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(54) Hinge, particularly to support frames, and method to achieve at least one of its components

(57) Hinge, particularly to support frames or suchlike, comprising a pintle (3), of the female type, provided with a substantially cylindrical first axial cavity (4), open at one end, into which a pin (23) provided with an annular throat (25) is able to be axially inserted. A clamping element (17), elastically deformable, cooperates both with an annular seating (6), made in the first axial cavity (4), and also with the annular throat (25) of the pin (23), in order to prevent the axial removal of the pin (23) from the axial cavity (4).

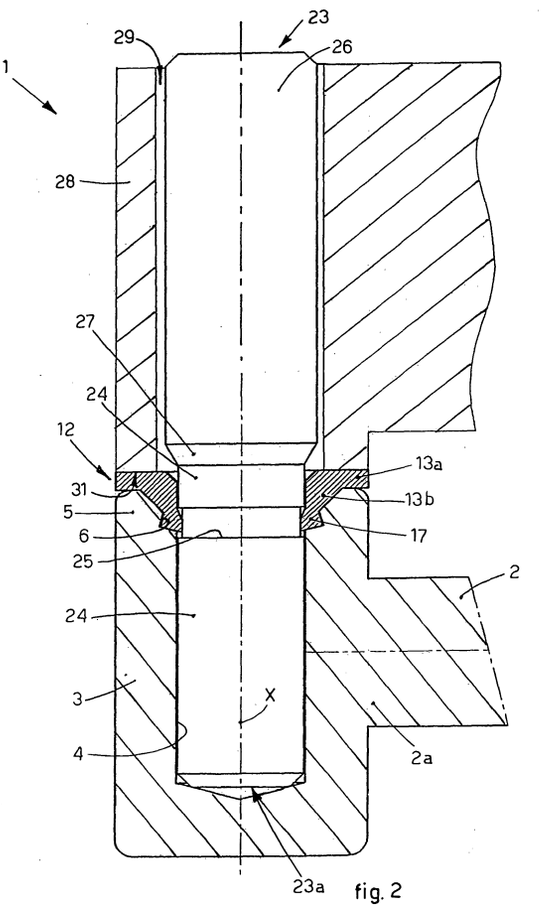


fig. 2

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Description

FIELD OF THE INVENTION

[0001] The present invention concerns a hinge, particularly to support frames.

[0002] The present invention also concerns a method to obtain a pintle or hinge of the female type.

BACKGROUND OF THE INVENTION

[0003] Frames commonly used to make, for example, doors, windows, dormer windows and skylights, present in buildings of various types, are equipped, in order to pass from an open position to a closed position, and vice versa, with movable parts, which can close, or alternatively leave open, the compartments, made inside the walls of the buildings, which house the frames themselves.

[0004] To be more exact, it is very common to use frames in which the movable parts consist of one or more wings, which can be opened by means of a rotation imparted thereto around a pre-determined axis, generally vertical and coinciding with one end of said wings.

[0005] In order to allow this rotation, the wings of the frames are connected to a framework, or directly to the wall, by means of hinges of a known type, positioned between them, which at the same time offer a support to the wings themselves.

[0006] To be more exact, in order to support wings of outside frames, for example made of wood, plastic material or otherwise, hinges are commonly used for which characteristics of strength, simplicity and resistance are required, and also a pleasant aesthetic appearance and limited bulk.

[0007] To support such outside frames, hinges of a known type are used, consisting of a first pintle, generally cylindrical in shape, arranged vertically and equipped with a first axial cavity open at the upper part in correspondence with at least one end thereof, irremovably constrained to the lateral wall of a compartment present in a wall.

[0008] A second pintle is rigidly constrained to the wing, shaped like the first pintle and therefore equipped with a second cylindrical cavity of about the same size as the first cavity, arranged vertically and open at both ends, which during the assembly step is superimposed above the first pintle, so that it rests on the upper face of the latter, the first and second cavities thus being aligned.

[0009] Inside the first and second cavities a pin is inserted from above, the axial position of which is defined by a head made at one end thereof and abutting against the upper wall of the second pintle, the pin constituting the axis of rotation of the wing when the wing is opened or closed.

[0010] The main disadvantage of this known type of hinge is that, since the pin is kept inside the first and second seating only by the action of its own weight, it can be lifted due to the stresses that take place during the repeated opening and closing of the wings, until it comes completely out of the pintles, causing the disarticulation of the hinge.

[0011] Another disadvantage of this known type of hinge is that, in order to release the wing of the outer frame from the wall to which it is connected, it is enough to remove the pin from the pintles, which, not being impeded by any safety device, makes it easy to break the frame by any persons who wish to enter by stealth into the building where the frame is installed.

[0012] Another disadvantage is that, since the first and second pintles are in direct contact, the rubbing between the respective surfaces gives rise to a movement of relative rotation that is not very uniform and subject to sticking, especially in the case where atmospheric agents have caused phenomena of oxidation on the pintles.

[0013] A second type of hinge for frames is known, similar to the one described above, from which it differs in that the pin, in proximity with its end that faces downwards, has a truncated cone shape: on the cavity made inside the first pintle a counter-shaped surface is defined, able to achieve a fixed coupling with said pin, thanks to the fact that the latter is driven inside the cavity.

[0014] A variant of this type of known hinge is obtained by making a knurling on at least one zone of the lateral surface of the pin, able to achieve a coupling through interference between said pin and the cavity made inside the first pintle.

[0015] The main disadvantage of such known type of hinges is that, in order to achieve the particular coupling surfaces now shown, it is necessary to perform supplementary workings, which considerably affect the cost of said hinges, which in themselves are very economical.

[0016] A further disadvantage is that to make couplings through interference pre-supposes the application on the pin of an axial force of considerable entity, for example imparted by means of a hammer or a mallet, which can damage the pin or, especially in the case of interference achieved by means of knurling on the pin, can cause the pin to be misaligned with respect to the axis of the cavity of the first pintle, so that in both cases the rotation of the wing of the frame is impeded, if not totally prevented.

[0017] Another hinge is known which, with respect to the first type described above, comprises a washer, made of plastic material, approximately cylindrical in shape and with a hole in the center, able to be positioned between the first and the second pintle, and equipped with a plurality of fins protruding radially towards the inside of its central hole.

[0018] In the zone situated, once the pin has been inserted into the cavity made in the first pintle, in correspondence with the radial fins of the washer, the pin has a throat, inside which the fins are housed, which thus

oppose a possible action intended to loosen the pin from the first pintle.

[0019] The main disadvantage of this known type of hinge is that it is difficult to assemble since, in order to make it possible to insert the pin, the washer must be positioned exactly coaxial with respect to the first and second pintle.

[0020] A further disadvantage of this known type of hinge is that it requires a large number of components, which can easily be lost during assembly or dis-assembly of the hinge.

[0021] Yet another disadvantage is that, since the washer is positioned between the first and second pintle, and visible from outside, it can damage the overall aesthetic appearance of the hinge.

[0022] A method is also known to achieve a pintle or hinge of the female type, which consists in obtaining, by means of an appropriate machine, an axial hole on a metal blank which affects part of the length.

[0023] Subsequently this blank is removed from the machine and formed, by means of molding, on a second machine, so as to obtain the first axial cavity inside the first pintle.

[0024] Should the presence be required, inside the cavity, of a throat, this is obtained in a known manner by means of a third machine, for example a milling machine, on the lateral wall of the cavity.

[0025] This known method requires high production costs, due to the use of several machine tools and the time needed to move the pieces from one machine to the next.

[0026] To be more exact, using a process to remove chip, such as milling, in order to make the throat, is very burdensome, both in terms of time, since the machine is subject to frequent interruptions in its functioning due to the change of tools, for maintenance or for fine tuning the processing, and also in economic terms, as the worn tools have to be replaced frequently.

