Feb. 23, 1971 D. W. BERMAN 3,565,476

HOOD LATCH ASSEMBLY

Filed Aug. 26, 1969 2 Sheets-Sheet 1

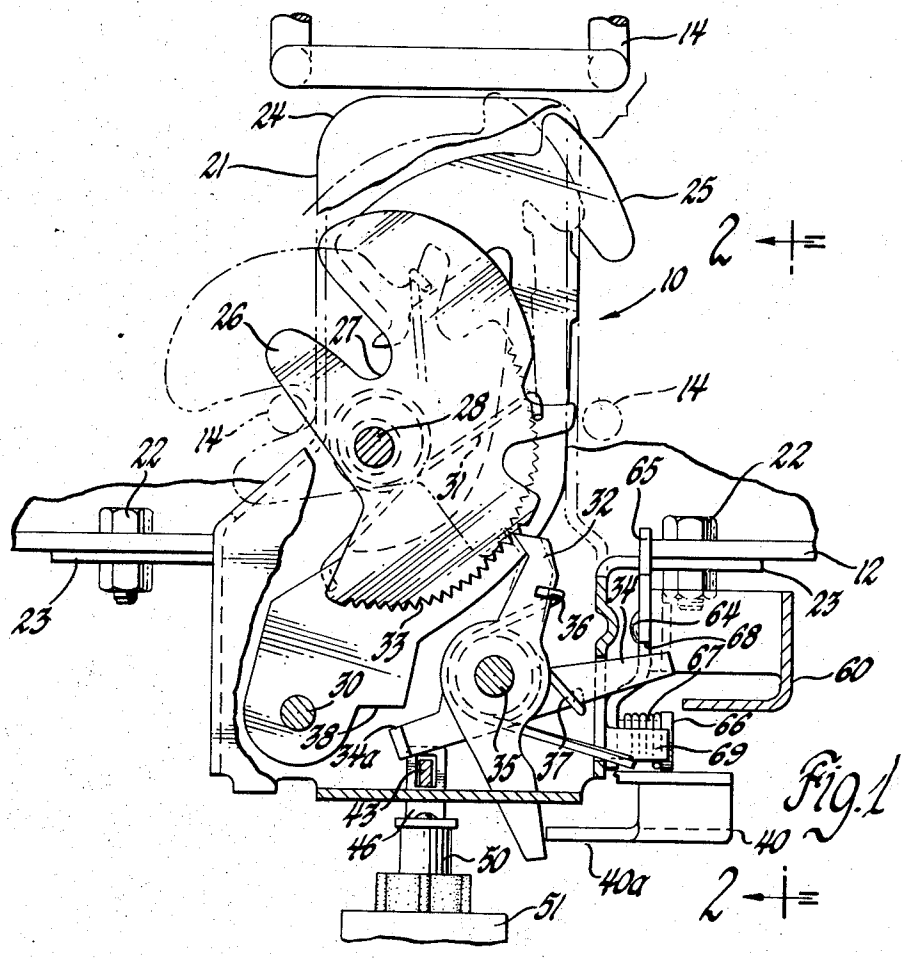


Fig. 1

