Jan. 3, 1961 J. MINTZ 2,966,697

SELF-LOCKING HINGE

Filed May 16, 1958

FIG. 1

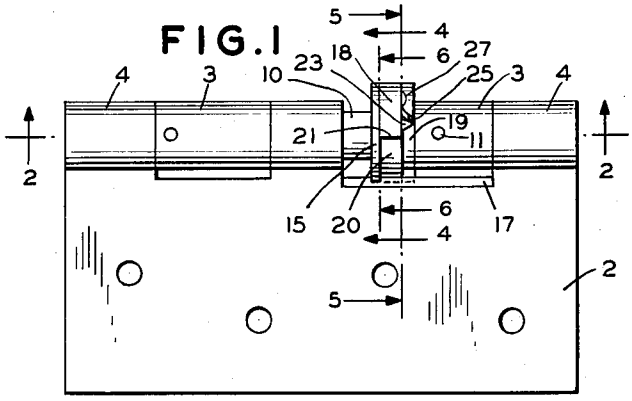


FIG. 3

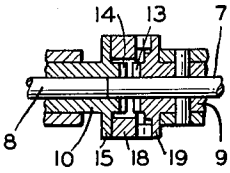


FIG. 4

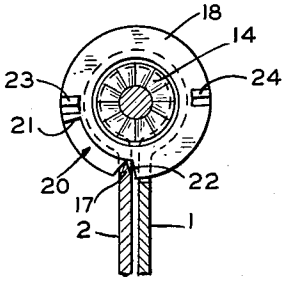


FIG. 2

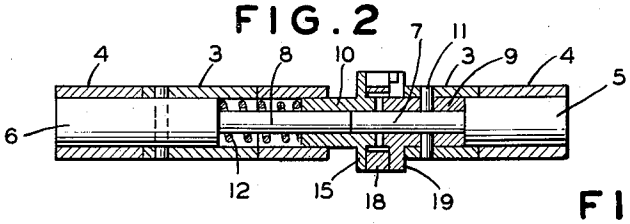


FIG. 5

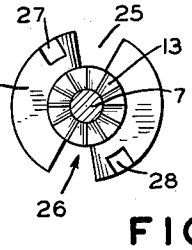


FIG. 6

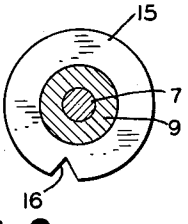


FIG. 7

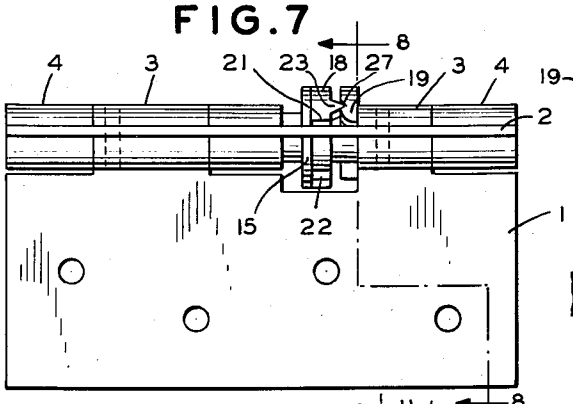


FIG. 8

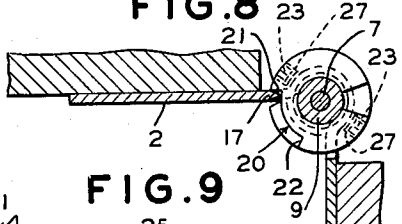


FIG. 10

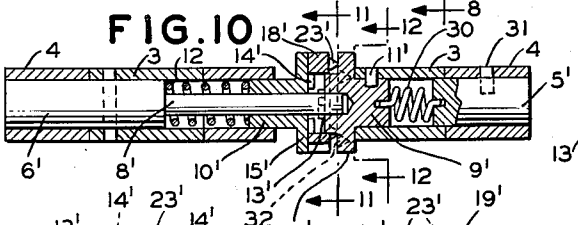


FIG. 9

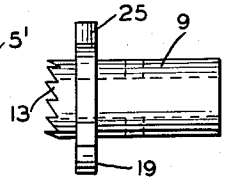


FIG. 11

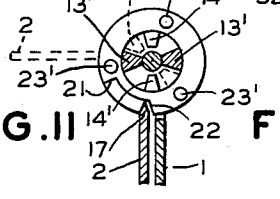
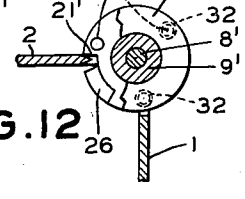


