, the cover 28 of the seat portion 41 receiving the load of the person sags or the cover 28 of the backrest portion 40 is pulled downward, and the tension working on the rest portion 3 is increased. In this case, the elastic member 2 restricts the oscillation of the rest portion 3 in the standing direction A with the rotation resistance moment M as the resistant force, and certainly keeps the final inclination state.

[0051] Then, the rest portion 3 in the final inclination state is stood up in the standing direction A against the rotation resistance moment M as shown in Figure 1 and Figures 16A through 16C. In Figure 16A, the toothed face 4a engages with the gear portion 11b, and the contact

face 4b contacts the wedge face 5a. When the gear portion 11b is oscillated in the standing direction A as shown in Figure 16B, the contact face 4b of the floating wedge member 4 becomes apart from the wedge face 5a and makes a slight gap g. When the rest portion 3 is oscillated further in the standing direction A as shown in Figure 16C, the guiding sloped face 14 of the floating wedge member 4 contacts the floating staged portion 8 of the wedge-shaped window portion 5, the engagement of the toothed face 4a and the gear portion 11b is released, and the toothed face 4a goes over the gear portion 11b with click sound as bounced by the gear portion 11b. When the oscillation of the rest portion 3 is stopped at a desired position, the floating wedge member 4 is pushed to the gear portion 11b by the spring wire 6, and the toothed face 4a engages with the gear portion 11b. The oscillation of the rest portion 3 in the inclining direction B is restricted by wedge work, and the rest portion 3 is kept with a desired inclination angle.

[0052] And, opposite to the Figures and description above, it may be desirable to fix the attachment arm 46 to the rest portion 3, and attach the oscillation arm 47 on the fixation base portions 40F, 41F, and 43F side (not shown in Figures). That is to say, the bracket 48 of the oscillation arm 47 is fixed to the inner frame of the fixation base portions 40F, 41F, and 43F, and the attachment arm 46 is fixed to the inner frame 49 of the rest portion 3. In this case, although the horizontal oscillation axis L13 moves approximately parallel to or draws an arc against the fixation base portions 40F, 41F, and 43F, generation of lax wrinkles can be similarly prevented. Further, it is advantageous that the configuration and construction of the connecting portion of the inner frame 49 of the rest portion 3 to the attachment arm 46 can be easily modified.

[0053] As shown in Figure 15, when the rest portion 3 is oscillated for a predetermined amount to make the final standing state, the push-in protrusion 15 contacts and pushes the floating wedge member 4 as shown in Figure 16D. When the rest portion 3 is oscillated further in the standing direction A as shown in Figure 16E, the floating wedge member 4, sliding on the floating staged portion 8 of the wedge-shaped window portion 5, is guided (conducted) by the guiding sloped face 14 to the retreat space 9. When the floating wedge member 4 is stored in the retreat space 9 (corresponding to Figure 8), the engagement of the toothed face 4a and the gear portion 11b is released, and the oscillation in the inclining direction B is made free. And, as shown in Figure 16F, when the rest portion 3 is oscillated in the inclining direction B as to return to the final inclination state, the push-out protrusion 16 contacts and pushes the floating wedge member 4 out of the retreat space 9. As described above, the state shown in Figure 16A is made again, the toothed face 4a engages with the gear portion 11b to restrict the oscillation of the rest portion 3 in the inclining direction B.

[0054] Although the case that the angle-adjustable hinge 1 stops the oscillation of the rest portion 3 in the inclining direction B with 7 or more stages, called "multi-stage" in the present invention, and keeps the desired inclination angle is mainly described above, the number of stages may be plural of 2 to 6, and one stage (single stage) is also possible.

[0055] As described above, with the present invention, the rotation resistance moment M prevents the rest portion 3 from being pulled by the cover 28 of the sofa S and oscillated in the standing direction A, and the rest portion 3 does not unintentionally stand and the posture is stably kept when the sofa S is used with the rest portion 3 in the final inclination state because in an angle-adjustable hinge, used for the sofa S provided with the reclinable rest portion 3, making oscillation of the rest portion 3 in the standing direction A possible, and stopping oscillation in the inclining direction B with multi stage to keep a desired inclination angle, the elastic member 2, giving the rotation resistance moment M to restrict the oscillation of the rest portion 3 in the standing direction A, is provided. And, the cover 28 can be set with appropriate tension keeping the posture in which the rest portion 3 is inclined to the final inclination state, the cover 28 does not unnecessarily slack when the rest portion 3 is upright, and the sofa can be made fine in appearance.

[0056] In the present invention, as described above, tension works on the cover 28 as the hinge in the inclined posture is stood in the standing direction A, lax wrinkles are not generated, beautiful smooth faces are kept, and comfort and beauty of furniture, especially of voluminous and luxurious furniture upholstered with leather can be improved because the wrinkle prevention mechanism 50 to restrict generation of lax wrinkles on the common cover 28 along oscillation of the rest portion 3 in the standing direction A is provided in the angle-adjustable hinge, used for furniture having the rest portion 3 inclinable around the horizontal oscillation axis L13 and covered by the common cover 28 with fixation base portions 40F, 41F, 43F, and stopping oscillation in the inclining direction B with single stage or plural stages (multi stage) to keep a desired inclination angle while making oscillation of the rest portion 3 in the standing direction A possible.

[0057] And, number of parts as an angle-adjustable hinge is small, the dimension of the hinge in the axis direction is small, and the hinge is entirely compact, having a simple construction, light weight, and economical because the oscillation arm 47 attached to the rest portion 3, an attachment arm 46 fixed to the fixation base portions 40F, 41F, 43F, the connecting pin member 13 connecting the oscillation arm 47 and the attachment arm 46, are provided, the oscillation arm 47 is provided with an oscillation piece portion 11 of which base end 45 is attached to the pin member 13, the bracket 48 to which the inner frame 49 of the rest portion 3 is fixed, and two link pieces 34, 35 forming the parallel link mechanism H by connecting the bracket 48 and the oscillation piece portion 11, the attachment arm 46 has the attachment piece portion 12 of which base end is attached to the pin member 13, and the cover member 7 fixed to the base end of the

attachment piece portion 12, and, the wrinkle prevention mechanism 50 is provided with the bracket 48, the two link pieces 34, 35 forming the parallel link mechanism H by connecting the bracket 48 and the oscillation piece portion 11, and the connecting arm 37 connecting one of the link pieces 34, 35 and the cover member 7 to increase the arm length L47 of the oscillation arm 47 by moving the bracket 48 in the forth end direction P along the oscillation of the rest portion 3 in the standing direction A. Especially, in spite of the compactness, stroke (amount of movement in the forth end direction P) of the bracket 48 can be made sufficiently large.

[0058] Local small risings (small protrusion) are not generated on the cover 28, comfortable furniture such as a sofa is obtained, and the cover 28 is prevented from being damaged on the reverse face side because the cover member 7 is a thin disc, and configuration, dimension, and connecting positions on both ends of the connecting arm 37 are set as that the connecting arm 37 is always overlapped with at least one of the cover member 7 of disc and the oscillation piece portion 11 when observed in the direction parallel to the horizontal oscillation axis L13 corresponding to the axis of the pin member 13. And, this construction also results in excellent external beauty.

[0059] And, thickness dimension in the axis direction of the hinge can be reduced to make the construction compact, the rotation resistance moment M can be certainly generated, and the hinge is easily disposed within a sofa, etc. because the spiral spring 20, giving rotation resistance moment M to restrict the oscillation of the rest portion 3 in the standing direction A, is disposed on a side face opposite to the side face of the cover member 7 on which the connecting arm 37 is disposed.

Claims

1. An angle-adjustable hinge, used for furniture having a rest portion (3) inclinable around a horizontal oscillation axis (L13) and covered by a common cover (28) with fixation base portions (40F)(41F)(43F), and stopping oscillation in an inclining direction (B) with multi stage to keep a desired inclination angle while making oscillation of the rest portion (3) in a standing direction (A) possible, **characterized by** a construction in which:

   an oscillation arm (47) attached to the rest portion (3), an attachment arm (46) fixed to the fixation base portions (40F)(41F)(43F), and a connecting pin member (13) connecting the oscillation arm (47) and the attachment arm (46), are provided;
   the oscillation arm (47) is provided with an oscillation piece portion (11) of which base end (45) is attached to the pin member (13), a bracket (48) to which an inner frame (49) of the rest portion (3) is fixed, and two link pieces (34) (35) forming a parallel link mechanism (H) by connecting the bracket (48) and the oscillation piece portion (11) ;
   the attachment arm (46) has an attachment piece portion (12) of which base end is attached to the pin member (13), and a cover member (7) fixed to the base end of the attachment piece portion (12) ;
   a wrinkle prevention mechanism (50) to restrict generation of lax wrinkles along oscillation of the rest portion (3) in a standing direction (A) is provided; and
   the wrinkle prevention mechanism (50) is provided with the bracket (48), the two link pieces (34) (35) forming the parallel link mechanism (H) by connecting the bracket (48) and the oscillation piece portion (11), and a connecting arm (37) connecting one of the link pieces (34) (35) and the cover member (7) to increase arm length (L47) of the oscillation arm (47) by moving the bracket (48) in a forth end direction (P) along the oscillation of the rest portion (3) in the standing direction (A).

