Feb. 23, 1965 C. E. SCHUTTE 3,170,722

LATCH MECHANISM

Filed June 13, 1962 2 Sheets-Sheet 1

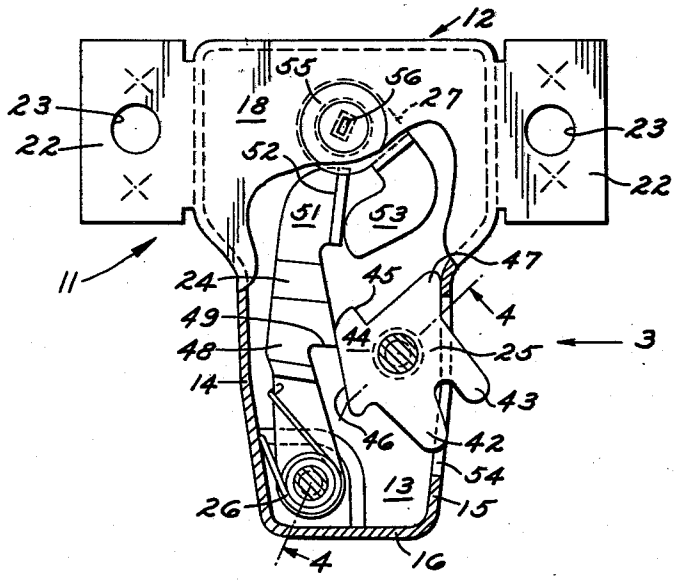


FIG. 1

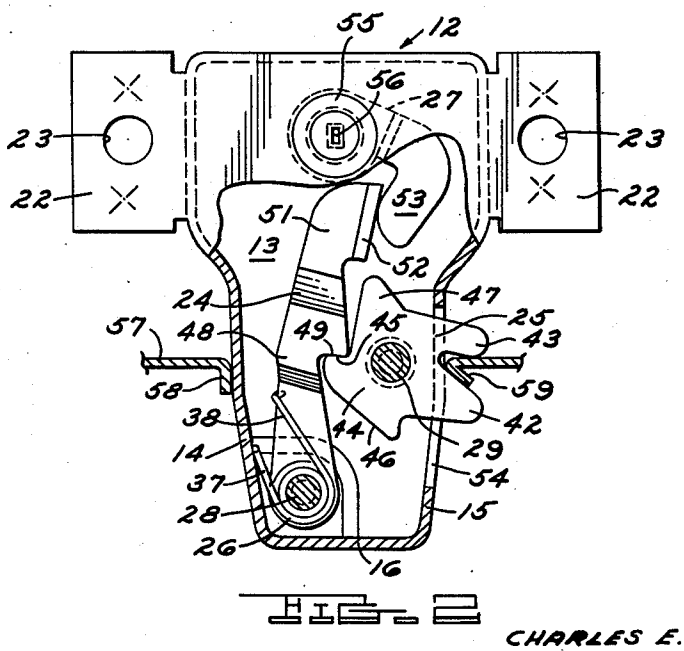


FIG. 2

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FIG. 3

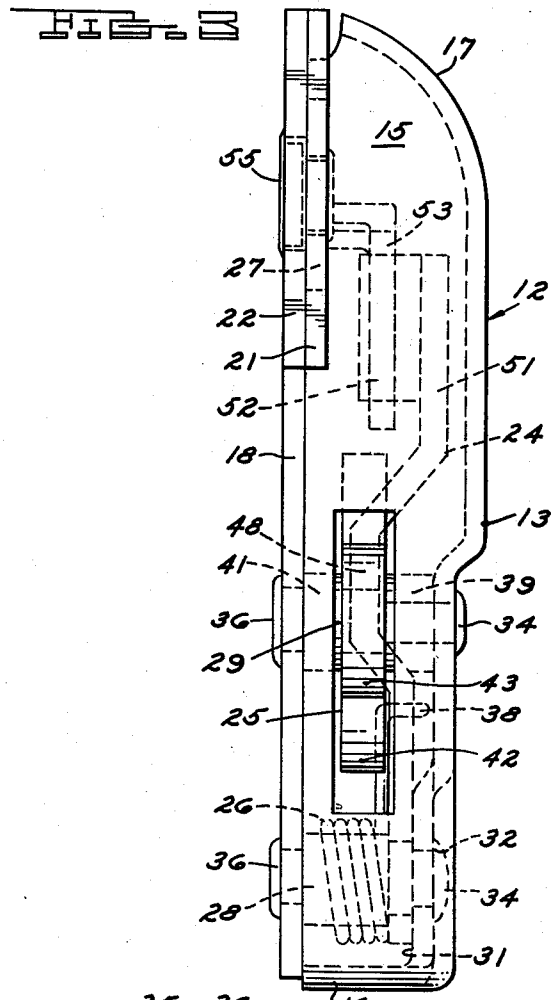
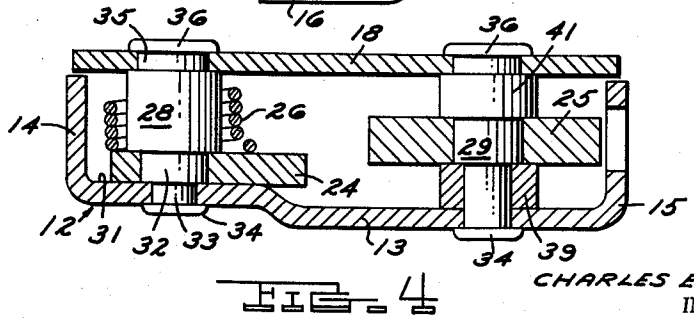


FIG. 4



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LATCH MECHANISM

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This invention relates to latch mechanisms and more particularly to such mechanisms as applied to luggage compartment closures or the like on vehicle bodies.

The conventional luggage compartment latch mechanism comprises a combination dovetail-housing partially enclosing a latch element having a keeper engaging portion projecting from the housing. The latch element is releasably held in latched position by some form of a detent. Disengagement of the detent from the latch element is accomplished through a system of levers arranged to multiply the turning force exerted on a key inserted in a key cylinder mechanism. The latch mechanism usually incorporates suitable springs which function to yieldably hold the mechanism parts in predetermined positions or to restore the parts to their original positions after the latch mechanism has been operated.

An important factor in the acceptability of such mechanisms for commercial use is the degree of key torque required to turn the key to cause operation of the system of levers for disengaging the detent from the latch element. The number and placement of the springs used in the mechanism has a direct bearing on the amount of torque which must be applied to the key to operate the latch mechanism.

The construction and arrangement of the latch mechanism embodying the present invention has the particular advantage that only one spring is utilized to perform the necessary functions of yieldably holding the latch mechanism elements in predetermined positions and of restoring elements of the lever system and the latch element to such predetermined positions after actuation of the latch mechanism by operation of a key operated locking and unlocking device. The ability of the single spring to perform its multiple functions is derived from the pivotal relationship of a detent carrying lever and of the latch element and of the relationship of a detent on the detent carrying lever and a detent engageable portion of the latch element. These relationships are such that: (1) when the latch element is in latched position the detent is engaged with the detent engageable portion to hold the latch element against movement in unlatching direction, and (2) when the latch element is in unlatched position the detent yieldingly abuts the detent engageable portion to hold the latch element in unlatched position.

It is an object of the present invention to provide a simple, compact, efficient and economical latch mechanism which will meet all durability and operational requirements particularly for use on automotive vehicles.