FIG. 12



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SELF-LOCKING HINGE

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9 Claims. (Cl. 16—144)

This invention relates to hinges and more particularly to a hinge construction for securing a door or closure member to a fixed body or support. It is especially useful in connection with doors or lids which open vertically, against gravity, as in the case of many types of luggage, car trunk lids, and the like. However, it is not limited to such use, but may also be employed for doors which swing on vertical pivots, as car doors, house doors, windows, and the like.

One of the objects of the invention is to provide a hinge comprising relatively movable hinge members pivoted together and having cooperating locking or latching means which permit free opening movement of the members but which lock the members against closure in one or more open positions of the hinge.

A further object is to provide a hinge of the above nature in which the members may be released for free closing movement upon a further predetermined opening movement thereof.

A still further object is to provide a hinge of the latching or locking type in which the latching and unlatching mechanism is mounted upon the hinge pin.

Further objects and advantages will hereinafter appear.

In accordance with the present invention I provide a hinge structure shown in the form of a butt hinge having a pair of flat leaf plates and intermeshed pintle loops through the aligned eyes of which pintle members pass. A portion of one of the loops is cut away and within the space thus provided a locking, detenting, or latching mechanism is provided. Such mechanism comprises generally a pair of spring pressed members mounted upon the hinge pintle means, one rigidly secured to one leaf plate and the other rotatable relative thereto by the opening and closing movement of the other leaf member, the opposed members having interengaging means for locking or detenting one leaf member relative to the other in predetermined open positions of the leaves. A third member also mounted on the pintle means serves during a predetermined movement of the leaves to disengage the locking or detenting members and to retain the same disengaged during a further movement of the leaves.

The invention will best be understood by reference to the accompanying drawing in which:

Fig. 1 is a side view of a butt hinge, in closed position, showing the invention applied thereto;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1, showing the locking members in interengagement;

Fig. 3 is a fragment of a similar section showing the locking members disengaged;

Fig. 4 is an enlarged sectional view on the line 4—4 of Fig. 1;

Fig. 5 is an enlarged sectional view on the line 5—5 of Fig. 1 with the hinge in the closed position;

Fig. 6 is a sectional view on the line 6—6 of Fig. 1;

Fig. 7 is a side view of the hinge in fully opened position;

Fig. 8 is a sectional view on the line 8—8 of Fig. 7;

Fig. 9 is a detail view of one of the locking sleeves;

Fig. 10 is a sectional view similar to Fig. 2 but showing a modified construction;

Fig. 11 is a sectional view on the line 11—11 of Fig. 10; and

Fig. 12 is a sectional view on the line 12—12 of Fig. 10.

Referring first to Figs. 1, 7 and 8, the hinge comprises two leaf members 1 and 2 having interengaged pintle loops 3 and 4, respectively. The aligned eyes of the loops receive a hinge or pintle composed of two parts 5 and 6 (Fig. 2) insertable from opposite ends of the hinge. The inner ends 7 and 8 of the respective pintle members are reduced in diameter to receive two sleeves 9 and 10, respectively. The sleeve 9 is pinned at 11 to the pintle loop 3 formed on leaf member 1. The sleeve 10 slides loosely on the reduced end 8 of pintle member 6 and is urged into endwise engagement with sleeve 9 by a coiled spring 12.

The abutting ends of sleeves 9 and 10 have complementary teeth 13 and 14, respectively, Figs. 3, 4 and 5, normally held interengaged by the spring 12. The sleeve 10 has a circular flange 15, notched at 16 (Fig. 6), for engagement with the inner edge 17 of the leaf 2, said edge being formed in part by cutting away of one of the pintle loops 4. As a result the sleeve 10 will be rotated in either direction by the opening and closing movement of leaf member 2.

It will be noted that the teeth 13 and 14 are shaped to permit the teeth 14 of sleeve 10 to cam past the teeth 13 of sleeve 9 against the compression of spring 12 on an opening movement of the leaf member 2 but to lock into each other so as to prevent a closing movement of the leaf member 2 in any one of a number of open positions, depending upon the number and size of the teeth 13 and 14. Thus the hinge may be readily opened to a number of different positions in which it is held against closure.

In order to restore the hinge to its closed position it is necessary to first open it to a predetermined further position in which means is brought into play for completely disengaging the teeth 13 and 14 holding them disengaged until the hinge leaves again reach their fully closed position. For this purpose a camming ring 18 is loosely mounted on the abutting sections of sleeves 9 and 10 between the flange 15 and a flange 19 formed on sleeve 9. The function of ring 18 is to force sleeve 10 to the left, as seen in Fig. 2, to disengage teeth 13 and 14, as shown in Fig. 3. The ring 18 is cut away at 20 over substantially a 90° arc to form the shoulders 21, 22, engageable by the edge 17 of leaf plate 2. The ring 18 is provided with a pair of diametrically opposite cam lugs 23, 24, which normally rest in recesses 25, 26 in the flange 19 of sleeve 9.

During the opening movement of leaf plate 2, the edge 17 thereof moves freely in the cut away portion 20 of cam ring 18 but as the leaf nears a predetermined fully opened position the leaf edge 17 engages shoulder 21 of the cam ring 18 and rotates, upwardly as seen in Fig. 1, causing lugs 23, 24 to engage the sloping faces of slots 25, 26 to thereby force cam ring 18 to the left. Further rotative movement causes lugs 23, 24 to detent in depressions 27, 28 formed in the face of flange 19, thereby locking cam ring 18 to sleeve 9. Leftward movement of the cam ring 18 forces sleeve 10 to the left, thus disengaging the teeth 13 and 14. The leaf plate 2 may now be freely closed, the locking teeth being held disengaged until full closure of the hinge.

As the hinge leaf 2 approaches leaf 1, the edge 17 of the leaf 2 engages the opposite shoulder 22 of cam ring 18, thus rotating the ring counterclockwise as seen in Fig. 4, and thus forcing the cam lugs 23, 24 out of the detents 27, 28 and into the slots 25, 26 of flange 19. When this occurs, substantially in the fully closed posi-

tion of the hinge, the teeth 13, 14 become reengaged. The hinge is then again in condition for reopening into a number of positions from which it is locked against closure.

In Figs. 10, 11 and 12 I have shown a modified form of hinge in which the interlocking teeth are held disengaged during both the opening and closing movements of the hinge and become engaged to lock the hinge open only when such open position is reached. The hinge is unlocked by a slight further opening movement and is closed under spring action.

Referring to Fig. 10, the sleeve 10' is urged to the right by the coiled spring 12 as in Fig. 2. The opposite sleeve 9' is pinned at 11' to the pintle loop 3 of leaf 1. In this form the sleeve 9' bears on the extended end 8' of pintle member 6' and is connected by a torsion spring 30 to pintle member 5' which is pinned at 31 to pintle loop 4 of leaf member 2.

The hinge of Figs. 10, 11 and 12 is designed to have but one locked open position, and hence the serrated teeth 13, 14 of the first form have been replaced by pairs of keystone shaped lugs 13', 14' disposed on sleeves 9', 10', respectively. In the closed position of the hinge these pairs of lugs are located substantially 90° to each other as shown in Fig. 11. When the hinge leaf 2 is opened to the dotted line position of Fig. 11, the lugs 14' move clockwise relative to lugs 13' into the dotted position of this Fig. 11. Since the pintle member 5' is pinned to leaf 2 and sleeve 9' is pinned to leaf 1, opening movement of the hinge tensions spring 30.

Normally the lugs 13', 14' are held disengaged as shown in Fig. 10 by the ring 18' so that the hinge leaves may be freely opened. For this purpose ring 18' has a group of three conical lugs 23' which engage the face of the collar 19' of sleeve 9', to hold the sleeve 10' to the left against tension of spring 12, a sufficient distance to retain locking lugs 13', 14' separated. The collar 19' is continuous and is provided with three conical recesses such as 32, circumferentially spaced to correspond with the location of the lugs 23' but out of radial alignment therewith in the closed position of the hinge.