2. The angle-adjustable hinge as set forth in claim 1, wherein the cover member (7) is a thin disc, and configuration, dimension, and connecting positions on both ends of the connecting arm (37) are set as that the connecting arm (37) is always overlapped with at least one of the cover member (7) of disc and the oscillation piece portion (11) when observed in a direction parallel to the horizontal oscillation axis (L13) corresponding to the axis of the pin member (13).

3. The angle-adjustable hinge as set forth in claim 1 or claim 2, wherein a spiral spring (20), giving rotation resistance moment (M) to restrict the oscillation of the rest portion (3) in the standing direction (A), is disposed on a side face opposite to a side face of the cover member (7) on which the connecting arm (37) is disposed.

4. An angle-adjustable hinge, used for furniture having a rest portion (3) inclinable around a horizontal oscillation axis (L13) and covered by a common cover (28) with fixation base portions (40F)(41F)(43F), and stopping oscillation in an inclining direction (B) with multi stage to keep a desired inclination angle while making oscillation of the rest portion (3) in a standing direction (A) possible, **characterized by** a construction in which:

   an attachment arm (46) attached to the rest portion (3), an oscillation arm (47) fixed to the fixation base portions (40F)(41F)(43F), and a connecting pin member (13) connecting the oscilla-

tion arm (47) and the attachment arm (46), are provided;
the oscillation arm (47) is provided with an oscillation piece portion (11) of which base end (45) is attached to the pin member (13), a bracket (48) to which an inner frame of the fixation base portions (40F) (41F) (43F) is fixed, and two link pieces (34) (35) forming a parallel link mechanism (H) by connecting the bracket (48) and the oscillation piece portion (11);
the attachment arm (46) has an attachment piece portion (12) of which base end is attached to the pin member (13), and a cover member (7) fixed to the base end of the attachment piece portion (12) ;
a wrinkle prevention mechanism (50) to restrict generation of lax wrinkles along oscillation of the rest portion (3) in a standing direction (A) is provided; and
the wrinkle prevention mechanism (50) is provided with the bracket (48), the two link pieces (34) (35) forming the parallel link mechanism (H) by connecting the bracket (48) and the oscillation piece portion (11), and a connecting arm (37) connecting one of the link pieces (34) (35) and the cover member (7) to increase arm length (L47) of the oscillation arm (47) by moving the pin member (13), the oscillation piece portion (11), and the attachment piece portion (12) in a forth end direction (P) against the bracket (48) along the oscillation of the rest portion (3) in the standing direction (A).

5. The angle-adjustable hinge as set forth in claim 4, wherein the cover member (7) is a thin disc, and configuration, dimension, and connecting positions on both ends of the connecting arm (37) are set as that the connecting arm (37) is always overlapped with at least one of the cover member (7) of disc and the oscillation piece portion (11) when observed in a direction parallel to the horizontal oscillation axis (L13) corresponding to the axis of the pin member (13).

Amended claims in accordance with Rule 137(2) EPC.

1. An angle-adjustable hinge, used for furniture having a rest portion (3) inclinable around a horizontal oscillation axis (L13) and covered by a common cover (28) with fixation base portions (40F)(41F)(43F), and stopping oscillation in an inclining direction (B) with multi stage to keep a desired inclination angle while making oscillation of the rest portion (3) in a standing direction (A) possible, **characterized by** a construction in which:
an oscillation arm (47) attached to the rest portion (3), an attachment arm (46) fixed to the fixation base portions (40F)(41F)(43F), and a connecting pin member (13) connecting the oscillation arm (47) and the attachment arm (46), are provided;
the oscillation arm (47) is provided with an oscillation piece portion (11) of which base end (45) is attached to the pin member (13), a bracket (48) to which an inner frame (49) of the rest portion (3) is fixed, and two link pieces (34) (35) forming a parallel-link mechanism (H) by connecting the bracket (48) and the oscillation piece portion (11);
the attachment arm (46) has an attachment piece portion (12) of which base end is attached to the pin member (13), and a cover member (7) fixed to the base end of the attachment piece portion (12);
a wrinkle prevention mechanism (50) to restrict generation of lax wrinkles along oscillation of the rest portion (3) in a standing direction (A) is provided; and
the wrinkle prevention mechanism (50) is provided with the bracket (48), the two link pieces (34) (35) forming the parallel link mechanism (H) by connecting the bracket (48) and the oscillation piece portion (11), and a connecting arm (37) connecting one of the link pieces (34) (35) and the cover member (7) to increase arm length (L47) of the oscillation arm (47) by moving the bracket (48) in a forth end direction (P) along the oscillation of the rest portion (3) in the standing direction (A).

2. The angle-adjustable hinge as set forth in claim 1, wherein the cover member (7) is a thin disc, and configuration, dimension, and connecting positions on both ends of the connecting arm (37) are set as that the connecting arm (37) is always overlapped with at least one of the cover member (7) of disc and the oscillation piece portion (11) when observed in a direction parallel 1 to the horizontal oscillation axis (L13) corresponding to the axis of the pin member (13).

3. The angle-adjustable hinge as set forth in claim 1 or claim 2, wherein a spiral spring (20), giving rotation resistance moment (M) to restrict the oscillation of the rest portion (3) in the standing direction (A), is disposed on a side face opposite to a side face of the cover member (7) on which the connecting arm (37) is disposed.

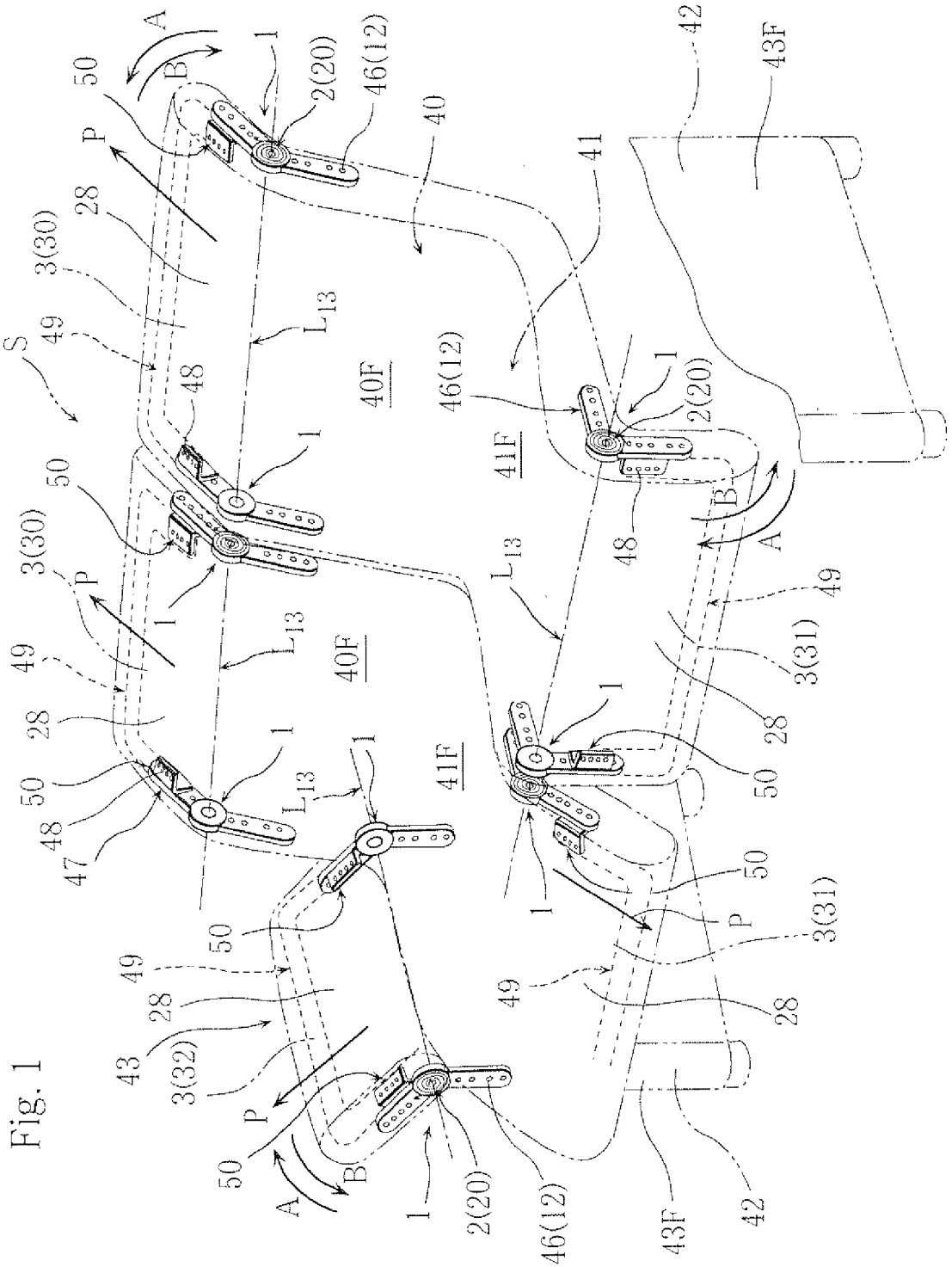

A
B
P
S
1
2(20)
46(12)
40
41
42
43F
28
3(30)
49
48
50
L_{13}
40F
41F
47
3(31)
43
3(32)

