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(54) **DEVICE FOR THE FINE ADJUSTMENT OF THE USEFUL LENGTH OF A WRIST STRAP, SUCH AS THE WRIST STRAP OF A WATCH**

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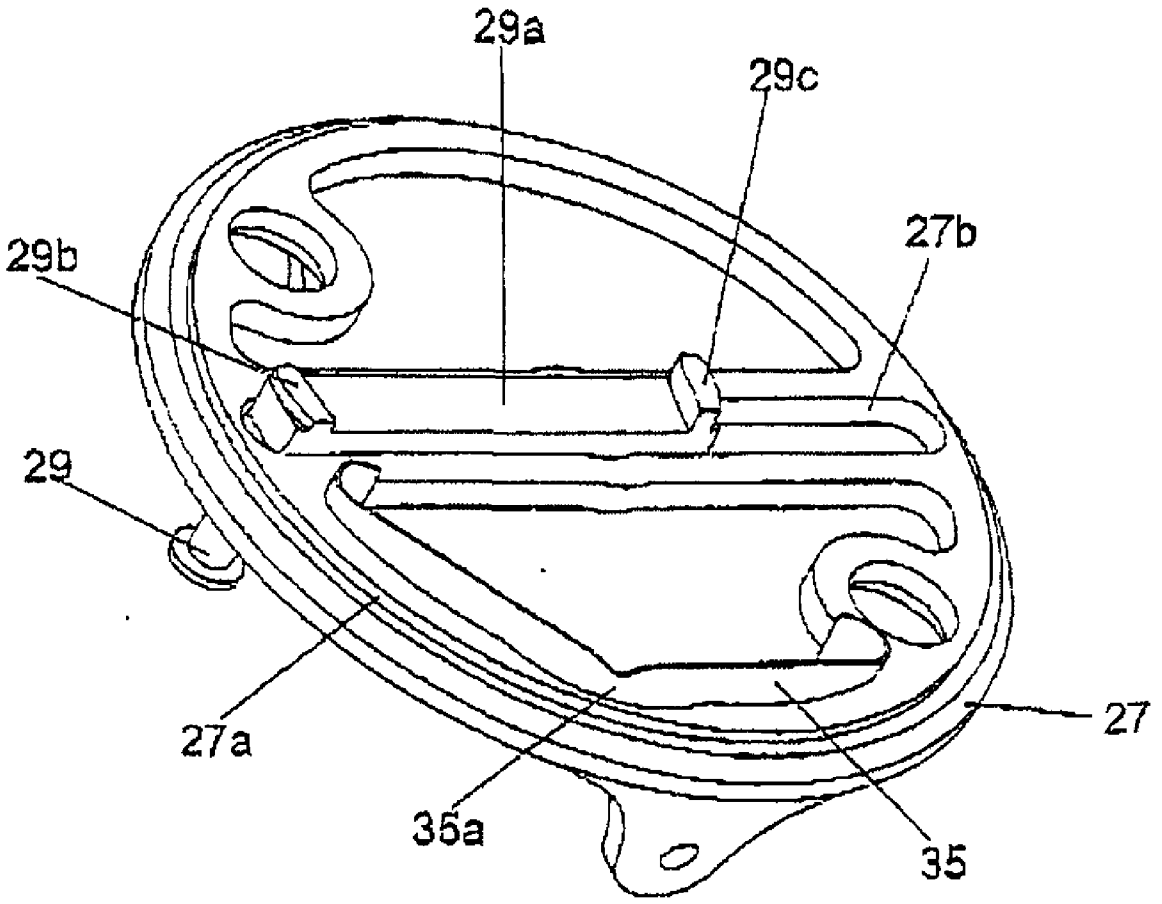
(57) **ABSTRACT**

This adjustment device comprises: a first adjustment member with a fixed position relative to the longitudinal axis of the strap; first guide means connected to this first adjust member; a connecting member engaged on the one hand with said first guide means and on the other hand with the other of the strap halves; second guide means for rotational guidance, connected to said first adjustment member; a second or manual adjustment member having guide means shaped to engage with said second guide means of the first adjustment member; and means for transmitting movement between said second or manual adjustment member and said connecting member to turn the circular movement of the second or manual adjustment member into a rectilinear movement of said connecting member.



