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[54] MOTOR ACTUATED SEAT BACK LATCH RELEASE MECHANISM

[72] Inventors: **Gideon A. DuRocher,** Mount Clemens; **Michael B. Kosowan,** Allen Park, both of Mich.

[73] Assignee: **Essex International, Inc.**

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[52] **U.S. Cl.** **297/379,** 292/201

[51] **Int. Cl.** **B60n 1/06**

[58] **Field of Search** 297/379, 354, 355, 361, 362, 297/373; 292/201, 144

[56] **References Cited**

UNITED STATES PATENTS

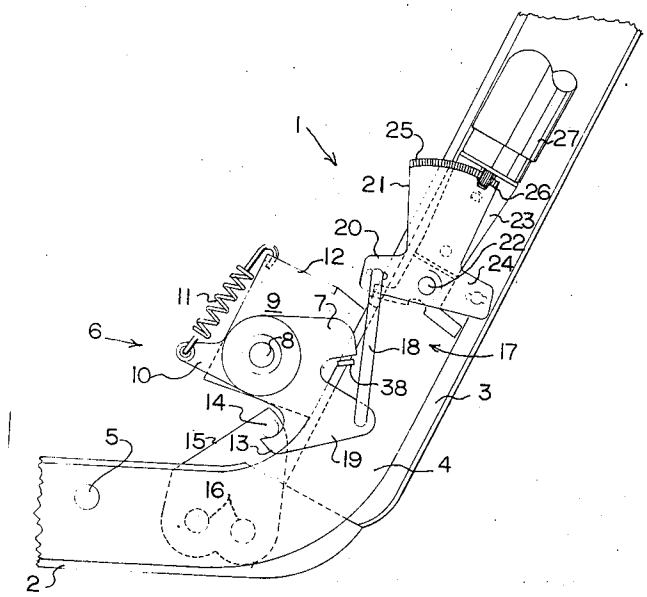
2,624,613	1/1953	Parmely	297/379 X
2,783,826	3/1957	Haltenberger	297/379 X
3,020,088	2/1962	Haltenberger	297/379 X
3,028,199	4/1962	Beierbach	297/379
3,312,491	4/1967	Peters	292/201
3,321,226	5/1967	DeClaire	292/201
3,332,713	7/1967	DeClaire	292/201
3,387,885	6/1968	Boschen	297/379
3,504,511	4/1970	Allen	292/201
3,516,704	6/1970	Riester	297/379 X

Primary Examiner—Francis K. Zugel
Attorney—Learman & McCulloch

[57] **ABSTRACT**

A motor actuated mechanism for releasing the latch by means of which a vehicle's pivoted back seat back is restrained against pivotal movement. The mechanism comprises a latch member normally urged into latching engagement with a keeper and being connected by a linkage to an electric motor which may be driven in such direction as to move the latch to its released position. A current limiting resistance is inserted in the circuit of the electric motor in response to movement of the operating linkage to its latch-releasing position so as to protect the motor circuit against electrical overload. Spring means is operable to restore the latch and linkage to their latching positions automatically in response to deenergization of the motor circuit.