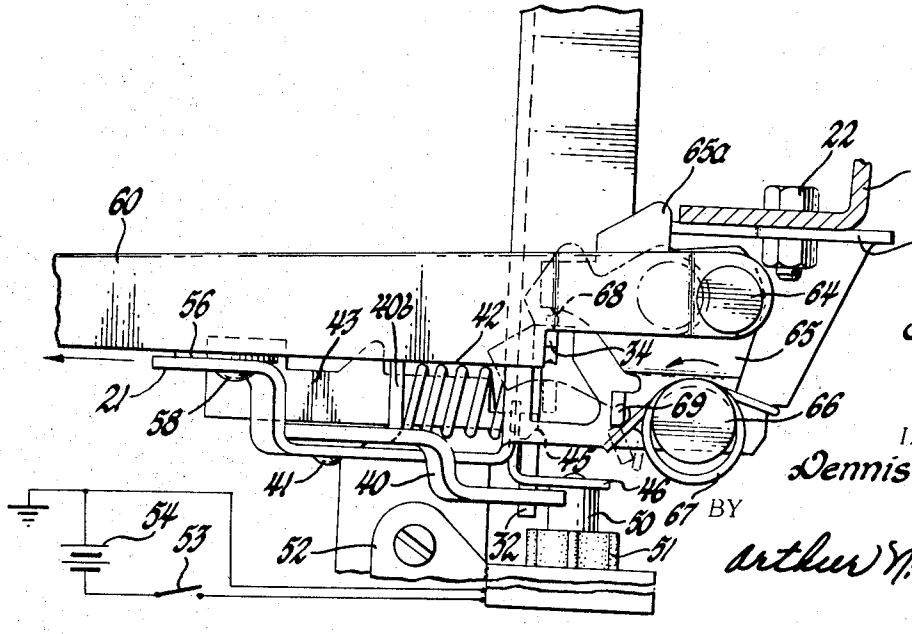


Fig. 2

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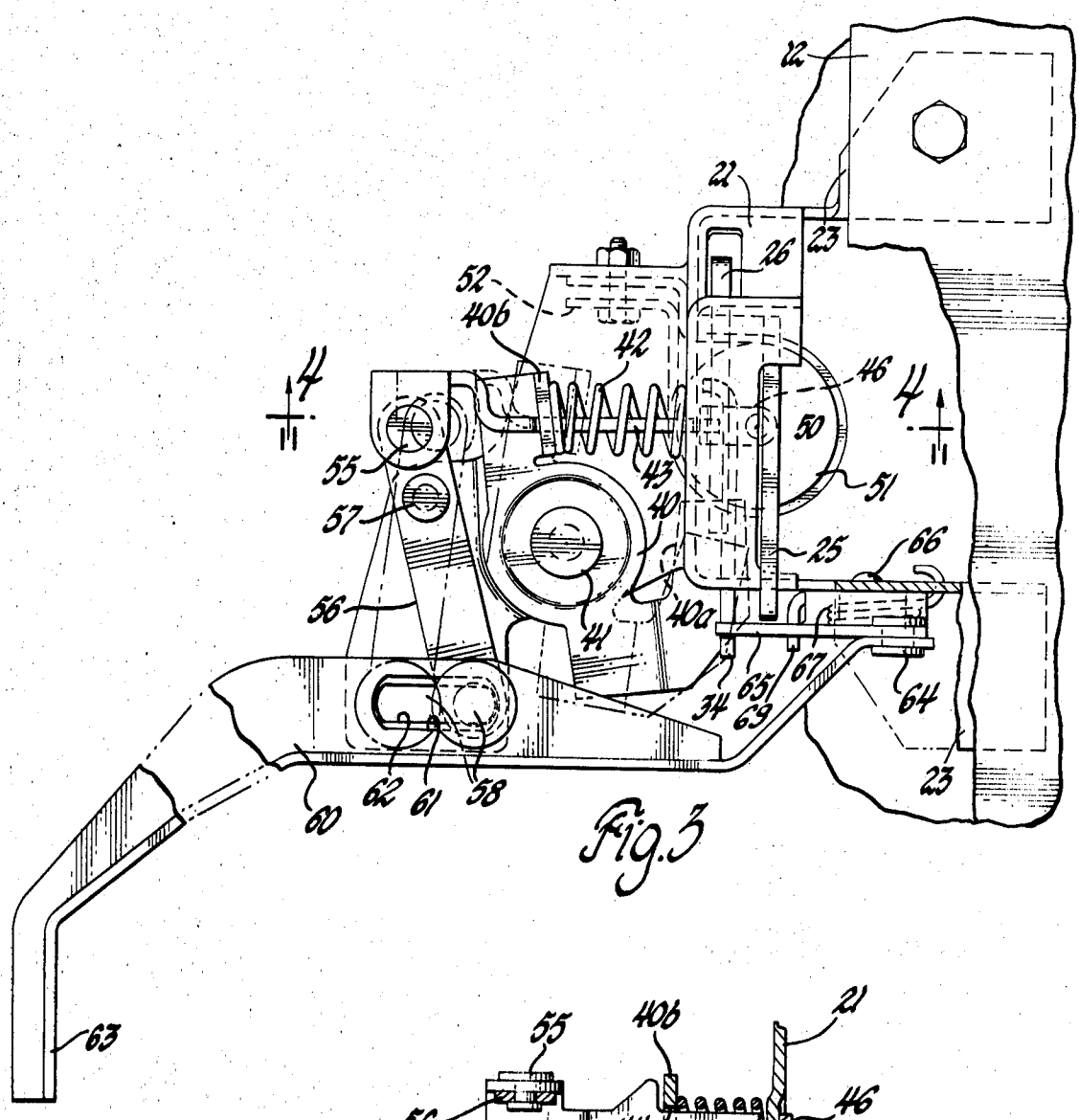


