United States Patent [19]

James et al.

[11] **3,785,186**

[45] **Jan. 15, 1974**

[54] **CLOSURE LATCH ARRANGEMENT**

[75] Inventors: **Bruce A. James,** Sterling Heights; **Michael J. Lawless,** Warren; **David L. Clark,** Grosse Pointe Woods, all of Mich.

[73] Assignee: **General Motors Corporation,** Detroit, Mich.

[22] Filed: **Nov. 30, 1972**

[21] Appl. No.: **310,770**

[52] **U.S. Cl.** **70/240,** 70/150, 292/216

[51] **Int. Cl.** **E05c 3/24**

[58] **Field of Search** ..... 292/216, 280, 99, 292/DIG. 14, DIG. 43; 70/240, 150

[56] **References Cited**

UNITED STATES PATENTS

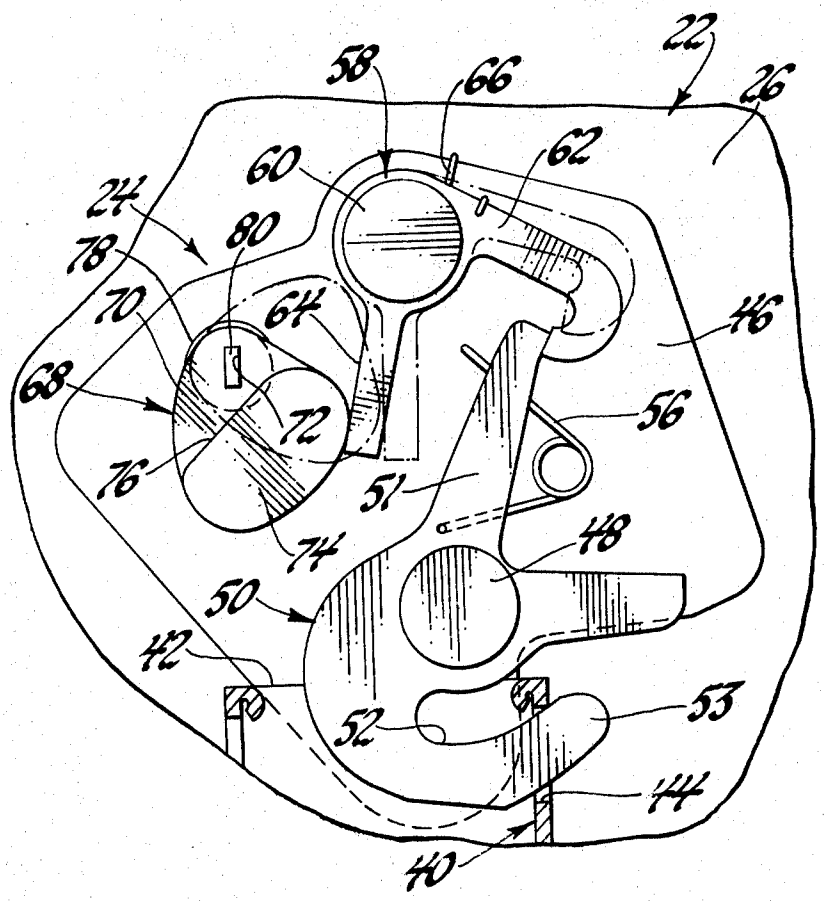
3,378,291	4/1968	Brian	292/DIG. 14
3,504,511	4/1970	Allen	292/DIG. 14

Primary Examiner—Richard E. Moore
Attorney—Saul Schwartz

[57] **ABSTRACT**

A closure latch arrangement particularly for an automobile deck lid including a latch bolt, a detent lever, an actuating cam element and a lock cylinder connected to the cam element through a disengageable connecting bar. The cam element normally rotates with the lock cylinder barrel portion to move the detent lever between a detenting and a releasing position. If the lock cylinder is forcibly removed from the deck lid the connecting bar disengages from the cam element whereupon a spring acting on the detent lever causes the latter to rotate the cam element to a remote position permitting movement of the detent lever to a dead bolt position in which the latch bolt is irreversibly maintained in a latched condition.

3 Claims, 5 Drawing Figures



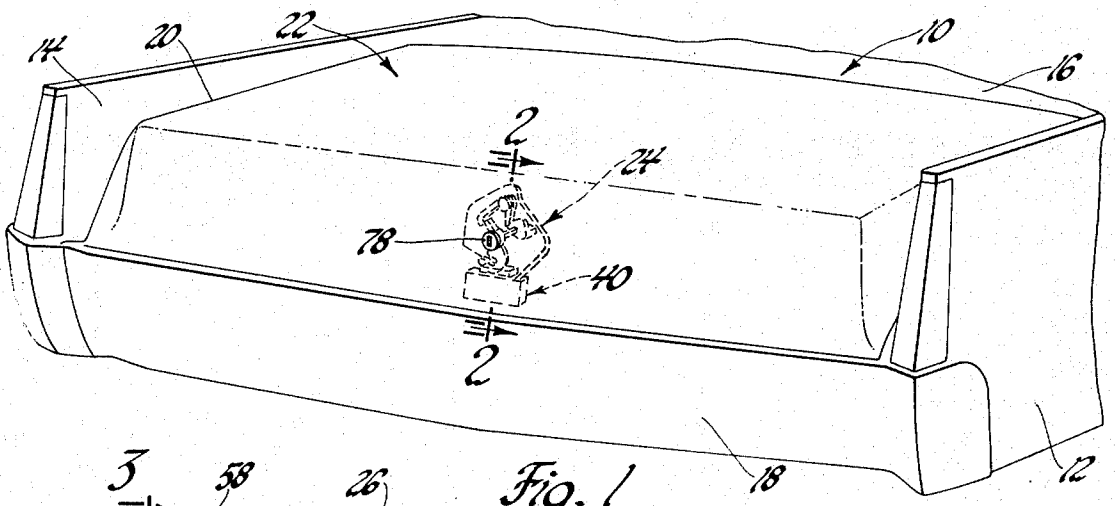


Fig. 1

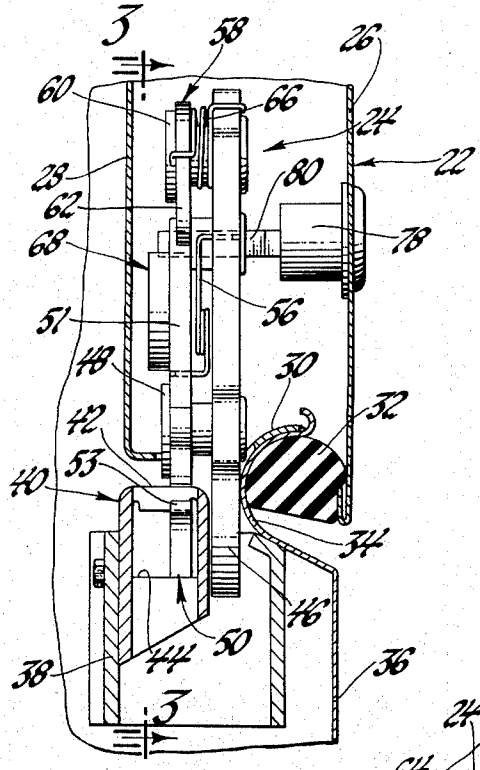


Fig. 2

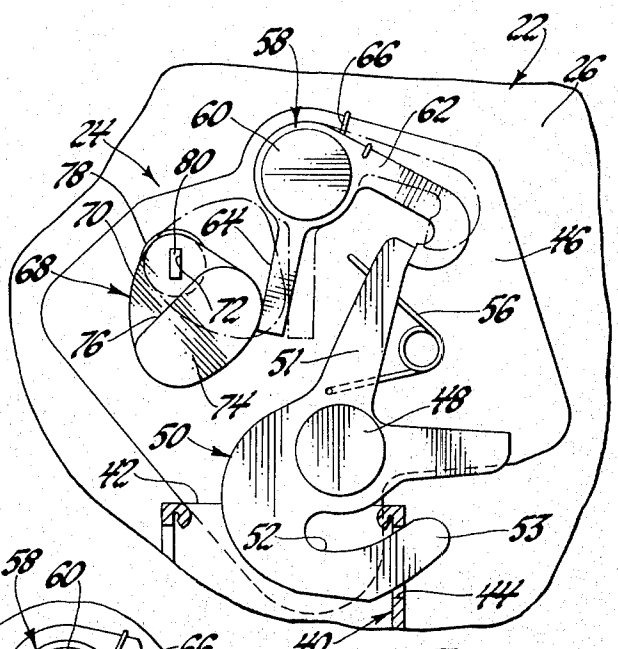


Fig. 3

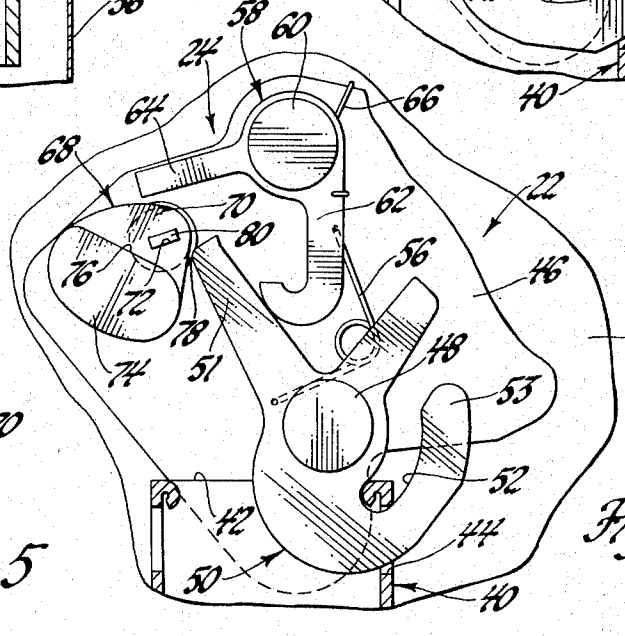


Fig. 4

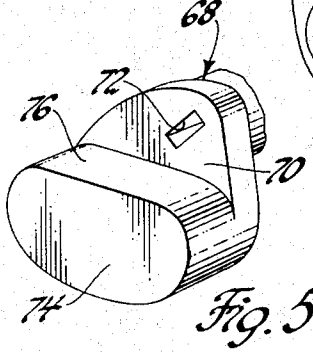


Fig. 5

CLOSURE LATCH ARRANGEMENT

This invention relates generally to closure latch arrangements and more particularly to a latch arrangement which automatically assumes a dead bolt or irreversibly latched configuration when a predetermined element of the latch arrangement is forcibly removed.

The primary feature of this invention is that it provides an improved closure latch arrangement particularly adapted for automobile rear deck applications. Another feature of this invention is that it provides an improved closure latch arrangement which automatically assumes a dead bolt or irreversibly latched configuration when a predetermined element of the latch arrangement is forcibly removed. Yet another feature of this invention resides in the provision in the latch arrangement of a combination of elements including a latch bolt, a detent lever, a detent lever operating cam and a cylinder lock which elements normally cooperate in selectively and positively maintaining the deck lid in a closed position, the detent lever being operative to force the cam to a remote position when the cylinder lock is forcibly removed whereupon the detent lever assumes a dead bolt position in which it is unaffected by subsequent movement of the cam so that the latch bolt is continuously maintained in a latched position. A further feature of this invention resides in the provision in the latch arrangement of a spring adapted for continuously biasing the detent lever toward the dead bolt position and a cam rotatable or a unit with the barrel portion of the cylinder lock and including a shoulder portion and a relieved portion, the shoulder portion normally engaging the detent lever for moving the latter between the detenting and the releasing positions and also preventing movement of the detent lever to the dead bolt position except when the barrel portion of the cylinder lock is forcibly removed whereupon the detent lever forces the cam to a remote position wherein the relieved portion permits movement of the detent lever to the dead bolt position.

These and other features of this invention will be readily apparent from the following specification and from the drawings wherein:

FIG. 1 is a fragmentary perspective view of the rear portion of an automobile type vehicle body having thereon a closure latch arrangement according to this invention;

FIG. 2 is an enlarged sectional view taken generally along the plane indicated by lines 2—2 in FIG. 1;

FIG. 3 is a sectional view taken generally along the plane indicated by lines 3—3 in FIG. 2 and showing the closure latch arrangement in a normal latched configuration;

FIG. 4 is similar to FIG. 3 but showing the closure latch arrangement in a dead bolt or irreversibly latched configuration; and

FIG. 5 is an enlarged perspective view of the cam actuator portion of the closure latch arrangement.

Referring now to FIG. 1 of the drawings, thereshown in perspective view is the rear portion of a conventional automobile type vehicle body **10** including a right rear quarter panel structure **12** and a left rear quarter panel structure **14.** At the top, the quarter panel structures **12** and **14** extend generally to the belt line of the vehicle and are interconnected by a panel **16** disposed generally at the belt line and extending transversely between the quarter panel structures. A rear bumper assembly **18** similarly extends between the quarter panel structures **12** and **14** at the rear extremity of the body **10** and substantially below the belt line. The quarter panel structures, the panel **16** and the bumper assembly **18** cooperate in defining a conventional luggage or cargo compartment accessible through a generally rectangular opening **20.** A closure or deck lid **22** is conventionally swingably hinged to the body **10** adjacent the panel **16** for pivotal movement about a transverse axis of the body between a closed position, FIG. **1,** in the opening **20** and an open position, not shown, remote from the opening. The deck lid **22** is releasably maintained in the closed position by a closure latch arrangement according to this invention and designated generally **24.**

As best seen in FIG. **2,** the deck lid **22** includes an outer panel **26** and an inner panel **28** spaced inboard of the outer panel, the inner panel including a flanged portion **30.** A conventional weather seal **32** is disposed on the deck lid between the outer panel **26** and the flanged portion **30** of the inner panel and is adapted for cooperation, in the closed position of the deck lid with a flanged portion **34** of a panel **36** rigidly attached to the vehicle body forwardly of the bumper assembly **18.** Adjacent to and forwardly of the panel **36,** the vehicle body has rigidly disposed thereon a bracket **38** on which is fixedly supported a striker **40.** The striker **40** is generally rectangular in horizontal cross-sectional configuration with the uppermost end thereof being open, as at **42,** and includes a generally rectangular aperture **44** in one side thereof slightly below the open end **42.**

Referring now to FIGS. **2, 3** and **4,** the closure latch arrangement **24** includes a plate **46** rigidly attached to the deck lid **22** between the inner and outer panels **26** and **28** by conventional fastening means, not shown. A rivet **48** projecting rigidly from the plate **46** rotatably supports a fork type latch bolt **50.** The bolt **50** includes an elongated arm portion **51** and an arcuate mouth portion **52** defined by the main body of the bolt and an integral retaining finger **53.** The bolt **50** is rotatable on the rivet **48** between an unlatched position, not shown, wherein the deck lid is free to pivot between the open and closed positions with the mouth portion of the bolt moving freely in and out of the open end **42** of the striker **40,** a first latched position, FIG. **3,** wherein the distal end of the retaining finger **53** projects through the aperture **44** in the striker preventing pivotal movement of the deck lid to the open position, and a second latched position, FIG. **4,** beyond the first latched position wherein substantially the entire retaining finger **53** projects through the aperture **44** in the striker. An over-center type torsion spring **56** disposed between the plate **46** and the bolt **50** normally urges the latter toward the unlatched position except when the bolt is pivoted beyond the first latched position toward the second latched position whereupon the spring urges the bolt toward the second latched position.

The latch arrangement **24** further includes a detent lever **58** rotatably disposed on a rivet **60** projecting rigidly from the plate **46.** The detent lever **58** includes a hook portion **62** adapted for engagement on the arm portion **51** of the bolt **50** and an actuator arm portion **64.** The detent lever is rotatable on the rivet **60** between a releasing position, shown in broken lines in FIG. **3,** a detenting position shown in solid lines in FIG. **3,** corresponding to the first latched position of the bolt **50** wherein hook portion **62** engages the arm portion **51** to prevent movement of the bolt to the unlatched

position, and a dead bolt position, FIG. 4, corresponding to the second latched position of the bolt 50. A torsion spring 66 coiled about the shank of the rivet 60 bears at one end against the plate 46 and at the other end against the detent lever to bias the latter clockwise, FIG. 3, toward the dead bolt position.

As seen best in FIGS. 3, 4 and 5, a generally oval shaped cam element 68 is rotatably disposed on the plate 46. The cam element includes a main body portion 70 having a generally rectangular slot 72 therethrough, and a smaller actuating portion 74 offset from the slot 72 and defining a shoulder 76. The actuating portion 74 is adapted for engagement on the actuator arm portion 64 of the detent lever, FIG. 3, so that pivotal movement of the cam effects concurrent pivotal movement of the detent lever. Further, the length of the arm portion 64 of the detent lever is predetermined to provide clearance between the distal end of the arm portion and the shoulder 76 when the cam element 68 is pivoted clockwise from the position of the latter shown in FIG. 3 to the position thereof shown in FIG. 4.

As best seen in FIG. 2, a conventional lock cylinder assembly 78 is mounted on the outer panel 26 of the deck lid 22 and includes a barrel portion adapted for rotation relative to a fixed cylinder portion upon insertion of a properly coded key, the cylinder portion including a conventional keying arrangement for preventing rotation thereof relative to the deck lid. A connecting bar 80 having a cross-sectional configuration complementary to the configuration of the slot 72 in the cam element 68 extends between the barrel portion of the lock cylinder assembly and the cam element. The connecting bar is slidably disposed in the slot 72 and functions to couple the cam element and the barrel portion of the lock cylinder assembly for unitary rotation. Accordingly, when a properly coded key is inserted in the lock cylinder assembly and rotated the cam element 68 is simultaneously rotated through a corresponding included angle. Of course, when the key is removed from the barrel portion of the lock cylinder assembly, both the barrel portion and the cam element are rotatably immobilized.

Describing now the operation of the latch assembly 24, in the closed position of the deck lid with the key removed from the lock cylinder assembly, the latch bolt 50, the detent lever 58 and the cam element 68 assume the positions thereof shown in solid lines, FIG. 3. More particularly, the latch bolt assumes the first latched position positively maintaining the deck lid in the closed position while the detent lever 58 assumes the detenting position wherein the hook portion 62 thereof maintains the latch bolt in the latched position. The position of the cam element 68 is determined by the position of the barrel portion of the lock cylinder assembly 78 and, of course, as long as the key is removed the cam element is held fixed relative to the plate 46 so that the actuating portion 74 prevents the spring 66 from rotating the detent lever to the dead bolt position thereof. To release the deck lid for opening movement, the key is inserted in the barrel portion of the lock cylinder assembly and the latter is rotated counterclockwise, FIG. 3, thereby to rotate the cam element 68 from the solid line position to the broken line position shown in FIG. 3. Simultaneously, the actuating portion 74 of the cam element effects pivotal movement of the detent lever from the detenting position to the releasing position wherein the hook portion 62 lies remote from the arm portion 54 of the bolt 50. Thereafter, a combination of the seal pressure on the deck lid and the spring 66 effects movement of the latch bolt 50 from the first latched position thereof to the unlatched position, not shown, permitting free movement of the deck lid from the closed to the open position.

As is conventional, the key is rotated back to the locked position after the deck lid is unlatched so that the cam element 68 and the detent lever 60 are returned to the solid line positions shown in FIG. 3. When the deck lid is subsequently brought to the closed position, the latch bolt is cammed by the striker in a conventional manner from the unlatched position to the first latched position during which movement the arm portion 51 cams the hook portion 62 of the detent lever in a counterclockwise direction, FIG. 3, an amount sufficient to permit passage of the distal end of the arm portion below the hook portion 62 whereupon the spring 66 effects movement of the lever back to the detenting position.

If an attempt is made to gain unauthorized entry into the luggage compartment by forcibly removing the lock cylinder assembly 78 from the deck lid, the connecting bar 80 remains attached to the barrel portion so that withdrawal of the lock cylinder assembly effects concurrent withdrawal of the connecting bar from the slot 72 in the cam element. As the connecting bar separates from the cam element the restraint on the detent lever against the clockwise bias of the spring 66 is removed. Accordingly, the actuator arm portion 64 of the detent lever thereupon pivots the cam element 68 in a clockwise direction, FIGS. 3 and 4, from the solid line position shown in FIG. 3 toward the solid line position shown in FIG. 4. As the cam element 68 pivots, the distal end of the actuator arm portion 64 of the detent lever approaches the shoulder 76 and upon reaching the latter passes thereover thereby allowing the spring 66 to pivot the detent lever 58 from the detenting position to the dead bolt position, FIG. 4. Simultaneously, as the detent lever pivots to the dead bolt position, the hook portion 62 thereof engaging the arm portion 54 of the bolt rotates the latter from the first latched position to the second latched position while continuously maintaining the deck lid positively secured in the closed position.

If, after the lock cylinder assembly 70 and the connecting bar 80 are withdrawn from the deck lid 22, an attempt is made to rotate the cam element 68 in a clockwise direction by the insertion of a suitable tool, as for example the blade of a screw driver, in the slot 72, no engagement is effected between the cam element 68 and the detent lever 58. Thus, the cam element is ineffective to thereafter pivot the detent lever back to the releasing position. Accordingly, as long as the detent lever cannot be brought to the releasing position, the bolt 50 cannot achieve the unlatched position and the deck lid is thus positively maintained in the closed position.