Other objects and advantages of the present invention will be made more apparent as this description proceeds, particularly when considered in connection with the accompanying drawings, wherein:

FIG. 1 is a front elevational view of a latch mechanism constructed in accordance with the present invention, a portion of the housing cover plate being cut away to expose the components of the latch mechanism as they appear with the latch element in unlatched position;

FIG. 2 is a view in part similar to FIG. 1 illustrating the components of the latch mechanism in latched position;

FIG. 3 is an enlarged side elevational view looking in the direction of the arrow 3 in FIG. 1; and

FIG. 4 is an enlarged sectional view taken substantially on the line 4—4 of FIG. 1.

The drawings illustrate the latch mechanism, generally designated 11, as it would appear when applied to the luggage compartment door of an automobile body, but it will be understood that the device is also applicable to other doors and closure members.

The latch mechanism 11 comprises a substantially rectangular housing or casing, generally designated 12. In the installed position of the latch mechanism on a vehicle compartment door or deck lid closure structure, the longitudinal axis of its housing or casing 12 extends in a substantially up and down direction. The housing or casing 12 has an integral inner or rear wall 13, side walls 14 and 15 and a bottom or end wall 16. The term "inner" or "rear" as applied to wall 13 indicates that this wall, in the installed position of the latch mechanism, is the wall which faces inwardly of the compartment on which the closure structure is mounted. At its upper end 17, the inner wall 13 is curved, as best seen in FIG. 3, to form the closed upper end of the housing. The outer or front wall 18, or the one in spaced relationship to the wall 13, is an elongated cover plate which is secured in position to complete the housing after the assembly of the latch mechanism components within the housing or casing 12. It will be noted that the side walls 14 and 15 are tapered at their bottom ends (see FIGS. 2 and 3), for a purpose to be more fully explained.

Both the housing 12 and the cover plate 18 are provided with complementary flanges or ears 21 and 22, respectively, extending laterally from the sides thereof at the upper end of each. The flanges are provided with aligned apertures 23 adapted to receive bolts (not shown) or the like for mounting the latch mechanism on the closure structure. In the final assembly of the cover plate to the housing, the flanges 21 and 22, respectively, are spot welded to each other.

The operating components of the latch mechanism 11 are few in number and consist of a pivoted lever 24, a latch element 25, a spring 26, a second lever or actuator cam 27, and two pivot shafts or studs 28 and 29, respectively.

The lever 24 is an elongated member which is pivotally mounted against the inner face 31 of the inner or rear wall 13 of the housing. As best seen in FIG. 4, lever 24 is mounted on a reduced diameter shoulder portion 32 of pivot shaft 28. The pivot shaft 28 has a further reduced end portion 33 which projects through a hole in the inner wall 13 of the housing and is riveted or staked over as indicated at 34 for permanent attachment to the housing. The pivot shaft 28 at its other end has an extension 35 adapted to project through a suitable aperture in the cover plate 18 and then to be riveted or staked over at 36. This, of course, is done after the latch mechanism components have been assembled within the housing.

The spring 26 yieldably urges the lever 24 in a clockwise direction as viewed in FIGS. 1 and 2. The spring 26 is a coil spring which encompasses the pivot stud 28. It has two upstanding free end portions 37 and 38. The end portion 37 of the spring 26 lies against the inner surface of the side wall 14 and the end portion 38 hooks over the edge of the lever 24 contiguous to the side wall 14. The spring 26 is installed in a preloaded condition.

The latch element 25 comprises a plate member which is pivotally mounted on the shoulder stud or pivot shaft 29. It will be noted that the latch element is mounted in centrally spaced relationship to the inner and outer walls of the housing. A spacer 39 maintains the latch element in properly spaced relationship to the inner wall and a shoulder 41 on the pivot shaft 29 maintains the proper spaced relationship to the outer wall. The pivot shaft 29

ends are staked or riveted over at 34 and 36, respectively, as were the ends of the shaft 27.

The latch element 25 is provided at one side of its pivot axis with spaced fingers 42 and 43. At its opposite side it is provided with an abutment or projection 44 having on one side thereof a shoulder 45 and on the other side thereof a cam surface 46. The latch element 25 is provided with a further abutment or extension 47 which in unlatched condition of the latch mechanism, see FIG. 1, engages the side wall 15 of the casing to act as a stop limiting the direction of movement of the latch element in unlatched direction or, as viewed in FIG. 1, in a clockwise direction.