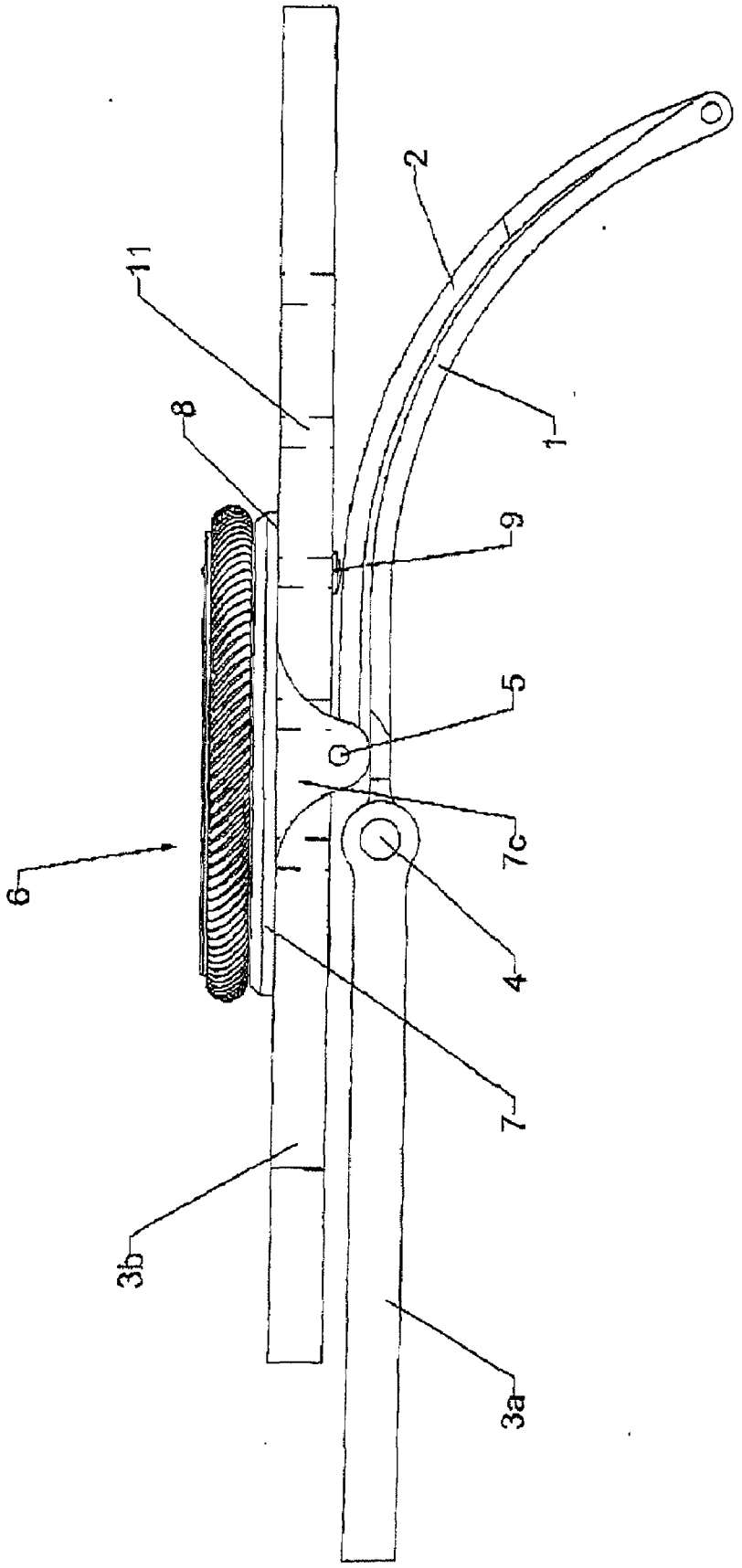


Fig. 1

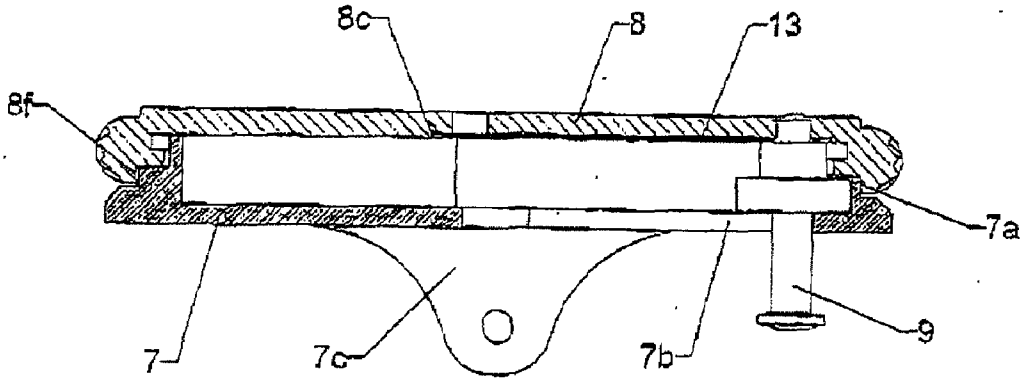


Fig. 2

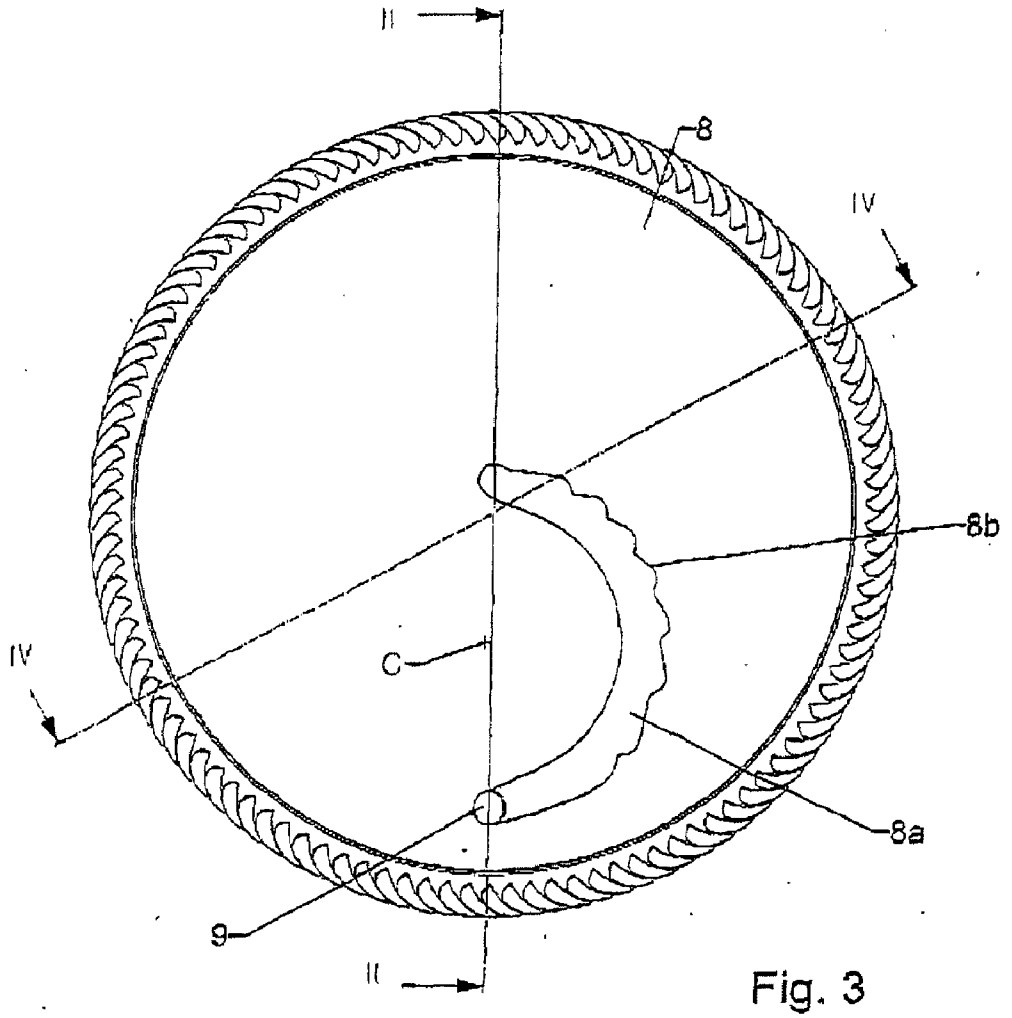


Fig. 3

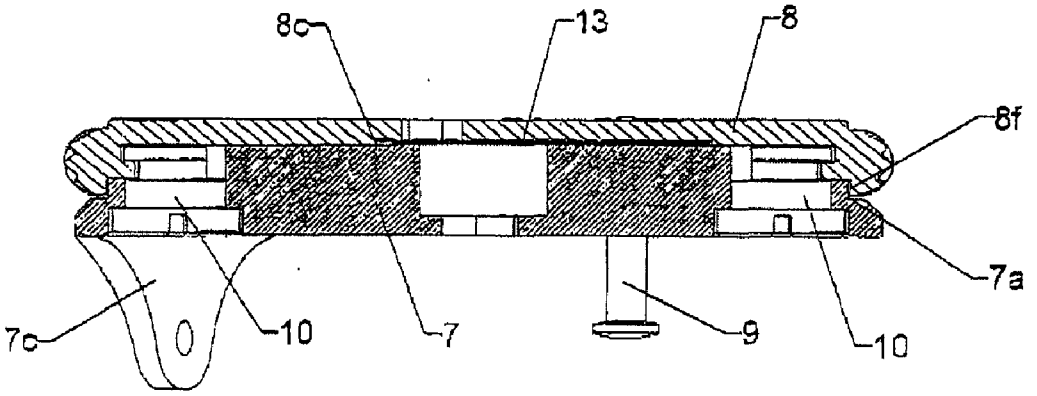


Fig. 4

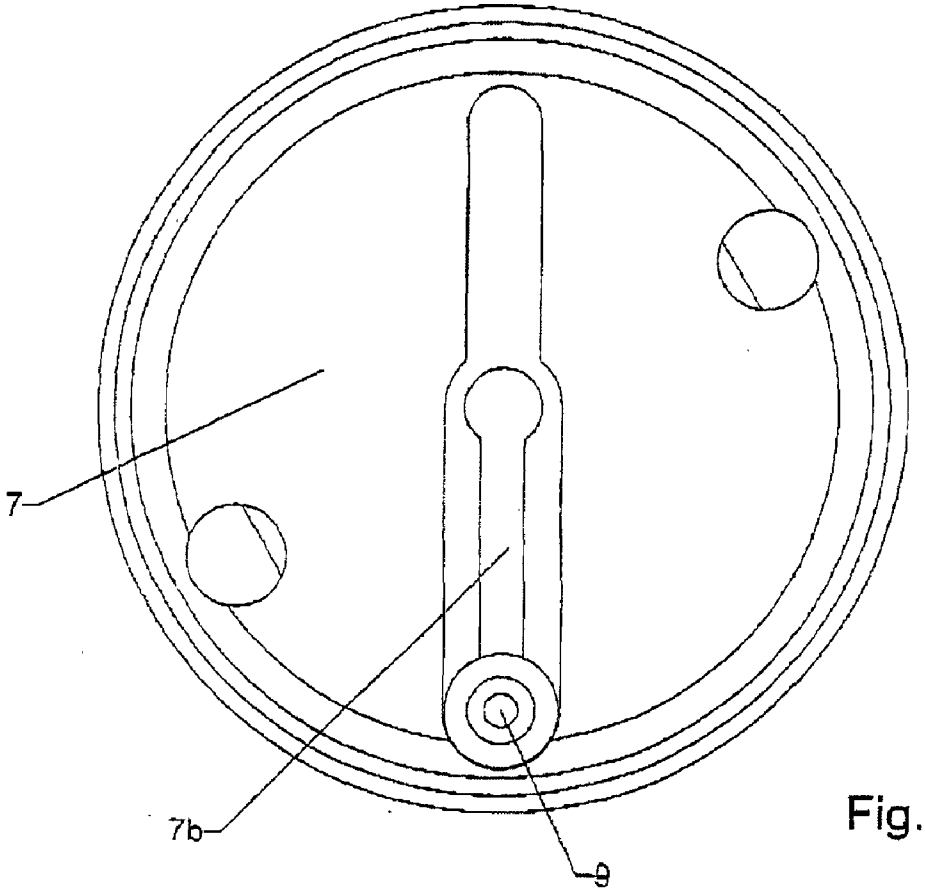


Fig. 5

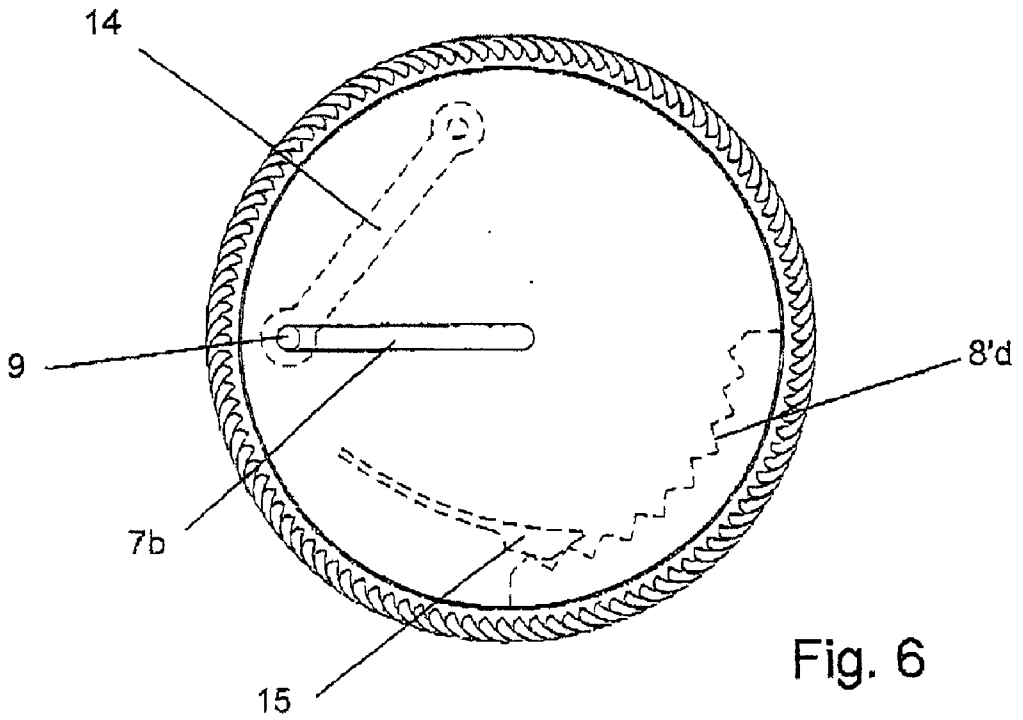


Fig. 6

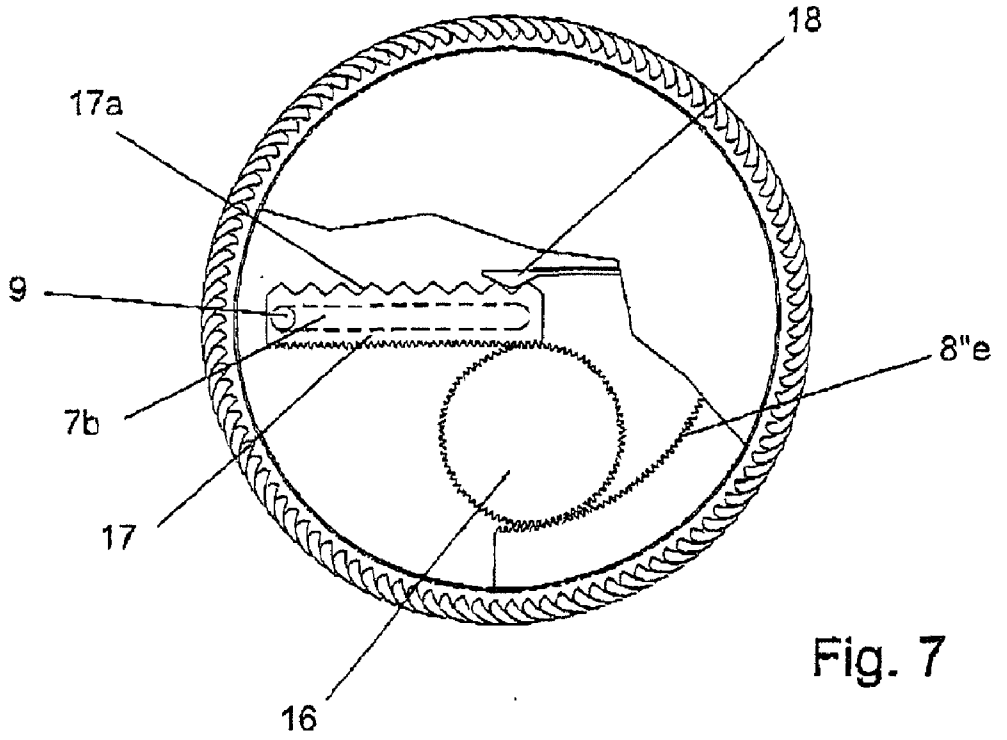


Fig. 7

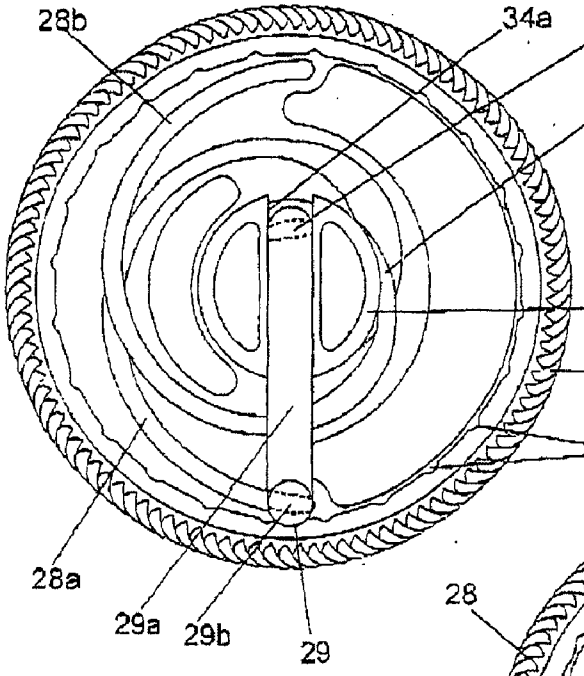


Fig. 8

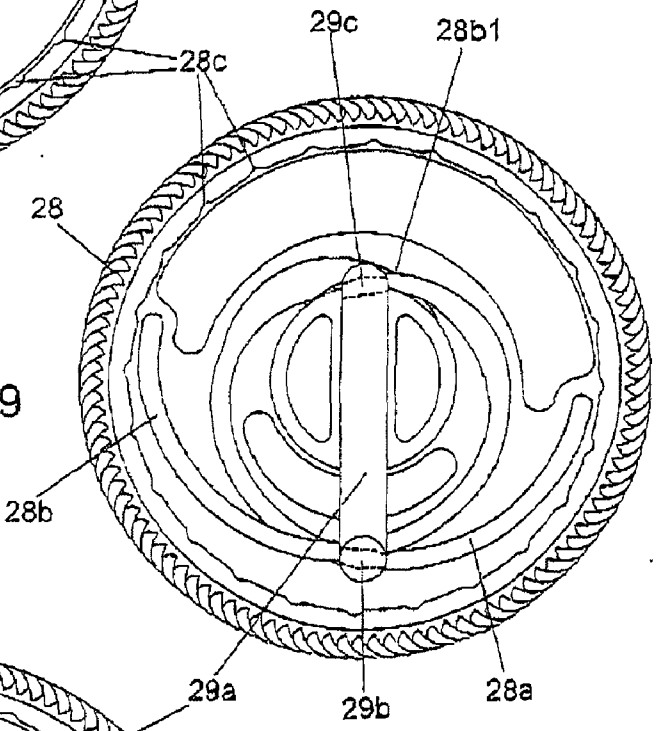


Fig. 9

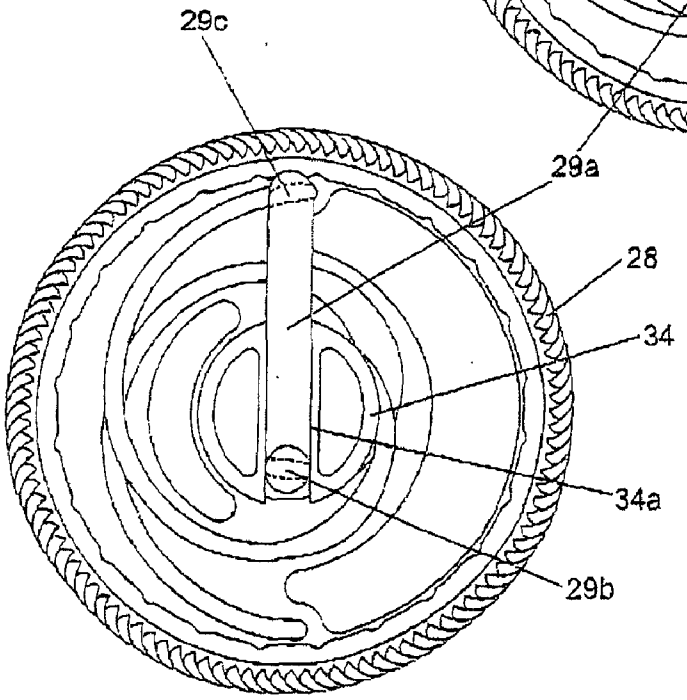


Fig. 10

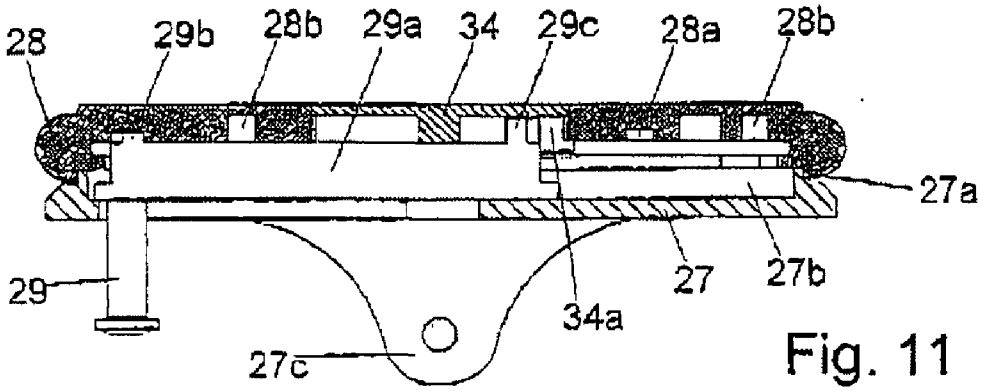

28
29b
28b
29a
34
29c
28a
28b
27a
29
27
27b
34a
27c

Fig. 11

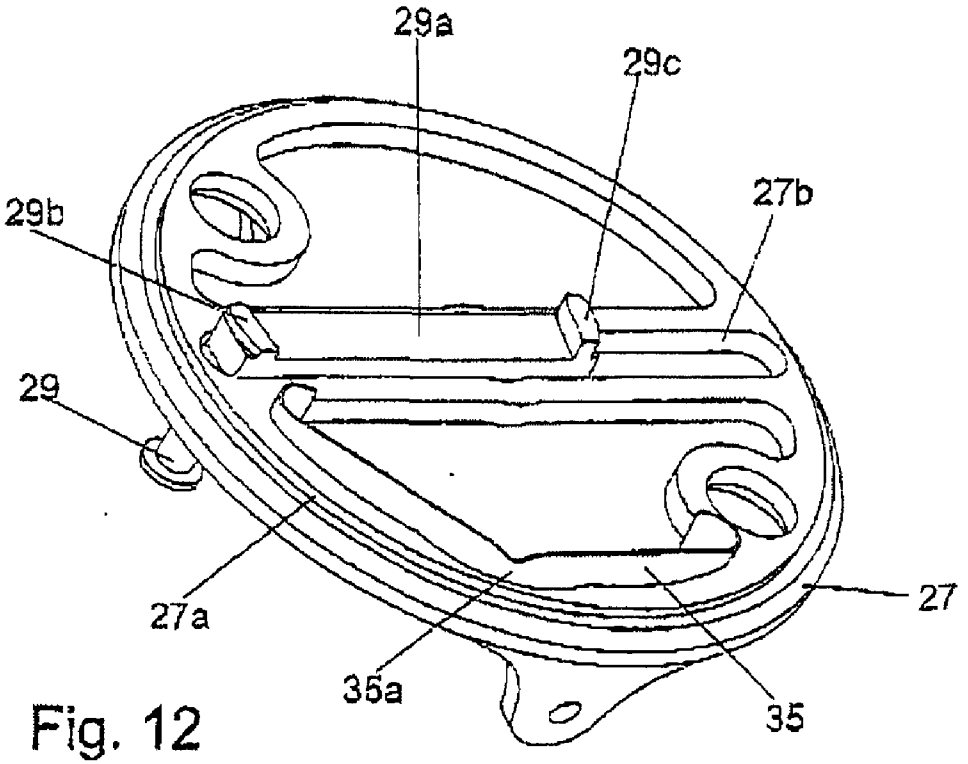

29a
29c
27b
29b
29
27a
27
35a
35

Fig. 12

DEVICE FOR THE FINE ADJUSTMENT OF THE USEFUL LENGTH OF A WRIST STRAP, SUCH AS THE WRIST STRAP OF A WATCH

[0001] The present invention relates to a device for the fine adjustment of the useful length of a wrist strap, such as the wrist strap of a watch, comprising two portions and a clasp for connecting the free ends of said portions to allow said free ends to be connected at a specific useful length.

[0002] A plurality of solutions have already been proposed to make it possible to provide a modification to the initial adjustment of the useful length of a wrist strap, in particular a wrist strap of a watch. This type of