SUMMARY OF THE INVENTION

[0027] A first purpose of the present invention is therefore to solve the technical problems shown above, eliminating the disadvantages of the prior art cited and hence devising an invention which allows to obtain a hinge, particularly to support frames, which when the wings are closed prevents the pin from coming off the first pintle, and which at the same time is easy and quick to assemble.

[0028] Another purpose of the present invention is to embody a hinge which allows the wings of a frame to rotate homogeneously and constantly over time, even after long exposure to atmospheric agents.

[0029] Another purpose achieved by the invention is to make a hinge that is aesthetically pleasing and of limited size.

[0030] Another purpose is to embody a hinge which is structurally simple, with limited production costs.

[0031] The above purposes, and others which will appear more clearly hereafter, are achieved by a hinge according to the invention which comprises a first pintle on which a first axial cavity is made, substantially cylindrical in shape, open at one end and into which a pin is able to be axially and at least partly inserted, equipped with an annular throat, and which is characterized in that it also comprises clamping means to prevent said pin becoming axially removed from said axial cavity of said first pintle, and in that said clamping means comprise at least an elastically deformable element, which can be a bushing or a sealing ring, which cooperates both with an annular seating made in said first cavity, and also with said annular throat present in said pin.

[0032] Said annular seating is advantageously shaped so as to have a throat formed by two segments, inclined with respect to each other, which define a substantially V-shaped transverse section.

[0033] If the clamping means consist of a bushing, this is advantageously shaped so as to have at least an elastically deformable appendix.

[0034] Another purpose of the present invention is to perfect a method that allows to obtain, with production costs that are limited with respect to the state of the art, a pintle or hinge of the female type, having an axial cavity open at one end thereof, for the rotatable interconnection to a pin, and shaped so as to accommodate axial clamping means, positioned between the pin and the female-type pintle or hinge.

[0035] This purpose is achieved by the method according to the present invention which is characterized in that it comprises, also in a different sequence, the following steps:

- cutting a blank from wire;
- forming said blank;
- first cold punching of one end of said blank so as to obtain an axial pre-hole;
- second cold punching made on said pre-hole so as to obtain an axial cavity in said female pintle or hinge, with a diameter less than that of said pre-hole, to define a stepped zone between said pre-hole and said axial cavity;
- deformation of said stepped zone so as to obtain an annular seating with at least a throat that defines an undercut in said axial cavity.

[0036] Said throat advantageously comprises two segments, inclined with respect to each other, which define a substantially V-shaped transverse section of said annular seating.

[0037] Other characteristics and advantages of the invention will be clear from the detailed description of two particular but non-exclusive forms of embodiment, given as an unrestricted example in the attached drawings wherein:

- fig. 1 shows a perspective and partly exploded view

of some elements of a hinge according to the invention;

- fig. 2 shows a longitudinal section of a complete hinge, according to the invention, in a first form of embodiment;
- fig. 3 shows a perspective view of a first detail of the hinge in fig. 2;
- fig. 4 shows an enlarged longitudinal section of a second detail of the hinge in fig. 2;
- fig. 5 shows an enlarged longitudinal section of a detail of the female pintle of the hinge in fig. 2;
- fig. 6 shows a perspective view of a variant of the detail in fig. 3;
- fig. 7 shows a longitudinal section view of a second form of embodiment of the hinge according to the invention;
- fig. 8 shows a lateral view of a blank to achieve the female pintle of the hinge in fig. 2;
- fig. 9 shows a sectioned lateral view of the blank in fig. 8 after a first punching;
- fig. 10 shows, in a view similar to that in fig. 9, the blank of fig. 8 after a second punching;
- fig. 11 shows, in a view similar to that in fig. 9, the blank of fig. 8 after a deformation that defines an annular seating.

DETAILED DESCRIPTION OF SOME PREFERENTIAL FORMS OF EMBODIMENT OF THE INVENTION

[0038] In the examples of embodiment that follow, individual characteristics given in relation to specific examples can in reality be exchanged for other, different characteristics, existing in other embodiments.

[0039] Moreover, it should be noted that everything that in the course of the procedure to obtain the patent should be revealed to be already known, shall be understood not to be claimed by the claims and the object of a disclaimer.

[0040] With reference to figures 1 and 2, a hinge 1 according to the invention comprising an attachment element 2, for example cylindrical in shape, able to be constrained to a wall, not shown in the drawings, in proximity with or inside an opening, made in the wall and constituting the compartment for example for a door or window.

[0041] The attachment element 2 is able to be partly inserted inside said wall, so that one end 2a protrudes therefrom, approximately orthogonally.

[0042] In correspondence with the end 2a, the attachment element 2 supports a first pintle 3, of the female type, constrained thereto, for example cylindrical in shape, whose axis is arranged approximately orthogonally with respect to that of the attachment element 2.

[0043] The first pintle 3 can have, as an alternative to the cylindrical shape, any prismatic shape whatsoever, for example with a square, rectangular, elliptical base or other.

[0044] Axially to the first pintle 3 a first cavity 4 is made, cylindrical, open in correspondence with one upper end 5 of the first pintle 3.

[0045] In correspondence with the upper end 5, the lateral surface of the first cavity 4 has an annular seating 6, whose profile comprises a first plane segment 7 (figs. 4 and 5), including a slight inclination, for example equal to about 15°, with respect to a diametric plane, the height of said first segment increasing as it is radially distanced from the axis X of the first cavity 4.

[0046] The profile of the annular seating 6 also comprises a second segment 8, plane, consecutive to the first segment 7 and including a slight inclination, for example equal to about 15°, with respect to the axis X of the first cavity 4, and arranged in the direction of the narrowing of the annular seating 6, from the bottom upwards, along the axial direction.

[0047] The annular seating 6 therefore comprises a throat, which defines an undercut formed by the two segments 7 and 8, inclined with respect to each other and arranged so that the transverse section of the annular seating 6 is substantially V-shaped.

[0048] The second segment 8 is then connected at the upper part to a second surface 10, defining a third segment 11, plane, consecutive to said second segment 8 and inclined by about 45° with respect to the axis X of the first cavity 4.

[0049] The third segment 11 is then connected to a first upper surface 9, plane, of the first pintle 3.

[0050] The hinge 1 also comprises a bushing 12, with a circular shape (figs. 1, 2, 3 and 4), able to be associated in snap-in manner above the first pintle 3.

[0051] The bushing 12 comprises an abutment body 13 (figs. 3 and 4), substantially T-shaped, defining a head 13a, plane, and at the lower part of which a third annular surface 14 (fig. 4) is defined, able to abut against the first upper surface 9 of the first pintle 3, so as to define the positioning of the bushing 12.

[0052] In correspondence with the head 13a a hole 12a is made, with a diameter substantially equal to that of the first cavity 4.

[0053] From the head 13a a shank 13b protrudes at the lower part, having on the outside a fourth surface 15, with a profile consisting of a fourth segment 16, inclined with respect to the third annular surface 14 by an angle equal to that defined by the third segment 11, so that said fourth surface 15 corresponds with the second surface 10, defined on the first pintle 3, when the bushing 12 is coupled on the latter.

[0054] The hole 12a, made axially on the bushing 12, has in correspondence with the head 13a a diameter about equal to that of the first cavity 4, made inside the first pintle 3.

[0055] The bushing 12 also comprises, below the shank 13b, an elastically deformable appendix 17, also with an annular conformation, whose outer profile is defined, along its outer surface, by a fifth segment 18, plane, consecutive to the fourth segment 16 and slightly inclined, by an angle for example equal to about 10°

when the appendix 17 is inactive, in its non-deformed configuration, with respect to the axis X of the bushing 12, in the direction of the widening of the bushing 12 proceeding from the top downwards along the axis X of the latter.

