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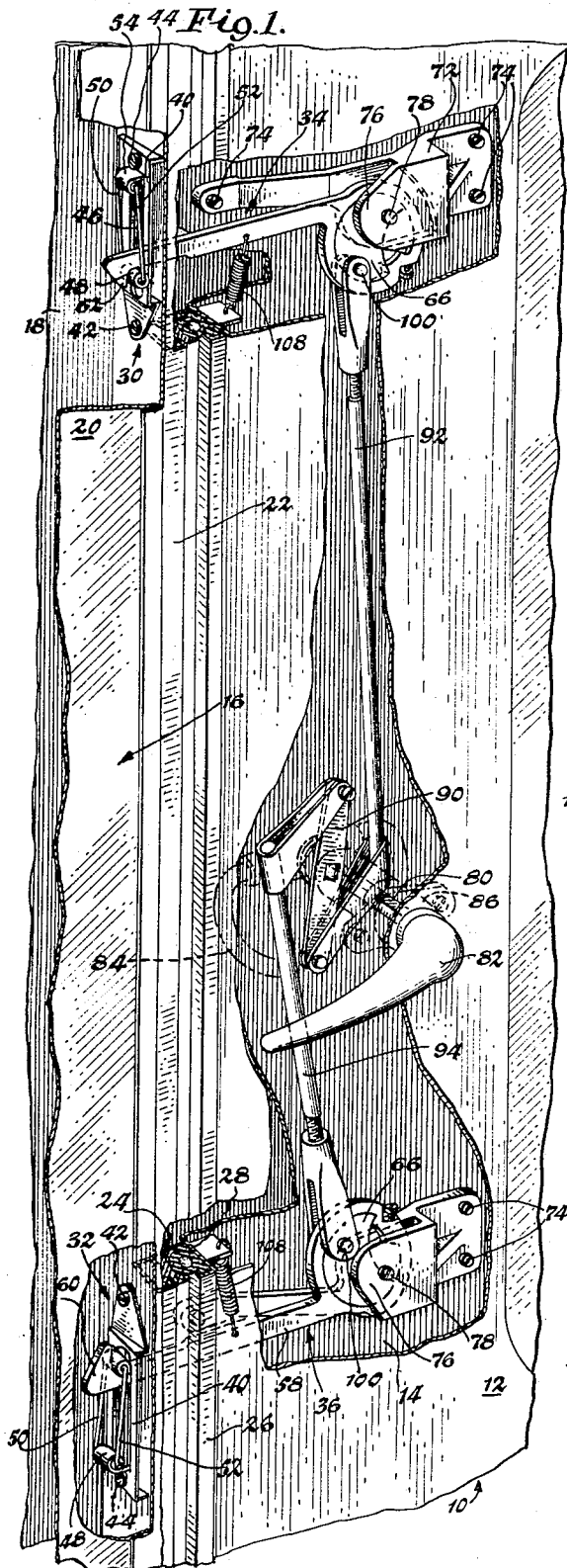
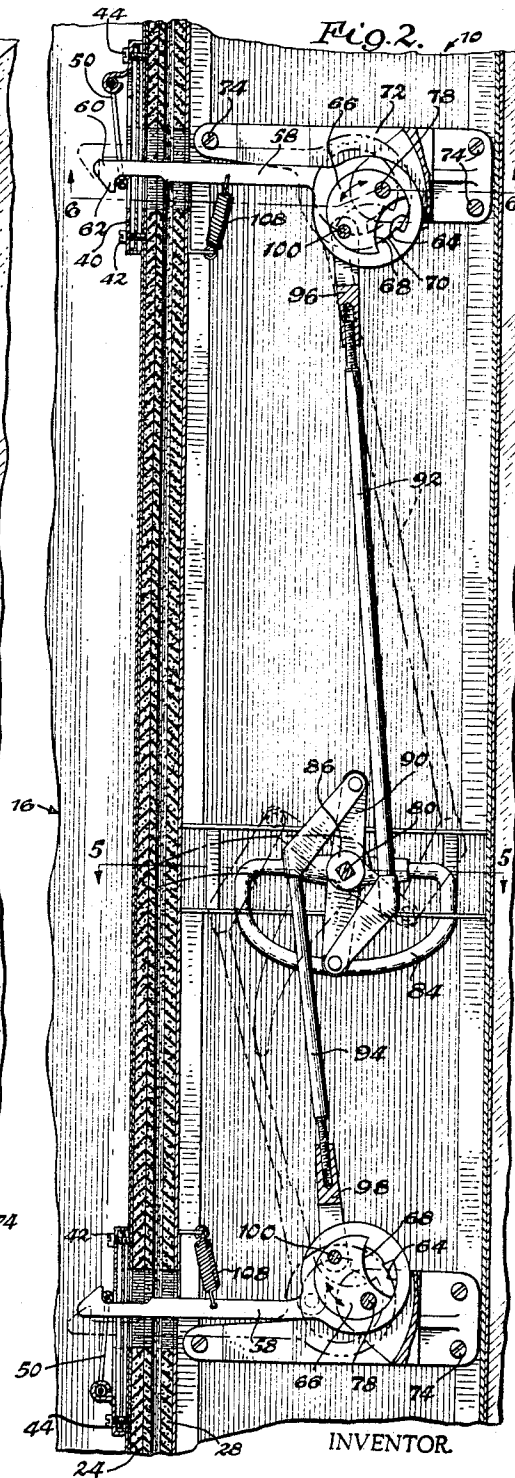
R. C. SPERRY

