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(71) Applicant (for all designated States except US): **GROUP P&A HOLDING B.V.** [NL/NL]; Liesboslaan 53, NL-4813 EB Breda (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **VAN DER VEEN, Steven** [NL/NL]; Wezenhof 6568, NL-6536 BB Nijmegen (NL). **VAN DER VELDEN, Patrick** [NL/NL]; Liesboslaan 53, NL-4813 EB Breda (NL).

(74) Agent: **GROOTSCHOLTEN, Johannes, Antonius, Maria**; Sweelinckplein 1, NL-2517 GK The Hague (NL).

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(54) Title: BLOCKABLE HINGE CONSTRUCTION

(57) Abstract: The present invention relates to a hinge construction for hingedly connecting at least two elements. The new hinge construction comprises a rotation shaft connected to a first of the two elements, in addition to a member which engages the rotation shaft and which is connected to the other of the two elements. The construction is distinguished here in that, at least at one outer end of an assembly of the shaft and the member, a locking plate is arranged on one of the shaft and the member and in that a locking acting selectively on the locking plate is provided which is connected to the other of the shaft and the member. At least in a locked position the locking thus acts at least partially on the contour of the locking plate and a thus defined closing form is provided which has contact surfaces which are not susceptible to wear between the locking plate and the locking.



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BLOCKABLE HINGE CONSTRUCTION

The present invention relates to a blockable hinge construction for hingedly connecting at least two elements. Such a hinge construction is for instance useful and can be used in a scooter, cycle, in particular a folding cycle, and so on. Such a hinge construction can then be applied for instance in the steering tube to enable blockable pivoting for the purpose of folding the handlebar up and downward, a similar consideration applying for scooter-like vehicles when they have to be collapsible.

It is generally noted that such a hinge construction comprises a rotation shaft connected to a first of the two elements and a member which engages the rotation shaft and which is connected to the other of the two elements. A normal hinge construction is thus specified and defined. Diverse solutions are known in the art for blocking hereof.

It is thus possible that a pin, such as a split pin, can be inserted through the rotation shaft and a bush, as an embodiment of the member, engaging the rotation shaft. It is then possible to ensure that the hinge construction is blocked. This can however only be realized in a very limited number of angular positions of the elements relative to each other. If such a locking or blocking is desirable in many positions, many drilled holes must then be arranged in the bush and/or the rotation shaft, this resulting in a mechanical weakening thereof.

Configurations are also known wherein a blocking or locking is effected around the outside of the shaft and the member. Such solutions are however often subject to wear. It is therefore not possible to ensure in the long term that a play-free blocking or locking of the two per se pivotable elements relative to each other can be guaranteed, particularly not when actual wear has occurred. It is self-evident that, particularly in the case of

a collapsible steering tube on a cycle or scooter or other similar vehicle in which play occurs in a hinge construction thereof, play can result in very undesirable, if not potentially dangerous situations.

5 The present invention has been developed with the object of obviating, or at least alleviating, the above stated drawbacks of the known art. Provided for this purpose is a hinge construction with all the features of the single independent claim. A locking plate is here arranged on at least the shaft
10 and/or the member, and a locking acts on the contour of the locking plate. A closing form can thus be defined in the co-action of the locking plate and the locking, and this can be designed in order to provide contact surfaces between the locking plate and the locking which are not susceptible to wear.

15 Within the context of the present invention many preferred embodiment are possible, several of which will be discussed hereinbelow by way of non-limitative example. Several of these possible embodiments are thus also defined in the dependent claims.

20 It is for instance possible for the contact surfaces to have a divergent form relative to each other. In such an embodiment wear of the contact surfaces has as sole result that the locking and the locking plate engage more deeply into and onto each other. In such a situation occurring after wear the contact surfaces
25 thus become even larger and it is possible to establish, surprisingly, that wear can even result in an even more play-free situation as a consequence of an increased stability and interaction between the locking plate and the locking.

30 In yet another preferred embodiment the locking can comprise at least one cam on a tilting arm. This can be a very simple implementation of a locking which can be tilted up and downward, for instance about a turning shaft. The cam can then drop into a recess in the contour of the locking plates and be held in place,

for instance using a spring or other pull element or push element. The attraction of this embodiment is formed here by its simplicity. It can be possible here, if the tilting arm is tiltable about a turning shaft, for the cam to lie at a distance
5 from this turning shaft and for the cam to have curved contact surfaces. The contact surfaces are then preferably also divergent here.