[0056] Advantageously, the angle formed by the fifth segment 18 with respect to the axis of the bushing 12, when the appendix 17 is in its non-deformed configuration, is less than the angle formed by the second rectilinear segment 8 with respect to the axis of the first cavity 4.

[0057] The outer profile of the elastically deformable appendix 17 is defined at the lower part by a sixth segment 19, plane, consecutive to the fifth segment 18 and including an inclination, with respect to a horizontal direction, equal to that defined by the first segment 7.

[0058] The inner profile of the appendix 17, starting from the lower end contiguous to the sixth segment 19, consists of a seventh segment 20, plane, approximately parallel to the axis X of the bushing 12, and of an eighth segment 21, consecutive to the seventh segment 20 and slightly inclined with respect thereto, facing from the bottom upwards in the direction of distancing from the axis X of the bushing 12.

[0059] The seventh segment 20 is located, with the appendix in its non-deformed configuration, at a distance from the axis X of the bushing 12 less than the radius of the first cylindrical cavity 4, defining, in correspondence with the elastic appendix 17, a section 22 that is smaller than that of the hole 12a.

[0060] In order to obtain a desired deformability of the appendix 17, the bushing 12 can be made for example of plastic material.

[0061] A plurality of axial slits 12b (fig. 6), affecting the elastic appendix 17 and possible part of the shank 13b, can be made on the bushing 12, so as to further increase the elasticity of the elastic appendix 17.

[0062] There can be for example four slits 12b, positioned off-set circumferentially by about 90° one from the other.

[0063] In order to improve the functionality of the hinge 1, or for particular constructional requirements, one or more of the edges of the profile of said bushing 12, corresponding to the joining points of two consecutive segments, can be rounded or bevelled.

[0064] The hinge 1 also comprises a pin 23 (figs. 1 and 2), with a substantially cylindrical conformation including at the lower part a first zone 24, which extends from a first lower end 23a of the pin 23 for a length at least equal to the depth of the first cavity 4 present on the first pintle 3, and with a diameter a little less than that of the first cavity 4, so that it can be inserted therein with minimum play.

[0065] Adjacent to the first zone 24 of the pin 23 there is a second zone 26 which can have a diameter greater than that of the first zone 24, and possibly be connected thereto by means of a flare 27.

[0066] On the first zone 24, in proximity with the connection to the second zone 26, an annular throat 25 is made, with a smaller diameter than that of the first zone 24, and about equal to that of the reduced section 22 present on the bushing 12 in correspondence with the elastically deformable appendix 17.

[0067] Advantageously, the annular throat 25 is made at a distance from the first end 23a of the pin 23 about equal to that between the annular seating 6 made on the first cavity 4 and the bottom of the first cavity; in this way, when the pin 23 is inserted inside the first pintle 3, the annular throat 25 is positioned in correspondence with the annular seating 6.

[0068] The hinge 1 also comprises a second pintle 28, able to be removably constrained to a wing of a frame, not shown in the drawings. The second pintle 28 is, for example, cylindrical in shape and is provided axially with a second, through cavity 29, with a diameter a little more than that of the second zone 26 of the pin 23, so that the latter can be inserted therein with play. Moreover, the second pintle 28 has a substantially plane lower surface 31, perpendicular to its longitudinal axis.

[0069] The hinge 1 according to the invention is assembled by associating in snap-in manner the bushing 12 with the first pintle 3, in correspondence with the upper end 5 of the latter.

[0070] The bushing 12 is inserted by means of a direct action along the axis X of the first cavity 4, so that its appendix 17 is positioned in correspondence with the annular seating 6.

[0071] During the axial movement of the bushing 12 with respect to the first cavity 4, the elastically deformable appendix 17 interacts with the third segment 11 (fig. 4) of the annular seating 6, which imposes on the appendix 17 a deformation sufficient to allow the bushing 12 to pass and the appendix 17 to be housed inside the annular seating 6.

[0072] Once the coupling of the bushing 12 is complete, and the appendix 17 therefore having returned to its non-deformed configuration, the sixth segment 19 of the profile of the appendix 17 is in contact with the first segment 7 of the profile of the annular seating 6; the appendix 17 protrudes for a part inside the first cavity 4, while the fourth segment 16 and the fifth annular surface 15 abut respectively against the third segment 11 and the first upper surface 9 defined on the first pintle 3, in proximity with its upper end 5.

[0073] The fifth segment 18, which constitutes the outer profile of the appendix 17, on the contrary is detached from the second segment 8 of the profile of the annular seating 6, so that between the bushing 12 and the annular seating 6 an interspace 30 is defined, which develops in an annular direction.

[0074] The lower end of the fifth segment 18, once the appendix 17 has been inserted into the annular seating 6, occupies a position that is radially more external with respect to the upper edge of the annular seating, consisting of the connection end between the second segment 8 and the third segment 11, so that the bushing 12

cannot be disconnected from the first pintle without the appendix 17 being subjected to a deformation equal to that achieved during its insertion.

[0075] The first pintle 3, on which the bushing 12 has been coupled, can therefore be constrained to a wall, by means of the attachment element 2, in correspondence or in proximity with the compartment of a window or door, so that the axis X of the first cavity 4 is arranged vertically, the aperture of said cavity facing upwards.

[0076] The pin 23 can therefore be inserted, in correspondence with its first zone 24, inside the first cavity 4, through the hole 12a present on the head 13a of the bushing 12.

[0077] During this axial movement, the pin 23, which in its first zone 24 has a greater diameter with respect to that of the reduced section 22 of the hole 12a, located in correspondence with the appendix 17, induces an elastic deformation of the appendix, during which, by sliding on the first segment 7 of the profile of the annular seating 6, the appendix is subjected to a substantially radial translation.

[0078] This radial translation is made possible by the presence of the interspace 30, which is occupied during the insertion of the pin 23 by the radially outermost portion of the appendix 17.

[0079] Once the first end 23a of the pin 23 has come into contact with the bottom of the first cavity 4 (fig. 2), the annular throat 25 is in correspondence with the appendix 17, so that the latter can re-acquire its non-deformed configuration, the inner part of its profile occupying the annular throat 25, so as to constitute clamping means to prevent the axial loosening of the pin 23.

[0080] The diameter of the annular throat 25 can also be slightly more than that of the reduced section 22 of the hole 12a, so that the appendix 17 maintains, once the pin 23 has been completely inserted, a slight residual deformation.

[0081] Finally, the second pintle 28 is positioned above the first pintle 3, so that the second zone 26 of the pin 23 is housed inside the second cavity 29 and the lower surface 31 rests on the head 13a of the bushing 12, clamping it.

[0082] The wing of the frame, connected to the second pintle 28, is hence supported by the first pintle 3, by means of the bushing 12, and is free to rotate with respect to the pin 23, in order to achieve the opening and closing movement of said frame.

[0083] The bushing 12 can advantageously be made of plastic material, equipped with good resistance to wear and with low friction coefficients, so as to render the rotation of the second pintle 28 homogeneous and free from jamming, even after long use or in the event of exposure to atmospheric agents.

[0084] The assembly of the hinge 1 as described above is very simple, especially because the bushing 12 is univocally positioned on the first pintle 3 and hence automatically centered thereon; as a consequence the insertion of the pin 23 is very easy.

[0085] Moreover, the fact that the bushing 12 is constrained to the first pintle 3 prevents it from being lost.

[0086] Finally, the bushing 12 is almost completely contained inside the first pintle 3, so that the overall size of the hinge 1 is kept limited; the invention is therefore aesthetically pleasing.