Intermediate its ends the lever 24 is provided with an embossed portion 48 having a shoulder 49 thereon. The shoulder 49 may hereinafter be referred to as the detent on the lever 24 and the abutment 44 on the latch element may hereinafter be referred to as a detent engageable portion of the latch element. As was previously explained, the latch element is positioned substantially centrally of the walls 13 and 18 and the lever 24 is mounted in surface contact with the inner wall 13 of the housing. The embossed portion 48 of the lever brings the detent 49 into a common plane with the latch element.

The upper end portion 51 of the lever 24 lies in a common plane with the lower end portion and has a flange 52 which is turned in the direction of the cover plate 18. The flange 52 is adapted to be engaged by the lower free end 53 of the actuator cam 27. The actuator cam 27 is pivotally mounted on the cover plate by means of a tubular rivet 55 having a square or rectangular hole or aperture 56 through its center. This actuator cam is adapted to be operated by a conventional key cylinder mechanism (not shown) mounted in the outer panel of the closure or compartment on which the latch mechanism is mounted. It will be understood that the key cylinder mechanism includes a shaft (not shown) which passes through the aperture 56 in the latch actuating cam tubular rivet.

As seen in FIGS. 1 and 2, the spaced fingers 42 and 43 which form the latching portion of the latch element 25 project through an aperture 54 in the side wall 15 of the housing or casing 12.

The latch mechanism is adapted to have latching engagement with any suitable striker device which may be mounted on the floor or lower panel of a compartment in any desired manner. As far as the present latch mechanism is concerned, the striker is required to have an upper wall portion 57, a fragmentary portion of which is illustrated in the drawing, having an aperture therein which at one side is defined by a downwardly turned flange 58 and at the other side by an inwardly and downwardly turned flange 59. As shown in FIG. 2, the tapered portions of the housing or casing side walls 14 and 15 will enter the aperture in the striker wall 57 and act as a pilot to center the latch mechanism with respect to the striker and thereby the closure with respect to the opening in the compartment.

As seen in FIG. 1, in unlatched position the latch element finger 42 is within the confines of the side wall 15 of the housing. The latch element finger 43 lies outside of the confines of the side wall 15 of the housing 12 and is adapted to engage the upper surface of the striker. Upon downward movement of the housing into the striker aperture, the engagement of the finger 43 with the upper surface of the striker causes the latch element to be rotated in a clockwise direction. As was pointed out above, the spring 26 urges the lever 24 in a clockwise direction toward the latch element 25. As the latch element rotates in a counterclockwise direction, the lever 24 is forced slightly to the left or in a counterclockwise direction until the detent 49 thereon is able first to surmount the cam surface 46 of the abutment on the latch element 25 and then to drop into engagement with the shoulder 45 of the latch element. As soon as this occurs, the latch element 25 is held against rotation in a clockwise direction by the detent 49 on the lever 24. The compartment closure is then latched to the compartment wall.

In order to unlatch the latch mechanism, the actuator cam 27 must be swung in a clockwise direction, by actuation of a key cylinder mechanism as previously described, so that its cam portion 53 will engage the upper end of the lever 24 to urge the latter in a counterclockwise direction against the resistance of the spring 26. As soon as the detent portion of the lever 24 is moved sufficiently to the left, or away from the pivot axis of the latch element, the latch element is free to rotate in a clockwise or unlatching direction.

It should be noted that most compartment closures are mounted on hinge structures which include torsion bars or other suitable counterbalance means which are effective to cause immediate upward movement of the closure as soon as the latch element is released. This upward movement is usually enough to cause withdrawal of the latch mechanism sufficiently above the plane of the striker and rotation of the latch element to a position in which the detent cannot re-engage the shoulder on the latch element.