Fig. 3

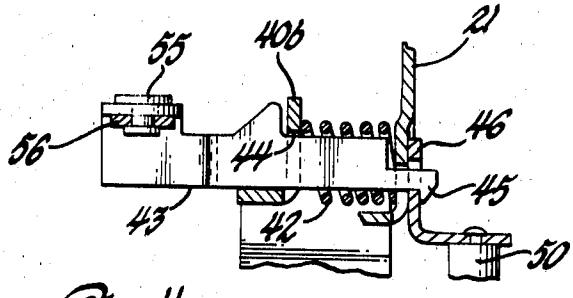


Fig 4

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HOOD LATCH ASSEMBLY

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U.S. Cl. 292—201 7 Claims

ABSTRACT OF THE DISCLOSURE

A vehicle hood latch assembly having a primary latch, a secondary latch, and a hood release mechanism whereby the primary latch is unlatched by a solenoid actuated by a master control from the passenger compartment to release a catch member on the hood latch to, in turn, release the primary latch, and the secondary latch being unlatched by a release lever pulled from the front of the vehicle to allow the hood to open while simultaneously latching the catch member so that it is again ready to be released by the master control.

The present invention relates to a hood latch assembly having an improved release mechanism adapted for the sequential release of a primary latch and a secondary latch.

It is common practice with vehicle front hood members to utilize both a keeper or primary latch to retain the hood in a tightly closed position as well as a safety or secondary latch which prevents full hood opening in the event the keeper or primary latch becomes disengaged. Further, it is broadly known to utilize a common operating member for sequentially achieving the disengaging action of both a keeper latch and a safety latch. Because of the use of a common operating member in the prior art devices, it was difficult to prevent unauthorized opening of the hood.

Accordingly, the primary object of this invention is to improve a hood latch assembly whereby a sequential release of the keeper latch and safety latch can only be accomplished by sequential operation of two separate operating members, one from the passenger compartment of the vehicle and the other from the front exterior of the vehicle. Another object of this invention is to improve a hood latch assembly whereby sequential operation of the keeper latch and safety latch is accomplished by a power actuated source from within the passenger compartment of the vehicle and a mechanical member actuated from the exterior of the vehicle.

According to the embodiment of the invention disclosed, these and other objects of the invention are achieved by providing a hood latch assembly including a primary latch and a secondary latch, spring biased to an unlatched position and a latched position, respectively. When the primary latch is moved to a latched position by engagement with a striker, it is releasably retained in this position by biased pawl detent means. A release lever is pivotally mounted to effect unlatching of the secondary latch. Sequential release of the primary and secondary latches is effected by a solenoid released spring biased primary release lever engaging the pawl detent means to release the primary latch after which manual movement of a secondary release handle pivots a secondary release member to engage and pivot the release-lever to unlatch the secondary latch while at the same time resetting the primary release lever for the next release by the solenoid and allowing the pawl detent means to return to a ready position to catch and hold the primary latch during the next closure of the hood.