In a further embodiment the contour of the locking plate can comprise at least one recess having a form corresponding to that
10 of the locking, such as that of a cam. A good co-action between the locking and the recess in the contour of the locking plate can thus be realized in order to provide an adequate locking of the hinge construction. It is possible here for the form of the recess to have an effective depth relative to the contour of the
15 locking plate greater than the distance to which the locking is able to drop into the recess. Space can thus be provided which can be progressively taken up as the locking or the locking plate respectively begin to display wear along the contact surfaces. In such a case the locking can also move more deeply into the
20 locking plate, for which purpose space is provided in the form of the greater effective depth thereof.

In yet another preferred embodiment the locking has the feature of at least one recess on a tilting arm, this recess corresponding to the contour of the locking plate. This is
25 therefore a reverse configuration of that where a cam or pin or other element of a locking drops into a recess in a locking plate. Such a reversal can likewise realize the above stated advantages, for instance and in particular in respect of diverging forms of contact surfaces, for the purpose of enabling locking that is
30 not susceptible to wear.

A number of embodiments of the present invention will be described in detail hereinbelow with reference to the accompanying figures, which show views of diverse embodiments

by way of example and not by way of limitation, wherein the same and similar elements, components and aspects or considerations are designated with the same reference numerals, and in which:

Fig. 1 is a side view of a scooter-like vehicle with a hinge
5 construction according to the present invention;

Fig. 2 is a perspective view of the hinge construction in
fig. 1;

Fig. 3 shows an exploded view of the hinge construction of
fig. 2;

10 Fig. 4, 5 and 6 show the different operative positions of
the hinge construction in fig. 1, 2 and 3;

Fig. 7 is a schematic side view of an alternative
configuration of a hinge construction according to the present
invention;

15 Fig. 8 shows another alternative embodiment of a hinge
construction according to the present invention.

Fig. 1 shows a side view of a scooter-like vehicle 1 which
comprises a footboard 2 on which a user can stand. Arranged at
the front and rear of vehicle 1 are wheels 3 with which the vehicle
20 1 can roll over a ground surface.

A handlebar 5 of vehicle 1 is arranged for pivoting about
a hinge construction 6 on vehicle 1 via a steering tube 4. It
is hereby possible to fold handlebar 5 on steering tube 4 down
in the direction of arrow A and thus provide a collapsible
25 configuration. The object of the present invention is to provide
a hinge construction in a manner such that it is substantially
not susceptible to wear. The solution to this problem is found
in the design of the locking associated with hinge construction
6. This is shown in more detail in fig. 2. The configuration can
30 moreover hereby be operated in a single action.

Fig. 2 shows that hinge construction 6 comprises a control
handle 7 which extends forward in the view of fig. 1. It can be
advantageous for control handle 7 to take up another position,

so that protruding parts can be reduced or minimized. Handle 7 forms part of a substantially Y-shaped tilting arm 8, the legs of which engage round steering tube 4. The Y-shaped tilting arm 8 is tiltable about turning shaft 9 in the direction of double arrow B. When handle 7 is moved upward, a cam 10 on tilting arm 8 comes out of a recess 11 in the contour of a locking plate 12 which is here circular. Two recesses 11 are arranged in the contour of locking plate 12. When handle 7 is moved upward, cam 10 comes out of recess 11 and steering tube 4 can be folded downward in the direction of arrow A in fig. 1. In such a folded-down position the cam 10 on tilting arm 8 can be positioned in the other of the recesses 11 in order to lock steering tube 4 in the downward folded position, as shown with broken lines in fig. 1.

In order to ensure that in a predetermined position of steering tube 4 the cam 10 drops into one of the recesses 11 in the contour of locking plate 12, a spring 13, of which only a part is shown in fig. 2, can act on tilting arm 8 so as to exert a force thereon in the direction of locking plate 12.