3,413,025

SLIDING CLOSURE LATCH

Original Filed Jan. 8, 1965

3 Sheets-Sheet 1



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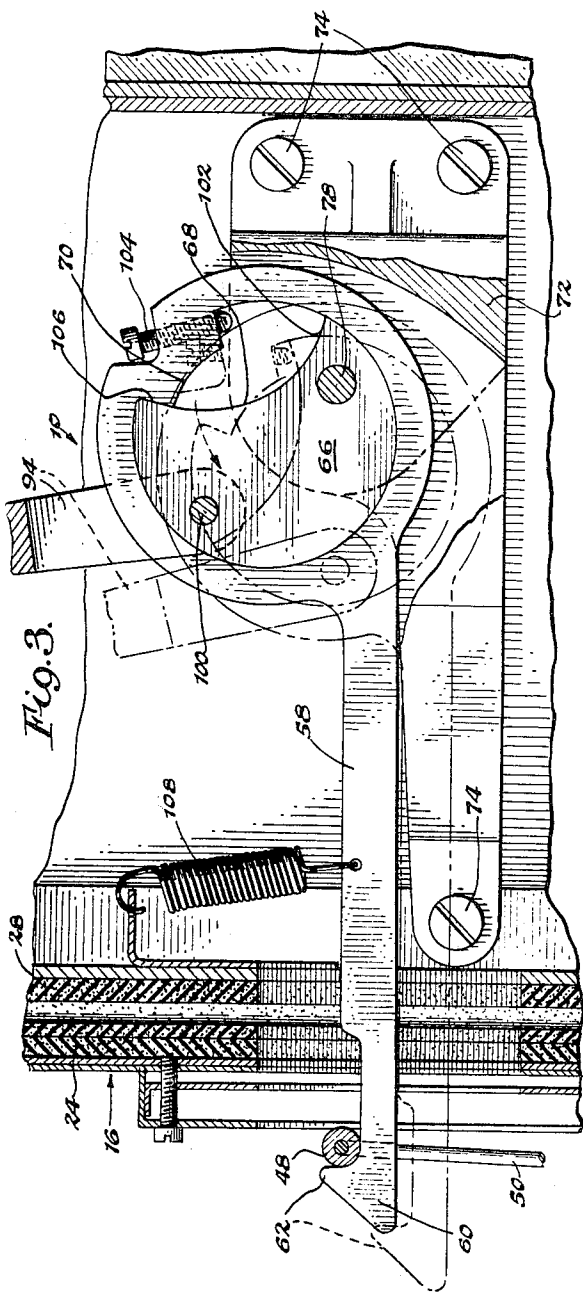
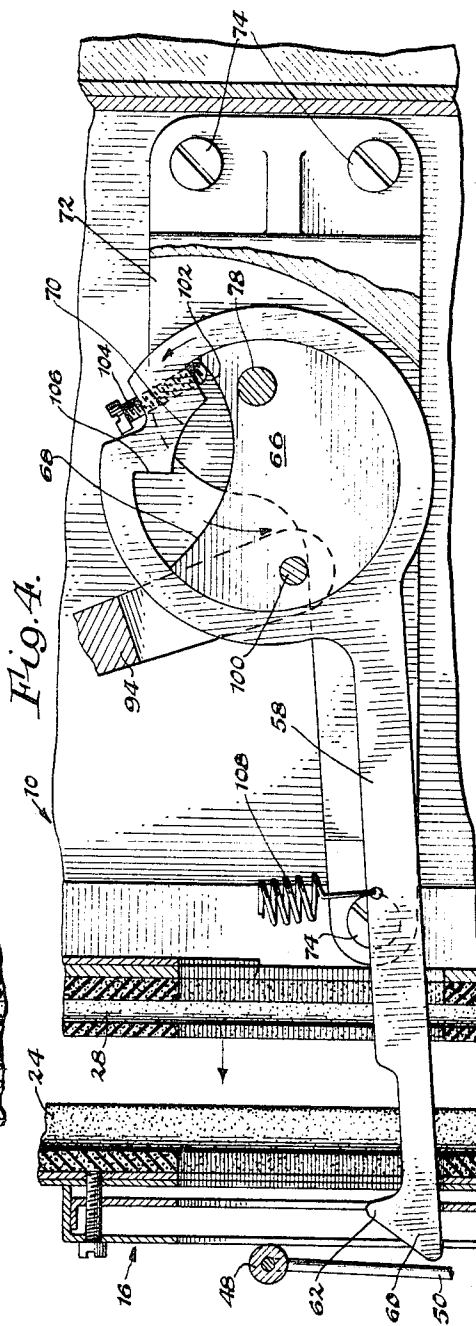
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3 Sheets-Sheet 2