Fig. 1

Fig. 2A

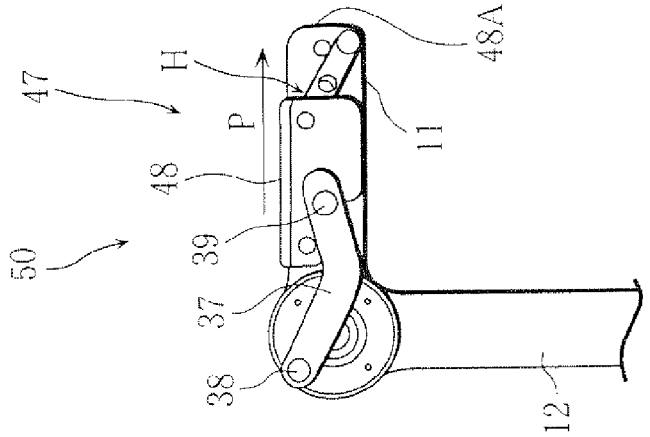


Fig. 2B

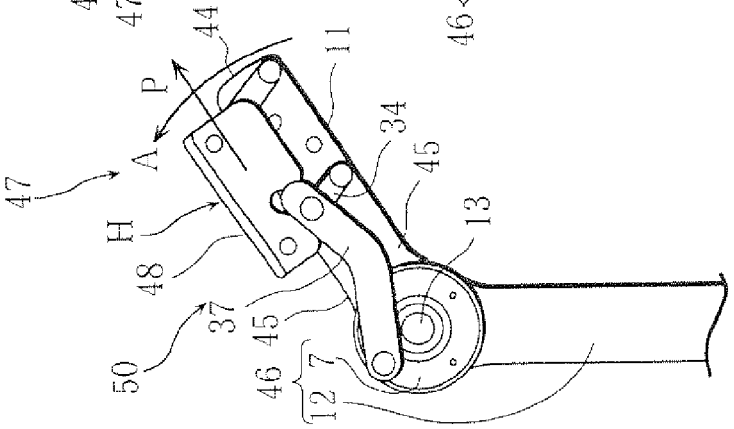


Fig. 2C

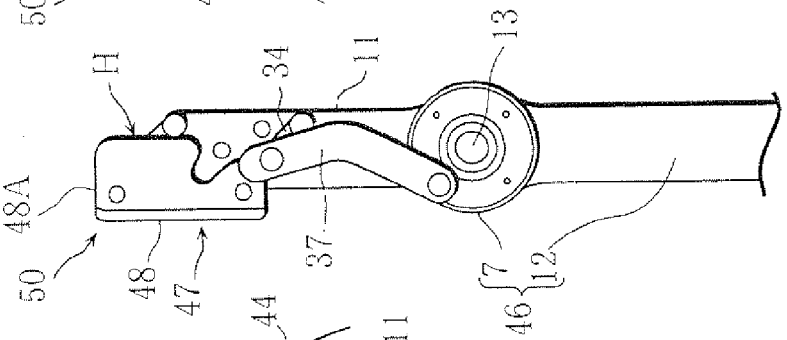


Fig. 2D

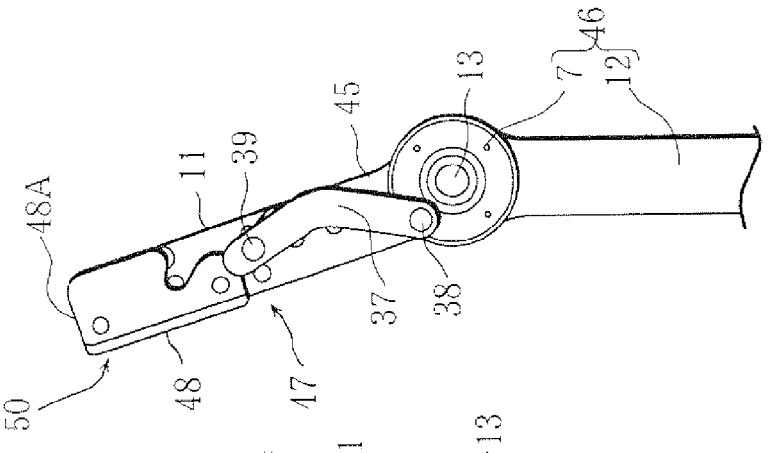


Fig. 3

