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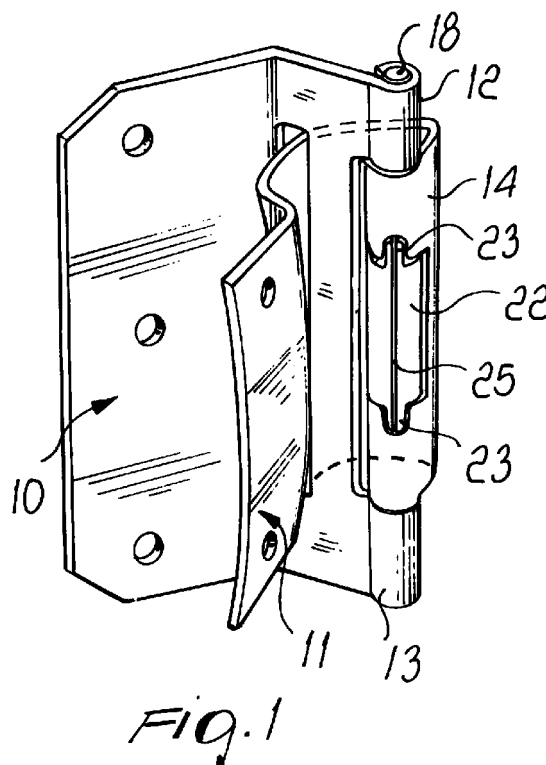
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(54) **Hinge for doors for electric household appliances such as washing machines or the like**

(57) A hinge comprising two components (10,11) formed by blanking and shaping metal plate elements which define, by means of their curled tabs (12-14), respective seats (15-17) crossed by a likewise metallic pivot (18) rigidly coupled to one of them and rotatable with respect to the other. The curled tab of the component that is rotatable is interrupted by a region (21) in which there is a bush (22) made of elastically deformable material which is rigidly coupled to the rotating component, is fitted with an interference fit on the pivot (18) and is adapted to induce compressions in a substantially radial direction in order to provide friction thereon.



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Description

[0001] The present invention relates to a hinge particularly for doors for electric household appliances such as washing machines or the like.

[0002] Conventional hinges, particularly for doors of washing machines, comprise two components formed by blanking and shaping metal plate elements forming, by means of their curled tabs, respective seats crossed by a likewise metallic pivot rigidly coupled to a first one of the components, which is fixed to the supporting structure of the washing machine, and can rotate with respect to a second one of the components, which is fixed to the door.

[0003] In particular, the first component has two parallel, coaxial and spaced wings with respective curled tabs between which the curled tab of the second element is arranged.

[0004] The pivot thus passes through the curled tab of a first wing, the curled tab of the second component, and then through the curled tab of the second wing.

[0005] In this way, the second component is blocked axially between the wings of the first one.

[0006] The pivot is fixed to the first component by deforming the wings of the first component by calking.

[0007] The pivot is also deformed so as to assume a non-straight configuration after insertion.

[0008] This non-straight configuration produces friction in the rotation of the second component that supports the door with respect to the pivot.

[0009] Different embodiments are also commercially available in which the pivot is fixed to the second component (movable part fixed to the door) and produces friction with respect to the first component (the part that is fixed to the washing machine body).

[0010] Although this type of hinge has been commercially available and appreciated by washing machine manufacturers for several years, it is not free from drawbacks, which mainly arise from the particular configuration of the seats of the pivot.

[0011] Since the seats are made of curled metal plate, first of all they are not perfectly circular and, most important, they do not fully close around the pivot.

[0012] Because of this, the torque required to turn the second component is not constant but varies according to the angular position.

[0013] Furthermore, in some cases the simultaneous deformation of the pivot causes sticking and jamming in certain points of the rotation, also because the provided galvanic zinc coating treatment does not cover the inside of the curled portion, which can therefore corrode.

[0014] Finally, it should be observed that the hinge formed without bending the pivot is naturally subject to unacceptable plays between the mutually moving parts.

[0015] The addition of friction-producing plastic elements to the wings of the first element cannot be considered, because in this case electrical continuity

between the two hinge components, required for safety reasons and compulsory according to the pertinent standards, would no longer be provided.

[0016] The aim of the present invention is to provide a hinge which eliminates the above-noted drawbacks.