When the hinge is opened from the closed position of Fig. 11 to the open position of Fig. 12, the edge 17 of leaf 2 engages the shoulder 21 of ring 18' to rotate the ring clockwise (Fig. 11) until the lugs 23' become aligned with conical recesses 32 of collar 19'. This occurs with the hinge open to the position of Fig. 12 and lugs 14' in the dotted position of Fig. 11. Lugs 23' thus move under pressure of spring 12 into the recesses 32 and lugs 14' drop in behind lugs 13'. The inter-engagement of lugs 14', 13' locks the leaf 2 against closing movement.

When it is desired to close the hinge it is first opened a further distance to cam the lugs 23' out of recesses 32 and thus force sleeve 10' to the left to disengage the lugs 14', 13'. Then upon release of leaf 2 the spring 30 returns the hinge to the closed position. In this return movement the ring 18' remains stationary until the edge 17 of leaf 2 engages shoulder 22 of notch 20 nearly in the closure position of the hinge. At this time lugs 14' are also approaching the solid position shown in Fig. 11 and hence out of locking position. As the edge 17 hits shoulder 22, ring 18' is driven counterclockwise and the momentum carries lugs 23' across the recesses 32 without reentry therein.

It will be understood of course that various modifications of the structures disclosed may be made, particularly in the form of the interengaging locking or detenting members and the camming means for disengaging the same, without departing from the essential attributes of the invention, and I contemplate all such changes and modifications as come within the scope of the appended claims.

What I claim is:

1. A hinge comprising a pair of hinge members, each having pintle loops at one end, pintle means engageable in said loops, a pair of interengaging positive locking members carried by said pintle means for locking said hinge against closure from at least one open position and means operable by a predetermined further opening movement of said hinge for disengaging said locking members to permit said hinge to be freely actuated to a closed position.

2. A hinge as defined in claim 1 in which said locking members have interengageable toothed surfaces, resilient means normally holding said toothed surfaces in engagement, the teeth of said surfaces being shaped to permit relative rotation of said locking members in one direction and to lock said members from relative rotation in the opposite direction.

3. A hinge as defined in claim 1, having spring means for holding said locking members in engagement, and said means for disengaging said locking members comprises a rotatable member having a cam element for separating said locking members against the action of said spring means.

4. A hinge as defined in claim 3, which comprises means for holding said members disengaged during closing movement of said hinge.

5. A hinge as defined in claim 1, having spring means tensioned by the opening movement of and operative upon said disengagement of said locking members for restoring said hinge to its closed position.

6. A hinge comprising a pair of hinge members, spring pressed interengageable hinge holding means operable into engagement in at least one operated position of the hinge members for holding said members in said operated position and a cam member operable in another operated position of said hinge members for separating said interengageable means, said cam member serving to retain said last means separated during a subsequent movement of said hinge members.

7. A hinge as defined in claim 6, in which said hinge members are mounted upon a hinge pin and said interengageable means include clutch elements rotatable relative to each other about the axis of said pin, and relatively along said axis for interengagement and disengagement.

8. A hinge as defined in claim 6, in which said cam member comprises a ring rotatable by the movement of one of said hinge members and having cam elements, and a member carried by the other hinge member having cooperating cam elements, said cam elements cooperating to permit engagement of said hinge holding means in at least said one operated position of said hinge members and for retaining said holding means disengaged in other positions of said hinge members.

9. A hinge comprising a pair of hinge members, said members each having pintle loops, a pintle disposed in said loops, a first detent member mounted on the axis of said pintle and fixedly secured to one of said hinge members, a second detent member mounted on the axis of said pintle for axial and rotative movement, a spring urging said second detent member axially into contact with said first detent member, means for rotating said second detent member by said other hinge member, and a cam member separate from said detent members mounted for axial rotation by said other hinge member and serving in predetermined rotative positions thereof to cam said first detent member out of contact with said second detent member.

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