

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO HINGES

(71) I, RICHARD HEINZE, trading as FIRMA RICHARD HEINZE, a German citizen of Eupener Strasse, 4900 Herford, Westphalia, Federal Republic of Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to hinges and more particularly is concerned with hinges of the latching type that is to say of the type including latching means effective to latch the hinge parts relative to one another in the closed position of the two members which are coupled by the hinge.

Such hinges enjoy considerable popularity in relation to articles of furniture. Usually they incorporate a dead-centre spring which, after movement through a dead-centre position, loads the hinge into the closed condition and maintains it therein. Various proposals have been put forward for hinges of this type in which a pivoted link of the hinge is provided with a lug which co-operates with a tilting spring. These proposals are, however, not completely satisfactory, partially because they are expensive to manufacture and partially because of inadequate operation.

Latching means are also known in which deformation of an integrally-formed resilient plastics component is employed to achieve the latching. However, such a construction has disadvantages, since the plastics material is susceptible to damage if the hinge is actuated frequently; and the component has been known to break off after a relatively short period of use.

An object of the present invention is to provide a construction of hinge in which the above-discussed disadvantages have been obviated.

With this object in view, the present invention provides a hinge permitting a first member, such as a door, to pivot relative to a second member, including a hinge casing for attachment to the first member, one or more hinge links pivotally mounted in said

casing and connected to a fitting for attachment to the second member, and a latch element loaded by a spring and pivotally mounted in said casing, a rounded surface of the hinge link or one of the hinge links engaging with the latch element when the hinge casing is in a closed position, corresponding to the first member being closed to the second member, to latch the hinge casing in said closed position, characterised in that the latch element is a lever pivotally mounted in the casing and shaped so that one edge thereof constitutes an inclined surface which is disposed so as to intersect the path of movement of and to be engaged by said rounded surface when the hinge casing is moved towards the closed position and which so slopes relative to the path of movement that, during final closing movement of the hinge casing, the lever is firstly displaced in one direction against its spring loading and thereafter moves in the opposite direction under its spring loading to latch the hinge casing in the closed position.

Preferably the hinge is provided with an abutment which serves to limit the possible pivotal movement of the latch element under its spring loading. In such an arrangement, the spring is always under a certain stress even when the rounded surface of the hinge link is disengaged from the latch element. The shape and angle of the inclined surface of the latch element determines the force development during engagement between the hinge link and the latch element.

A fastening plate, provided on the hinge casing, may be formed with a hood-like chamber which accommodates and masks a spring loading the latch element and into which a part of the latch element projects.

An axially adjustable screw may then be provided for pre-stressing the spring.

The spring may be a spiral spring or a resilient block of rubber or like material. The spring may, however, be a flat spring of metal or synthetic material and may adjustably engage by one end with retaining

means provided on the hinge casing whereby the spring loading of the latch element may be adjusted.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a cross-sectional side elevation illustrating a preferred embodiment of the hinge in its closed condition, the open position also being indicated in broken lines;

Figure 2 is a plan view of the hinge of Figure 1;

Figure 3 is a cross-sectional side elevation through the hinge casing of a first modification;

Figure 4 is a fragmentary plan view of the arrangement of Figure 3;

Figure 5 is a cross-sectional side elevation through the hinge casing of a second modification;

Figure 6 is a fragmentary plan view of the arrangement of Figure 5; and

Figure 7 is a fragmentary cross-sectional side elevation through the hinge casing of a third modification.

In the drawings reference numeral 1 indicates a side wall of an article of furniture to the inner surface of a locating plate 2 is independently secured. This plate 2 is embraced by a fitting 3 which is thereby prevented from rotating but is adjustable in its longitudinal direction and also towards and away from the wall 1, the fitting 3 being connected to the locating plate 2 by means of a fastening screw (not illustrated in Figure 1) and thereby being pressed against an adjusting screw 3' which is accessible through a slot 4 for effecting the adjustment towards and away from the wall 1. The fitting 3 carries two hinge pins 5 and 6 which are surrounded by respective eyes 7 and 8 at one end of respective hinge links 9 and 10 formed of sheet metal. Respective eyes on the other ends of the two hinge links 9 and 10 are mounted on respective hinge pins 11 and 12 in a hinge casing 13 which is located in a recess 14 in a door 15. The hinge casing 13 is of synthetic material and has an integral tapered fastening plate 16 projecting radially of the casing 13, which plate 16 is secured to the inner surface of the door 15 by means of screws 17, 18 and 19. The fastening plate 16 is formed with a hood-like chamber 20 which accommodates a helical spring 21 which locates by one end on a shoulder 22 provided on a set screw 23 extending through the side of the chamber 20 and by its other end on an abutment 24 provided on a latch element in the form of a lever 26 shaped to provide a triangular nose 25 and pivotally mounted by pivot pin 27 in the hinge casing 13. Front surface 25' of the nose 25 is inclined and is so disposed as to intersect the path of movement of and be

engaged by the outer rounded surface of the eye 8 of the hinge link 10 when the hinge casing 13 is moved towards its closed position illustrated in Fig. 1. Alignment pegs 28, 29 of the abutment 24 and the set screw 23 project into the respective ends of the helical spring 21 in order to hold it in position. In the position of maximum extension of the spring 21 the abutment 24 abuts against an inner shoulder 30 of the chamber 20 and thereby limits swinging movement of the lever 26 in the anticlockwise direction of Figure 1. In the closed condition of the door 15, the various parts of the hinge are in the positions illustrated in Figure 1.

The method of operation of the hinge is as follows:— On opening the door 15 by swinging it in the direction of arrow A, the inclined surface 25' of the lever 26 is moved slidably over the eye 8, whilst the door 15 is constrained, by the two hinge links 9 and 10 pivoting about the hinge pins 5 and 6 fixed to the side wall 1, so that the hinge pins 11 and 12 move along arcs 11' and 12'. The door 15 is thereby so lifted away from the confronting edge of the wall 1 of the article of furniture that it does not encounter the front face of the article in its pivoting movement. During this movement, by reason of the shape and disposition of the surface 25' relative to the path of movement of the eye 8, the lever 26 is firstly swung towards the spring 21 which is thereby compressed and is subsequently permitted to return to the illustrated position, the eye 8 of the link 10 disengaging from the surface 25' as the door 15 continues to move towards the fully open position. When the door 15 is subsequently swung back to its closed position, in the final stages of the closing movement, the eye 8 engages with the surface 25' and initially causes the lever 26 to swing against the loading of the spring 21. After passing a point of maximum compression of the spring 21, the lever 26 is permitted to swing back in the opposite direction under the loading of the spring 21 as a result of which movement of the door 15 into the closed position illustrated in Figure 1 is assisted by the force of the spring 21 which, together with the lever 26, effectively latches the door 15 in the closed position.

Figures 3 and 4 show a modification of the hinge in which a leaf spring 31 (of synthetic material or metal) is hingedly connected by one end to the lever 26. This leaf spring 31 has, at its other end, a catch pin 32 each end of which engages in a respective gap of a respective series of teeth 33 formed in an opening in the hinge casing 13. Adjustment of the force exerted by the spring 31 is effected by engagement of the catch pin 32 with selected ones of the gaps between the

teeth 33, which can be effected from outside the hinge casing by means of the catch pin's ends 32 which project out of such casing.

In the modification illustrated in Figures 5 and 6 the lever 26 has a moulded-on spring 34 the free end of which engages with a ratchet or toothing 35 within the hinge casing. Adjacent its free end, the spring 34 is provided with a grip 36 to facilitate adjustment thereof.

Figure 7 shows a further modification. In this case the ratchet or toothing of the arrangement of Figure 5 is replaced by holes 37 selectively engageable by a peg 38 on the free end of the spring. The holes 37 and the peg 38 can, if desired, be substituted by grooves and locking ribs.

In some circumstances in the illustrated embodiments difficulties may arise in mould removal when the hinge casing is moulded in one piece. In such cases the hinge casing may be composed of a number of parts.

WHAT I CLAIM IS:—

1. A hinge permitting a first member, such as a door, to pivot relative to a second member, including a hinge casing for attachment to the first member, one or more hinge links pivotally mounted in said casing and connected to a fitting for attachment to the second member, and a latch element loaded by a spring and pivotally mounted in said casing, a rounded surface of the hinge link or one of the hinge links engaging with the latch element when the hinge casing is in a closed position, corresponding to the first member being closed to the second member, to latch the hinge casing in said closed position, characterised in that the latch element is a lever pivotally mounted in the casing and shaped so that one edge thereof constitutes an inclined surface which is disposed so as to intersect the path of movement of and to be engaged by said rounded surface when the hinge casing is moved towards the closed position and which so slopes relative to the path of movement that, during final closing movement of the hinge casing, the lever is firstly displaced in one direction against its spring loading and thereafter moves in the opposite direction under its spring loading to latch the hinge casing in the closed position.

2. A hinge as claimed in Claim 1, characterised by the provision of an abutment which serves to limit the possible

pivotal movement of the latch element under its spring loading.

3. A hinge as claimed in Claim 1 or 2, characterised in that a fastening plate, provided on the hinge casing, is formed with a hood-like chamber which accommodates and masks a spring loading the latch element and into which a part of the latch element projects.

4. A hinge as claimed in Claim 3, characterised in that an axially adjustable screw is provided for prestressing the spring.

5. A hinge as claimed in Claim 3 or 4 characterised in that the spring comprises a resilient block of rubber or similar material.

6. A hinge as claimed in Claim 1, 2 or 3 characterised in that the spring loading the latch element adjustably engages by one end with retaining means provided on the hinge casing whereby the spring loading of the latch element may be adjusted.

7. A hinge as claimed in Claim 6 wherein the spring is formed integrally with the latch element.

8. A hinge as claimed in Claim 6 or 7 wherein the spring is in the form of a leaf spring.

9. A hinge as claimed in Claim 6, 7 or 8 characterised in that the retaining means comprises a plurality of teeth or holes provided on or in the hinge casing.

10. A hinge as claimed in any preceding claim characterised in that the hinge casing is of a synthetic material.

11. A hinge as claimed in Claim 3 or any of Claims 4 to 10 when appendant to Claim 3 characterised in that the part of the latch element which projects into the hinge casing has a triangular cross-section in a plane perpendicular to the pivot axis of the latch element, the shape and inclination of the inclined surface are selected according to the force with which it is desired to latch the hinge casing.

12. A hinge substantially as hereinbefore described with reference to and as illustrated in Figs. 1 and 2, or Figs. 3 and 4 or in Figs. 5 and 6, or in Fig. 7 of the accompanying drawings.

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teeth 33, which can be effected from outside the hinge casing by means of the catch pin's ends 32' which project out of such casing.

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