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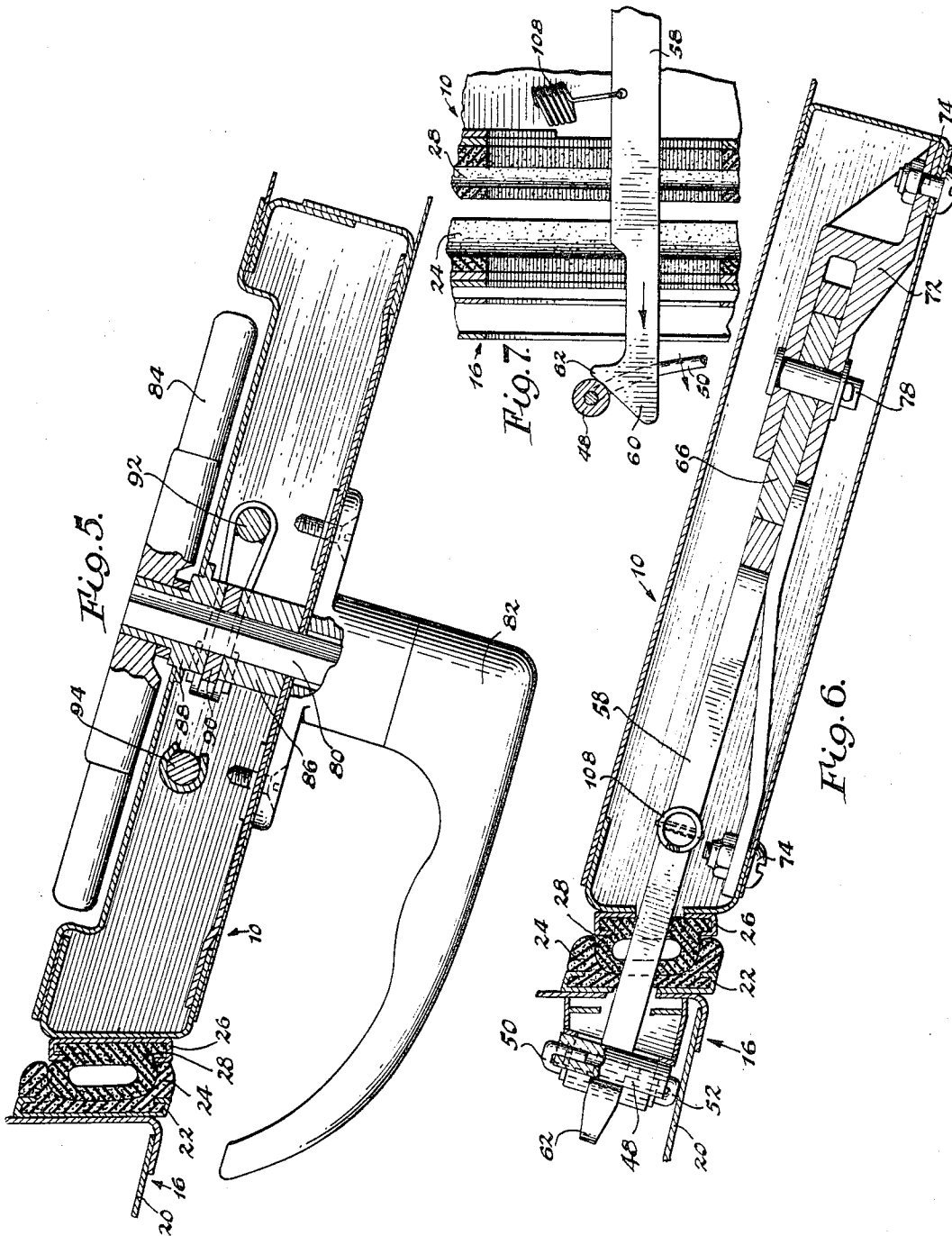
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SLIDING CLOSURE LATCH