adjustment is advantageous, in particular, in the case of clasps known as clasps with folding clips or arms, in which the ends of the wrist strap remain attached to the free ends of the clips or arms of the clasp articulated to one another, such that the useful length of the wrist strap may only be changed by modifying the initial adjustment. More specifically, this adjustment requires the use of tools and a certain degree of dexterity, such that it is not easily accessible to everyone.

[0003] Solutions for making it possible to adjust the useful length of the wrist strap between two, even three, different lengths are disclosed in CH 571 327, in CH 663 522 and in WO 03/015562. All the proposed solutions are intended to make it possible to carry out the adjustment without tools and without requiring any particular dexterity.

[0004] In CH 571 327, one of the arms of the clasp is telescopic and comprises a plurality of openings to allow the hooking elements of the other arm to be fixed to different lengths of the telescopic arm.

[0005] CH 663 522 and WO 03/015562, both comprise, between the two articulated arms, a small articulated link capable of being flipped over into two positions, one in which its length is added to that of the arms and the other in which it is subtracted from that of the arms, making it possible for the useful length of the wrist strap to be varied between two specific values.

[0006] These known solutions only allow an adjustment to be made between two, or even three, positions and the distances in length between these positions are by necessity several millimeters, the design of the proposed adjustment devices not allowing an adjustment to the length with virtually continuous variations over a given length range. Moreover, all the aforementioned solutions require opening the clasp to carry out the adjustment of the useful length of the wrist strap.

[0007] The object of the present invention is to remedy, at least partially, the aforementioned drawbacks.

[0008] To this end, the subject of this invention is a device for the fine adjustment of the useful length of a wrist strap, such as the wrist strap of a watch, as claimed in claim **1**.

[0009] The adjustment device which is the subject of this invention has a plurality of advantages, namely that of permitting a virtually continuous adjustment over a range of several millimeters, typically over a range corresponding to half the width of the wrist strap. This adjustment is carried out without requiring the opening of the clasp, which makes the adjustment device much more simple to use than might be imagined. Due to this particularity, the