[0017] Within the scope of the above aim, an object is to provide a friction coupling during the opening rotation in the door which remains constant over time and with use.

[0018] A further object is to provide a hinge which compensates for the coupling plays that occur as the hinge is used.

[0019] A further object of the present invention is to provide a hinge which is in any case competitive with respect to conventional ones.

[0020] A further object of the invention is to provide a hinge whose manufacture does not entail particular technical difficulties with respect to those entailed by current hinges.

[0021] A further object is to provide a hinge which can be manufactured with conventional equipment and systems.

[0022] This aim, these objects and others which will better appear hereinafter are achieved by a hinge particularly for doors for electrical household appliances such as washing machines or the like, comprising two components formed by blanking and shaping metal plate elements which define, by means of their curled tabs, respective seats which are crossed by a likewise metallic pivot which is rigidly coupled to one of them and can rotate with respect to the other, said hinge being characterized in that the curled tab of the component that can rotate freely with respect to said pivot is interrupted by a region in which there is at least one bush made of elastically deformable material which is rigidly coupled to said component, is fitted with an interference fit on said pivot and is adapted to induce compressions in a substantially radial direction in order to provide friction thereon.

[0023] Further characteristics and advantages of the invention will better appear from the following detailed description of embodiments thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a perspective view of a hinge according to the invention in the assembled condition;

Figure 2 is an exploded perspective view of the hinge of Figure 1;

Figure 3 is a sectional view, taken along a transverse plane, of the hinge of Figure 1;

Figure 4 is an enlarged-scale perspective view of a detail of the hinge;

Figure 5 is a plan view of a friction element provided in the hinge;

Figures 6 and 7 are plan views of different embodiments of the element of Figure 5.

[0024] With reference to the above figures, a hinge particularly for doors for electrical household appliances such as washing machines or the like comprises two components, respectively a first component 10 and a second component 11, formed by blanking and shaping metal plate elements which define, with their curled tabs 12, 13 and 14, respective seats 15, 16 and 17 crossed by a likewise metallic pivot 18 which is rigidly coupled to the first component 10 and is rotatable with respect to the second component 11.

[0025] In particular, as shown in the figures, the tabs 12 and 13 belong to the first component 10, and particularly to respective wings 19 and 20 between which the tab 14 of the second component 11 is arranged and is thus locked axially.

[0026] The pivot 18 is rigidly coupled to the first component 10 by plastic deformation thereof.

[0027] According to the invention, the curled tab 14 of the second component 11 is interrupted axially at the center of its length by a region 21 in which a plastic bush 22 is provided which is made of an elastically deformable material (for example polypropylene) and is rigidly coupled to the second component 11.

[0028] The bush 22 in fact comprises, at its ends, with two mutually opposite axial wings 23 which are accommodated in corresponding seats 24 of the curled tab 14 obtained by blanking the metal plate before the curling operations.

[0029] The bush 22 is fitted with an interference fit on the pivot and is shaped like an open ring, since it has a longitudinal slit 25 which also splits in two the wings 23.

[0030] In practice, the inside diameter of the bush 22 is smaller than the outside diameter of the pivot 18, so that the insertion of the pivot in the bush produces compressions in a substantially radial direction and therefore produces friction on the pivot 18.

[0031] Since the bush 22 is made of elastically deformable material, it tends to compensate for plays by tightening around the pivot 18 until the slit 25, which is normally open during use, closes completely.

[0032] An elastic system for compensating for coupling plays has thus been provided.

[0033] With reference to Figures 6 and 7, two constructive embodiments of the bush, designated by the reference numerals 122 and 222, respectively have a cross-section which is again circular with a slit 124, which however in this case lies diametrically opposite the axial tabs 123, and a cross-section with a multiplicity of lobes 126 and is closed.

[0034] The radial deformation of the lobes produces the elastic action on the pivot 18.

[0035] In practice it has been observed that the intended aim and objects of the present invention have been achieved.

[0036] The insertion of the bush 22 in a suitable region of the second component 11 in fact allows to provide an elastic system for providing friction and for com-

pensating for the plays that act on the pivot 18.

[0037] This is achieved very simply by the very blanking and deformation of the second component 11.

[0038] There are no problems of any kind also as regards the provision of the bush 22.