[0087] Should any axial forces act on the pin 23, facing in the direction of extraction of said pin 23 from the first cavity 4, and due for example to actions generated by repeated opening and closing of the frame, or due to interventions from outside, the appendix 17 of the bushing 12 opposes the removal of the pin together with the pressure generated on the head 13a of the second pintle 28.

[0088] An axial movement of the pin 23, facing upwards, entails an action in the same direction by the first zone 24 of the pin 23, in correspondence with the lateral wall of the annular throat 25 arranged below, on the portion of the sixth segment 19 of the profile of the appendix 17 protruding inside the annular throat 25 itself.

[0089] Thus stressed, however, the bushing 12 opposes resistance to a vertical movement, because its appendix 17, in order to pass over the upper edge of the annular seating 6, would have to be subject to a radial deformation directed towards the axis X of the bushing 12, which is however prevented precisely by the presence of the pin 23, which is in this way forced to remain inside the first cavity 4, at least until the force acting in the direction of extraction is so intense as to cause the appendix 17 to yield.

[0090] A further obstacle to a vertical motion of the bushing 12 also derives from the weight of the wing of the frame supported by the hinge 1, which acts on the head 13a by means of the second pintle 28.

[0091] A second form of embodiment of the hinge according to the invention, shown in fig. 7 and indicated in its entirety by the reference number 101, differs from the embodiment described above in that it comprises, instead of the bushing 12, a sealing ring 135, open, that is, cut, and with a circular or polygonal section, preferably made of metal material. The sealing ring 135 can also be of the closed type and made of deformable material, such as rubber or plastic. The sealing ring 135 is located between the annular seating 106 and the annular throat 125, made on the pin 123.

[0092] The sealing ring 135 constitutes a clamping means against the removal of the pin 123 from the pintle 103 since, as it is retained inside the annular throat 125, it acts, with a part protruding towards the inside of the annular throat 125, on the lateral wall of said annular throat arranged at the lower part.

[0093] The method to achieve the pintle, but also a hinge, of the female type, which is also the object of the present invention, comprises a first step that consists in cutting, from a metal drawn piece, preferably with a circular section, a blank 52 (fig. 8).

[0094] On the blank 52 a cold forming is then performed, so as to obtain an axial pre-hole 54 in corre-

spondence with one end 53 of the blank 52.

[0095] The forming of the pre-hole 54 is achieved by means of a first punching process, for which a first punch is used, of a known type and appropriately shaped. This first punching allows part of the material that constitutes the blank 52 to rise vertically, all around it.

[0096] The first forming step thus achieves a slight increase in the height of the blank 52, due to the plastic deformation imposed, which however does not yet correspond to the definitive height.

[0097] This height is obtained by means of a second punching, made on the pre-hole 54 by means of a second punch, also of a known type and suitably shaped. This second punching gives rise to the plastic displacement of material from the central zone of the blank 52 towards the upper and outer zones.

[0098] The material thus deformed rises vertically, so as to define the axial cavity 4 (fig. 10), which now has the definitive depth.

[0099] The axial cavity 4 has a diameter of less than that of the pre-hole 54, so that, in proximity with the upper end of the axial cavity 4, a stepped zone 57 is defined.

[0100] The method then provides to deform the stepped zone 57, by using a third, suitably shaped punch which plastically displaces the material, determining the creation of the annular seating 6 (fig. 11), which comprises the undercut throat defined by the segments 7 and 8 (fig. 5), and having a V-shaped transverse section. Consequently the upper flare is formed that defines the third segment 11.

[0101] The method as described heretofore therefore allows to obtain a pintle, or a hinge, of the female type, that has all the characteristics of use proper to female hinges of a known type, with a suitably shaped annular seating, but with the advantage that it is obtained in a cold molding cycle, in a same machine, as previously specified, and hence without requiring the piece to be picked up in the various working sequences, nor any processing of chip removal.

[0102] In this way a pintle or hinge of the female type can be obtained at a lower cost with respect to that of the state of the art as cited.

[0103] We have thus shown and described how the invention has achieved the pre-set purposes, as a hinge has been devised, particularly to support frames, that is easy and quick to assemble and that allows to keep the pin inside its first pintle.

[0104] A further purpose obtained is that of achieving an invention that allows the rotation of the wings of a frame that is homogeneous and constant in time, even when it is exposed to the action of atmospheric agents.

[0105] Another purpose obtained by the invention is that it achieves an aesthetically pleasing hinge, of limited size.

[0106] Naturally the materials used, and the sizes of the individual components of the invention can be more pertinent according to specific requirements.

[0107] The different means to effect certain different functions certainly shall not coexist only in the form of embodiment shown here, but can be present in many other embodiments, even not shown.

[0108] The characteristics indicated as advantageous, appropriate or suchlike, may not be present or may be replaced by equivalents.

Claims

1. Hinge, particularly to support frames and suchlike, comprising a first pintle (3), of the female type, on which a substantially cylindrical first axial cavity (4) is defined, open at one end, axially to which a pin (23), equipped with an annular throat (25), is able to be at least partly inserted, **characterized in that** it also comprises clamping means to prevent the axial removal of said pin (23) from said axial cavity (4) of said first pintle (3), and **in that** said clamping means comprise at least an element (17, 135) elastically deformable so as to cooperate both with an annular seating (6, 106), made in said first cavity (4), and also with said annular throat (25) present in said pin (23).

2. Hinge as in claim 1, **characterized in that** said clamping means comprise a bushing (12), able to be associated in snap-in manner in said first pintle (3) and including at the lower part at least an elastically deformable appendix (17).

3. Hinge as in claim 1, **characterized in that** said clamping means comprise an elastic sealing ring (135) positioned between said annular seating (106), made in said first cavity (4), and said annular throat (25) present in said pin (23).

4. Hinge as in any claim hereinbefore, **characterized in that** the profile of said annular seating (6, 106) comprises a first segment (7), plane, including a slight inclination with respect to a diametric plane, the height of said first segment (7) increasing as it is radially distanced from the axis (X) of said first cavity (4).

5. Hinge as in claim 4, **characterized in that** said profile of said annular seating (6, 106) also comprises a second segment (8), plane, consecutive to said first segment (7) and including a slight inclination with respect to said axis (X) of said first cavity (4), and arranged in the direction of the narrowing of said annular seating (6, 106) from the bottom upwards, along the axial direction.

6. Hinge as in claim 5, **characterized in that** said second segment (8) is connected at the upper part to a third segment (11), plane and inclined with respect

to said axis (X) of said first cavity (4).

7. Hinge as in claim 5, **characterized in that** said third segment (11) is connected to an upper surface (9), substantially plane, of said first pintle (3).

8. Hinge as in claims 2 and 7, **characterized in that** said bushing (12) has a substantially circular shape and is able to be associated in snap-in manner above said first pintle (3), said bushing (12) comprising an abutment body (13), substantially T-shaped and defining a head (13a) below which an annular surface (14) is defined, able to abut against said upper surface (9) of said first pintle (3) so as to define the axial positioning of said bushing (12).

9. Hinge as in claim 8, **characterized in that** a hole (12a) is made in correspondence with said head (13a), with a diameter substantially equal to that of said first cavity (4).

10. Hinge as in claim 9, **characterized in that** a shank (13b) protrudes from below said head (13a), said shank (13b) having on the outside a surface (15) inclined with respect to said annular surface (14), by an angle substantially equal to that defined by said third segment (11), so that said inclined surface (15) mates with said third segment (11) when said bushing (12) is coupled in said first pintle (3).