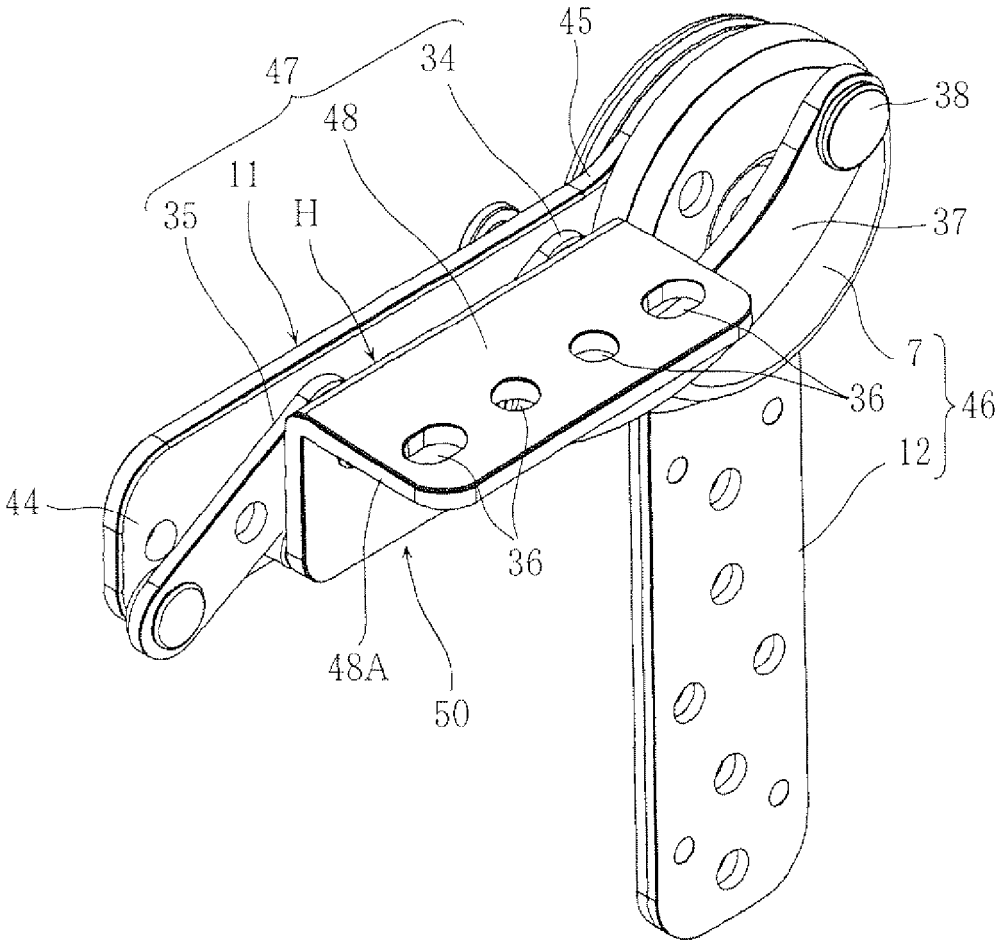


Fig. 4

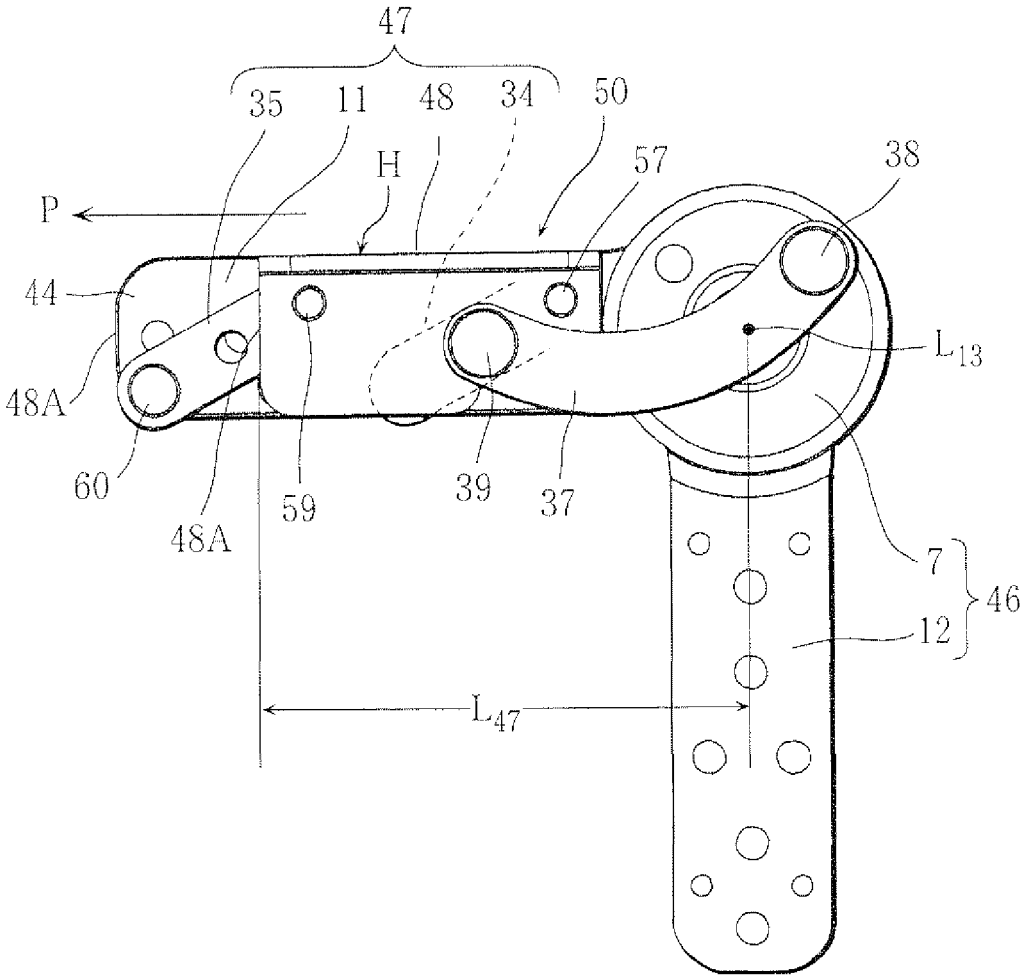


Fig. 5

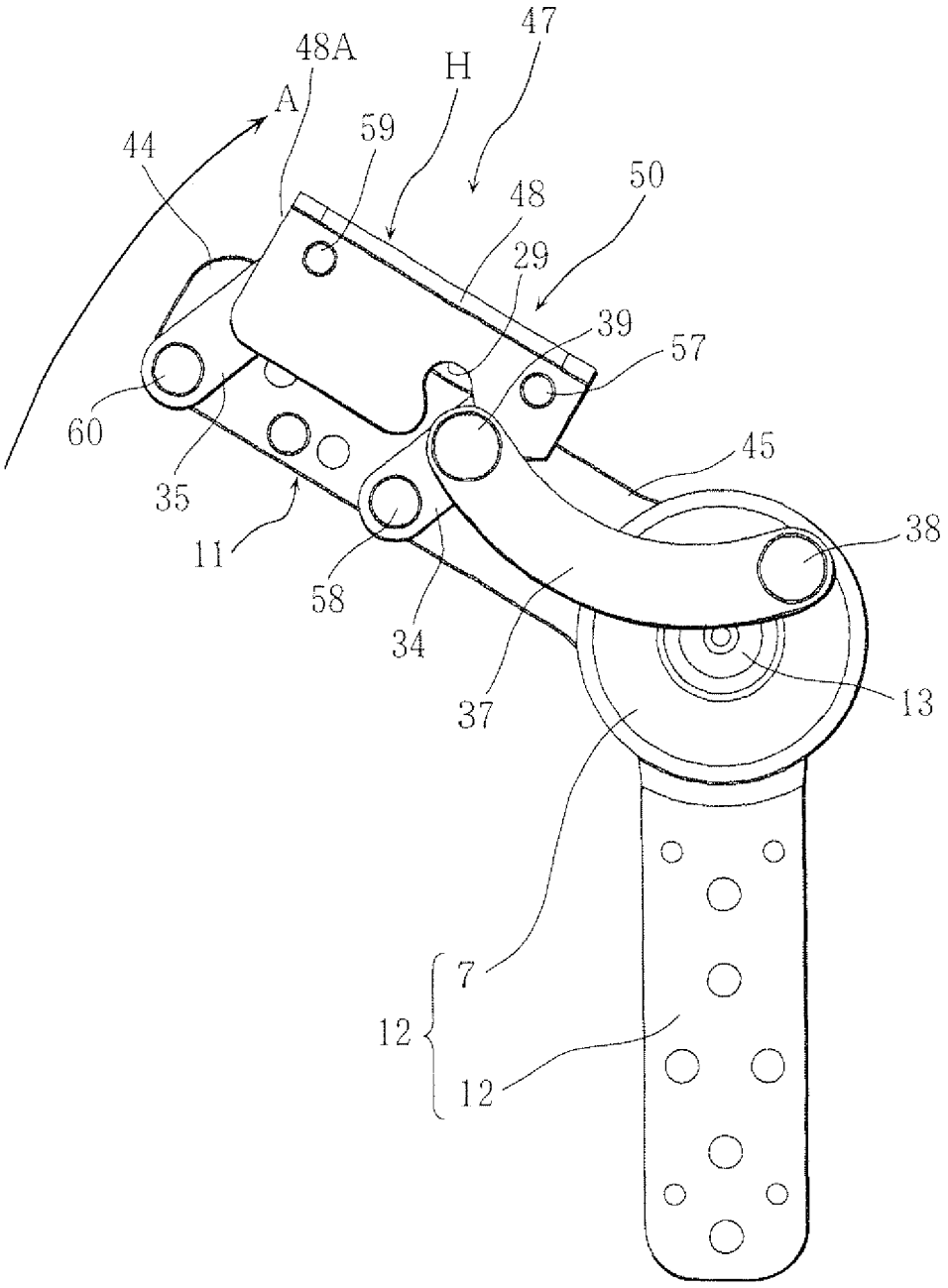


Fig. 6

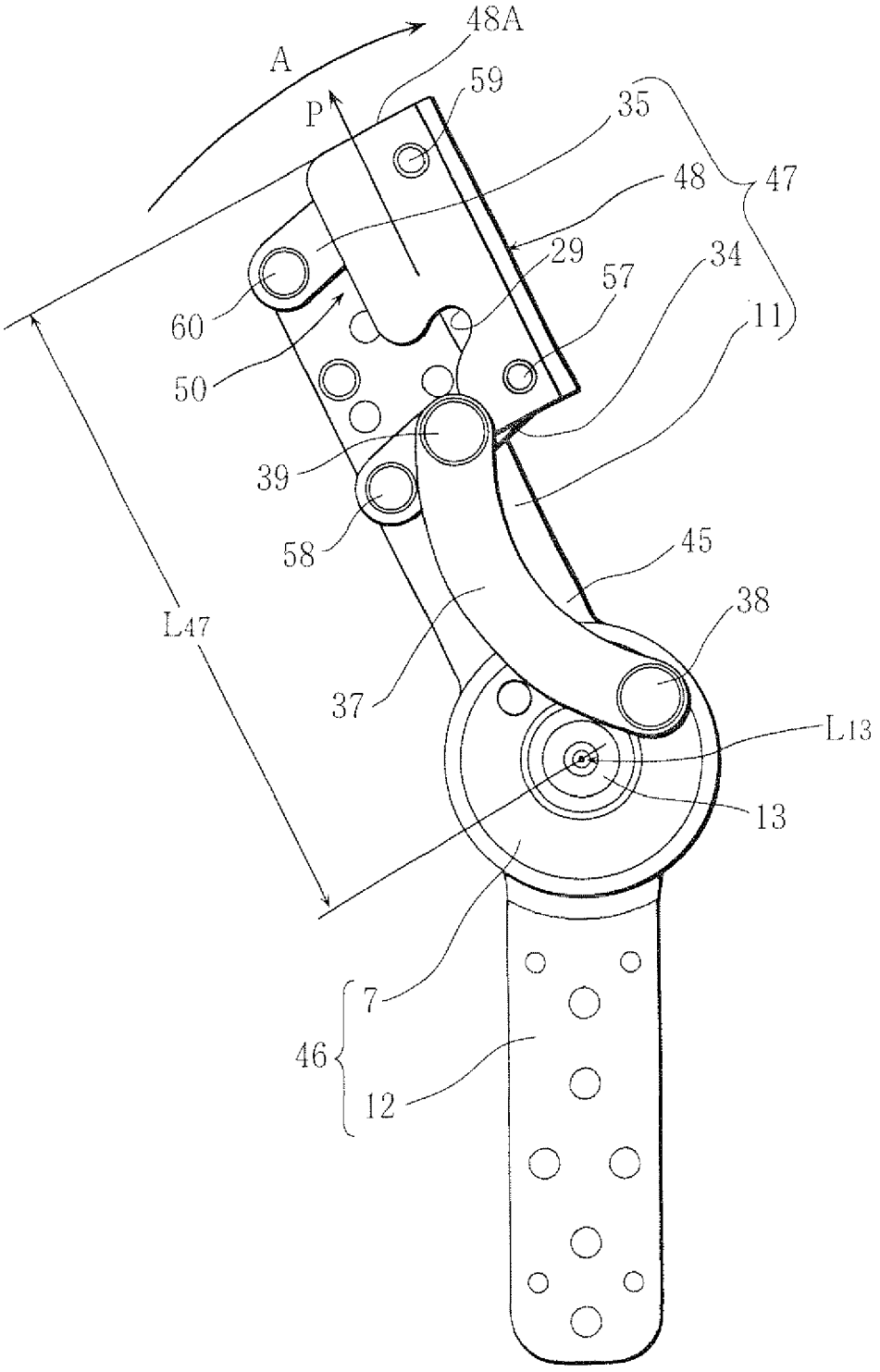
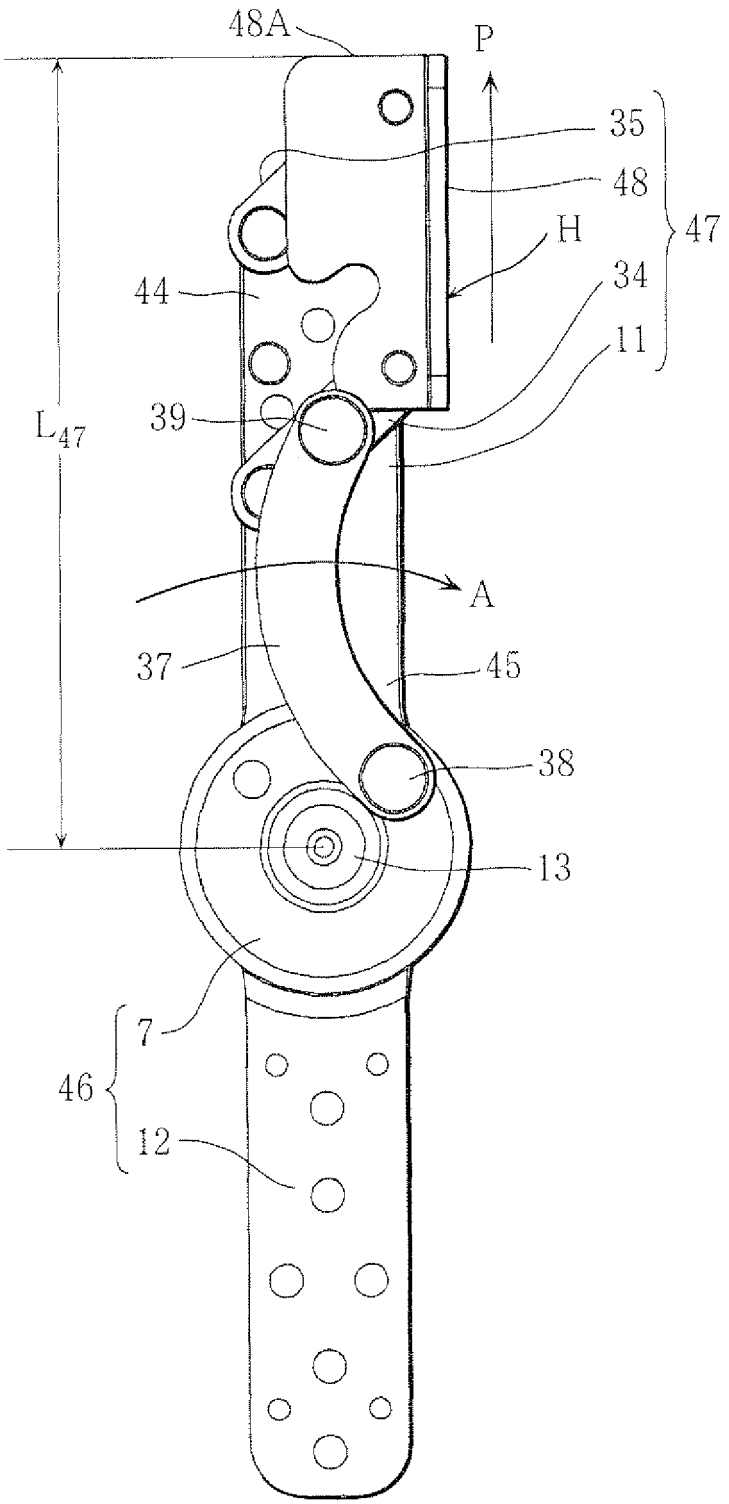