As soon as the actuator cam 27 is released, that is, as soon as the key actuating mechanism is no longer being twisted in a direction to swing the actuator cam 27 in a clockwise direction, the spring 26 exerts force on the lever 24 to urge the latter in a clockwise direction. However, one side of the detent on the lever 24 is now abutting the cam surface 46 on the latch element 25. Thus, the force of the spring tending to urge the lever 24 in a clockwise direction is also applied to the latch element 25 through the abutting relationship of the detent 49 and the cam surface 46 of the abutment on the latch element. As best seen in FIG. 1, the point of contact between the detent and the cam surface 46 in unlatched position of the latch element 25 lies on a line passing above the center of the pivot shaft 29. The resultant force couple on the latch element is one which urges the latch element in a clockwise or unlatching direction—at least to the extent permitted by the stop abutment 47. In latched condition of the latch mechanism the point of contact between the detent 49 and the shoulder 45 on the latch element 25 results in a reaction force which lies substantially on a line passing between the pivot axes of the latch element 25 and the lever 24. The force couple acting on the latch element in latched condition is such that the latch element is actually being urged in a counterclockwise direction or latching condition. Of course, the latch element and the lever being non-yieldable elements, the latch element is satisfactorily held in latched position as a result of the engagement of the detent 49 with the shoulder 45.

Because of the relationship of the pivot centers as determined by the pivot axes of the pivot shafts 28 and 29, and because of the relationship of the detent 49 of the lever 24 with respect to the abutment 44 on the latch element, only the single spring 26 is required to maintain the latch element in unlatched position in readiness for latching engagement with the striker and to hold the lever 24 so that its detent 49 is in readiness to engage the shoulder 45 on the latch element when the latter is rotated into latching position after engagement with the striker. Because of the mechanical advantage obtained by the fact that the spring acts on a shorter length of the lever 24 than does the actuator cam 27, the resistance of the actuating cam to being turned by the key is relatively low. This provides the desirable low key torque which is an important criteria of a satisfactory luggage compartment latch mechanism.

It will be understood that the invention is not to be limited to the exact construction shown and described, but that various changes and modifications may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A latch mechanism comprising:
an elongated housing having spaced support walls and side walls therebetween,
said side walls at one end of said housing being convergent and being adapted to act as pilot means for guiding said latch mechanism into latching position relative to a keeper device,
an elongated lever pivotally mounted at one of its ends at said one end of said housing for swinging movement about a pivot axis intersecting said support walls,
said lever extending longitudinally of said housing along one of said side walls,
a latch element pivotally mounted within said housing between said elongated lever and the other of said side walls for swinging movement about a pivot axis located intermediate the ends of said housing and parallel to said lever pivot axis.
said latch element having a keeper engaging portion at one side thereof projecting through an aperture in said other side wall of said housing,
a detent on said elongated lever intermediate the ends and on the side thereof toward said other side wall,
an abutment on said latch element on the side thereof opposite said keeper engaging portion and in opposing relation to said detent.
spring means urging said elongated lever and thereby said detent toward said other side wall into abutting relation to said latch element abutment,
and an outer manually operable means pivotally mounted on one of said support walls at the other end of said housing engageable with the other end of said elongated lever to swing the same and thereby said detent portion out of latch element holding position.

