United States Patent

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[54] **SELF-HOLDING HINGE**
4 Claims, 4 Drawing Figs.

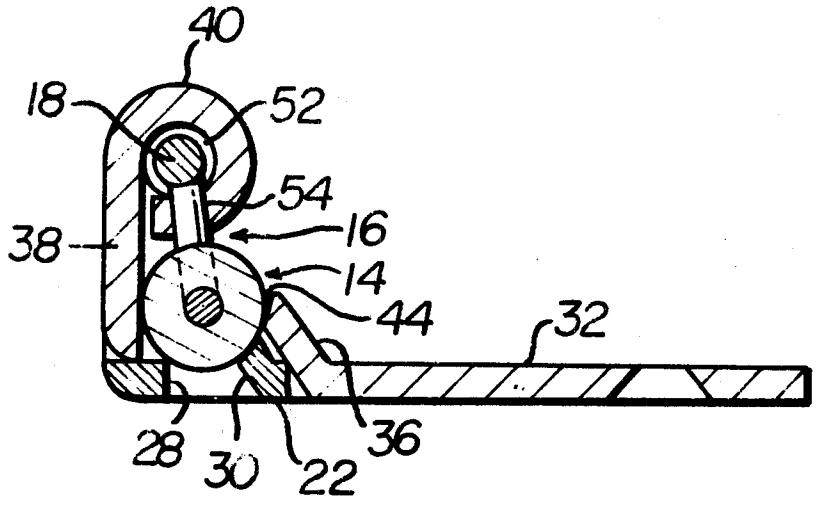
[52] **U.S. Cl.** **16/142**
[51] **Int. Cl.** **E05d 11/08**
[50] **Field of Search** 16/142, 140, 139, 168, 169, 180, 109, 190

[56] **References Cited**
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ABSTRACT: A self-holding hinge of the type wherein a resilient detentlike structure is incorporated into a hinge to resiliently hold or retain the hinge in its closed position.