Fig. 7



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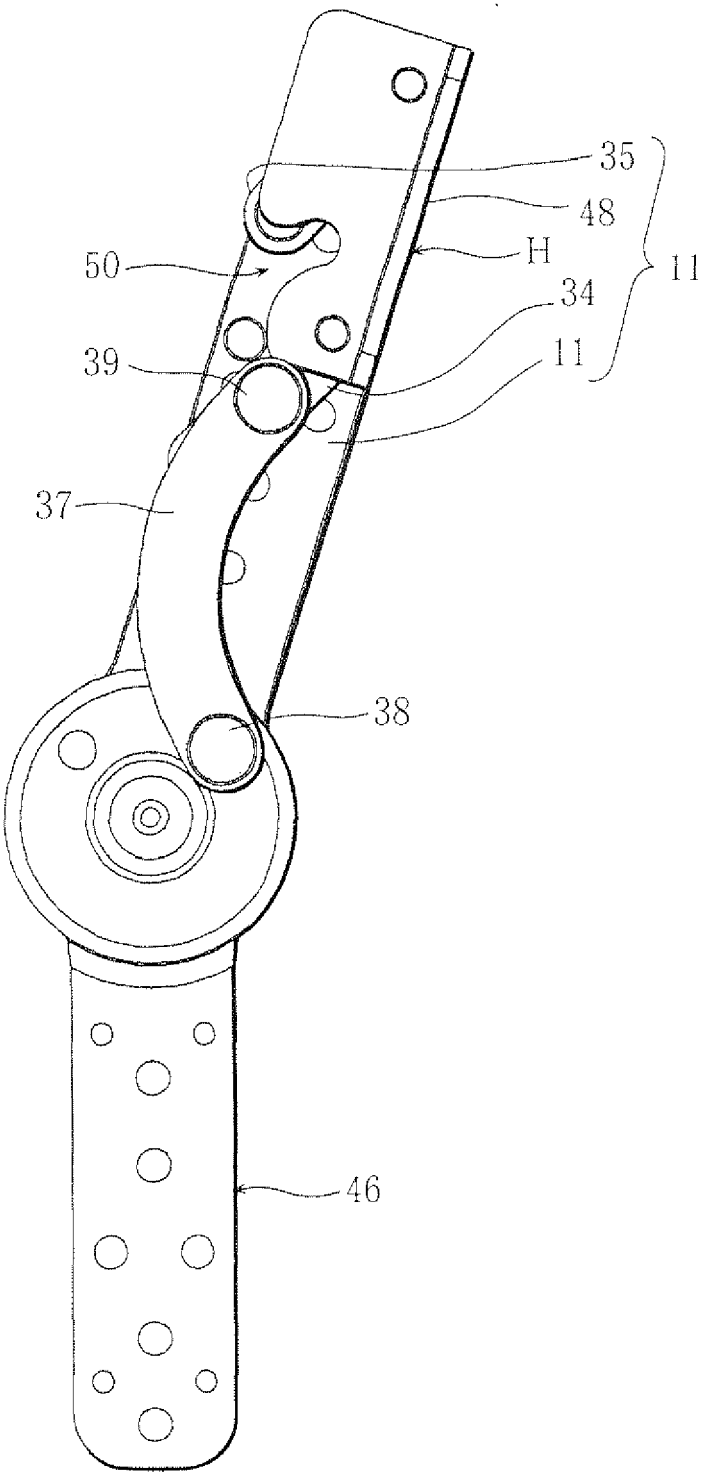


Fig. 9

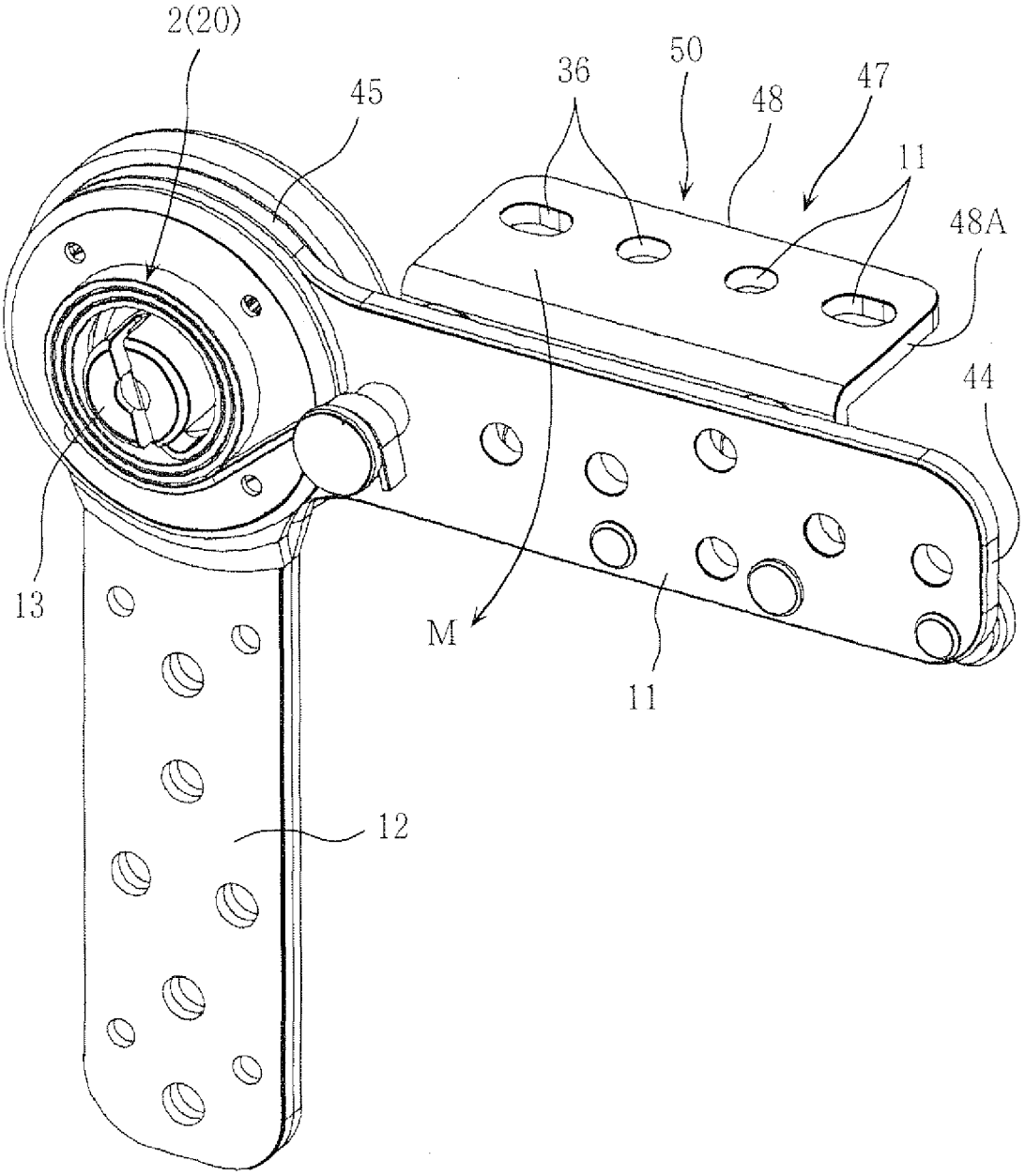
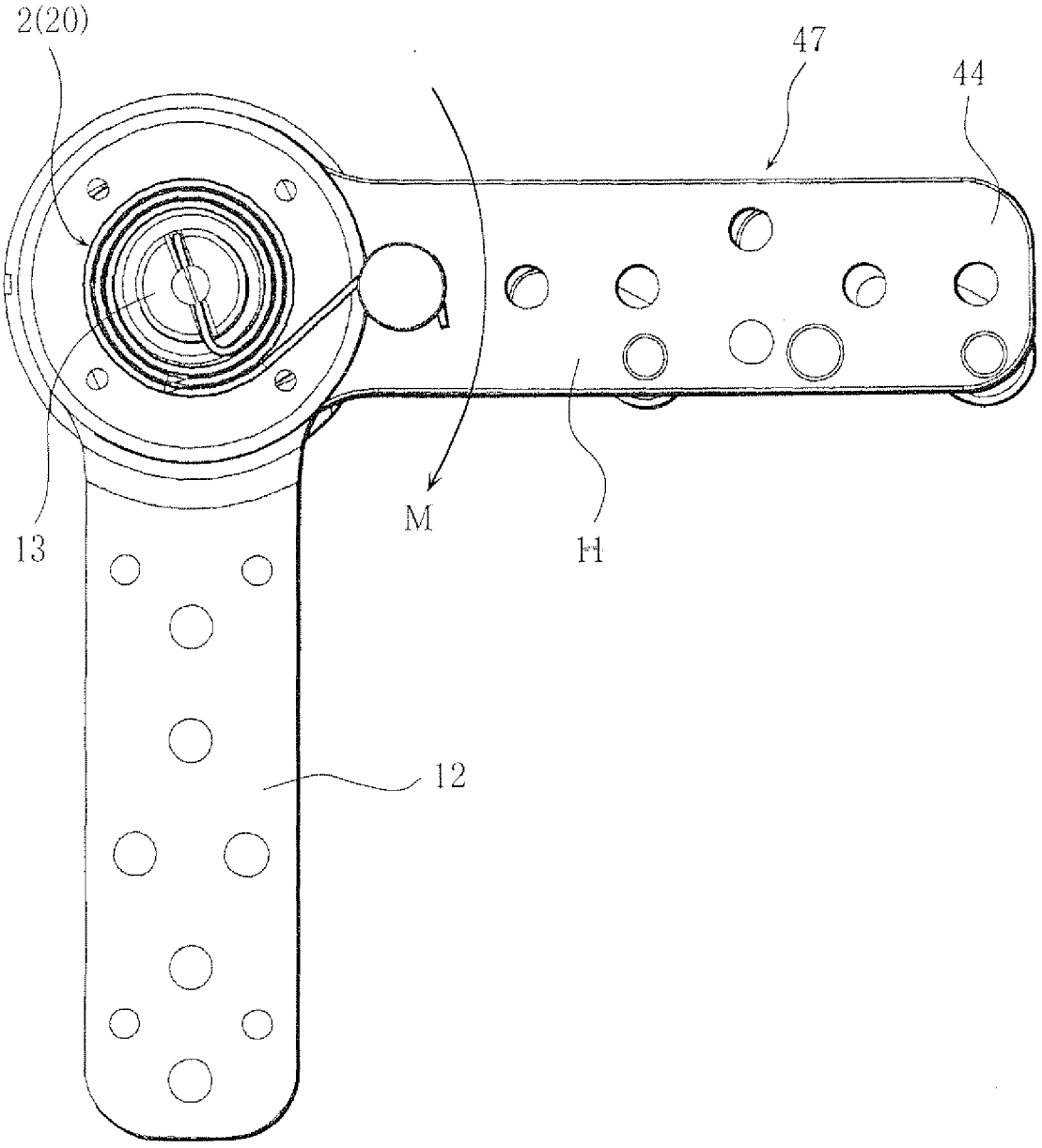