For a better understanding of the invention, as well as other objects and further features thereof, reference is had to the following detailed description of the invention

to be read in connection with the accompanying drawings, wherein:

FIG. 1 is a front elevational view of the hood latch assembly;

FIG. 2 is a view of the hood latch assembly taken along line 2—2 of FIG. 1 with parts removed to show details of the unlatching mechanism;

FIG. 3 is a top view of the hood latch assembly with the primary latch and secondary latch removed to show the details of the unlatching mechanism; and

FIG. 4 is a sectional view taken along line 4—4 of FIG. 3.

While the present invention is of general utility in any environment in which both a keeper latch and safety latch are desired, the invention will be described as employed on the front hood of an automotive vehicle, not shown. Referring particularly to FIG. 1, the hood latch mechanism, indicated generally at **10**, is secured to a transverse plate **12** of a front body portion of the vehicle and is adapted to coact with a striker **14** suitably secured to the underside of the hood, not shown, of the vehicle.

In the embodiment of the invention illustrated, the transverse plate **12** of the front vehicle body portion is shown as having an upstanding latch casing **21** secured thereto as by bolts **22** extending through spaced projecting flanged portions **23** of the latch casing.

The latch casing **21** may be formed from a single piece of sheet metal, as by a stamping operation, and has a rounded nose **24** guiding the casing for movement within striker **14** on the hood. As shown in FIG. 1, the outstanding legs of the striker **14** are adapted to be engaged by a safety or secondary latch **25** pivotally mounted within the casing and biased in projected relation with respect to the case toward the latched position relative to the striker and to be engaged by the keeper or primary latch **26** which is normally biased to the unlatched position. Both the primary latch, including its take-up feature, and the secondary latch are of a well-known type presently used on hood latches of motor vehicles.

The primary latch **26** is shown in FIG. 1 as being projected from the opposite side of the casing from the secondary latch **25** and as having a locking slot **27** therein, engageable with the striker. The primary latch is pivoted intermediate its ends within the latch casing on a pivot pin **28** rivited or secondary latch **25** is pivotally mounted on the latch casing adjacent the lower end thereof by a pivot pin **30** also secured to the wall of the casing. The primary latch **26** is normally biased in a clockwise direction to an unlatched position while the secondary latch is normally biased to a latched position by means of a coiled torsion spring **31** encircling the pivot pin **28** with one leg of the torsion spring being hooked on the primary latch **26** and the other leg being hooked over the secondary latch **25**.

Thus, as the hood is lowered, the striker **14** will first engage the secondary latch **25** to cam it in a counterclockwise direction as seen in FIG. 1 to the position shown by the broken line until that portion of the striker rides past the hook engaging portion of this latch at which time the secondary latch is again spring biased toward the latched position. Further downward movement of the striker will then cause the opposite side of the striker to engage the inturned portion of the locking slot **27** of primary latch **26** forcing it to rotate in a counterclockwise direction as seen in FIG. 1 to the latched position, shown by the broken line, against the bias of the torsion spring **31**. In the latched position, the primary latch is taken up on and held in a latched position by a detent in the form of a pawl **32** engageable with ratchet teeth **33** on the opposite side of the primary latch **26** from the locking slot **27**. The pawl **32** and a release lever **34** for the secondary latch **25** are pivotally supported on pivot pin **35** secured to the lower end of the latch casing

and at the opposite side thereof from the pivot pin **30**. Coiled torsion spring **36** is mounted to encircle the pivot pin **35** with one leg of the torsion spring **36** engaging a leg of the pawl **32** and the other leg of the spring engaging an apertured portion of the latch casing whereby the pawl is normally biased in a counterclockwise direction to engage the teeth of the primary latch. A second coiled torsion spring **37** is also mounted to encircle the pivot pin **35** with one leg of this torsion spring engaging a leg of the release lever **34** and the other leg of the spring engaging the apertured portion of the latch casing to also bias the release lever in a counterclockwise direction. Thus pawl **32** is normally biased toward engagement with primary latch **26** to retain it by engagement with the ratchet teeth thereon in a latched position while release lever **34** is normally biased out of contact with the secondary latch **25** to permit it to be normally biased to the latched position for engagement with striker **14**.