Locking plate 12 is per se fixedly mounted on a rotation shaft 14 of the hinge construction. Rotation shaft 14 is connected fixedly and non-rotatably to a carrier 15. Arranged on the downward oriented outer end of steering tube 4 is a member 16 which is intended to engage rotation shaft 14. Member 16 is freely pivotable or rotatable about rotation shaft 14.

In order to block the free pivoting or swivelling or rotation of steering tube 4 round rotation shaft 14, the locking is arranged in the form of tilting arm 8 with the cams 10 which protrude therefrom and which are intended and designed to drop into recesses 11 on the locking plate 12 arranged fixedly on base 15.

Fig. 4, 5 and 6 show the operation of hinge construction 6 according to the present invention.

When handle 7 is moved upward out of the position in fig. 4, cam 10 comes out of recess 11. Pivoting of steering tube 4 about rotation shaft 14 is hereby released. Steering tube 4 can then pivot to one or each of the two positions shown in fig. 5 and 6. The position shown in fig. 5 corresponds to the view of steering tube 4 in broken lines in fig. 1. It will be apparent that, by arranging an additional recess 11 in the outer contour of locking plate 12, steering tube 4 can also be blocked in this position relative to the other parts of vehicle 1. Also better shown is the manner in which spring 13 functions in order to hold cam 10 in recess 11.

In the opposite situation as shown in fig. 6, handlebar 5 on steering tube 4 can serve as handle for pulling along vehicle 1. A stiff or rigid, play-free connection is not necessary in such a position of use, and it is for this reason that in fig. 6 the cam 10 need not drop into a corresponding recess.

It will be apparent after examination of the foregoing that many alternative and additional embodiments and possibilities will occur to the skilled person. Fig. 7 thus shows a side view of a pentagonal locking plate with a tilting arm 17 without a cam thereon, but with a recess 18 which is designed to drop over a part of the outer periphery of the pentagonal locking plate 19. An effective blocking or locking can hereby also be realized, which can be blocked in five different positions.

It is noted that a pentagonal locking plate has the advantage that every angle is obtuse, and that the contact surfaces therefore clearly diverge relative to each other. If the outer surface or the contour of locking plate 19 or the inner surface of recess 18 on tilting arm 17 were to begin to display wear, recess 18 is then deep enough to be able to continue to receive locking plate 19 therein without beginning to exhibit play.

This is likewise the case for the embodiment of fig. 2-6, with the proviso that here the cam 10 and recess 11 have not only

a diverging, but even a curved design. These are therefore actual contact surfaces and not only contact points, whereby wear can be effectively spread over whole surfaces instead of over only several points.

5 The embodiment of fig. 8 further shows a locking plate 21 with a triangular contour. The locking is here also formed by a tilting arm 22 with a recess 23 for receiving at least two angles of the triangular locking plate 21. A protrusion 24 on tilting
10 arm 22 is somewhat flexible and as such fits as a snap closure round the point 25 of triangular locking plate 21 oriented therein.

 It should thus be apparent that many alternative and additional embodiments are possible within the scope of the present invention, all of which must be deemed as lying within
15 the scope of protection according to the letter or spirit of the appended claims. All combinations of possible embodiments and aspects thereof are understood to be included in the scope of protection of the invention. Reference is made by way of example in the foregoing to a scooter-like vehicle, but such a hinge
20 construction, and in particular locking therefor, can in fact be seen wholly separately from any vehicle and is therefore also defined as such in the appended claims - separately of any intended application; it is thus possible to apply the invention in folding ladders and tent poles and so on.

25

CLAIMS

1. Hinge construction for hingedly connecting at least two elements, comprising:

5 - a rotation shaft connected to a first of the two elements;
and

 - a member which engages the rotation shaft and which is connected to the other of the two elements,
characterized in that

10 - at least at one outer end of an assembly of the shaft and the member a locking plate is arranged on one of the shaft and the member; and

 - a locking acting selectively on the locking plate is provided which is connected to the other of the shaft and the
15 member, wherein at least in a locked position the locking acts at least partially on the contour of the locking plate and comprises a thus defined closing form, wherein the closing form has at least two curved, sideways oriented contact surfaces which are not susceptible to wear between the locking plate and the
20 locking, and the shape of the closing form has an effective depth relative to the contour of the locking plate greater than the distance to which the locking is able to drop therein.

2. Hinge construction as claimed in claim 1, wherein the contact surfaces have a divergent form relative to each other.

25 3. Hinge construction as claimed in claim 1 or 2, wherein the locking comprises at least one cam on a tilting arm.

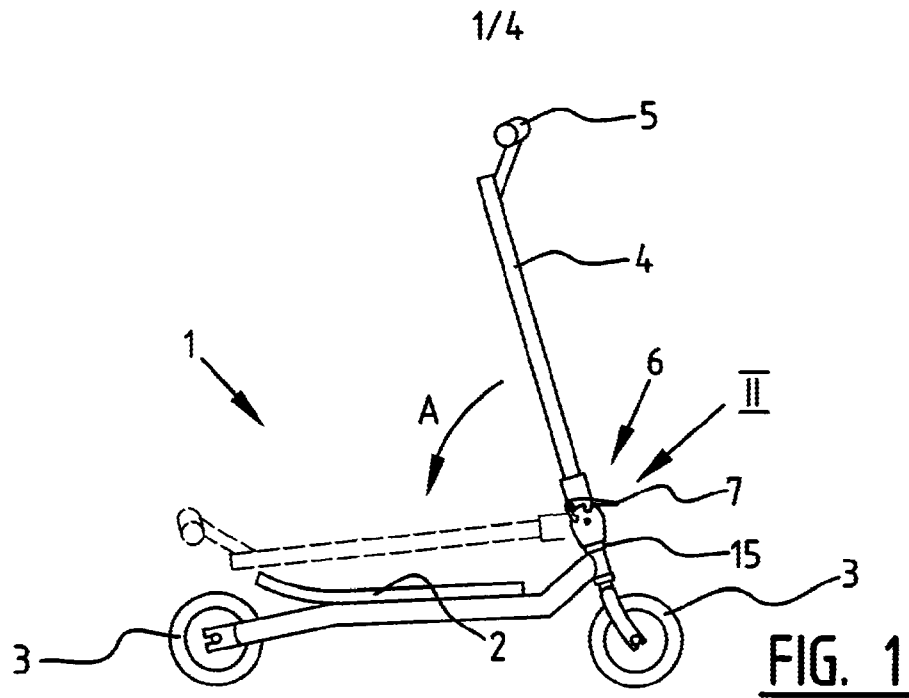
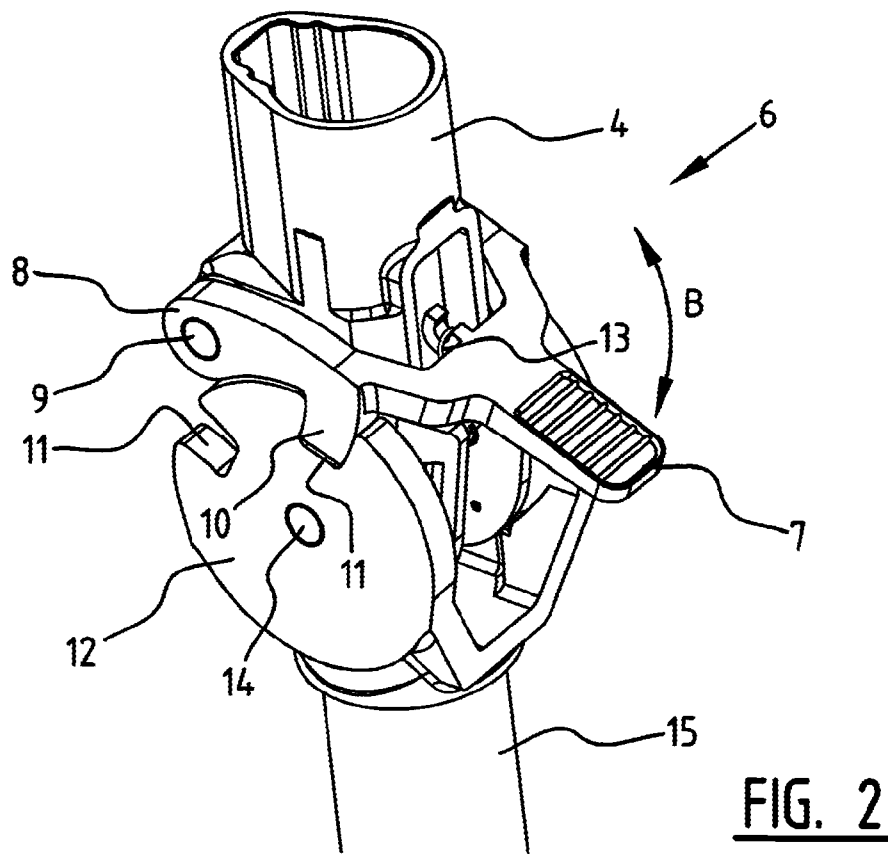
 4. Hinge construction as claimed in claim 3, wherein the tilting arm is tiltable about a turning shaft, with the cam at a distance from the turning shaft.

30 5. Hinge construction as claimed in at least one of the foregoing claims, wherein the contour of the locking plate comprises at least one recess having a form corresponding to that of the locking, such as a cam.

6. Hinge construction as claimed in at least one of the foregoing claims, wherein the locking comprises at least one recess on a tilting arm, this recess corresponding to the contour of the locking plate.

5 7. Hinge construction as claimed in at least one of the foregoing claims, wherein the locking plate has substantially a contour from the group comprising: round; triangular, square; rectangular etc.

10 8. Hinge construction as claimed in at least one of the foregoing claims, characterized in that it can be operated in a single action.



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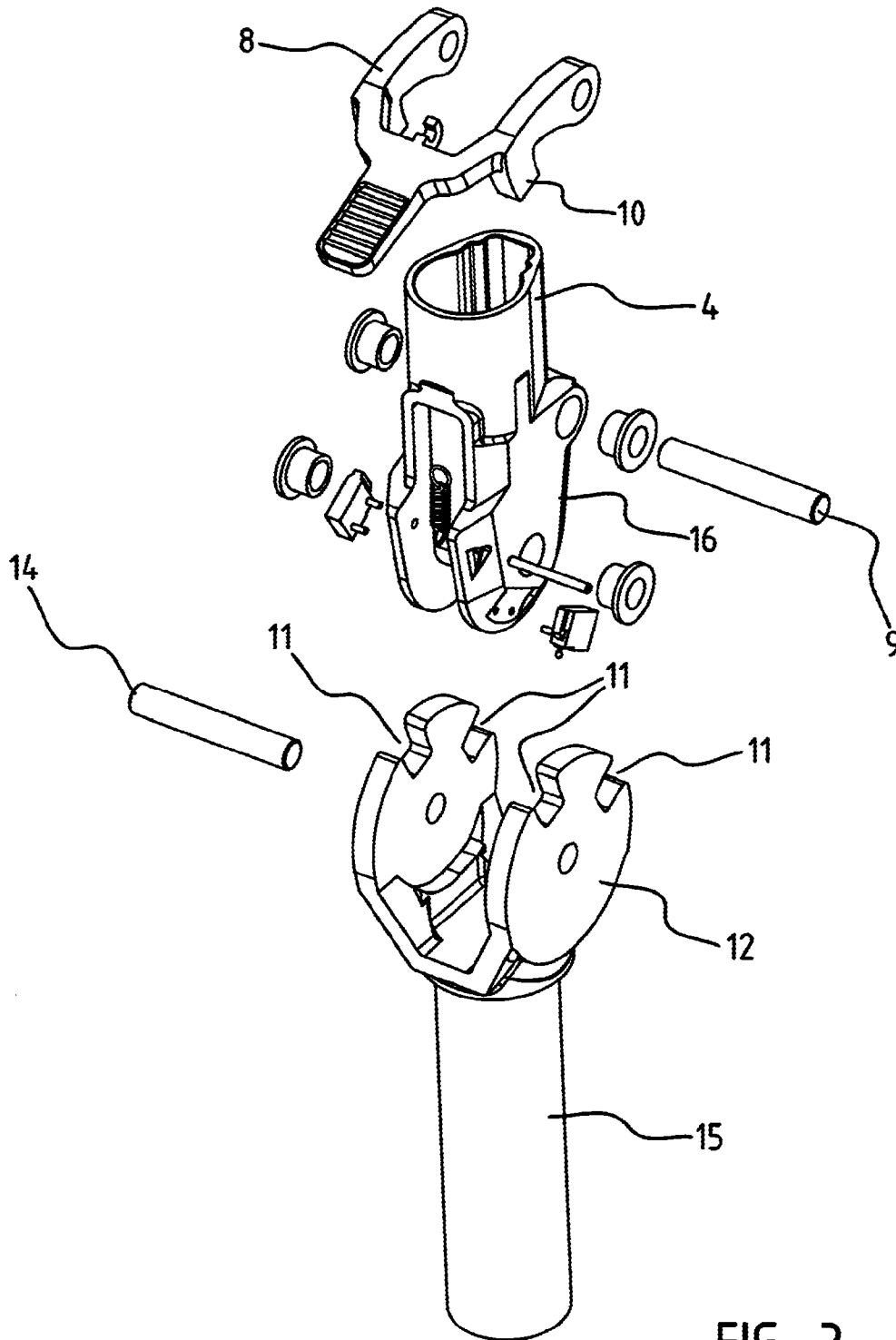


FIG. 3

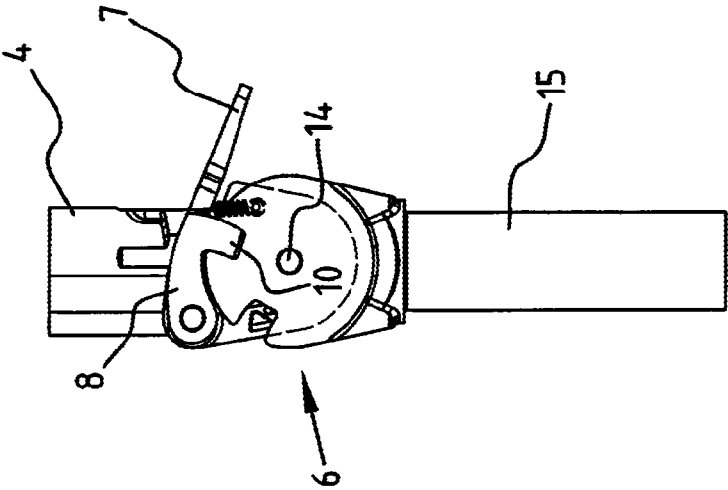


FIG. 4

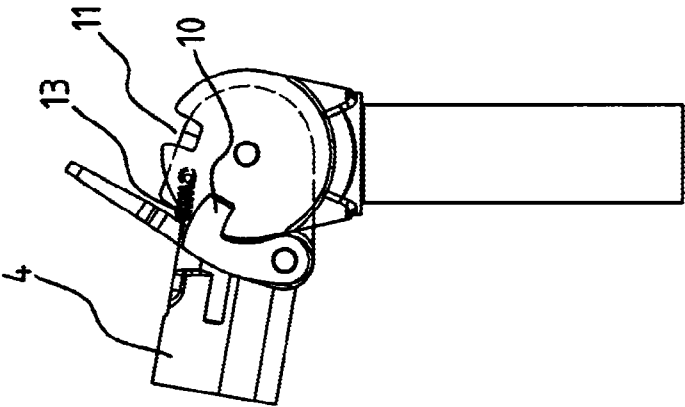


FIG. 5

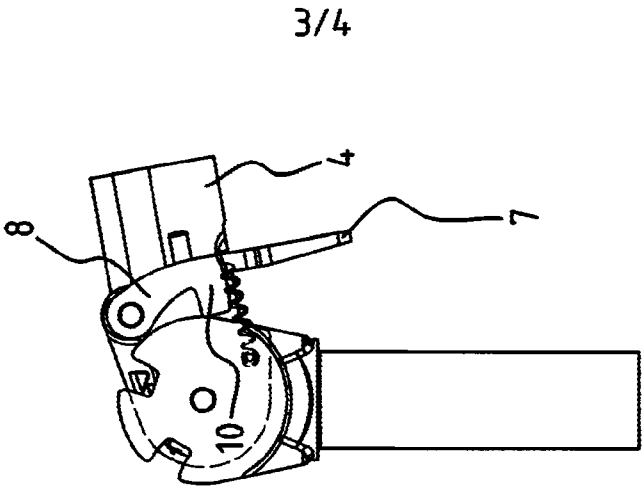


FIG. 6