wearer of the wrist strap is made aware in real time of the effect of the adjustment, which allows the wearer to carry out an accurate adjustment, primarily because this device allows the wearer to modify the useful length by very small increments over an adjustment range comprising three to four times more adjusting positions that the known devices.

[0010] Finally, said device is of extremely simple construction and may be very easily disassembled and reassembled to carry out cleaning if required.

[0011] The accompanying drawings illustrate, schematically and by way of example, an embodiment and two variants of the adjustment device which form the subject-matter of the present invention.

[0012] FIG. **1** is a lateral view of a clasp with folding clips associated with an embodiment of the adjustment device and connected to the two free ends of a wrist strap;

[0013] FIG. **2** is a sectional view of the adjustment device itself, sectioned along the line II-II of FIG. **3**;

[0014] FIG. **3** is a plan view from above of the adjustment device of FIG. **2**;

[0015] FIG. **4** is a sectional view along the line IV-IV of FIG. **3**;

[0016] FIG. **5** is a plan view from above of the fixed adjustment member of the adjustment device;

[0017] FIG. **6** is a plan view from above of a first variant of the adjustment device;

[0018] FIG. **7** is a fragmented plan view from above of a second variant of the adjustment device;

[0019] FIG. **8** is a view along the line VIII-VIII of FIG. **11**;

[0020] FIGS. **9** and **10** are views similar to FIG. **8** in two further positions of the adjustment device;

[0021] FIG. **11** is a sectional view along the line XI-XI of FIG. **8**;

[0022] FIG. **12** is a partial perspective view of the adjustment device showing the internal face of the first adjustment member.

[0023] FIG. **1** illustrates a preferred embodiment of the invention in which the adjustment device, the subject of the invention, is associated with a clasp with articulated clips or arms connecting the two free ends of the wrist strap and generally known as a clasp with folding clips or arms or even as a clasp with a folding buckle.

[0024] Said clasp of the known type comprises, therefore, two curved arms **1**, **2** articulated to one another and held in the folded position by separable hooking means (not shown). One of the portions **3***a* of the wrist strap is connected by a fixing pin **4** to the free end of the arm **1** of the clasp, whilst the free end of the arm **2** of this clasp is connected by a pin **5** to the adjustment device **6** which is the subject of the invention.

[0025] This adjustment device **6** essentially comprises a first adjustment member **7** having the shape of a disc connected to the clasp **1**, **2** by means of the pin **5** of which the ends are fixed in two parallel and diametrically opposed fixing tabs **7***c*, which extend perpendicularly below the disc forming the first adjustment member **7**. This pin **5** passes through the free end of the arm **2** of the clasp located between the fixing tabs **7***c* of the disc **7**. As a result, the first adjustment member **7** of the adjustment device **6** is connected by the two curved arms **1**, **2** of the clasp to the end of the portion **3***a* of the wrist strap, thus ensuring a fixed position of this first adjustment member **7** relative to the longitudinal axis of the portion **3***a* of the wrist strap. This first adjustment member **7** comprises a circular lateral surface **7***a* which is used as a guide surface for a second manual adjustment member **8**, also in the shape of a disc provided with a circular edge having an internal lateral circular guide surface **8***f* in engagement with the circular guide surface **7***a*. These two circular guide surfaces **7***a*, **8***f* are held in

engagement by two locks **10**, as illustrated by FIG. **4**, permitting the internal lateral circular guide surface **8***f* to rotate around the circular guide surface **7***a*. This second manual adjustment member **8** also forms a cover for closing the adjustment device **6**.

[0026] As illustrated by FIG. **5**, the first adjustment member **7** further comprises guide means which, in this example, are in the form of a radially oriented rectilinear guide opening **7***b*, parallel to the longitudinal axis of the wrist strap. Said radially oriented rectilinear guide opening **7***b* is in engagement with a connecting member **9**, slidably mounted in said radially oriented rectilinear guide opening **7***b*. Said connecting member **9** is further engaged, on the one hand, with an arcuate opening **8***a* made through the second manual adjustment member **8** and, on the other hand, with one of the perforations **11** for the preliminary fixing and adjustment of the length, made through the second portion **3***b* of the wrist strap. The two ends of the arcuate opening **8***a* are located on the same diameter of the manual adjustment member **8**. The arcuate opening **8***a* has the general shape of a half-ring, of which the center C is located in the vicinity of this same diameter. As illustrated by FIG. **4**, the external edge of this opening **8***a* comprises teeth **8***b* for cooperating with the connecting member **9** for the purpose which will be explained below.

[0027] Taking account of the fact that the connecting member **9** is in engagement with the arcuate opening **8***a* of the second manual adjustment member **8** and with the radially oriented rectilinear guide opening **7***b* of the first adjustment member **7**, it follows that the rotation of the second manual adjustment member **8** drives that of the arcuate opening **8***a* which thus constitutes an element for driving the connecting member **9**, such that the rotation of the arcuate opening **8***a* around its end coaxial with the center of the second manual adjustment member **8** is translated into a movement of the connecting member **9** along the radially oriented rectilinear guide opening **7***b*. Given, moreover, that on the one hand the radial opening **7***b* is oriented in the longitudinal direction of the wrist strap and, on the other hand, that the connecting member **9** is fixed to the portion of the wrist strap **3***b*, it follows that any rotation of the second manual adjustment member **8** is translated, in the direction of this rotation, into an extension or a shortening of the useful length of said wrist strap.

[0028] The role of the teeth **8***b* formed along the external edge of the arcuate opening **8***a* is to make it possible to retain the connecting member **9** in different positions, when said member **9** is subjected to a centrifugal force relative to the manual adjustment device **8**. Said force may result in placing the wrist strap under a certain amount of tension.

[0029] A friction disc **13** is further housed between the two adjustment members **7** and **8**. Said friction disc **13** is a curved spring disc, intended to create friction between the two adjustment members **7** and **8**, to prevent the second manual adjustment member **8** from being able to rotate freely relative to the first manual adjustment member. Moreover, as illustrated by FIG. **2**, this friction disc **13** is penetrated by the connecting member **9** and is housed in a circular opening **8***c* centered on the center C of the arcuate opening **8***a*, such that the friction disc **13** is driven in rotation around the center C, when the second manual adjustment member **8** is driven in rotation, thus continually blocking the arcuate opening **8***a*.

[0030] Further means for transmitting the movement between the second manual adjustment member **8** and the connecting member **9**, may be conceived to transform the circular movement of the second manual adjustment member **8** into a movement of the connecting member **9**, guided through the rectilinear guide opening **7***b* extending in the longitudinal direction of the wrist strap **3***a*, **3***b*. Thus a connecting rod **14** could be present, one end thereof being articulated to the second adjustment member **8'**, with the other end being articulated to the connecting member **9**. The angular positioning of the second adjustment member **8'** may be obtained by a catch **15** integral with the first adjustment member **7**, in engagement with internal teeth **8'***d* formed on the internal face of the edge of the second adjustment member **8'**.

[0031] According to a further variant, the second adjustment member **8"** comprises internal teeth **8"***e*, in engagement with a pinion **16** mounted pivotably on the first fixed adjustment member **7** and meshing with a radially oriented rack **17**, parallel with the radially oriented rectilinear guide opening **7***b* and parallel with the longitudinal axis of the wrist strap of the first adjustment member **7**. The connecting member **9** is simultaneously in engagement with the rectilinear guide opening **7***b* and with the rack **17**. A catch **18** is in engagement with second teeth **17***a* for positioning the adjustment device in different positions.

[0032] In the variant illustrated in FIGS. **8** to **12**, the connecting member **29** is integral with an elongated slide **29***a*, mounted in a diametrical slideway **27***b*, formed in the first adjustment member **27**. This elongated slide **29***a* comprises a projection **29***b*, **29***c* at each of its ends. The second manual adjustment member **28** is guided in rotation by the circular lateral surface **27***a* of the first adjustment member **27** and comprises two drive grooves **28***a*, **28***b* intended to be brought into engagement respectively and alternately with the projections **29***b*, **29***c*.

[0033] The drive grooves **28***a*, **28***b* each comprise a semi-circular, circular arc-shaped, active portion, the two semi-circular portions of the same radius being aligned relative to the same diameter of the second manual adjustment member **28** and offset along this diameter. This variant with two drive grooves **28***a*, **28***b*, intended to be brought alternately into engagement with two projections **29***b*, **29***c* of the slide **29***a*, makes it possible to double the adjustment range relative to the first embodiment. This adjustment range is shown by the movement of the slide **29***a* from its position illustrated by FIG. **8** to that illustrated by FIG. **10** and corresponds to a rotation of 360° of the manual adjustment member **28**. To prevent encountering a problem when the projection **29***b* arrives at the intersection between the drive groove **28***a* and the drive groove **28***b*, said drive groove **28***b* comprises an end $28b_1$ located outside its active semi-circular portion, to be brought into engagement temporarily with the projection **29***c* at the moment when the projection **29***b* is located in the intersection between the drive grooves **28***a*, **28***b*, as illustrated by FIG. **9**.

[0034] As is seen in FIG. **11**, the groove **28***b* is deeper than the groove **28***a* and the projection **29***c* is longer than the projection **29***b*, such that the problem of the intersection is not posed when the projection **29***c* passes over the groove **28***a*. It may also be observed in FIGS. **8** to **10** that outside the active portions of the grooves **28***a*, **28***b* defined above, the width of these grooves **28***a*, **28***b* increases, so that simultaneous guiding is only permitted using a single groove **28***a*, **28***b*.

[0035] The center of the second manual adjustment member **28** comprises a circular opening in which a fixed indicator

member **34** is positioned which comprises, on its internal face, a diametrical slideway **34***a* in engagement with the slide **29***a*. The external face of this fixed indicator member **34**, as well as the external face of the second manual adjustment member **28** may advantageously bear guide marks (not shown) to allow the angular position of the second manual adjustment member **28** to be known relative to the adjusting range which extends over 360°.

[0036] An internal lateral portion of the second manual adjustment member **28** bears angular positioning means **28***c* in the form of notches spaced apart at regular intervals around its axis of rotation and intended to be brought selectively and successively into engagement with a folded portion **35***a* formed along a resilient positioning member **35**, formed by a leaf spring housed in the first positioning member **27**, as illustrated by FIG. **12**.

[0037] As may be observed, if a force is exerted on the connecting member **29** following traction on the wrist strap, this force will in practice be oriented toward the center of the second manual adjustment member **28**, such that no torque is produced which is capable of accidentally turning said manual second adjustment member **28**.

1. A device for the fine adjustment of the useful length of a wrist strap, such as the wrist strap of a watch, comprising two portions and a clasp for connecting the free ends of said portions to allow said free ends to be connected at a specific useful length, characterized in that it comprises a first adjustment member, attaching means for connecting said first adjustment member to one of the portions of the wrist strap at a fixed position relative to the longitudinal axis of the wrist strap, first guide means extending in the longitudinal direction of the wrist strap, integral with said first adjustment member, a connecting member in engagement on the one hand with said first guide means and on the other hand with the other of the portions of the wrist strap, second means for guiding in rotation, integral with said first adjustment member, a second manual adjustment member having guide means shaped to be brought into engagement with said second means for guiding the first adjustment member in rotation and means for transmitting movement between said second manual adjustment member and said connecting member so that the circular movement of the second manual adjustment member is transformed by said first guide means into a rectilinear movement of said connecting member.

2. The adjustment device as claimed in claim **1**, in which said attaching means for connecting said first adjustment member to one of the portions of the wrist strap at a fixed position relative to the longitudinal axis of the wrist strap comprise two arms articulated to one another, provided with means for hooking to one another, forming a clasp with a folding buckle, the free end of one of said arms being integral with one of the portions of the wrist strap and the free end of the other of said arms comprising said attaching means of said first adjustment member.

3. The device as claimed in claim **1**, in which said means for transmitting movement between said second manual adjustment member and said connecting member comprise a semi-circular drive element in engagement with said connecting member and of which one end is coaxial with the axis of rotation of said second manual adjustment member.

4. The device as claimed in claim **1**, in which said means for transmitting movement between said second manual adjustment member and said connecting member comprise a connecting rod of which one end is articulated to said connecting member and the other end is articulated to said second manual adjustment member around an axis which is offset relative to the pivot axis defined by said guide means in engagement with said second means for guiding said first adjustment member in rotation.

5. The device as claimed in claim **1**, in which said means for transmitting movement between said second manual adjusting member and said connecting member comprise a toothed sector which is coaxial and integral with said second manual adjustment member, a radially oriented rack integral with said connecting member and a pinion in engagement with said toothed sector and with said rack.

6. The device as claimed in claim **1**, in which a spring element is arranged between the first and second adjustment members to create friction therebetween.

7. The device as claimed in claim **3**, in which said semi-circular drive element is an opening made through said second adjustment member, said spring element being formed by a disc housed in a circular opening centered on the center of said semi-circular opening and in engagement with said connecting member.

8. The device as claimed in claim **1**, in which said means for transmitting movement between said second manual adjustment member and said connecting member comprise two semi-circular elements of which the ends of the active parts are located on the same diameter of said second means for guiding the first adjustment member in rotation and in which said connecting member is integral with a slide in engagement with a diametrical slideway, integral with the first adjustment member, said slide having two projections to be brought into alternate and successive engagement, with each half turn of the second manual adjustment member, with the two semi-circular elements of said means for transmitting movement.

9. The device as claimed in claim **8**, in which said second manual adjustment member has a central opening to receive a fixed indicator member provided with a diametrical slideway in engagement with the slide.

10. The device as claimed in claim **8**, in which said second manual adjustment member has angular positioning means distributed about its rotational axis, a resilient positioning member being mounted on the first adjustment member to be brought successively into engagement with said angular positioning means.

* * * * *