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2 Sheets-Sheet 1

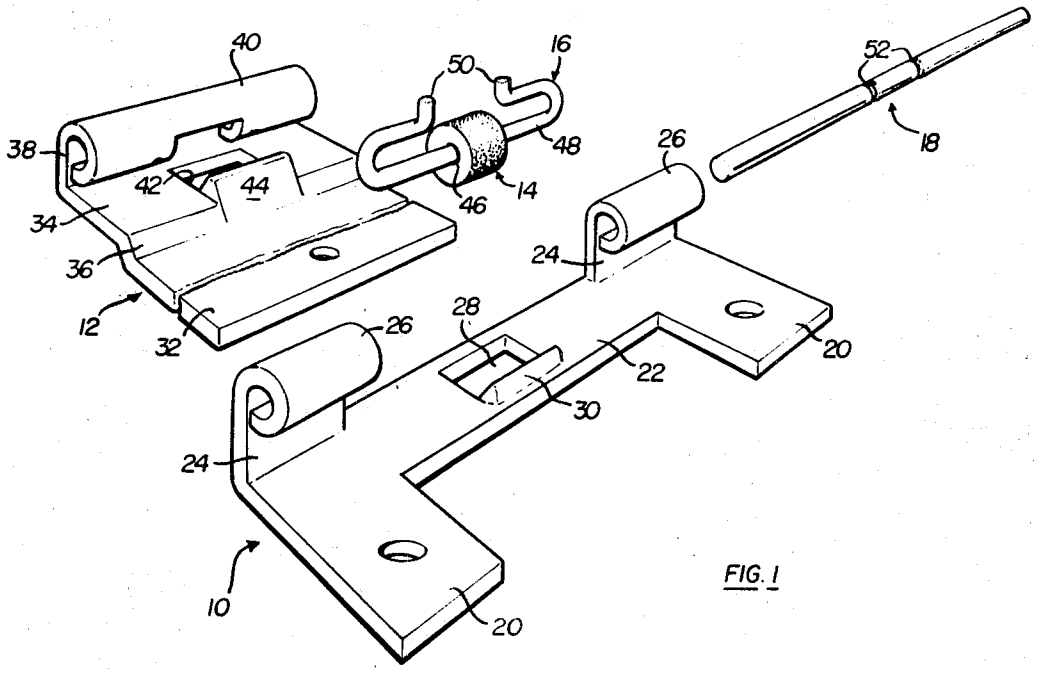


FIG. 1

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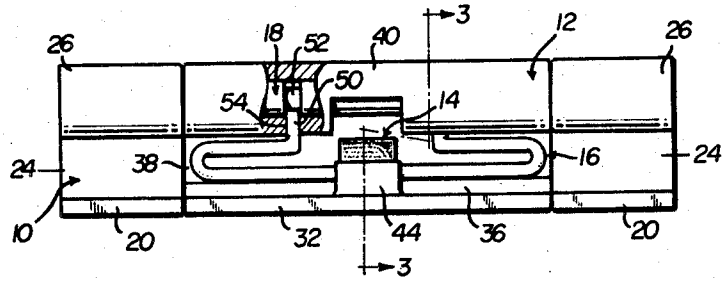


FIG. 2

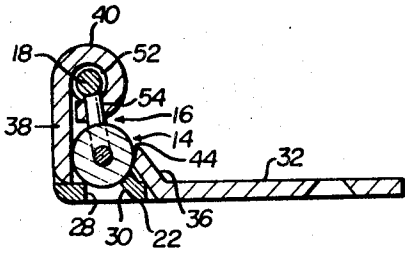


FIG. 3

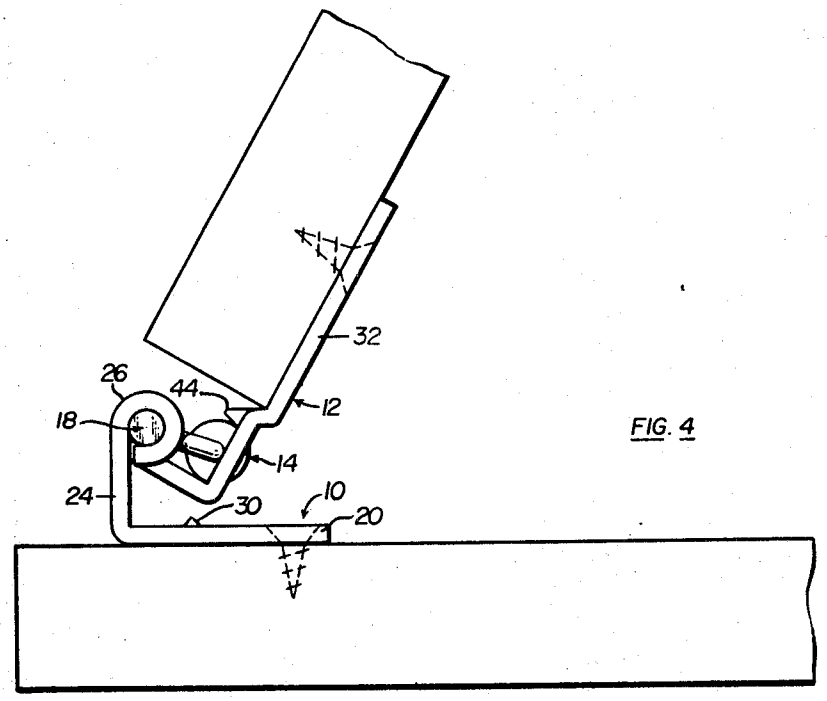


FIG. 4

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SELF-HOLDING HINGE

BACKGROUND OF THE INVENTION

While self-latching hinges of the general type with which the present invention is concerned are known, most prior art hinges of this type suffer from one or more of the following disadvantages:

a. Complexity of construction,
b. Use of one or more individual parts which require out of the ordinary or specialized production techniques either in their formation or in assembly,
c. Latching arrangements relying on resilience in portions of main hinge leaf components which require overly precise manufacturing techniques to achieve proper alignment necessary to assure proper operation,
d. Structural arrangements which present problems either of maintaining an accurately assembled relationship or which are virtually impossible to disassemble for repair of replacement of individual parts.