Having thus described the invention, what is claimed is:

1. In a closure assembly including a support and a lid disposed on said support for movement between an open position and a closed position, the combination comprising: a latch bolt disposed on one of said support and said lid for movement with respect to a striker on the other of said support and said lid between a first

latched position and a second latched position and an unlatched position, a detent lever engageable on said latch bolt and disposed on said one of said support and said lid for movement between a detenting position and a dead bolt position and a releasing position corresponding respectively to the first latched and the second latched and the unlatched positions of said latched bolt, means biasing said detent lever toward the dead bolt position, a cam element disposed on said one of said support and said lid for pivotal movement and engageable on said detent lever for moving the latter between the detenting and the releasing positions thereof, said detent lever being operative under the influence of said biasing means to pivot said cam element to a position remote from said detent lever thereby to permit movement of the latter to the dead bolt position whereafter said cam is inoperative to move said detent lever to the releasing position thereof, lock means on said one of said support and said lid rotatably actuable between a locked position and an unlocked position, and disengageable connecting means between said lock means and said cam element connecting the former and the latter for unitary movement so that said lock means prevents movement of said cam element to the remote position thereof except upon disengagement of said connecting means corresponding to removal of said lock means from said one of said support and said lid.

2. In a closure assembly including a support and a lid disposed on said support for swinging movement between an open position and a closed position, the combination comprising, a latch bolt disposed on one of said support and said lid for pivotal movement with respect to a striker on the other of said support and said lid between a first latched position and a second latched position and an unlatched position, a detent lever engageable on said latch bolt and disposed on said one of said support and said lid for pivotal movement between a dead bolt position and a detenting position and a releasing position corresponding respectively to the first latched and the second latched and the unlatched positions of said latch bolt, means biasing said detent lever toward the dead bolt position, a cam element including an offset actuating portion defining a shoulder, means mounting said cam element on said one of said support and said lid for pivotal movement and with said actuating portion engageable on said detent lever for moving the latter between the detenting and the releasing positions, said detent lever being operative under the influence of said biasing means to pivot said cam element to a remote position wherein said shoulder permits movement of said detent lever to the dead bolt position whereafter said actuating portion is inoperative to move said detent lever to the releasing position thereof, lock means on said one of said support and said lid including a lockable element selectively rotatable between a locked position and an unlocked position, and disengageable connecting means between said lockable element and said cam element connecting the former and the latter for unitary rotation so that said lockable element prevents pivotal movement of said cam element to the remote position thereof except upon disengagement of said connecting means corresponding to removal of said lockable element from said one of said support and said lid.

3. In a closure assembly including a support and a lid disposed on said support for swinging movement between an open position and a closed position, the combination comprising, a fork type latch bolt including an elongated arm portion, means mounting said latch bolt on said lid for pivotal movement with respect to a striker on said support between a first latched position and a second latched position and an unlatched position, over center spring means disposed between said latch bolt and said lid adapted for biasing said latch bolt toward the unlatched position when the latter is on one side of the first latched position and toward the second latched position when said latch bolt is on the opposite side of the first latched position, a detent lever including a hook portion, means mounting said detent lever on said lid for pivotal movement between a detenting position wherein said hook portion engages said elongated arm for maintaining said latch bolt in the first latched position thereof and a releasing position releasing said elongated arm and dead bolt position beyond the detenting position corresponding to the second latched position of said latch bolt, spring means biasing said detent lever toward the dead bolt position, a cam element including an actuating portion defining a shoulder, means mounting said cam element on said lid for pivotal movement and with said actuating portion enagageable on said detent lever for moving the latter between the detenting and the releasing positions, said detent lever being operative under the influence of said biasing means to pivot said cam element to a remote position wherein said shoulder permits movement of said detent lever to the dead bolt position whereafter said actuating portion is inoperative to move said detent lever to the releasing position thereof, lock means on said lid including a lockable element selectively rotatable between a locked position and an unlocked position, and disengageable connecting means between said lockable element and said cam element connecting the former and the latter for unitary rotation so that said lockable element prevents pivotal movement of said cam element to the remote position thereof except upon disengagement of said connecting means corresponding to removal of said lockable element from said lid.

* * * * *