11. Hinge as in claim 10, **characterized in that** said appendix (17) comprises an outer profile defined, along its outer surface, by a plane segment (18), consecutive to said inclined surface (15) and slightly inclined, with respect to the axis of said bushing (12), in the direction of the widening of said bushing (12) proceeding from the top downwards along the axis of said bushing (12).

12. Hinge as in claim 11, **characterized in that** the angle formed by said plane segment (18) with respect to the axis of said bushing (12) is less than the angle formed by said second segment (8) with respect to said axis (X) of said first cavity (4).

13. Hinge as in claim 12, **characterized in that** the outer profile of said appendix (17) also comprises another plane segment (19), consecutive to said plane segment (18) and including an inclination, with respect to a horizontal direction, substantially equal to that defined by said first segment (7) of said first cavity (4).

14. Hinge as in claim 13, **characterized in that** the inner profile of said appendix (17) consists, starting from its lower end contiguous to said other plane segment (19), of an inner segment (20), substantially parallel to the axis of said bushing (12), and of another inclined segment (21), consecutive to said inner segment (20) and facing, from the bottom upwards, in the direction in which it is distanced from the axis of said bushing (12).

15. Hinge as in claim 14, **characterized in that** said inner segment (20) is arranged at a distance from the axis of said bushing (12) that is less than the radius of said first cavity (4), thus defining, in correspondence with said appendix (17), a reduced section with respect to that of said hole (12a).

16. Hinge as in claim 2, **characterized in that** on said bushing (12) a plurality of axial slits (12b) are made, angularly distanced with respect to each other and affecting said elastic appendix (17).

17. Hinge as in any claim hereinbefore, **characterized in that** said pin (23) comprises at the lower part a first zone (24) having a length at least equal to the depth of said first cavity (4) and with a diameter a little less than that of said first cavity (4), so that it is able to be inserted therein with minimum play.

18. Hinge as in claims 15 and 17, **characterized in that** said annular throat (25) is made on the upper part of said first zone (24) and has a diameter substantially equal to that of said reduced section present on said bushing (12) in correspondence with said appendix (17).

19. Hinge as in claim 18, **characterized in that** said annular throat (25) is made at a distance from a first end (23a) of said pin (23) approximately equal to that between said annular seating (6, 106) made in said first cavity (4) and the bottom of said first cavity (4) so that, when said pin (23) is inserted inside said first pintle (3), said annular throat (25) is positioned in correspondence with said annular seating (6, 106).

20. Hinge as in claim 2, **characterized in that** it also comprises a second pintle (28), preferably cylindrical in shape and axially to which a second cavity (29) is made, through, with a diameter slightly greater than that of a second zone (26) of said pin (23), so that said pin (23) is able to be inserted with play into said second cavity (29), said second pintle (28) resting in correspondence with said bushing (12).

21. Hinge as in claim 20, **characterized in that** said appendix (17) opposes the removal of said pin (23) together with the pressure generated on said bushing (12) by said second pintle (28).

22. Hinge as in claim 21, **characterized in that**, when said bushing (12) is inserted into said first cavity (4), said appendix (17) is positioned in correspondence

with said annular seating (6, 106), during the axial movement imparted to said bushing (12), said appendix (17) interacting with said third segment (11) of said annular seating (6, 106), which imposes on said appendix (17) a deformation sufficient to allow the passage of said bushing (12) and the housing of said appendix (17) inside said annular seating (6, 106).

23. Hinge as in claim 22, **characterized in that**, with said bushing (12) inserted and with said pin (23) removed, said plane segment (18) constituting the outer profile of said appendix (17) is detached from said second segment (8) of said first cavity (4), so that between said bushing (12) and said annular seating (6, 106) an interspace (30) is defined that develops in an annular direction.

24. Hinge as in claim 23, **characterized in that**, with said bushing (12) inserted and during the step of inserting said pin (23) into said first cavity (4), the lower end of said plane segment (18) is subjected to a radial deformation so as to allow the complete positioning of said pin (23) inside said first cavity (4) and, in this condition, the positioning of said appendix (17) in correspondence with said annular throat (25) so as to allow said appendix (17) to re-acquire its non-deformed conformation and clamp the axial removal of said pin (23) from said first pintle (3).

25. Hinge as in claim 3, **characterized in that** said sealing ring (135) is made of metal material, is open and has a circular or polygonal section.

26. Method to obtain a pintle (3), or a hinge, of the female type, **characterized in that** it comprises, even in different sequence, the following steps:

- a first step wherein a metal blank (52) is made;
- a second step wherein said metal blank (52) is formed, said second step comprising:
  - a first cold punching of one end of said metal blank (52) so as to obtain an axial pre-hole (54);
  - a second cold punching made on said pre-hole (54) so as to obtain an axial cavity (4) in said pintle (3), or female hinge, with a diameter less than that of said pre-hole (54), to define a stepped zone (57) between said pre-hole (54) and said axial cavity (4);
  - a deformation of said stepped zone (57) so as to obtain an annular seating (6) with at least a throat that defines an undercut in said axial cavity (4).

27. Method as in claim 26, **characterized in that** said throat comprises two segments (7, 8), inclined with respect to each other, which define a substantially V-shaped transverse section of said annular seating (6).

28. Method as in claim 26 or 27, **characterized in that** said first step consists of cutting said metal blank (52) from a metal drawn piece, preferably with a circular section.

29. Method as in claim 26, 27 or 28, **characterized in that** during said first punching a first punch is used that allows part of the material that constitutes said metal blank (52) to rise vertically, all around it, thus achieving a slight increase in its height.

30. Method as in any claim from 26 to 29 inclusive, **characterized in that** during said second punching, a second punch is used, which gives rise to a plastic displacement of material from the central zone of said metal blank (52) towards the upper and outer zones, the material thus deformed rising vertically so as to define said axial cavity (4) in its definitive depth.

31. Method as in any claim from 26 to 30 inclusive, **characterized in that** said deformation of said stepped zone (57) is achieved by using a third punch, which displaces plastically the material, determining the creation of said annular seating (4).

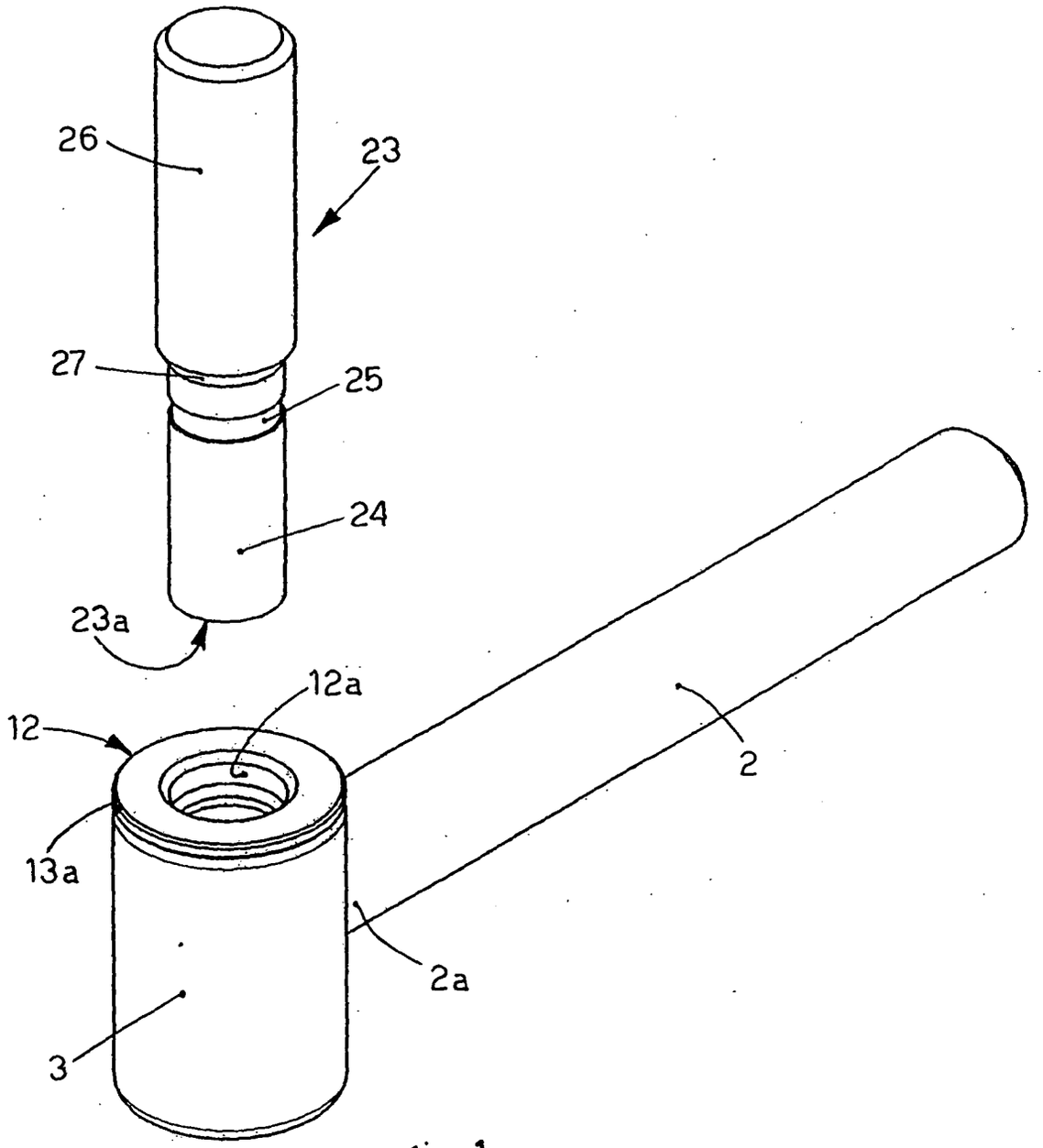


fig.1

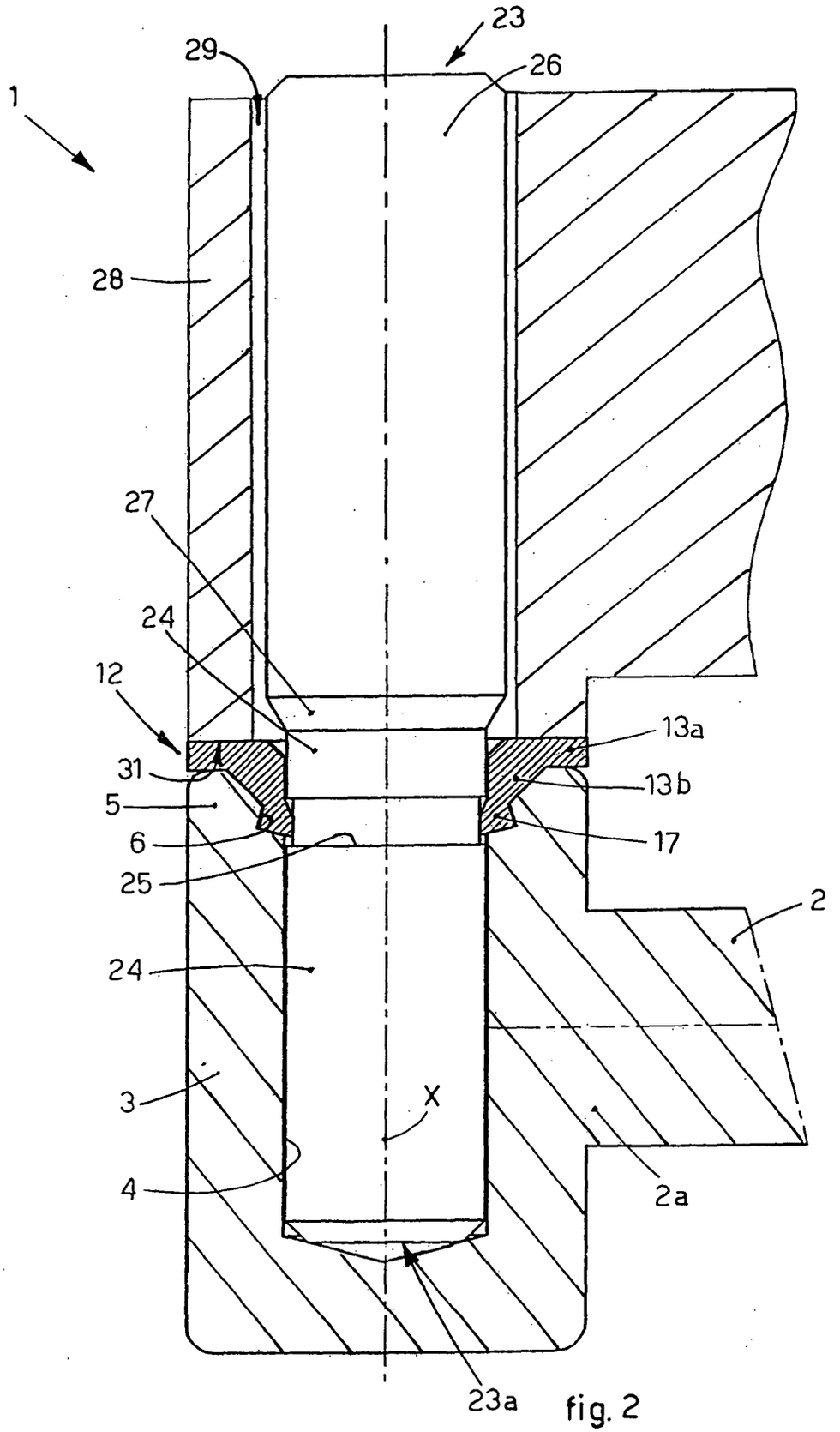


fig. 2

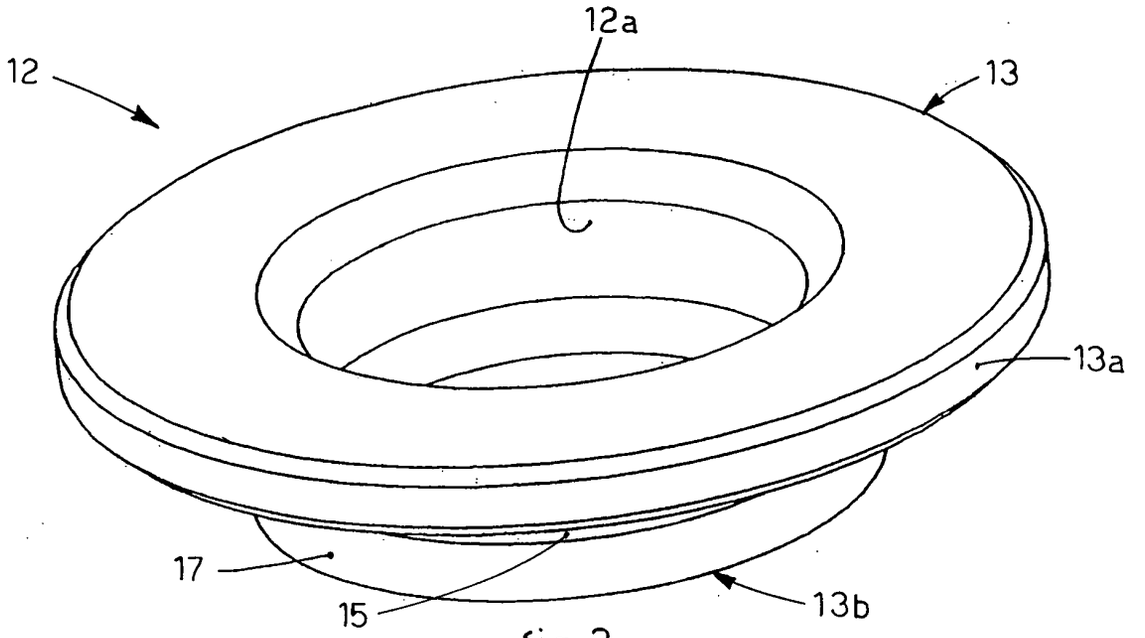

12
12a
13
13a
17
15
13b

fig. 3

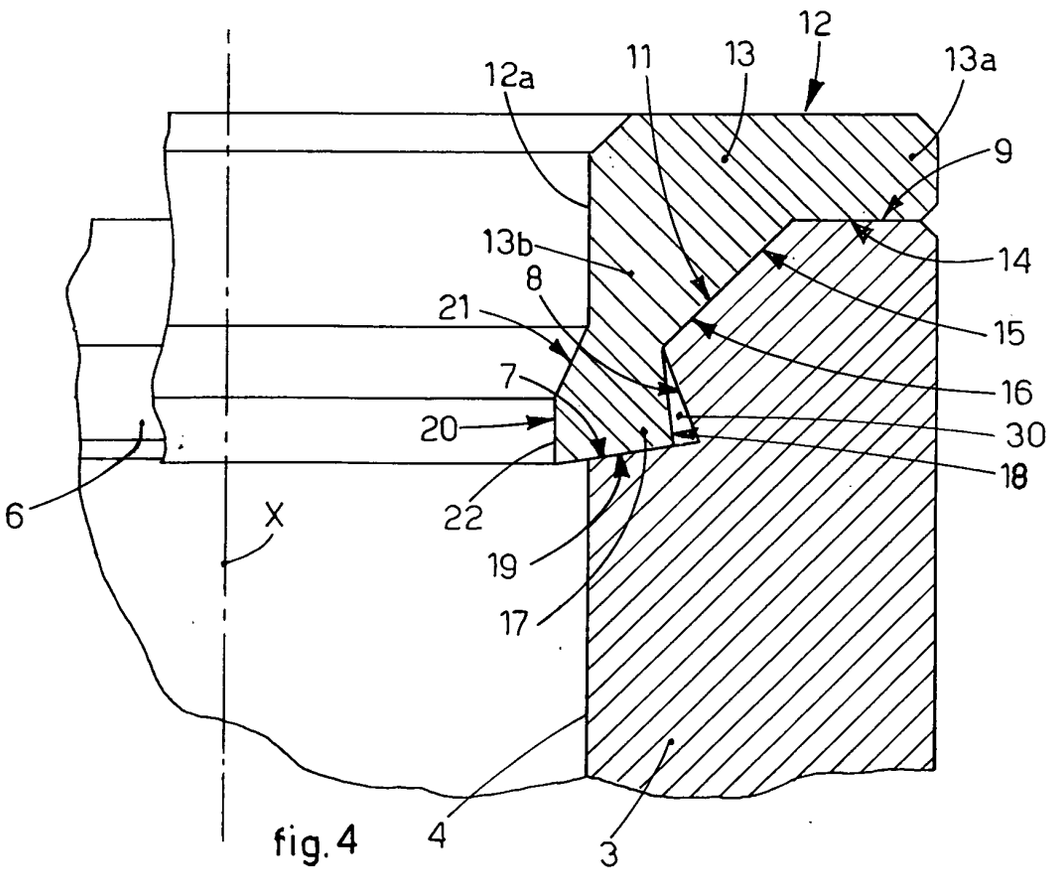

12
11
13
13a
12a
9
13b
14
8
21
15
7
16
20
30
18
6
X
22
19
17
4
3

fig. 4

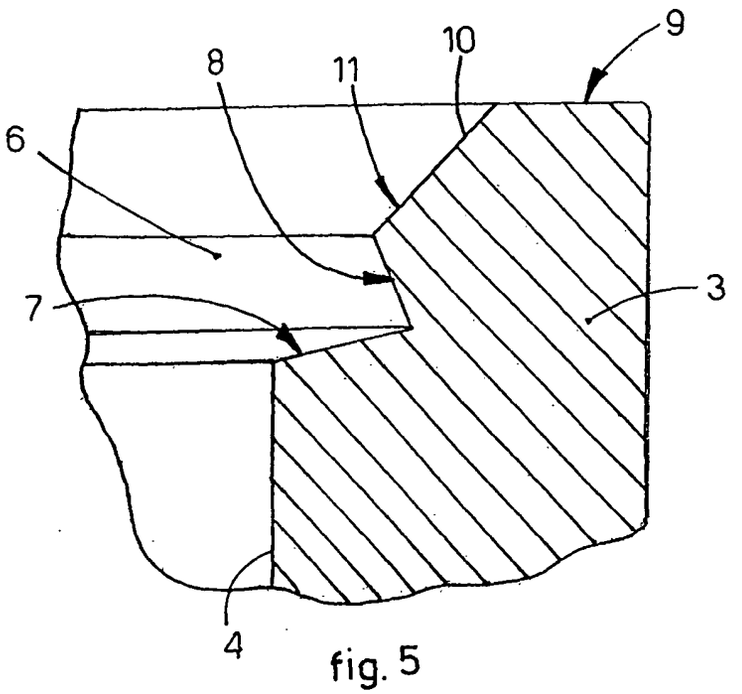


fig. 5

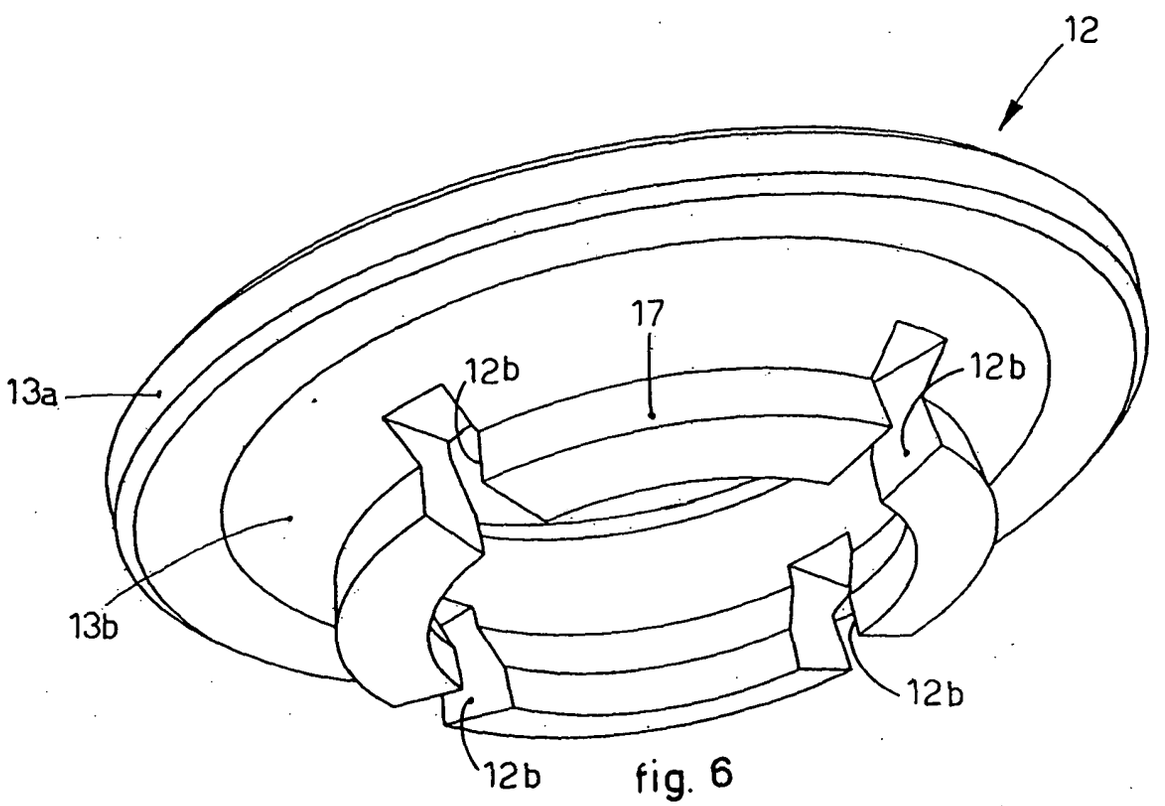


fig. 6

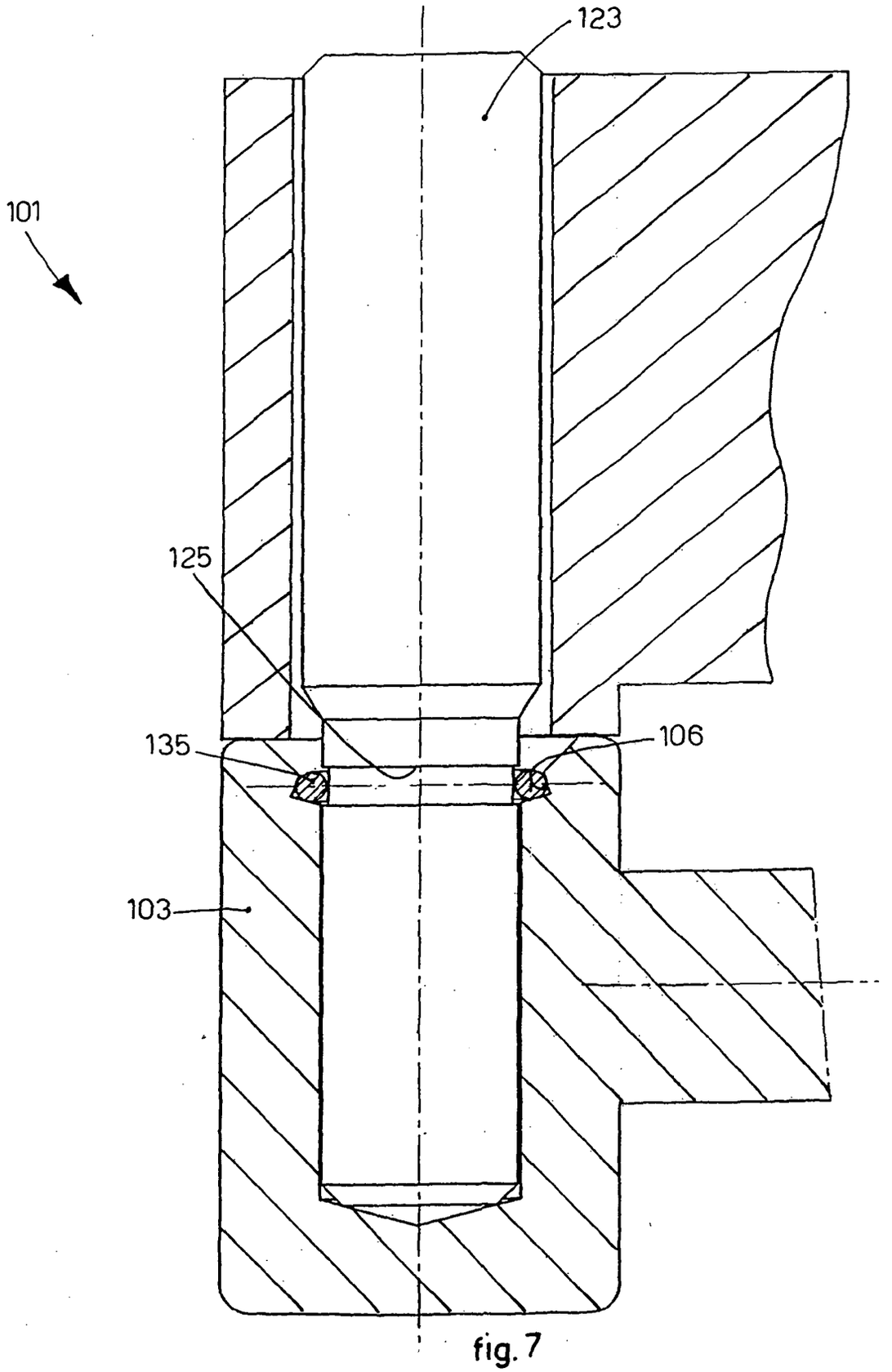


fig. 7

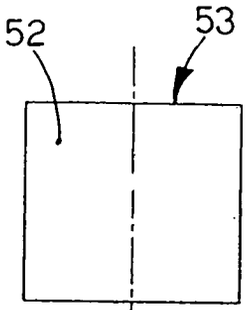


fig.8