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3 Sheets-Sheet 3



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3,413,025

SLIDING CLOSURE LATCH

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Continuation of application Ser. No. 424,389, Jan. 8, 1965. This application May 1, 1967, Ser. No. 635,264

4 Claims. (Cl. 292—111)

ABSTRACT OF THE DISCLOSURE

A cam mounted latch and an over-center linkage connecting the cam to a handle so that vibration-induced forces acting on the latch are prevented from moving the latch out of engagement with its striker.

This is a continuation of application Ser. No. 424,389 filed Jan. 8, 1965 and now abandoned.

Essentially, the present invention encompasses a latch mechanism for doors and the like in which the simple combination of a latch member, a cam mechanism mounting the latch mechanism and abutment means acting between the latch member and the cam mechanism operates to achieve a positive and highly efficient latching action.

More particularly, it is an object of this invention to provide a latch mechanism as set forth wherein a cam mechanism is utilized to mount one end of a latch member so as to impart shifting of the latch member generally in a longitudinal direction thereof so as to dispose the latch member in condition for unlatching action, and wherein abutment means acting between the cam mechanism and the latch member thereafter operates to swing the latch member to clear an associated striker element and thus permit relative separation between the component parts mounting the cam mechanism and striker element.

Still another object of this invention resides in the combination of a latch member, a cam element for mounting the latch member and abutment means acting between the cam and latch member whereby rotation of the cam imparts a compound motion to the latch member.

Another object of this invention resides in the combination, in a sliding door assembly, of a latch mechanism as aforesaid and of resilient means interposed between the door and the frame therefor which is adapted to be compressed or squeezed during final latching action thereby tightly and positively effecting a closure seal for the assembly.

Still another object of this invention is to provide a sliding door assembly as set forth in the preceding object wherein the latch mechanism is so constructed and arranged that normal and natural opening movements of the door handle are effected to release the latch mechanism and permit such opening of a door.

Other objects and advantages of the invention will appear from the description hereinbelow and the accompanying drawing wherein:

FIG. 1 is a perspective view showing a portion of a frame and sliding door assembly with portions thereof broken away to illustrate the cooperative relationship of parts according to the present invention;

FIG. 2 is a sectional view of the assembly shown in FIG. 1;

FIG. 3 is an enlarged sectional view illustrating the component parts of the latch assembly in latched condition and illustrating, in dot-dash lines, the unlatched position of the mechanism;

FIG. 4 is a view similar to FIG. 3 but showing the

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unlatched position of the mechanism as the door is moved to closed position;

FIG. 5 is an enlarged horizontal sectional view taken substantially along the plane of section line 5—5 in FIG. 2 and illustrating details of the handle mechanism;

FIG. 6 is an enlarged horizontal sectional view taken substantially along the plane of section line 6—6 in FIG. 2 and illustrating further details of the latch assembly; and

FIG. 7 is an enlarged view of a portion of the door, the door frame, the latch member and the striker member illustrating the interaction between the latch member and striker member under door closing conditions in which the latch mechanism is in its operative position.