2. A latch mechanism comprising:
an elongated housing having spaced support walls and side walls therebetween,
said side walls at one end of said housing being convergent and being adapted to act as pilot means for guiding said latch mechanism into latching position relative to a keeper device,
an elongated lever pivotally mounted at one of its ends at said one end of said housing for swinging movement about a pivot axis intersecting said support walls,
said lever extending longitudinally of said housing adjacent one of said side walls,
a latch element pivotally mounted within said housing between said elongated lever and the other of said side walls for swinging movement about a pivot axis located intermediate the ends of said housing and parallel to said lever pivot axis,
said latch element having a keeper engaging portion at one side thereof projecting through an aperture in said other side wall of said housing,
a detent portion on said elongated lever intermediate the ends and on the side thereof toward said other side wall,
an abutment on said latch element on the side thereof opposite said keeper engaging portion and in opposing relation to said detent portion,
said detent portion being engageable with one side of said latch element abutment to hold said latch element in latched position and with another side of said abutment in unlatched position of said latch element,
spring means urging said elongated lever in a direction to position said detent portion in abutting relation to either side of said abutment,
the pivotal relationship of said lever and said latch element and the relationship of said detent portion and said one side of said abutment when said latch element is in latched position being such that the force exerted by said detent portion on said abutment acts substantially along a line passing to one side of said latch element pivot axis and between the lever and latch element pivot axes.

3. A latch mechanism comprising:
an elongated housing having spaced support walls and side walls therebetween,
said side walls at one end of said housing being convergent and being adapted to act as pilot means for guiding said latch mechanism into latching position relative to a keeper device,
an elongated lever pivotally mounted at one of its ends at said one end of said housing for swinging movement about a pivot axis intersecting said support walls,
said lever extending longitudinally of said housing adjacent one of said side walls,
a latch element pivotally mounted within said housing between said elongated lever and the other of said side walls for swinging movement about a pivot axis located intermediate the ends of said housing and parallel to said lever pivot axis,
said latch element having a keeper engaging portion at one side thereof projecting through an aperture in said other side wall of said housing,
a detent portion on said elongated lever intermediate the ends and on the side thereof toward said other side wall,
an abutment on said latch element on the side thereof opposite said keeper engaging portion and in opposing relation to said detent portion,
said detent portion being engageable with one side of said latch element abutment to hold said latch element in latched position and with another side of said abutment in unlatched position of said latch element,
spring means urging said elongated lever in a direction to position said detent portion in abutting relation to either side of said abutment,
the pivotal relationship of said lever and said latch element and the relationship of said detent portion and one side of said abutment when said latch element is in latched position being such that the force exerted by said detent portion on said abutment acts substantially along a line passing to one side of said latch element pivot axis and between the lever and latch element pivot axes,
and the relationship of said detent portion and the other side of said abutment when said latch element is held in unlatched position being such that the force exerted by said detent portion on said abutment acts substantially along a line passing to the other side of said latch element pivot axis.

4. A latch mechanism comprising:
an elongated housing having spaced support walls and side walls therebetween,
said side walls at one end of said housing being convergent and being adapted to act as pilot means for guiding said latch mechanism into latching position relative to a keeper device,
an elongated lever pivotally mounted at one of its ends at one end of said housing for swinging movement about a pivot axis intersecting said support walls,
said lever extending longitudinally of said housing adjacent one of said side walls,
a latch element pivotally mounted within said housing between said elongated lever and the other of said side walls for swinging movement about a pivot axis located intermediate the ends of said housing and parallel to said lever pivot axis,
said latch element having a keeper engaging portion at one side thereof projecting through an aperture in said other side wall of said housing,
a detent portion on said elongated lever intermediate the ends and on the side thereof toward said other side wall,
an abutment on said latch element on the side thereof

opposite said keeper engaging portion and in opposing relation to said detent portion,

said detent portion being engageable with one side of said latch element abutment to hold said latch element in latched position and with another side of said abutment in unlatched position of said latch element,

spring means urging said elongated lever in a direction to position said detent in abutting relation to either side of said abutment,

the pivotal relationship of said lever and said latch element and

(1) the relationship of said detent portion and said one side of said abutment being such that when said latch element is in latched position said detent portion holds said latch element against movement in unlatching direction, and

(2) the relationship of said detent and said other side of said abutment being such that when said latch element is in unlatched position said detent yieldingly holds said latch element in said unlatched position.

5. A latch mechanism according to claim 4 having an outer manually operable means pivotally mounted on one of said support walls for engagement with the other end of said elongated lever to swing the same out of latch element holding position.

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