[0039] The slit 25 also allows to automatically load and correctly position the bush 22 on the second component 11.

[0040] Finally, it should be observed that the insertion of the bush 22 at the center of the tab 14 of the second component 11 in any case ensures electrical continuity between the first component 10 and the second component 11, since they are in contact at the tabs 12, 13 and 14.

[0041] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0042] For example, the hinge can have its pivot fixed to the second component and the bush made of elastically deformable material can be fitted in a seat of the first component.

[0043] According to another example, the hinge can also be configured with a multiplicity of articulations, i.e., with two or more articulation pivots.

[0044] In this case, which is the series coupling of two hinges, the element that connects the two pivots constitutes the second component on one side and the first component on the other side.

[0045] All the details may also be replaced with other technically equivalent elements.

[0046] In practice, the materials employed, so long as they are compatible with the contingent use, as well as the dimensions, may be any according to requirements.

[0047] The disclosures in Italian Patent Application No. PD99A000083 from which this application claims priority are incorporated herein by reference.

[0048] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A hinge, particularly for doors for electrical household appliances such as washing machines or the like, comprising two components formed by blanking and shaping metal plate elements which form, by means of their curled tabs, respective seats crossed by a likewise metallic pivot rigidly coupled to one of them and rotatable with respect to the other, said hinge being characterized in that the curled tab of the component that can rotate freely with respect to said pivot is interrupted by a region in which there is at least one bush made of elasti-

cally deformable material which is rigidly coupled to said component, is fitted with an interference fit on said pivot and is adapted to induce compressions in a substantially radial direction in order to provide friction thereon.

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2. The hinge according to claim 1, characterized in that said at least one bush has a circular transverse cross-section and ends, at its tips, with two mutually opposite wings which are accommodated in corresponding seats formed in said curled tab. 10
3. The hinge according to claim 2, characterized in that said at least one bush is open and has a longitudinal slit. 15
4. The hinge according to claim 3, characterized in that said slit is arranged in such a position as to also split in two said end wings. 20
5. The hinge according to claim 4, characterized in that said slit lies diametrically opposite with respect to the position of said wings.
6. The hinge according to claim 1, characterized in that said bush has a multilobed cross-section and has two mutually opposite axial end wings. 25

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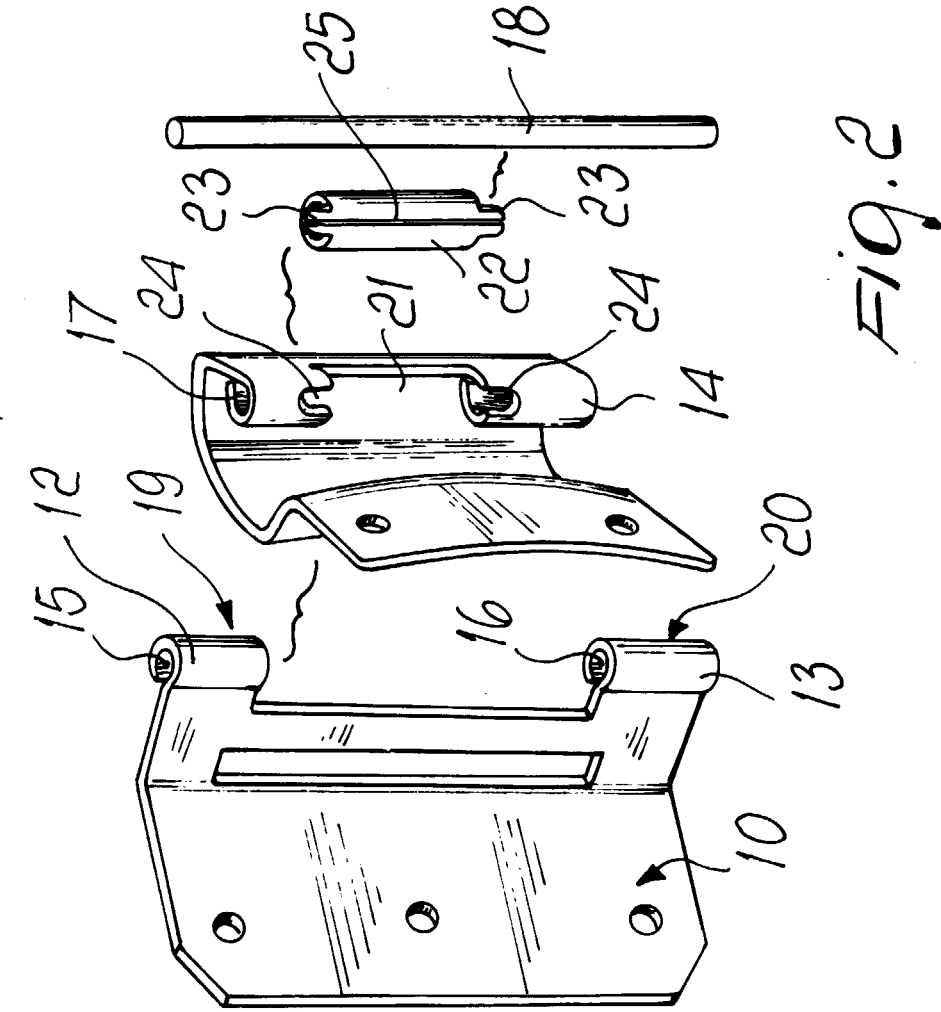