With reference at this time more particularly to FIG. 1, the reference numeral 10 indicates in general a door assembly which may be provided with inner and outer panels 12 and 14 and the reference character 16 indicates in general an enclosure member. In the specific instance described herein, the enclosure member is the fuselage or body of an aircraft, preferably a helicopter and, as shown, the body 16 includes the outer panel 18 and the inner panel 20. The frame or body portion 22 toward and away from which the door assembly 10 is adapted to be moved is provided with a female seal member 24 and the free edge 26 of the door is provided with a complementary male seal member 28 adapted for relative disposition substantially as is shown in FIG. 1. The door 10 itself is provided with any suitable mechanism by means of which it is slidably mounted in the frame or body 16 for movement, in the plane of the door, toward and away from the portion 22 of the frame as aforesaid. The body 16 carries a pair of striker assemblies indicated generally by the reference characters 30 and 32 and the door 10 carries a pair of latch assemblies indicated generally by the reference characters 34 and 36 which are respectively cooperable with the striker assemblies 30 and 32. The construction and operation of the two latching assemblies thus provided are identical and for the purpose of brevity, a description of only one of these assemblies is included herein.

Each of the striker assemblies 30 and 32 may incorporate a suitable mounting plate 40 by means of which the assembly is removably attached to the frame as by the fasteners 42 and 44, such plate 40 being provided with an opening 46 for receiving the respective corresponding latching assembly carried by the door. The striker assembly in each case further includes a striker member 48 which is resiliently secured to the plate 40 as by a pair of spring arms 50 and 52 anchored at their upper ends as shown in FIG. 1 to a suitable anchor element 54 connected to the plate 40. The resilient mounting member may be simply a single U-shaped member providing the two arms 50 and 52, having laterally bent ends passing into the central opening of the roller-like striker 48 and with the bight of the U-shaped member passing through and secured to the anchor member 54; or any other suitable means may be employed to resiliently mount the striker 48 for movement away from the plate 40 when forcibly engaged, but wherein the striker 48 is normally disposed closely adjacent to or in engaged position against the plate 40.

The latch assembly 34 or 36 in each case includes an elongate latch member 58 having a free end portion 60 provided with a nose 62 adapted to engage over the corresponding striker and thus hold the door 10 in closed condition. The inner end of each latch member 58 is provided with a generally circular opening 64 within which a cam disc 66 is seated for limited rotation therewithin. The cam disc 66 is provided with a cutout or notch 68

which cooperates with a tongue 70 on the latch 58 to provide abutment means for controlled swinging movement of the latch 58, as will presently appear. The door 10 mounts the latch 58 through the medium of the cam disc 66 and, for this purpose, a mounting bracket 72 is provided for each cam disc which, in the specific embodiment shown, is secured as by fasteners 74 to the outer panel 14 of the door. The ear portion 76 of the bracket 72 carries a pin 78 which rotatably mounts the cam disc 66 eccentrically thereof.

Mounted between the inner and outer panels 12 and 14 are simple bearing assemblies in a rotatable shaft 80 having handle members 82 and 84 secured to its inner and outer ends. Intermediate portion of the shaft 80 is received in a sleeve 86 fixed for rotation with the shaft and the sleeve 86 serves, in conjunction with the sleeve member 88, to sandwich a lever member 90 therebetween, see particularly FIG. 5. The opposite ends of the lever 90 are connected to rod members 92 and 94 for operation of the respective cams, suitable connector devices 96 and 98 being provided to establish the connections to the respective cam disc 66. The connectors 96 and 98 are of clevis type construction and straddle the enlarged inner end of their respective latches 58 and each carries a pin 100 fixed to the cam disc 66 at a position remote from the pivot connection at the pin 78 between the cam disc 66 and the mounting bracket 72 therefor. Whenever one or the other handle is rotated, corresponding rotation is imparted to the cam discs and, as a result of cam rotation, two movements are imparted to the latch 58 in each case.

Referring to FIG. 3, the first movement is accomplished before the abutment means comes into play and is merely a shifting of the latch 58 in the direction of the path of movement of the sliding door 10, to a position as shown by the dash-dot lines for the latch 58 in FIG. 3. Further movement of the cam discs 66 causes the portion 102 of the cam disc notch or cutout 68 to engage the adjustable abutment member 104 carried by the tongue 70 of the latch 58 and continued movement of the cam discs 66 will further shift the latch 58 axially along the path of movement of the door away from the striker 48 and will also swing the latch 58 downwardly to a position as is shown in FIG. 4 wherein the latch 58 clears the striker 48 substantially as is shown. Normally, the latch 58 is urged to establish abutment at the region 106 (FIG. 3) under the action of the tension spring 108, as will be readily apparent. The disposition of the component parts is such that when the mechanism is in latched position as is shown in FIG. 3, the seals 24 and 28 are squeezed together to provide a good tight fit along the leading edge of the door. It will be further noted, from FIG. 2 in particular, that when the door is in the latched position, the lever 90 is over center so that the latches 58 are positively held in engaged position over their respective strikers 48. This is a very important feature in aircraft where twisting or racking of the fuselage is apt to take place and wherein a great deal of vibration may be encountered. With the arrangement as shown, vibration or relative movement will not permit the latch to "crawl" over the striker and become suddenly released.

A further feature of the invention is shown in FIG. 7. In this figure, the door 10 is being closed while the latch 58 has not been disposed in its unlatched position. In such an instance, the latch 58 will merely strike the striker 48 and flex its resilient mounting arms 50 and 52 permitting the striker to move away from the striker plate 40. If the mounting arms 50 and 52 are made strong enough, the door will be pushed back away from closed position, apprising the operator that the door has not been latched. This particular feature of the invention is ancillary to the fact that the construction as shown is such that natural movements of the handle for the purpose of opening and closing the door will cause proper operation of the latching mechanism. Thus, as can be seen in FIG. 1, the handle

82 will naturally be swung downwardly during opening movement of the door which will rotate the cam discs 66 in the proper sense to release the latch mechanism whereafter continued pressure on the now substantially depending handle 82 will effect opening movement of the door. In the reverse situation, the door, moving easily, will slide while the handle is still depending and when the door has been closed and further movement thereof is resistant, continuing pressure by the operator will swing the handle 82 operatively to effect a latching condition.

It is to be understood that certain changes and modifications as illustrated and described may be made without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. In a closure assembly, in combination,
 - a pair of members adapted for relative movement between a closed position and an open position,
 - a striker mounted on one of said members,
 - a latch carried by the other member and adapted to engage with said striker to prevent opening movement between said members when they are in closed position,
 - actuating means for moving said latch into and out of engagement with said striker to respectively latch and release said members when they are in said closed position,
 - said actuating means including a handle for moving said latch at will as aforesaid, a cam member mounting said latch and including abutment means cooperatively associated with said cam member and said latch, and an over-center linkage connecting said handle to said cam member for preventing said latch from moving out of engagement with said striker as a result of vibration-induced forces acting on said latch.
2. In a closure assembly, in combination,
 - a pair of members adapted to relative movement from each other,
 - a striker mounted on one of said members,
 - a latch having an inner end portion pivotally attached to and extending from the other member and having a free end portion adapted to engage over said striker and hold said members in close proximity to each other against relative movement away from each other,
 - cam means closing abutment means acting between said cam means and said latch and adapted in response to movement of said cam means in one direction simultaneously to pivot said latch against said striker and pull on said striker to urge said members together,
 - opening abutment means acting between said cam member and said latch and adapted in response to movement of said cam member in the opposite direction to shift said striker away from said latch and swing it clear thereof,
 - handle means for selectively rotating said cam means, said handle means including a handle and over-center locking means connecting said handle to said cam means whereby when the latch is fully engaged over the striker, the closing abutment means and the over-center locking means preclude movement of the latch away from engagement with the striker.
3. The combination defined in claim 1 wherein said cam member is in the form of a cam disc having a peripheral notch therein, said abutment means comprising a finger connected to said latch and engageable with said notch.
4. In a closure assembly, in combination,
 - a pair of members adapted for relative movement between a closed position and an open position,
 - a striker mounted on one of said members,
 - a latch carried by the other member and adapted to engage with said striker to prevent opening move-

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ment between said members when they are in closed position,
cam means mounting said latch on said other member and including abutment means cooperating with said latch allowing for limited lost motion therebetween, 5
a handle mounted on said other member,
and over-center linkage means connecting said handle to said cam means for preventing forces acting on said latch from moving said latch out of engagement with said striker.

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