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(54) **Hinge pin, particularly for window and door frames, and method for manufacturing the related pin**

Scharnierzapfen, insbesondere für Fenster- und Türrahmen, und Herstellungsverfahren

Broche de charnière, en particulier pour chassis de fenêtre ou de porte, et procédé de fabrication

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Description

FIELD OF THE INVENTION

[0001] This invention concerns a hinge-pin consisting of at least two elements each provided with a cylindrical through hole suitable to receive the pin, and the method for manufacturing the pin.

[0002] To be more exact, the invention refers to a hinge-pin with three elements, advantageously used for locks of a considerable weight, such as armor-plated doors, main doors, gates or similar.

BACKGROUND OF THE INVENTION

[0003] The state of the art includes several types of hinge-pins, particularly for those suitable to be assembled in locks of considerable weight, such as in armor-plated doors, main doors, gates or similar.

[0004] Such pins normally consist of a cylindrical metal rod, which has clamping means in correspondence with the upper head suitable to cooperate with the upper element of the hinge, attached to the supporting frame, to prevent reciprocal rotation and consequent unhinging.

[0005] The state of the art includes clamping means consisting of an axial knurling made circumferentially very close to the head of the pin.

[0006] However, pins made in this way are difficult to insert completely into the respective holes of the elements of the hinge, particularly in the fixed, upper one, since there is considerable interference from the circumferential knurling.

[0007] Often, in order not to damage the elements of the hinge, the pin is left to protrude upwards, with consequent disadvantages, not only aesthetic.

[0008] Apart from this, because of their rigidity, when they are inserted forcefully into the hole of the fixed element of the hinge, such pins usually damage the inner walls of the hole permanently and irreparably; this sometimes makes it necessary to replace the whole hinge, with consequent high costs, especially labour costs.

[0009] Moreover, once they have been inserted and clamped into the elements of the hinge, such pins are also difficult to remove and, once removed, due to the deterioration to which the knurling is subjected on its first use, can no longer be re-used, since they have lost their initial characteristics.

[0010] The state of the art also includes a pin which, apart from the axial knurling, is provided with a central and longitudinal slit which, starting from the top of the head, extends for several millimetres inside the rod, thus dividing the head into two parts, in order to make the two parts elastic.

[0011] This pin is not only particularly expensive, because of the working needed to obtain the longitudinal slit, it also has the disadvantage that it does not guar-

antee an efficient clamping action, since the transverse thrust imparted by the two parts into which the head of the rod is divided is insufficient.

[0012] Consequently, in practical experience, this pin is subject to rotate and therefore to come unhinged, especially when the window/door frame on which the relative hinge is mounted is opened and closed frequently.

[0013] The present Applicant has devised and embodied this hinge-pin according to the invention to overcome these shortcomings.

SUMMARY OF THE INVENTION

[0014] The hinge-pin according to the invention is set forth and characterised in the main claim, while the dependent claims describe other innovative characteristics.

[0015] One purpose of the invention is to achieve a hinge-pin which can easily be inserted, in a removable manner, inside the pivoting holes of the hinge elements and which at the same time guarantees it can be auto-clamped with one of the elements of the hinge during the normal working of the latter.

[0016] In accordance with this purpose, the pin according to the invention comprises a substantially cylindrical rod, in correspondence with one end of which there is at least a protuberance which radially protrudes from the rod to interfere with the cylindrical hole of one of the hinge elements.

[0017] This protuberance may be straight, or rounded or conical and may have a protrusion coherent with the diameter of the rod.

[0018] Moreover, according to another feature of the invention, in order to give greater elasticity to the radial protuberance, inside the rod there is an axial cavity which defines a substantially peripheral wall from which the protuberance protrudes.

[0019] In accordance with another characteristic feature of the invention, there are two radial protuberances provided on diametrically opposite sides with respect to the central axis of the rod. Moreover, associated with the radial protuberances, two corresponding recesses are provided, offset by 90° with respect to the protuberances.

[0020] A further purpose of the invention is to achieve a pin which is simple and inexpensive to produce.