Fig. 1

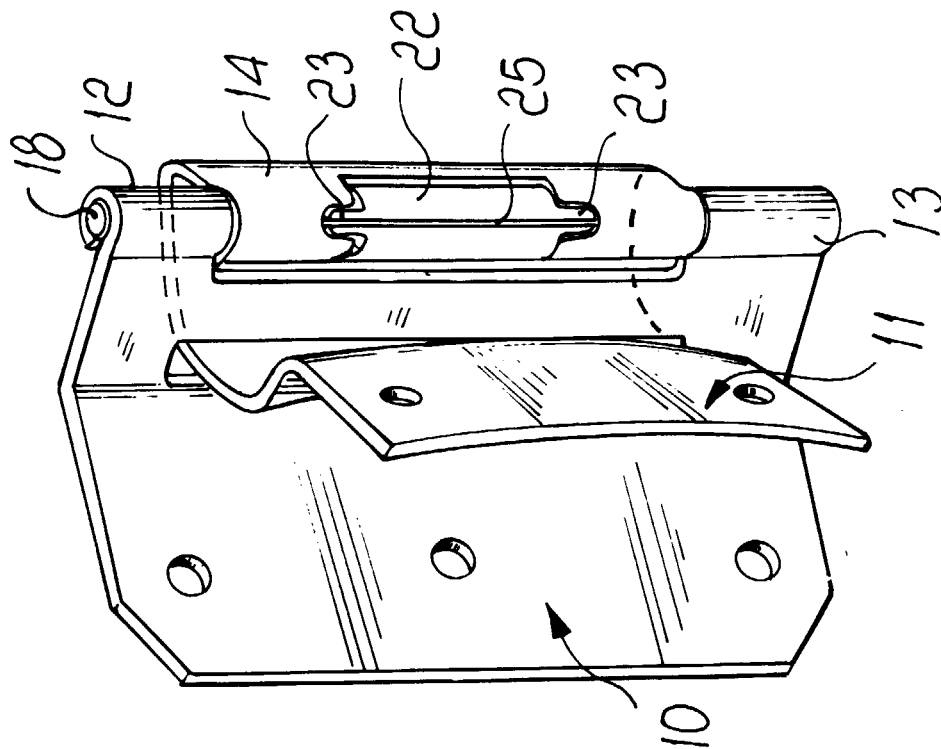


Fig. 2

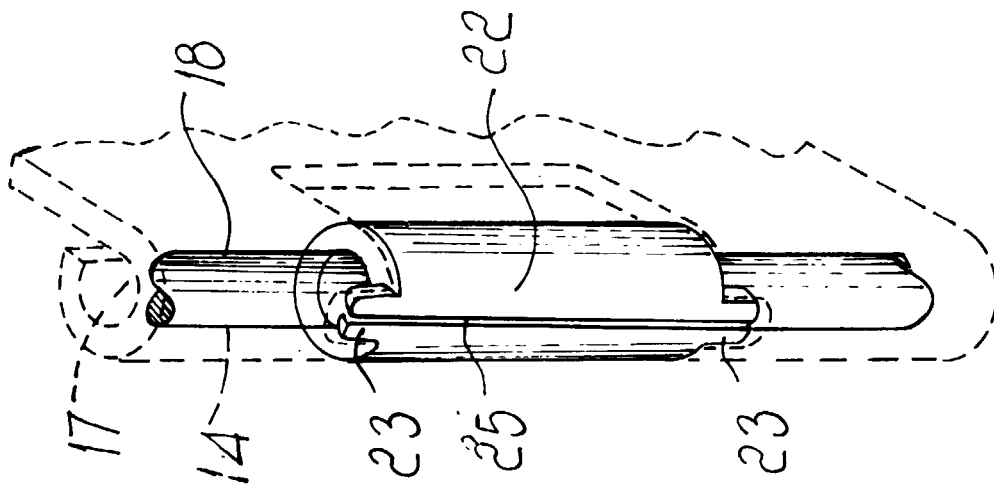


Fig. 4

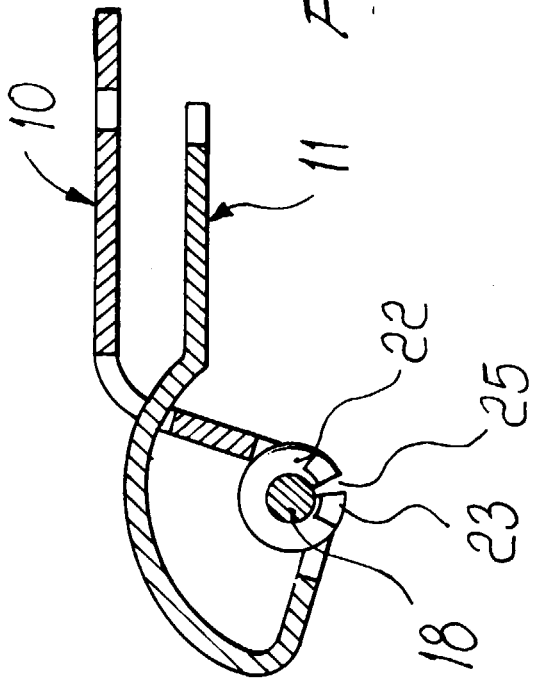


Fig. 3

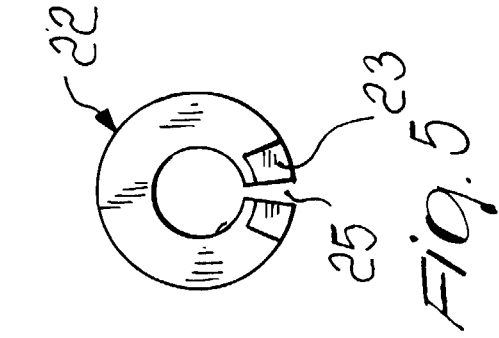


Fig. 5

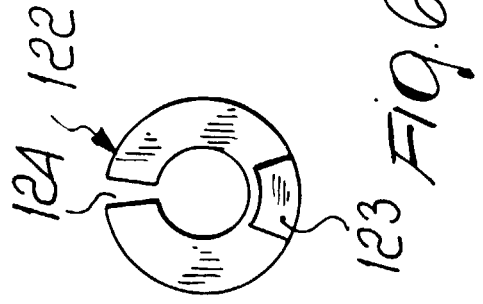


Fig. 6

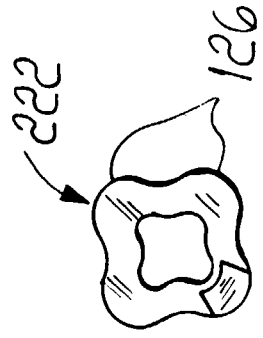


Fig. 7



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EUROPEAN SEARCH REPORT

Application Number
EP 00 10 7988

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	GB 1 555 877 A (SCHARWAECHTER GMBH CO KG) 14 November 1979 (1979-11-14) * page 2, line 66 - line 99; figures 1-4 *	1	E05D11/08
A	DE 813 665 C (SCHULTE) * page 2, line 56 - line 61; figures 1-5 *	3	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7) E05D
Place of search THE HAGUE		Date of completion of the search 26 July 2000	Examiner Guillaume, G
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 10 7988

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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26-07-2000

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