The hinge of the present invention has been designed to consist of but five individual parts, each of which can be easily made by simple conventional manufacturing techniques. The hinge consists of two main members or hinge leaves, a cylindrical detent roller, an elliptic wire spring element and a hinge pin. The detent roller is rotatably mounted on the spring member which is engaged between the hinge pin knuckle and mounting portion of one of the leaves with the detent roller projecting through an opening in the leaf. The spring and roller are thus mounted on a single hinge member and retained in their assembled relationship by the resilience of the spring. A cooperating detent lip on the other hinge member or leaf cooperates with the roller to resiliently retain the hinge in the closed position. The spring member is likewise employed to releasably lock the hinge pin against axial movement, the opposite ends of the spring projecting radially through openings in the hinge knuckle to be received in circumferential grooves in the hinge pin.

Other objects and features of the invention will become apparent by reference to the following specification and to the drawings.

IN THE DRAWINGS

FIG. 1 is an exploded view showing the individual elements of the hinge in perspective;

FIG. 2 is a front elevational view, partially in cross section, of the hinge per se in its closed position;

FIG. 3 is a cross-sectional view of the hinge in its closed position, taken approximately on line 3–3 of FIG. 2; and

FIG. 4 is a side elevational view of the mounted hinge in a partially open position.

Referring first to FIG. 2, a hinge embodying the present invention includes five individual elements, first and second main hinge leaf members designated generally 10 and 12, a cylindrical detent roller 14, rotatably mounted upon an elliptic wire spring 16, and a hinge pin 18.

For convenience, hinge element 10 will be referred to as the "outer hinge element" because, in the assembled condition, the other or "inner" hinge element 12 is disposed between portions of hinge element 10. Hinge element 10 is formed from sheet metal material, as by a progressive die operation, and includes a flat, generally C-shaped mounting portion having a pair of forwardly projecting arms 20 integrally connected in spaced relationship to each other by a central base portion 22. At the rear edge of base 22, a pair of upwardly projecting flanges 24 are integrally connected to the base and are rolled over at their upper ends to form hinge pin receiving knuckles 26. Knuckles 26 are in spaced axial alignment with each other and are laterally offset from the general plane of the mounting portion 20, 22 of the hinge member.

In the central portion of base 22, a rectangular opening 28 is punched through the base, and the metal at the forward edge of the opening 28 is upset to form an upwardly inclined detent lip 30.

Hinge element 12 is formed, as by a progressive die operation from a rectangular piece of sheet metal and includes a flat mounting portion 32 having a width such that it fits between the opposed inner edges of arms 20 of hinge element 10. At its rearward side, mounting portion 32 is offset to provide a flat portion 34 integrally connected to mounting portion 32 by an inclined portion 36. Portions 32 and 34 lie in parallel general planes which are offset from each other by the thickness of base portion 22 of outer hinge element 10 so that, when the hinge is in the closed position, portion 34 is in substantially face-to-face engagement with base 22 of hinge element 10, while mounting portion 32 lies in the same general plane as arms 20. At its rearward end, portion 34 merges into an upwardly bent flange 38 which is rolled over at its upper edge to form a hinge knuckle 40.

Approximately midway of offset portion 34 of hinge element 12, a rectangular opening 42 is punched through portion 34 and, as was the case with hinge element 10, the forward edge of this opening is offset to form an upwardly projecting inclined lip 44, the lip 44 being essentially a continuation of inclined portion 36.

Detent roller 14 is a simple cylindrical roller which may be formed from any suitable material, such as nylon, or other plastic or metal material. The roller is centrally bored as at 46 so that the roller can be rotatably mounted on the wire spring element 16.

Spring element 16 takes the form of an elliptic spring of resilient wire material bent into the illustrated shape which includes the generally flattened C-shaped spring section 48 which terminates at each end in projecting fingers 50.

Hinge pin 18 consists of a simple pin having a pair of circumferential grooves 52 axially spaced from each other by the same distance as which the fingers 50 of spring 16 are spaced from each other.

The assembly of the hinge is best shown in FIGS. 1, 3 and 4. As best seen in FIG. 3, the width of hinge element 12 is such that when the hinge is in the illustrated closed position, the hinge element 12 fits between the spaced arms 20 and spaced flanges 24 of hinge element 10. When in this position, the knuckle 40 of hinge element 12 is axially aligned with the spaced knuckles 26 of hinge element 10, and hinge pin 18 passes through the knuckles to pivotally couple the two hinge elements to each other. Offset portion 34 of hinge element 12 bridges the base 22 of hinge element 10, and openings 42 and 28 are aligned with each other, the lip 44 on hinge element 12 lying against the inclined upper surface of lip 30 on hinge element 10, as best seen in FIG. 3. Spring 16 is resiliently engaged between the upper surface of portion 34 and the lower surface of knuckle 40 of hinge element 12, with roller 14 mounted upon the spring element and having its lower portion projecting downwardly through opening 42 and into opening 28. Fingers 50 of the spring project upwardly through openings 54 in the lower surface of the knuckle and into the grooves 52 of hinge pin 18 to thereby retain the hinge pin against axial movement.

From FIG. 3, it will be noted that roller 14 is not only engaged against axial or side-to-side movement within opening 42 by the side edges of the opening, but is further retained against movement from right to left as viewed in FIG. 3 by lip 44 and flange 38.

The biasing force of spring 16 is normally absorbed by its engagement between knuckle 40 and portion 34 of hinge element 12, however, upon opening or closing of the hinge, the spring may be compressed to permit roller 14 to roll over detent lip 30 of hinge element 10. Lip 30 and the spring biased spring and roller combination 16 and 14 thus act as a resilient detent for releasably latching or retaining the hinge assembly in its closed position.

The mounting portions of the hinge elements 10 and 12 may be suitably bored to accommodate mounting screws 56 (see FIG. 4).

While one embodiment of the invention has been described in detail, it will be apparent to those skilled in the art that the

disclosed embodiment may be modified. Therefore, the foregoing description is to be considered exemplary rather than limiting, and the true scope of the invention is that defined in the following claims.

I claim:

1. A self-holding hinge assembly comprising first and second hinge members each having a generally flat mounting portion and integrally formed hinge pin receiving knuckles laterally offset to one side of the general plane of the mounting section by a flange portion perpendicular to and integral with the mounting section, a hinge pin received in said knuckles to pivotally couple said hinge members to each other for hinged movement of said first hinge member relative to said second hinge member in which in a closed position a first portion of the mounting section of the first hinge member lies in substantially face-to-face overlying engagement with a first portion of the mounting section of the second hinge member, said first portions having openings therethrough aligned with each other when said hinge members are in their closed position, a detent roller received in the opening of said first hinge member, a spring element supporting said roller for rotation about an axis parallel to said hinge pin attached to said first hinge member for movement therewith an engageable between the knuckle and first portion of said first hinge member to resiliently bias said roller away from said knuckle to a normal position determined by the engagement of said spring element with said first portion of said first hinge member, said roller, when in its normal position and said hinge assembly is in its closed position, projecting through the opening in said first hinge member and into the opening in said second hinge member, and a detent lip on said second hinge member projecting into the path of movement followed by said roller upon movement of said hinge assembly into closed position to thereby retain said hinge assembly in closed position and to require temporary compression of said spring element upon movement of said hinge assembly from its closed position.

2. A hinge assembly as defined in claim 1 wherein said spring element comprises an elliptic wire spring passing through said roller to rotatably support said roller said spring having a pair of projecting fingers at each end of the wire element from which the spring is formed, means defining a pair of openings in the knuckle of said first hinge member receiving said fingers, said hinge pin having a pair of circumferential grooves therein adapted to receive said fingers to retain said hinge pin against axial movement within said knuckle.

3. A hinge assembly as defined in claim 1 wherein said opening in said first portion of said first hinge member is located adjacent the juncture of said flange of said first hinge member with said first portion, and a retaining lip bent upwardly from said first portion of said first hinge member at the side of said opening opposite said flange to confine said roller between said retaining lip and said flange.

4. A hinge assembly as defined in claim 1 wherein said first portion of said first hinge member lies in a general plane offset from the general plane of the mounting section by approximately the thickness of the first portion of said second hinge member, said mounting section of said second hinge member having a pair of forwardly projecting arms spaced from each other by at least the width of the mounting section of said first hinge member whereby the mounting section of said first and second hinge members lie in a common general plane when said hinge is closed.