When the latch assembly is in latched condition, disengagement of pawl **32** from the primary latch **26** by clockwise rotation of the pawl **32**, as seen in FIG. 1, permits coiled spring **31** to rotate the primary latch **26** in a clockwise direction to disengage the latter from striker **14** thereby permitting at least a partial opening of the hood. While permitting a partial opening of the hood, disengagement of primary latch **26** from the striker **14** does not enable a complete opening of the hood since as the striker **14** moves upward during opening of the hood it will contact the extended portion of secondary latch **25** which as previously mentioned is normally biased to the latched position to thereby restrain the hood from further opening movement. To effect full opening of the hood, the secondary latch **25** must be actuated or released by clockwise rotation of release lever **34** whereby the leg **34***a* thereon engages a projecting portion **38** of the secondary latch **25** and in so doing to impart a counterclockwise rotation to the secondary latch **25** moving it out of latching engagement with striker **14**.

Now to be described are the means to provide the following sequential steps of operation in opening and closing the engine compartment hood of a vehicle using the subject hood latch assembly:

A master control is actuated, for example, from within the passenger compartment of the vehicle which releases a catch member to in turn release the primary latch;

A safety release handle is pulled from the front of the vehicle releasing the secondary latch allowing the hood to open fully while simultaneously latching the catch member so that it is again ready to be released by the master control; and

The hood is closed latching the primary latch and secondary latch to maintain the hood in the closed position until the above sequence is repeated.

As shown best in FIG. 3, a C-shaped primary release lever **40** is pivotally mounted intermediate the legs **40***a* and **40***b* thereof by headed stud **41** to a lateral forward leg of latch casing **21**, the leg **40***a* being positioned to engage pawl **32** to rotate it clockwise as seen in FIG. 1 when the primary release lever **40** is rotated in a counterclockwise direction as seen in FIG. 3 by means of compression spring **42**. Spring **42** has one end abutting against the front wall of latch casing **21** and the other end abutting an upstanding flange portion of leg **40***b* of the release lever **40** with the spring **42** thus encircling a locking member **43**. Locking member **43** extends through a slot **44** in the upstanding flange portion of leg **40***b*, through the spring **42** and then through a slot in latch casing **21**, this end of the locking member **43** terminating in an inverted hook **45** which is engageable by the upright notched leg of catch member **46** which is suitably positioned for vertical up and down movement and connected to a suitable actuator for actuation, preferably from the interior of the vehicle. In the preferred embodiment disclosed, the catch member is secured to the armature **50** of a solenoid **51**. Solenoid **51**, mounted by bracket **52** to a depending portion of latch casing **21**, is connected via normally open switch **53**, which may be mounted on the dash panel of the vehicle, to the vehicle battery **54**. The solenoid **51**, of a well-known type, is provided with an internal spring, not shown, to normally bias the armature to an extended position.

The other end of the locking lever **43** is provided with a flanged portion whereby the locking lever **43** is pivotally connected by pivot pin **55** to one end of lever **56** which is in turn pivotally mounted intermediate its ends by stud **57** to a lateral forward extension of latch casing **21**. At its other end, lever **56** is coupled to secondary release handle **60** by double shouldered stud **58** which extends through a slot **61** intermediate the ends of secondary release handle **60** and through a slot **62** in latch casing **21**.

Secondary release handle **60** extends forwardly, as seen in FIGS. 2 and 3, toward the front of the vehicle with its most forward portion formed with a hand grip **63** in position to be accessible from the front of the vehicle. The opposite end of the secondary release handle **60** is pivotally connected by pivot pin **64** to secondary release member or lever **65** which is pivotally mounted by shoulder stud pin **66** to the side of latch casing **21** whereby as the secondary release handle **60** is pulled forward, to the left as seen in FIG. 2, the secondary release member **65** is rotated counterclockwise, as seen in this figure, to have the cam portion **68** thereon engage release lever **34** to effect disengagement or release of the secondary latch **25**, as previously described.