Fig. 10



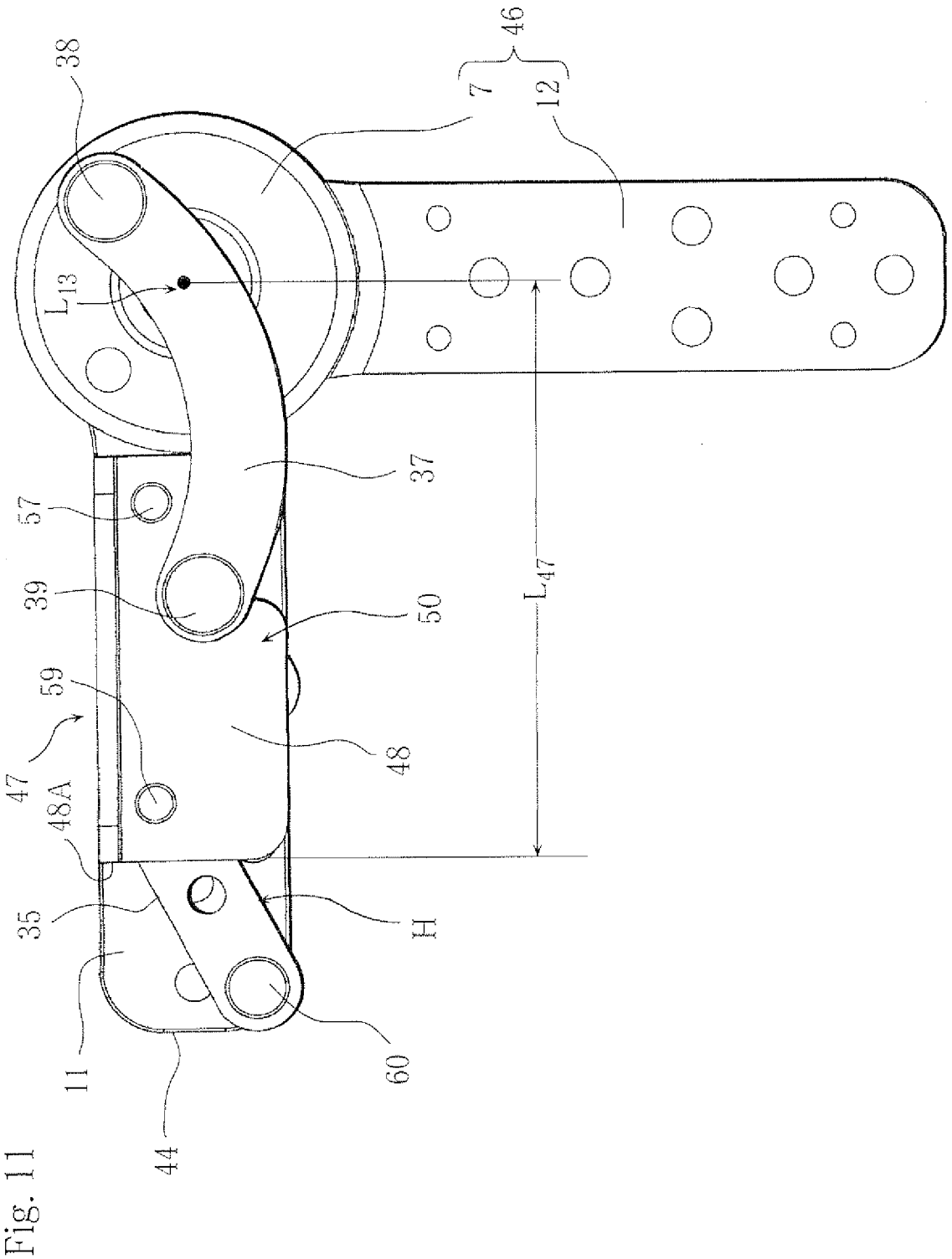


Fig. 11

Fig. 12

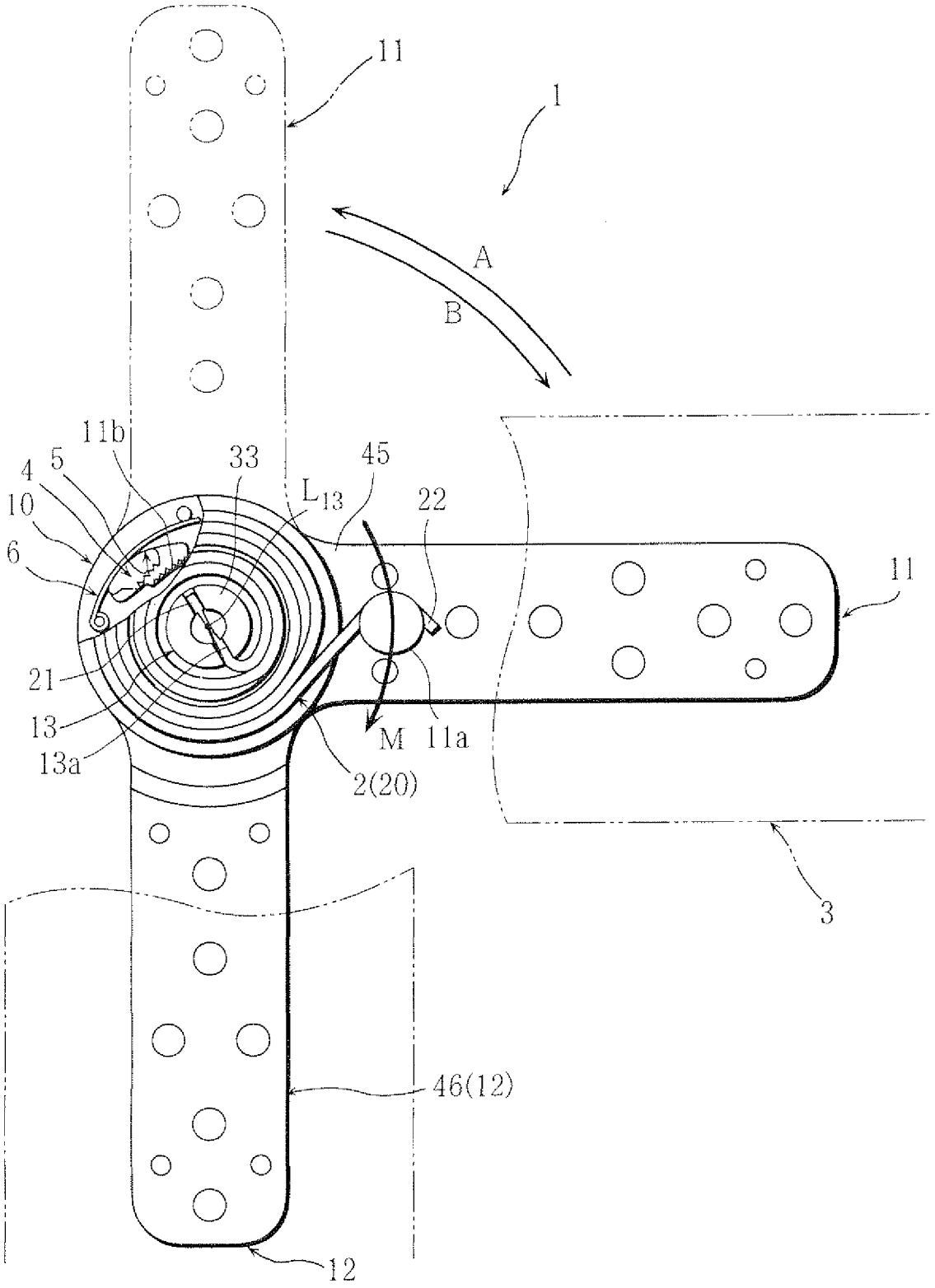


Fig. 13

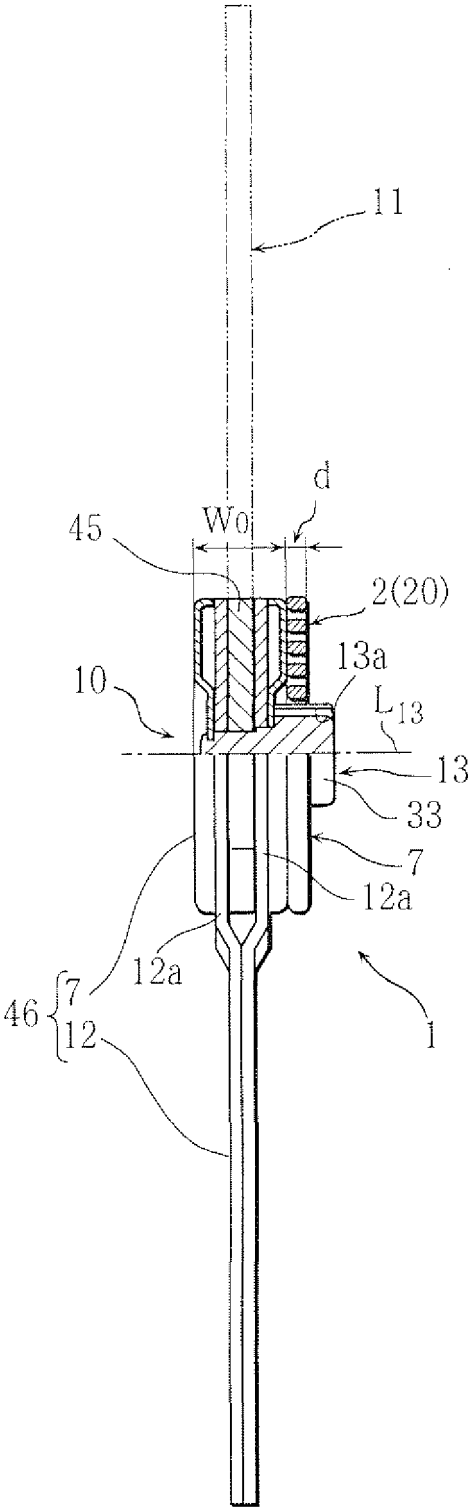
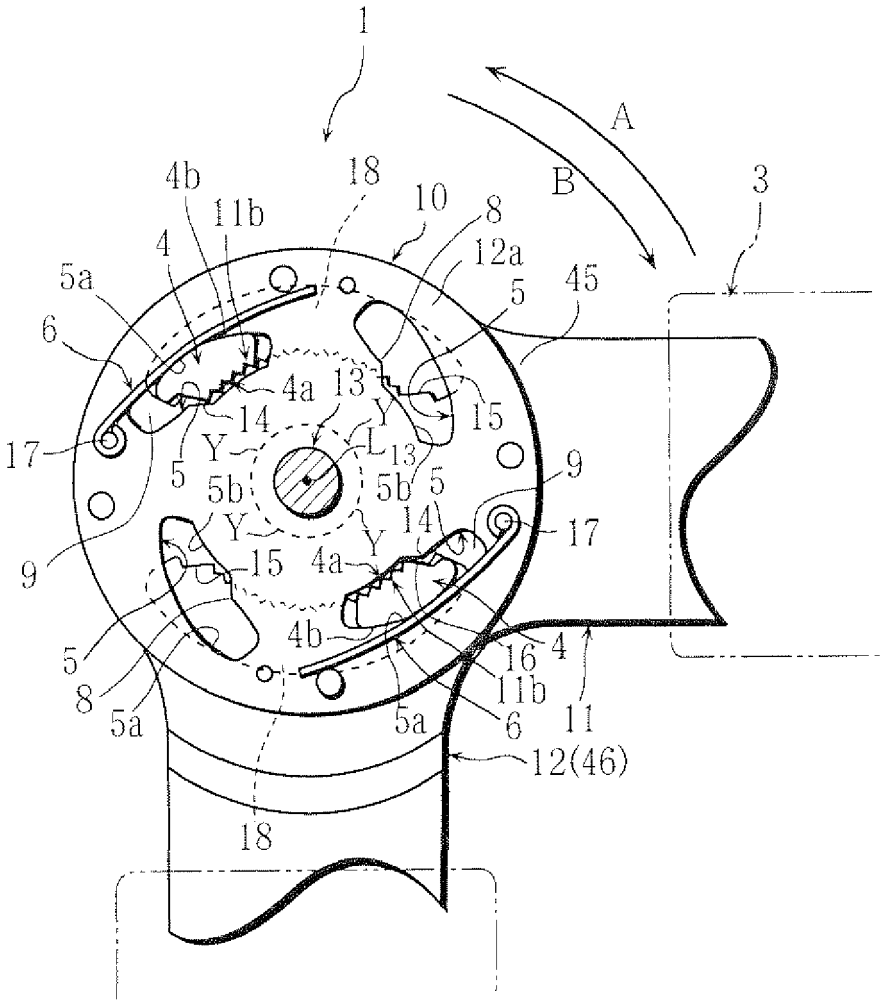


Fig. 14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A
B
3
4b
18
10
8
11b
4
12a
5a
5
45
6
4a
13
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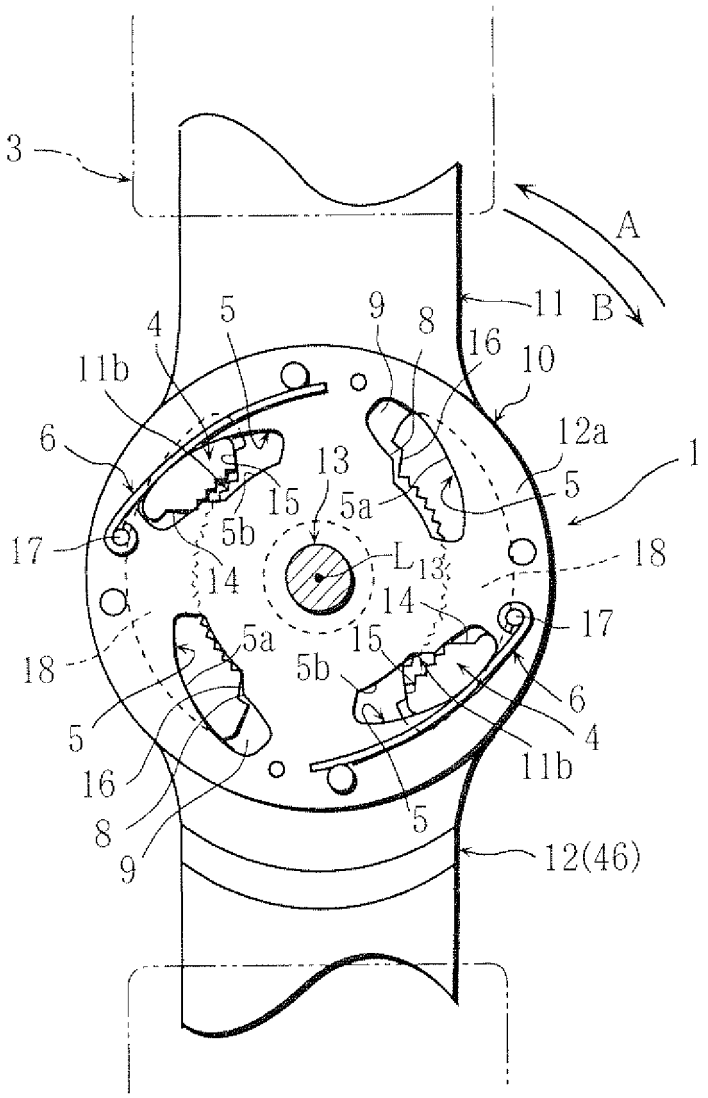
Y
15
17
5
Y
L13
9
5b
5b
5
Y
14
17
9
15
4a
Y
5
4b
16
4
8
11b
5a
5a
6
11
12(46)
18

Fig. 15


3
A
B
11
4
5
9
8
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10
11b
6
12a
1
13
15
5a
5
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18
14
L13
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16
11b
8
5
9
12(46)

Fig. 16A

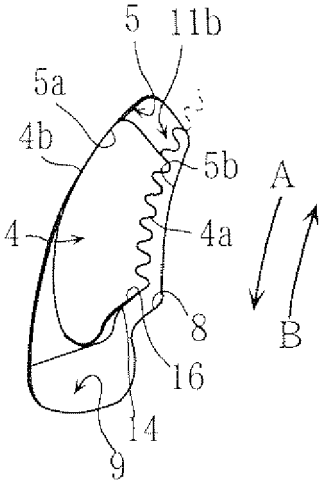


Fig. 16B

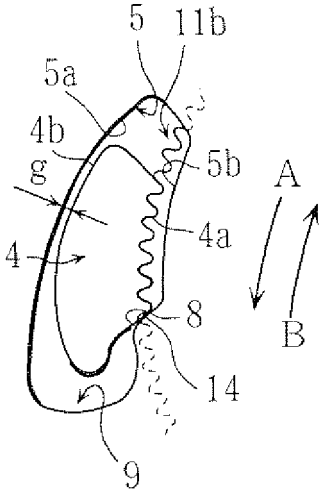


Fig. 16C

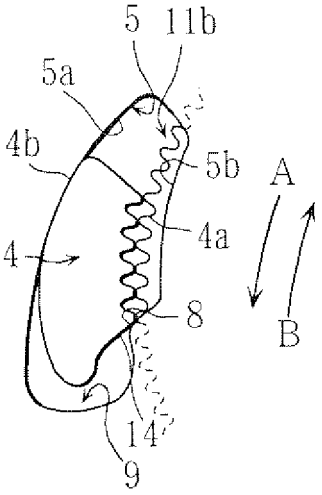


Fig. 16D

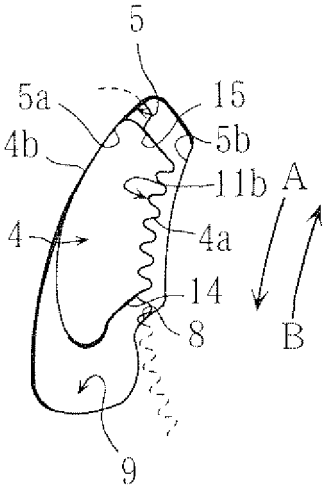


Fig. 16E

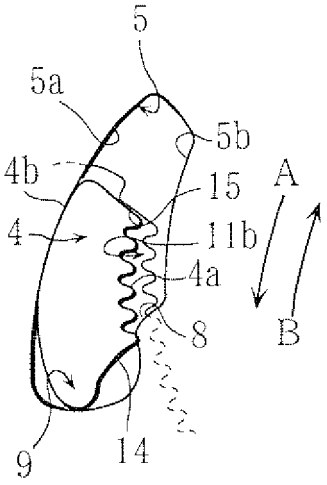
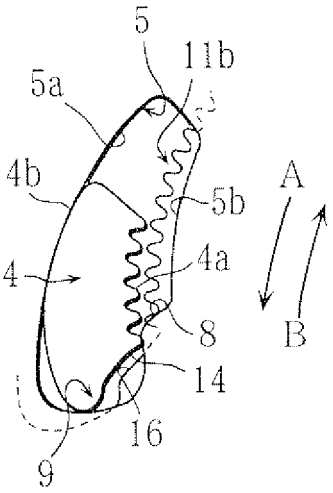


Fig. 16F



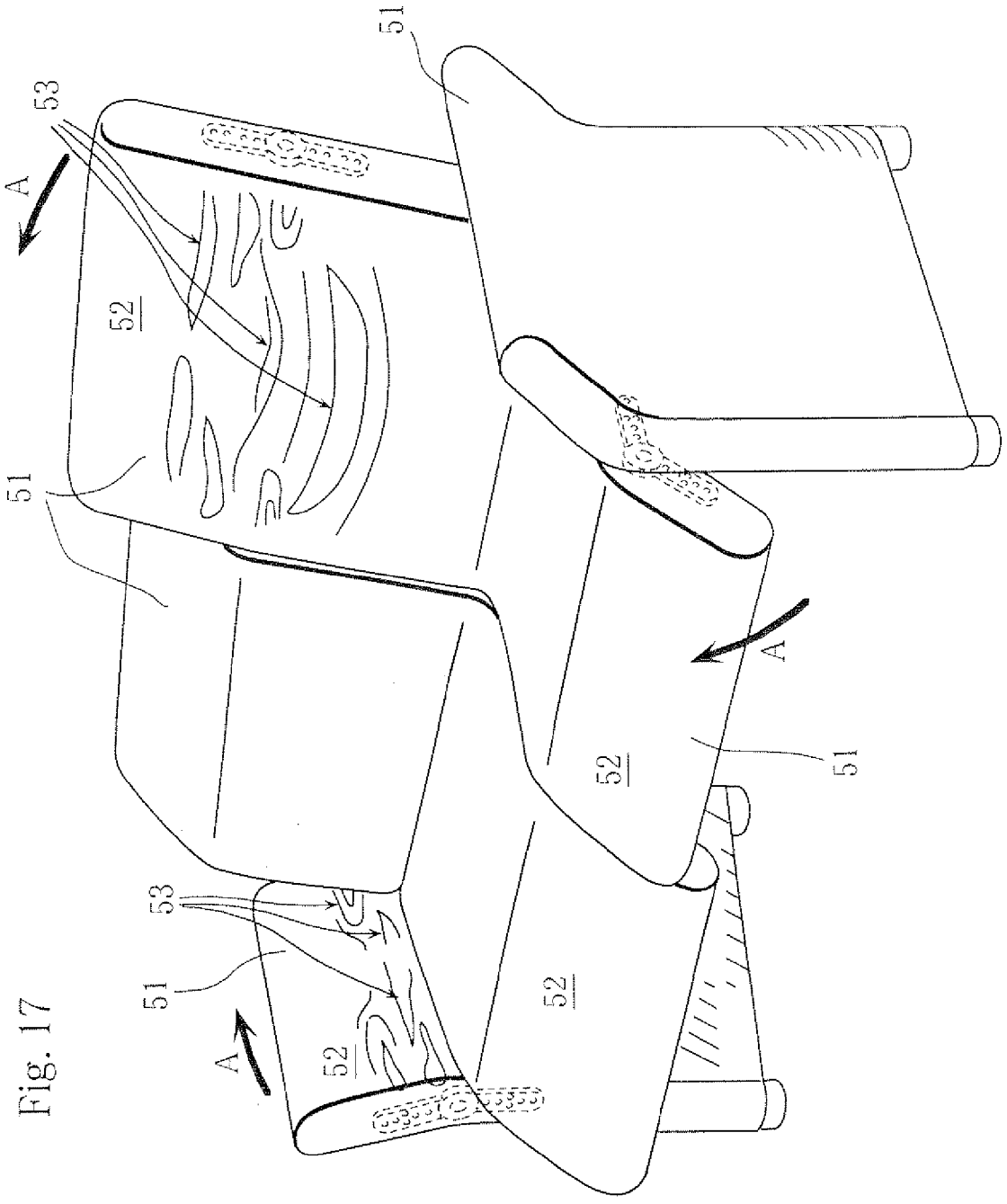


Fig. 17

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EUROPEAN SEARCH REPORT

Application Number
EP 11 16 9274

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	4 November 2011	Behammer, Frank

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EUROPEAN SEARCH REPORT

Application Number
EP 11 16 9274

DOCUMENTS CONSIDERED TO BE RELEVANT

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Munich	4 November 2011	Behammer, Frank

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X : particularly relevant if taken alone
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A : technological background
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P : intermediate document

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D : document cited in the application
L : document cited for other reasons
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