4 Claims, 5 Drawing Figures



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2 Sheets-Sheet 1

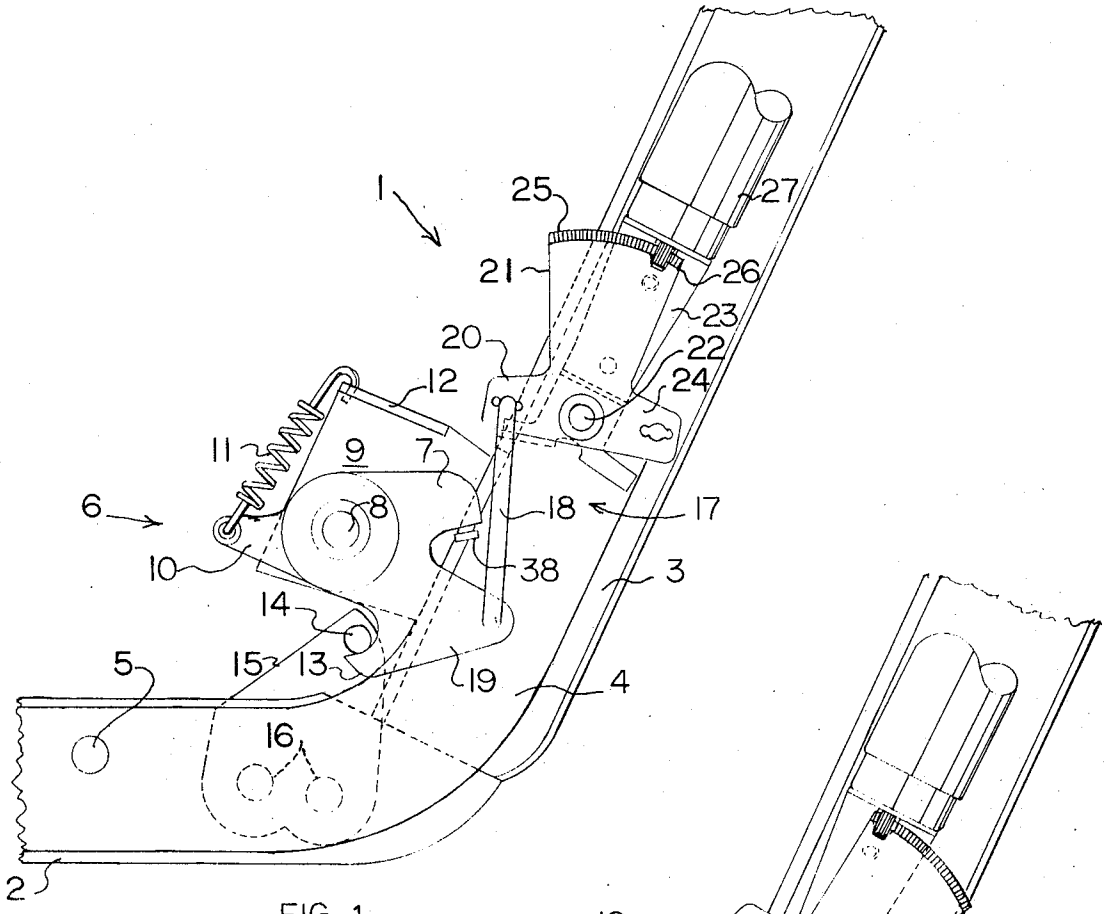


FIG. 1

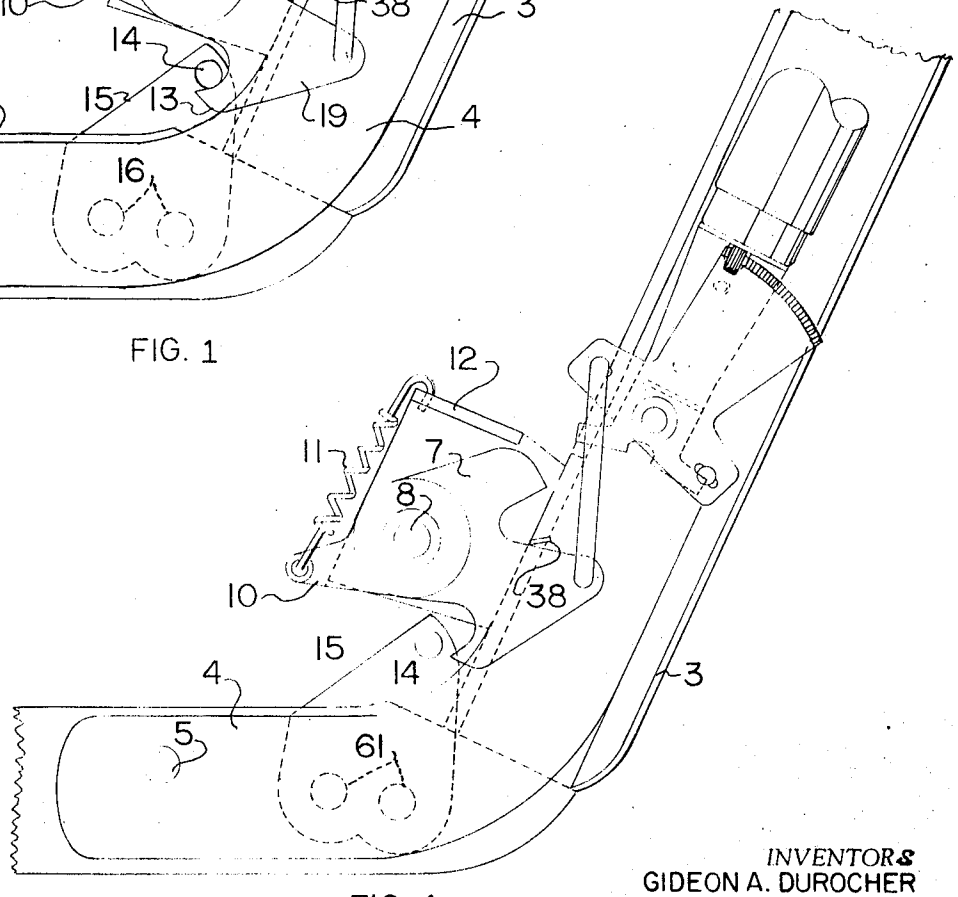


FIG. 4

INVENTORS
GIDEON A. DUROCHER
MICHAEL B. KOSOWAN

BY

Leaman & McCulloch

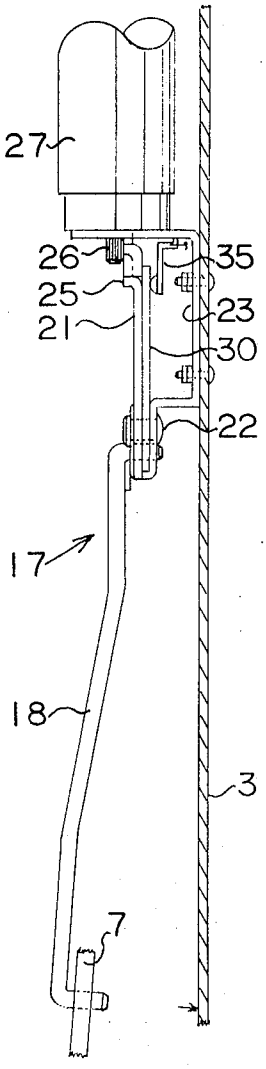


FIG. 2

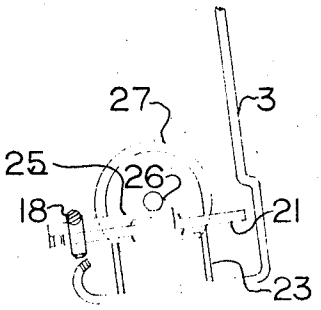


FIG. 3

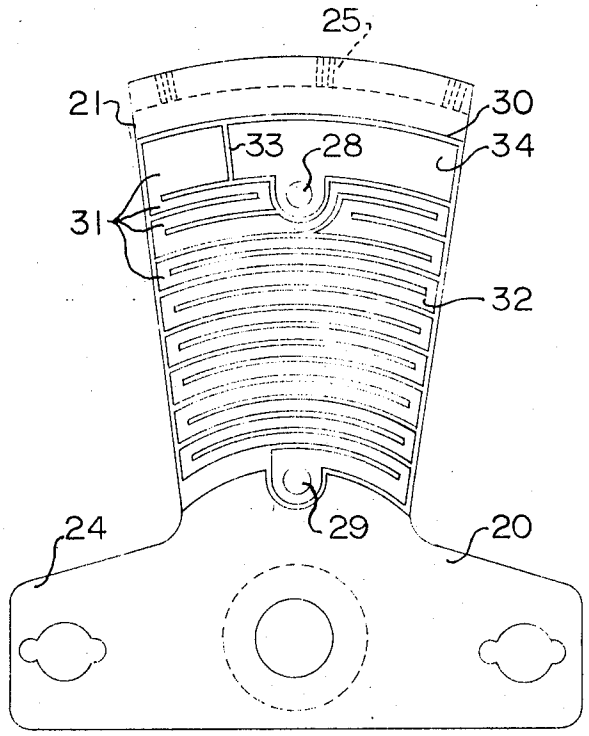


FIG. 5

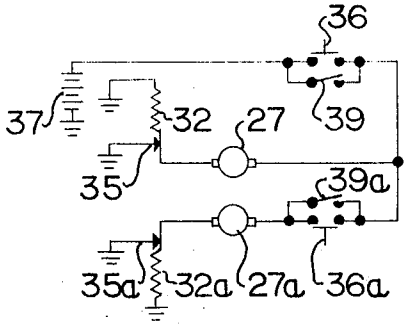


FIG. 6

INVENTORS
GIDEON A. DUROCHER
MICHAEL B. KOSOWAN
BY
Leaman & McCulloch

MOTOR ACTUATED SEAT BACK LATCH RELEASE MECHANISM

The invention disclosed herein relates to motor operated apparatus for releasing the latch mechanisms by means of which the pivoted seat backs of vehicle seats are restrained against pivotal movement, except in those instances in which such movement is desired, and to effect automatic restoration of the latch mechanisms to their latching positions when the vehicle is in use.

Two-door vehicles of the kind having front and rear seats conventionally employ pivoted back members for the front seats which may be swung forwardly so as to permit rear seat passengers to enter and exit from the rear passenger compartment with greater ease than otherwise would be possible. In such an arrangement rapid deceleration of the vehicle may cause the rear seat passengers to be thrown forwardly into engagement with the backs of the front seats. Unless the backs of the front seats are restrained against forward movement, both the rear and front passengers in the vehicle are subjected to possible injury.

The potential hazard to the occupants of a vehicle has been recognized heretofore and various proposals have been suggested for reducing or eliminating the hazard. For example, manually operated latch means have been included in some vehicles for locking the front seat backs against pivotal movement, but such devices are awkward and, many times, difficult to operate. It also has been proposed heretofore to utilize solenoid-operated means for unlatching the seat back latch mechanisms in response to opening of one or both of the vehicle's doors. Such devices overcome the problems associated with manually operable latch release mechanisms, but have the disadvantages of being expensive and noisy in operation. In addition, such devices may interfere with the relatching of a seat back in those instances in which the solenoid is deenergized prior to restoration of a pivoted seat back to its normal condition.

Another disadvantage of known seat back latching mechanisms is that they may be rendered inoperative in the event a rear seat passenger, in his haste to exit from the vehicle, exerts a forward tilting force on the seat back prior to energization of the unlatching mechanism. In an attempt to overcome this disadvantage, the fixed and movable latch parts of some mechanisms have been spaced apart in an attempt to prevent binding of the latch parts during either manual or electrical operation, but such a construction is objectionable because it frequently results in rattling of the latch parts of an unoccupied seat during operation of the vehicle.

An object of this invention is to provide a seat back latching mechanism which overcomes the disadvantages of devices heretofore known for similar purposes.

Another object of the invention is to provide a seat back latch mechanism which is operable automatically in response to opening of a door of a vehicle and which employs a high torque, inexpensive, electric motor.

A further object of the invention is to provide a motor operated seat back latch mechanism having self-contained means for preventing overload of the motor circuit during extended periods of energization thereof.

Another object of the invention is to provide a motor-operated seat back latch mechanism wherein the motor has sufficient power, when energized, to overcome premature tilting forces on a latched seat back and yet which offers, when the motor is deenergized, little resistance to reverse operation so as thereby to assure automatic latching of the seat back.

A further object of the invention is to provide a seat back latching mechanism of the character referred to and wherein the latch parts are biased snugly into engagement with one another so as to avoid the generation of objectionable noise.

Other objects and advantages of the invention will be pointed out specifically or will become apparent from the following description when it is considered in conjunction with the appended claims and the accompanying drawings, in which:

FIG. 1 is a fragmentary, side elevational view of a typical vehicle seat assembly having a pivoted back restrained against pivotal movement by latching mechanism constructed in accordance with the invention;

FIG. 2 is a fragmentary, partly sectional, rear elevational view of a portion of the latching mechanism;

FIG. 3 is a fragmentary plan view of the apparatus shown in FIG. 2;

FIG. 4 is a view similar to FIG. 1, but illustrating the latch mechanism in its unlatched condition;

FIG. 5 is an enlarged, elevational view of a part of the latching mechanism; and

FIG. 6 is a simplified, schematic wiring diagram of electrical circuitry incorporated in the invention.

Apparatus constructed in accordance with the invention is adapted for use in connection with a conventional vehicle seat assembly 1 having a substantially horizontal seat cushion frame member 2 and a seat back cushion frame member 3 to which is welded or otherwise suitably secured a generally L-shaped link 4 that is pivoted as at 5 to the horizontal frame member 2 so as to enable the back frame 3 to be swung counterclockwise from the position shown in FIG. 1 about the axis of the pivot 5. The frame members 2 and 3 engage one another when the frame member 3 is in the position shown in FIG. 1 so as to limit clockwise movement of the frame 3 and support the latter in an upwardly inclined position.

A typical two-door vehicle has a pair of seat assemblies 1, one on the driver's side of the vehicle and the other on the front seat passenger's side of the vehicle. For the sake of convenience and to avoid undue enlargement of the disclosure only one seat assembly 1 is shown, but it will be understood that the invention is applicable to both the left-hand and the right-hand seat assemblies.

A latch mechanism 6 is provided for preventing forward tilting or rocking movement of the frame 3 relatively to the frame member 2 and comprises a latch member 7 pivoted as at 8 on a bracket 9 which is welded or otherwise fixed to the frame member 3. Projecting from the latch member 7 is an ear 10 to which is anchored one end of a tension spring 11, the other end of which is anchored to a flange 12 forming part of the bracket 9. The spring 11 constantly biases the latch member 7 to rock clockwise as viewed in FIG. 1. The latch member 7 includes a pawl 13 that is adapted to engage a keeper or stud 14 which is fixed to a bracket 15 that is secured to the frame member 2 by rivets 16 or the like. The spring 11 maintains the pawl 13 snugly against the stud 14 when the frame members 2 and 3 are in the positions shown in FIG. 1.

An important characteristic of the invention is the relationship among the pivot 5, the pivot 8 and the latch members 13 and 14. The latch members 13 and 14 are so located with respect to the axes of the pivots 5 and 8 that an attempt to rock the member 3 counterclockwise from the position shown in FIG. 1 urges the member 7 to rotate clockwise, thereby preventing disengagement between the parts 13 and 14 and, therefore, precluding counterclockwise movement of the member 3. This result is achieved by locating the point of reaction between the members 13 and 14 at a level lower than that of the pivot 8 and between the levels of the pivots 5 and 8, and rearwardly, or to the right, of a vertical line passing through the axis of the pivot 8. As a result of the arrangement of the pivots and the point of reaction between the latch parts, counterclockwise movement of the latch member 7 about the pivot 8 causes movement of the pawl 13 in such manner as to avoid any increase in the force applied thereby on the stud 14. The significance of this will be pointed out hereinafter.

The apparatus includes an operating linkage 17 for moving the latch 7 from its locking position to its unlocking position and comprises a motion transmitting link 18 pivoted at one end to an arm 19 of the latch member 7 and pivoted at its other end to a laterally projecting ear 20 of an operating lever 21 which is pivoted as at 22 for oscillating movement on a bracket 23 fixed to the frame member 3. The lever 21 has an ear 24 identical to the ear 20 so as to enable the member 21 to

be used either with the left-hand seat or with the right-hand seat of a vehicle.

The operating lever **21** carries at its upper end an arcuate, laterally directed gear segment **25** having gear teeth in mesh with the teeth of a pinion **26** fixed on the driven shaft of a permanent magnet, electric motor **27** supported by the bracket **23**. The motor **27** is a unidirectional motor in the sense that energization of the motor causes the pinion **26** to be rotated in one direction, but the ratio between the gears **25** and **26** is such that, when the motor **27** is deenergized, the pinion **26** may be driven in the opposite direction quite easily by movement of the lever **21**.

The lever **21** has secured thereto by means of rivets **28** and **29** or the like a carrier **30** on which is etched or otherwise suitably arranged electrically resistive material **31** which forms a circuitous resistor **32** terminating as at **33** at the upper end of the lever **21** and terminating at the lower end of the lever at the rivet **28** which is at ground potential. Adjacent the upper terminus of the resistor **32** is a conductive strip **34** which is maintained at ground potential via the rivet **28**. A brush **35** is supported by, and electrically insulated from, the bracket **23** and engages the carrier **30** at the level of the strip **34**. The purpose and function of these parts will be explained in the description of the operation of the apparatus.

When the vehicle is conditioned for operation the doors of the vehicle will be closed and the seat frame member **3** will be in the position shown in FIG. **1**. In these positions of the parts, the spring **11** maintains the latch pawl **13** snugly against the latch stud **14** so as to preclude counterclockwise movement of the seat frame member **3** about the axis of the pivot **5**. When the vehicle is stopped and the door on the driver's side is opened, a switch **36** which normally is maintained open by the driver's door will be closed, thereby connecting the vehicle battery **37** to the motor **27** so as to energize the latter via a circuit including the brush **35** which, as long as it is in engagement with the strip **34**, is at ground potential. Full battery potential thus is applied to the motor **27** so as to drive its shaft and the pinion **26** in such direction as to effect rocking of the lever **21** clockwise, as viewed in FIG. **1**. Clockwise movement of the lever **21** is transmitted via the link **18** to the latch member **7** so as to rock the latter counterclockwise about the axis of the pivot **8**, thereby retracting the pawl **13** from latching engagement with the stud **14**.

Movement of the lever **21** by means of the motor **27** and the coupling train of gears **25** and **26** continues until such time as the arm **19** of the latch member **7** engages a stop **38** on the member **4**, whereupon movement of the lever **21** is arrested and the motor **27** stalls. By the time the movement of the lever **21** is arrested the brush **35** will have traversed the strip **34** and will be in engagement with the upper end of the resistor **32**, thereby inserting the resistor in the motor circuit and limiting the current supplied to the windings of the motor to a value sufficiently low to prevent any damage to the motor or its circuit components even though the motor may remain in stalled condition for substantial periods of time.

As a result of the arrangement of the pivots **5** and **8** and the direction of movement imparted to the pawl **13** during retraction of the latch **7**, the release of the stud **14** by the pawl **13** is assured even though a forward tilting force may be applied on the member **3** by a rear seat passenger prior to energization of the motor **27**.

Movement of the members **7** and **21** from the positions shown in FIG. **1** to the positions shown in FIG. **4** effects elongation of the spring **11** so that the latter constantly biases the latch member **7** to its latching position. Although the current supplied to the motor under these conditions is of a lower magnitude than that supplied to the motor when the member **21** is in the position as shown in FIG. **1**, the magnitude of the current supplied to the motor nevertheless is sufficient to overcome the force of the spring **11**, thereby enabling the latch member **7** to remain in its unlatching position as long as the motor **27** is energized.

When the vehicle door on the driver's side is closed, the switch **36** will be opened, thereby disconnecting the motor **27** from the battery **37**, whereupon the spring **11** is operable to return the latch member **7** to its latching position. Return movement of the member **7** is transmitted via the link **18** to the lever **21** so as to return the latter to its original position. During the return movement of the lever **21** the gear segment **25** drives the pinion **26** in a direction opposite to that in which it is driven when the motor is energized.

Although it is preferred that the seat frame member **3** be in the position illustrated in FIG. **1** prior to opening of the switch **36**, premature opening of the switch i.e., prior to such positioning of the member **3**, does not prevent latching of the latter. The location of the latch stud **14** rearwardly, or to the right, of a vertical line passing through the pivot **8** of the latch member **7** enables engagement between the lower surface of the pawl **13** and the latch stud **14** to rock the member **7** counterclockwise as the member **3** is rocked clockwise, thereby permitting the pawl **13** to bypass the stud **14** until such time as the pawl is at a lower level than that of the pin, whereupon the spring **11** will rock the member **7** clockwise so as securely to latch the member **3** against forward movement. During such rocking movements of the member **7** the lever **21** also will be rocked, but inasmuch as the motor **27** is deenergized such movement of the lever is possible.

If desired, a manually operable switch **39** may be wired in parallel with the door-mounted switch **36** to enable energization of the motor regardless of whether or not the vehicle door is open. Alternatively, the switch **39** may be used in lieu of the switch **36**.

FIG. **6** discloses not only the electrical parts associated with one of the vehicle's front seats, but also the electrical parts associated with the other front seat. Such electrical parts are identical to those hereinbefore described and are identified by the same reference characters, followed by the suffix *a*.

The disclosed embodiment is representative of a presently preferred form of the invention, but is intended to be illustrative rather than definitive thereof. The invention is defined in the claims.

I claim:

1. In a seat assembly having a seat member and a back member pivoted to said seat member, a first latch part carried by one of said members, and a second latch part carried by the other of said members, one of said latch parts being fixed and the other being pivoted for movements into and out of latching engagement with said fixed latch part so as respectively to disable and enable relative pivotal movement of said members, the improvement comprising oscillatable operating means; means mounting said operating means on one of said members for oscillating movement from a first position to a second position; motion transmitting means interconnecting said operating means and said movable latch part for moving the latter out of latching engagement with said fixed latch part in response to oscillating movement in one direction of said operating means to said second position; a rotary, unidirectional electric motor adapted to be connected to and disconnected from a source of electric current for respectively energizing and deenergizing said motor; means coupling said motor to said operating means for imparting movement to the latter in said one direction in response to connection of said motor to said source; current limiting means carried by and movable with said operating means to said second position and in said second position being operable to minimize current supplied to said motor while maintaining said motor energized; and spring means acting on said operating means for restoring the latter to its first position in response to deenergization of said motor.

2. The construction set forth in claim **1** wherein said coupling means comprises a train of gears.

3. Apparatus as set forth in claim **1** wherein said coupling means comprises a driving gear driven by said motor means and a gear carried by said operating means and in mesh with said driving gear.

4. Apparatus as set forth in claim 3 wherein the ratio between said gears and the capacity of said yieldable means are such as to effect reverse movement of said motor means in response to deenergization thereof.

* * * * *