Normally, the secondary release member **65** is biased in a clockwise direction, as seen in FIG. 2, by coiled torsion spring **67** which encircles shoulder stud pin **66** with one leg of the spring hooked over the edge of latch casing **21** and the other leg engaging a turned out tab **69** of the secondary release member. Movement of the secondary release member **65** in this direction is limited by stop **65***a* thereon engaging a flanged portion **23** of latch casing **21**.

From the above description, it is aparent that the primary release lever **40** is, in effect, actuated by an energy storage device, that is, spring **42** which is armed by the operator as he pulls on secondary release handle **60** to release the secondary latch. Pulling forward on the secondary release handle will, through the linkage described, force a compression of spring **42**, the spring then being held in compression by engagement of catch member **46** with the hook **45** of locking member **43** until again released by actuation of the solenoid **51**. The energy thus stored in spring **42** is available for use to unlatch the primary latch whenever desired from the interior of the vehicle.

The sequential operation of the latch mechanism and, particularly, the relationship of the elements thereof during this operation will now be described. Assuming that the hood is in the closed position, when the operator wishes to open the hood he must first close switch **53** in the passenger compartment to energize solenoid **51**. As the solenoid **51** is energized, armature **50** is retracted pulling with it the catch member **46** to release lock member **43** thus permitting compression spring **42** to pivot release lever **40** about the axis of headed stud **41** from the position shown by the broken lines in a counterclockwise direction, as seen in FIG. 3. As the release lever **40** is thus pivoted the leg **40***a* thereof will engage pawl **32** to rotate it out of engagement with the ratchet teeth **33** of primary latch **26**. The primary latch **26** is now free to be biased by spring **31** to the unlatched position to release striker **14**, allowing the hood to move to a partially open position at which position it is then retained by engagement of the striker **14** with secondary latch **25**. As the release lever is pivoted in this counterclockwise direction, it engages the upstanding portion of locking member **43** to move it to the left, as seen in FIG. 4, to pivot lever **56** in a counterclockwise direction, as seen in FIG. 3. When this occurs, the opposite end of lever **56** moves from

the left hand end of slot **61** in secondary release handle **60**, to the right hand end of the slot as seen in FIG. 3.

To fully release the hood, the secondary release handle **60** is pulled from the front of the hood, moving it to the left, as seen in FIG. 3, pivoting secondary release member **65** in a counterclockwise direction, as seen in FIG. 2, into engagement with release lever **34** to rotate it in a clockwise direction, as seen in FIG. 1. Release lever **34** is thus pivoted into engagement with the projecting portion **38** of secondary latch **25** to move this latch to the unlatched position out of engagement with striker **14** completely releasing the hood whereby it can then be moved to the fully open position. At the same time that the forward pull of secondary release handle **60** is actuating secondary release member **65**, it is also engaging stud **58** to move it to the left, as seen in FIG. 3, pivoting lever **56** about the axis of stud **57** in a clockwise direction, as seen in this same figure. This pivotal movement of lever **56** will force locking member **43** to the right, as seen in this same figure, against the biasing action of spring **42** into the catch member **46**. The tapered end portion of locking member **43** adjacent to hook **45** thereon will cam the catch member **46** downward and the spring, not shown, of the solenoid **51** acting on the armature **50** will return the catch member **46** to the raised position where the locking member **43** hooks onto the catch member **46** to in effect reset the solenoid **51**. Movement of the locking member **43** to the right, as just described, will also cause pivotal movement of the release lever **40** in a clockwise direction to the position shown by the broken lines in FIG. 3, in which it is out of engagement with pawl **32**, thus releasing the pawl **32** to be pivoted by spring **36** into a ready position to engage the ratchet teeth **33** of primary latch **26** to hold the primary latch when again moved to the latched position. The hood is now in the open position and the hood latch assembly is reset.

When the hood is again closed, the striker **14**, as the hood is lowered, will first engage the upper cam portion of secondary latch **25** to cam it temporarily to the unlatched position as it passes past the secondary latch **25**, after which the spring **31** biases this latch back to the latched position. The striker **14**, as it is further lowered, engages the primary latch **26** rotating it to the latched position, shown by broken lines in FIG. 1, where the striker **14** is held by the primary latch **26** whose release is then prevented by engagement of pawl **32** with the ratchet teeth **33** thereon until the hood opening operation is repeated.