[0021] In accordance with this purpose, all the protuberances and the optional axial cavity, plus the upper head which closes the cavity, are obtained by heading.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] These and other characteristics of the invention will become clear from the following description of some preferred forms of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- Fig. 1 is an exploded view of a pin according to the invention associated with a hinge with three elements;
- Fig. 2 is an enlarged detail, partly in section, of the pin shown in Fig. 1;
- Fig. 3 is a section along the line A-A of Fig. 2;
- Fig. 4 is a section along the line B-B of Fig. 2;
- Fig. 5 is a transverse section of a pin according to the invention in accordance with a first variant;
- Fig. 6 is a transverse section of a pin according to the invention in accordance with a second variant;
- Fig. 7 is a transverse section of a pin according to the invention in accordance with a third variant.

DETAILED DESCRIPTION OF PREFERRED FORMS OF EMBODIMENT

[0023] With reference to Fig. 1, a pin 10 according to the invention, in accordance with a first form of embodiment, is shown associated with the elements 11, 12 and 13 of a hinge 14 for door/window frames, particularly for those of a considerable weight, such as armor-plated doors, main doors, gates and similar.

[0024] The outer elements 11 and 13 are identical and each comprises a substantially cylindrical body provided lengthwise with a central cylindrical through hole 15, respectively 16.

[0025] A threaded peg 17, respectively 18, is attached transversely to the body of each element 11, 12 and is suitable to be screwed onto the frame or jamb of the door/window frame which is to be hinged and which is not shown in the drawings.

[0026] The central element 12 of the hinge 14 comprises a substantially cylindrical body, provided longitudinally with a central cylindrical through hole 19, inside which one or two cylindrical bushings 20 are attached, made of plastic material or other anti-friction material. Only one of the bushings 20 is shown in Fig. 1.

[0027] Each bushing 20 is provided with a central through hole 21 which has the same diameter as the holes 15 and 16 of the elements 11 and 13.

[0028] A threaded peg 22 is attached transversely to the central body of the element 12 and is suitable to be screwed into the movable part of the window/door frame to be hinged, which is not shown in the drawings.

[0029] The pin 10 comprises a central metal rod 23, substantially cylindrical in shape, the outer diameter of which is slightly less than the inner diameter of the holes 15, 16 and 21, so that it can enter said holes and leave a little play.

[0030] In accordance with a characteristic feature of the invention, in one of the ends of the pin 10, to be more exact in the upper end 25, there is at least a protuberance 30 which protrudes radially by 1-2 tenths of a millimetre with respect to the diameter of the rod 23 which in the example shown here is indicatively about 9-10 mm.

[0031] In the form of embodiment shown in Figs. 1-4,

there are two protuberances 30a and 30b, obtained by squashing the wall 27 with consequent formation of two corresponding recesses 31a and 31b, offset by 90° with respect to the two protuberances 30a and 30b.

[0032] To give elasticity to the protuberances 30, the end 25 is shaped in such a way that it has an axial cavity 26 which defines a wall 27, substantially cylindrical in shape, about a millimetre thick, closed at the top by a head 28. The axial cavity 26 allows the elastic deformation of the protuberances 30a and 30b towards the interior of the same cavity 26 during the insertion of the pin 10 into the hole 15.

[0033] In the upper part of the cavity 26, a small metal spherical element 29 may be inserted for hermetically close the same cavity 26, so that the entry into the cavity 26 of any improper substances, such as those used for the surface treatment of the pin 10 before its marketing, or dirty in general, is avoided.

[0034] According to a first variant (Fig. 5), there are four radial protuberances 30, offset by 90° from each other, separated by four corresponding recesses 31. In this case the wall 27 is substantially polygonal in shape.

[0035] According to a second variant (Fig. 6), there is a multitude of protuberances 30 and corresponding recesses 31, at least eight, so as to define a series of teeth and longitudinal compartments in the wall 27.

[0036] According to a third variant (Fig. 7), the protuberances 30 are of the conical type, tapering downwards, or in the opposite direction to the head 28.

[0037] The pin 10 described hereinbefore can be realized using at least one forging or pressing machine of any known type, starting from a steel cylindrical bar and performing the following steps.

[0038] A piece, having the length corresponding to the pin 10 to realize, is cut from the steel cylindrical bar. Then the axial cavity is obtained by means of heading or backward extrusion utilizing a first suitable punch, or alternatively by cold molding or drilling.

[0039] In a subsequent step, utilizing a second punch, the spherical element 29 is inserted by pressure into the axial cavity 26 to seal it hermetically.

[0040] Then the head 28 by elastic deformation of the material and, finally, the recesses 31a, 31b and the corresponding protuberance 30a, 30b are realized by means of squashing of the wall.

[0041] To put together the elements 11, 12 and 13 of the hinge 14, the holes 15, 21 and 16 of the elements 11, 12 and respectively 13 are axially aligned and the pin 10 is inserted into the said holes.

[0042] The central rod 23 enters with a play into the holes 15, 21 and 16 until the protuberances 30 interfere with the hole 15 of the upper element 11.

[0043] To make the end 25 of the pin 10 enter completely into the hole 15, and to make the head 28 abut against the element 11, it is enough to give a slight tap with a hammer, or similar tool, on the head 28.

[0044] The protuberances 30 are elastically deformed towards the inside of the cavity 26 and are clamped into

the hole 15, exerting sufficient transverse thrust towards the inner wall of the latter.

[0045] In this way, when the hinge 14 is assembled and the pin 10 is completely inserted with its central rod 23 in the holes 15, 21 and 16, the protuberances 30 prevent the pin 10 from rotating with respect to the upper element 11 and hence from coming unhinged therefrom.

[0046] It is equally easy and effortless to remove the pin 10 from the hinge 14.

[0047] It is enough to give the rod 23 a tap from the bottom upwards, that is, towards the head 28, to remove it from the holes 16, 21 and 15 of the elements 13, 12 and respectively 11, in that order.

[0048] The protrusions 32 and 33, being elastic, do not offer much axial resistance and, as soon as they are out of the hole 15, they return to their initial position, so that the pin 10 is ready to be re-used, in the same condition in which it was before being inserted into the elements 11, 12 and 13 of the hinge 14.

[0049] Experiments and practical trials have shown that this operation can be repeated a multitude of times without the pin 10 and the element 11, which cooperates with the protuberances 30, being subject to permanent deterioration or deformation.

[0050] It is obvious that modifications and additions may be made to the pin 10 as described heretofore, but these shall remain within the field and scope of the invention.

[0051] For example instead of there being two protrusions 32 and 33, diametrically opposite, there may be only one, or more than two and distributed angularly in a regular manner to give a better distribution of the forces of thrust inside the hole 15 of the element 11.

[0052] It is also obvious that the application of the pin according to the invention is not limited to hinges of the type described above, as the pin can be used in any type of hinge whatsoever.

Claims

1. Hinge-pin comprising a substantially cylindrical rod (23), **characterised in that** an axial cavity (26) is provided in proximity of one end (25) of said rod (23), said axial cavity (26) defining a wall (27) on which at least one radial protuberance (30), protruding towards the outside of said rod (23), is obtained due to at least one corresponding recess (31) on said wall (27), whereby said radial protuberance (30) is able to elastically deform towards the interior of said axial cavity (26).
2. Hinge-pin as in Claim 1, wherein the hinge (14) comprises at least a fixed element (11, 13) and a movable element (12) and wherein each of said elements (11, 12, 13) is provided with a hole (15, 16, 21), **characterised in that** said protuberance (30) is able to elastically interfere with the wall of said hole (15) of one of the elements (11) of the hinge (14), whereby said rod (23) can be inserted in and removed from said hole (15) without any permanent deformation.
3. Hinge-pin as in Claim 1, **characterised in that** a plurality of radial protuberances (30) are obtained in said wall (27), due to a corresponding plurality of recesses (31) on said wall (27).
4. Hinge-pin as in Claim 3, **characterised in that** said radial protuberances (30) are two and arranged on diametrically opposite sides with respect to the central longitudinal axis of said rod (23), offset by 90° with respect to two corresponding recesses (31a, 31b).
5. Hinge-pin as in Claim 1, **characterised in that** said wall (27) is substantially cylindrical.
6. Pin as in Claim 1, **characterised in that** said wall (27) is substantially polygonal.
7. Hinge-pin as in Claim 1, **characterised in that** a head (28) is obtained in correspondence with said end (25) of said rod (23), to close said axial cavity (26).
8. Hinge-pin as in Claim 1, **characterised in that** a spherical element (29) is inserted into said axial cavity (26) to seal it hermetically.
9. Hinge-pin as in claim 1, **characterised in that** each of the protuberances (30) protrudes radially by about 1-2 tenths of a millimetre with respect to the diameter of said rod (23).
10. Hinge-pin as in any claim hereinbefore, **characterised in that** each of the protuberances (30) is substantially conical in shape with the taper facing the opposite side of said end (25) of said rod (23).
11. Method for manufacturing a hinge-pin starting from a substantially cylindrical rod (23), **characterised by** the following steps: to realize an axial cavity (26) in the proximity of one end (25) of said rod (23) by means of backward extrusion, heading, cold moulding or drilling, to define a substantially peripheral wall (27); and to realize in said wall (27) at least one radial protuberance (30) protruding towards the outside of said rod (23) and a corresponding recess (31) by means of squashing of said wall (27), whereby said radial protuberance (30) is then able to elastically deform towards the interior of said axial cavity (26).
12. Method as in Claim 11, **characterised in that** a spherical element (29) is inserted by pressure into

said axial cavity (26) to seal it hermetically.

13. Method as in Claim 11, **characterised in that** a head (28) is obtained in correspondence of said end (25) by means of heading or elastic deformation of the material.

Patentansprüche

1. Scharnierzapfen, bestehend aus einer im wesentlichen zylindrischen Stange (23), **dadurch gekennzeichnet, daß** in Nähe eines Endes (25) der Stange (23) eine axiale Höhlung (26) vorgesehen ist, die von einer Wand (27) begrenzt wird, von der mindestens ein radialer Höcker (30) gegen die Außenseite der Stange (23) vorspringt und durch mindestens eine entsprechende Vertiefung (31) an der Wand (27) erhalten wurde, wobei der radiale Höcker (30) gegen das Innere der axialen Höhlung (26) elastisch verformbar ist.

2. Scharnierzapfen nach Anspruch 1, wobei das Scharnier (14) mindestens ein fixes Element (11, 13) und ein bewegliches Element (12) aufweist und jedes dieser Elemente (11, 12, 13) mit einem Loch (15, 16, 21) versehen ist, **dadurch gekennzeichnet, daß** der genannte Höcker (30) elastisch auf die Wand des Loches (15) eines der Elemente (11) des Scharniers (14) einwirken kann, wobei die genannte Stange (23) ohne bleibende Verformung in das Loch (15) eingesetzt und aus diesem entnommen werden kann.

3. Scharnierzapfen nach Anspruch 1, **dadurch gekennzeichnet, daß** aus einer Mehrzahl von Vertiefungen (31) an der genannten Wand (27) herrührend eine Mehrzahl von radialen Höckern (30) in der Wand (27) erhalten wurden.

4. Scharnierzapfen nach Anspruch 3, **dadurch gekennzeichnet, daß** zwei radiale Höcker (30) vorgesehen sind, die in bezug auf die mittlere Längsachse der Stange (23) diametral an entgegengesetzten Seiten angeordnet sind, und zwar um 90° versetzt in bezug auf zwei entsprechende Vertiefungen (31a, 31b).

5. Scharnierzapfen nach Anspruch 1, **dadurch gekennzeichnet, daß** die genannte Wand (27) im wesentlichen zylindrisch ist.

6. Scharnierzapfen nach Anspruch 1, **dadurch gekennzeichnet, daß** die genannte Wand (27) im wesentlichen polygonal ist.

7. Scharnierzapfen nach Anspruch 1, **dadurch gekennzeichnet, daß** ein Kopf (28) in Übereinstimmung

mit dem genannten Ende (25) der Stange (23) erhalten wird, um die axiale Höhlung (26) zu verschließen.

8. Scharnierzapfen nach Anspruch 1, **dadurch gekennzeichnet, daß** ein kugelförmiges Element (29) in die axiale Höhlung (26) eingesetzt ist, um diese hermetisch abzudichten.

9. Scharnierzapfen nach Anspruch 1, **dadurch gekennzeichnet, daß** die Höcker (30) radial etwa 1/10 bis 2/10 mm in bezug auf den Durchmesser der Stange (23) ausragen.

10. Scharnierzapfen nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, daß** jeder der Höcker (30) eine im wesentlichen konische Gestalt besitzt, wobei die Verjüngung gegen die entgegengesetzte Seite des genannten Endes (25) der Stange (23) weist.

11. Verfahren zur Herstellung eines Scharnierzapfens, ausgehend von einer im wesentlichen zylindrischen Stange (23), **gekennzeichnet durch** die folgenden Schritte: zur Bestimmung einer im wesentlichen peripheren Wand (27) **durch** Aufdornen, Anstauchen, Kaltverformung oder Bohren eine axiale Höhlung (26) herstellen; in dieser Wand (27) mindestens einen gegen die Außenseite der Stange (23) vorspringenden radialen Höcker (30) und eine entsprechende Vertiefung (31) herstellen, wobei dieser radiale Höcker (30) dann befähigt ist, sich elastisch gegen das Innere der axialen Höhlung (26) zu verformen.

12. Verfahren nach Anspruch 11, **dadurch gekennzeichnet, daß** ein kugelförmiges Element (29) durch Pressung in die axiale Höhlung (26) eingesetzt wird, um diese hermetisch zu verschließen.

13. Verfahren nach Anspruch 11, **dadurch gekennzeichnet, daß** durch Anstauchen oder elastische Deformation des Materials in Übereinstimmung mit dem genannten Ende (25) ein Kopf (28) gebildet wird

Revendications

1. Broche de charnière comprenant une tige (23) sensiblement cylindrique, **caractérisée en ce qu'une** cavité axiale (26) est présente à proximité d'une extrémité (25) de ladite tige (23), ladite cavité axiale (26) définissant une paroi (27) sur laquelle au moins une protubérance radiale (30), s'avancant vers l'extérieur de ladite tige (23), est obtenue en raison d'au moins un évidement correspondant (31) sur ladite paroi (27), moyennant quoi ladite protubérance ra-

diale (30) est capable de se déformer de manière élastique vers l'intérieur de ladite cavité axiale (26).

2. Broche de charnière selon la revendication 1, dans laquelle la charnière (14) comprend au moins un élément fixe (11, 13) et un élément mobile (12) et dans laquelle chacun desdits éléments (11, 12, 13) est doté d'un trou (15, 16, 21), **caractérisée en ce que** ladite protubérance (30) est capable d'interférer de manière élastique avec la paroi dudit trou (15) d'un des éléments (11) de la charnière (14), moyennant quoi ladite tige (23) peut être insérée dans et retirée dudit trou (15) sans déformation permanente. 5 10 15
3. Broche de charnière selon la revendication 1, **caractérisée en ce qu'**une pluralité de protubérances radiales (30) sont obtenues sur ladite paroi (27), en raison d'une pluralité correspondante d'évidements (31) sur ladite paroi (27). 20
4. Broche de charnière selon la revendication 3, **caractérisée en ce que** lesdites protubérances radiales (30) sont au nombre de deux et agencées sur des côtés diamétralement opposés par rapport à l'axe central longitudinal de ladite tige (23), compensées de 90° par rapport aux deux évidements correspondants (31a, 31b). 25
5. Broche de charnière selon la revendication 1, **caractérisée en que** ladite paroi (27) est sensiblement cylindrique. 30
6. Broche selon la revendication 1, **caractérisée en ce que** ladite paroi (27) est sensiblement polygonale. 35
7. Broche de charnière selon la revendication 1, **caractérisée en qu'**une tête (28) est obtenue en correspondance avec ladite extrémité (25) de ladite tige (23), pour fermer ladite cavité axiale (26). 40
8. Broche de charnière selon la revendication 1, **caractérisée en qu'**un élément sphérique (29) est inséré dans ladite cavité axiale (26) pour la fermer de manière étanche. 45
9. Broche de charnière selon la revendication 1, **caractérisée en ce que** chacune des protubérances (30) s'avance de manière radiale d'environ 1 à 2 dixièmes de millimètre par rapport au diamètre de ladite tige (23). 50
10. Broche de charnière selon l'une quelconque des revendications précédentes, **caractérisée en ce que** chacune des protubérances (30) a une forme sensiblement conique, la pointe faisant face au côté opposé de ladite extrémité (25) de ladite tige (23). 55

11. Procédé de fabrication d'une broche de charnière commençant par une tige (23) sensiblement cylindrique, **caractérisé par** les étapes suivantes : la réalisation d'une cavité axiale (26) à proximité d'une extrémité (25) de ladite tige (23) par extrusion inverse, refoulement en bout, moulage à froid ou perçage, pour définir une paroi sensiblement périphérique (27) ; et la réalisation sur ladite paroi (27) d'au moins une protubérance radiale (30) s'avancant vers l'extérieur de ladite tige (23) et d'un évidement correspondant (31) par l'écrasement de ladite paroi (27), moyennant quoi ladite protubérance radiale (30) est alors capable de se déformer de manière élastique vers l'intérieur de ladite cavité axiale (26).

12. Procédé selon la revendication 11, **caractérisé en ce qu'**un élément sphérique (29) est inséré par pression dans ladite cavité axiale (26) pour la fermer de manière étanche.

13. Procédé selon la revendication 11, **caractérisé en qu'**une tête (28) est obtenue en correspondance avec ladite extrémité (25) par refoulement en bout ou déformation élastique du matériau.

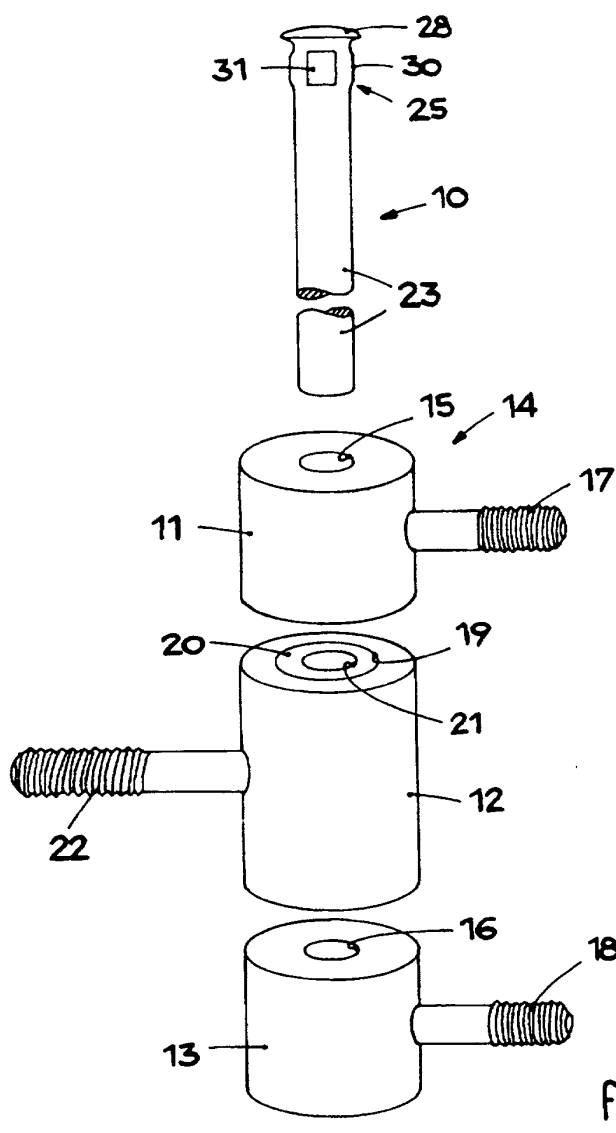


Fig. 1

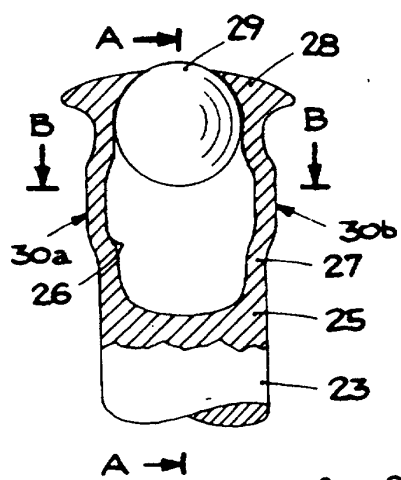


Fig. 2

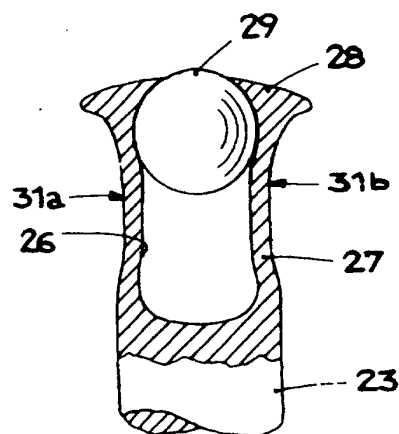


Fig. 3

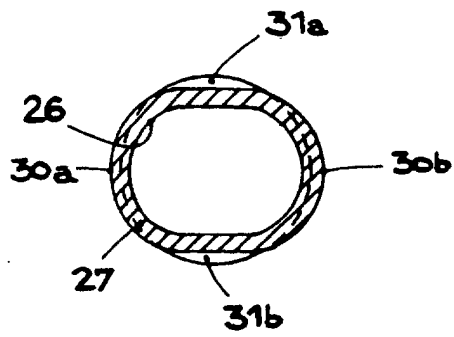


Fig. 4

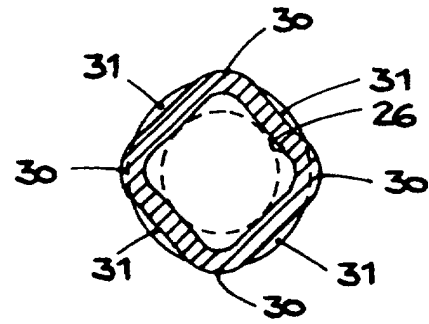


fig.5

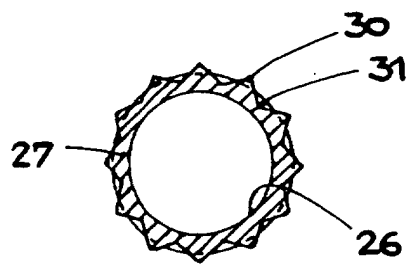


fig.6

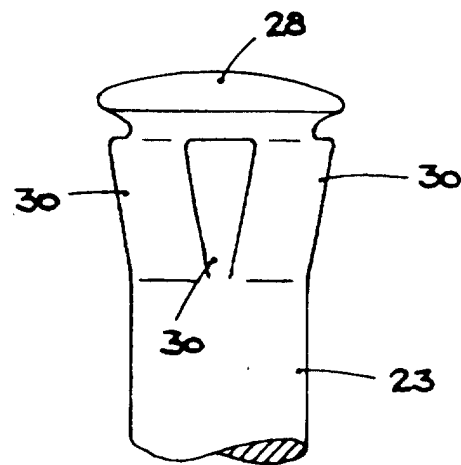


fig.7