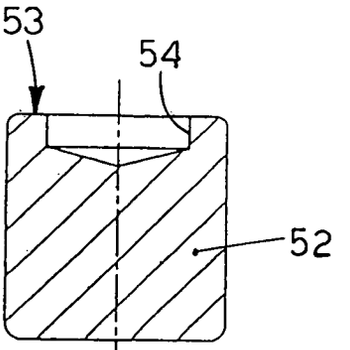


fig. 9

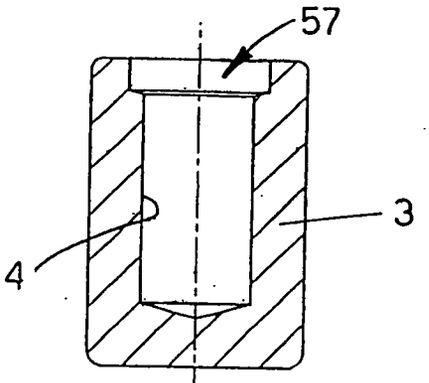


fig.10

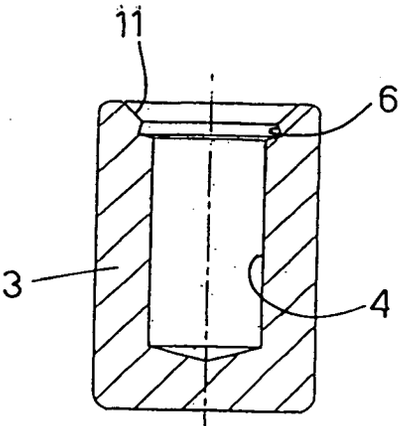


fig.11

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 02 9974

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A	* paragraph [0009] * * claim 1 * * figures 4,5 *	4-15, 19-25	B21C23/20
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X	FR 2 640 674 A (MEMO SPA) 22 June 1990 (1990-06-22) * page 3, line 30 - page 4, line 14 *	1,3,4,25	
A	* figures 3-5,8 *	19	
A	GB 2 156 898 A (WORCESTER PARSONS LIMITED) 16 October 1985 (1985-10-16) * page 2, line 112 - line 121 * * page 3, line 127 - page 4, line 18 * * page 4, line 101 - page 5, line 4 * * figures *	1-25	TECHNICAL FIELDS SEARCHED (Int.Cl.7) E05D B21K B21C
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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
The Hague	11 April 2005	Mund, A

CATEGORY OF CITED DOCUMENTS

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