While the invention has been described with reference to the structures disclosed herein, it is not confined to the details set forth, and this application is intended to cover such modifications or changes as may come within the purposes of the improvements or the scope of the following claims.

What is claimed is:

1. A hood latch assembly for a motor vehicle including a latch casing, primary latch means swingably mounted on said latch casing for movement between unlatched and latched positions, detent means positioned for releasably holding said primary latch means in said latched position, secondary latch means swingably mounted on said latch casing for movement between latched and unlatched positions, lever means engageable with said secondary latch means for moving said secondary latch means to said unlatched position, primary latch release means including an energy storage device operative from the interior of the vehicle for affecting movement of said detent means to release said primary latch means, secondary latch release means including a manually actuated release handle accessible from the exterior of the vehicle to temporarily move said secondary latch means to said unlatched position, and coupling means interconnecting said primary latch release means and said secondary latch release means for sequentially controlling the unlatching of said primary latch means and said secondary latch means, said means effecting arming of said energy storage device during actuation of said secondary latch release means.

2. A hood latch assembly according to claim **1** wherein said primary latch release means includes primary release means positioned for pivotal movement from a position out of engagement with said detent means to a position engaging and releasing said detent and said energy storage device includes power means positioned to move said primary release means to said position engaging and releasing said detent, a locking member connected to said coupling means and engaging said primary release means to move said primary release means to said position out of engagement with said detent means, catch means positioned to lock said locking member upon actuation of said secondary release means, and release means operative on said catch means to release said locking member.

3. A hood latch assembly according to claim **2** wherein said secondary latch release means includes a lever pivotally mounted on said latch casing for engagement with said lever means to move said secondary latch means to said unlatched position and release handle means connected to said lever for effecting the release of said secondary latch means.

4. A hood latch assembly including a latch casing, primary latch means swingably mounted on said latch casing for movement between unlatched and latched positions, detent means positioned for releasably holding said primary latch means in said latched position, a secondary latch means swingably mounted on said latch casing for movement between latched and unlatched positions, lever means engageable with said secondary latch for moving said secondary latch means to said unlatched position, primary release means positioned for movement from a non-engaging position relative to said detent means to a detent means engaging position for releasing said primary latch means, primary actuator means for selectively moving said primary release means to said detent engaging position, secondary latch release means positioned to engage said lever means to effect movement of said secondary latch means to said unlatched position, and coupling means interconnected between said secondary release means and said primary actuator means for moving said primary release means to said non-engaging position when said secondary release means is actuated to affect movement of said secondary altch means to said unlatched position.

5. A hood latch assembly according to claim **4** wherein said primary actuator means includes power means positioned to move said primary release means to said detent means engaging position, a locking member connected to said coupling means and engaging said primary release means to move said primary release means to said non-engaging position, catch means positioned to engage said locking member to restrain movement of said locking member, and catch release means positioned to move said catch means to release said locking member, said catch means being operative to engage said locking member upon actuation of the secondary release means.

6. A hood latch assembly according to claim **5** wherein said secondary latch release means includes a lever pivotally mounted for movement from a first position out of engagement with said lever means to a second position to engage said lever means for moving said secondary latch means to said unlatched position, means to normally bias said lever to said first position, and a manually movable release handle secured to said lever and projecting therefrom for moving said lever to said second position.

7. A hood latch assembly according to claim **6** wherein said coupling means includes a coupling lever pivotally secured at one end to said locking member and at its other end pivotally and slidably secured to said release

handle and to said latch casing, said coupling lever being pivotally secured intermediate its ends to said latch casing.

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U.S. Cl. X.R.

70—241; 292—11, 210, 336.3

PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,565,476 Dated February 23, 1971

Inventor(s) Dennis W. Berman

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 64, after "release", delete the hyphen -- - --.

Column 2, line 45, after "or", insert -- otherwise secured to the wall of the latch casing while the --

Column 6, line 48, "altch" should read -- latch --.

Signed and sealed this 17th day of August 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents