Jan. 23, 1940. J. P. LAVIGNE 2,188,052

HINGE STRUCTURE

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Fig. 1.

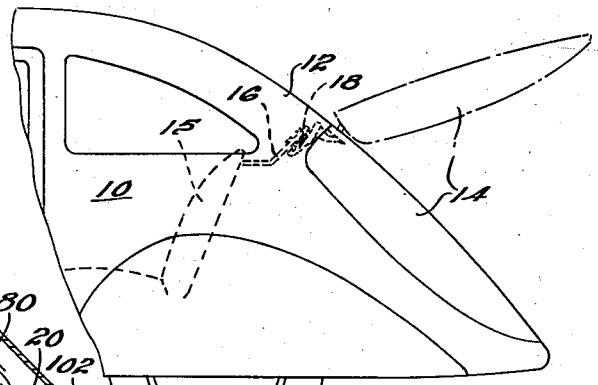


Fig. 2.

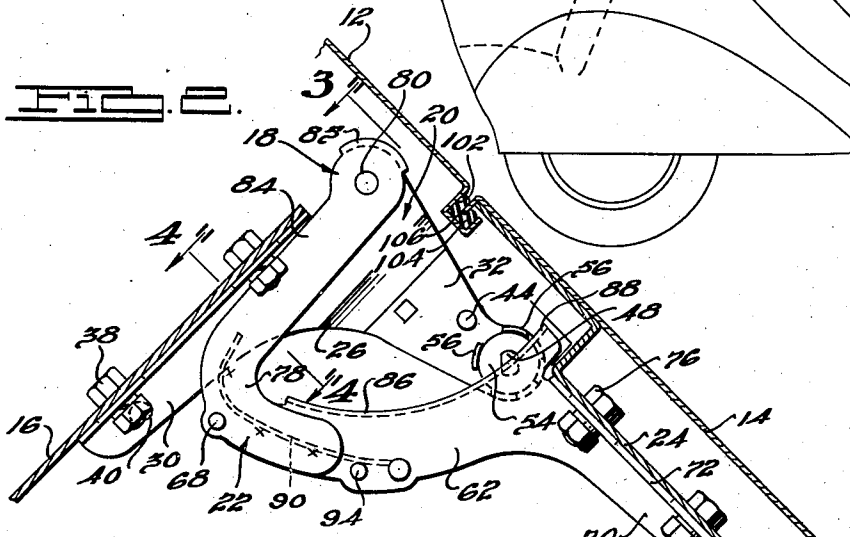


Fig. 3.

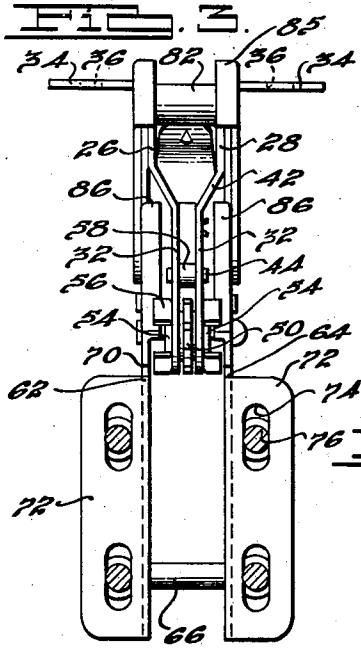
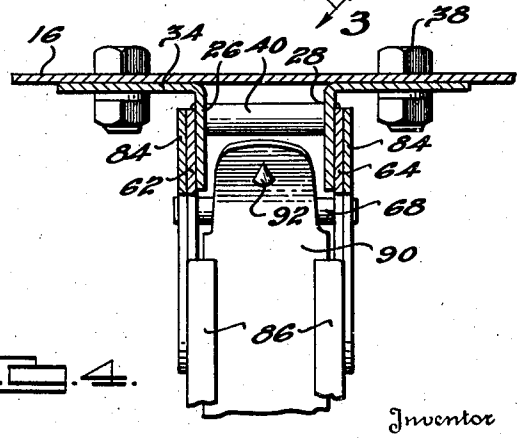


Fig. 4.



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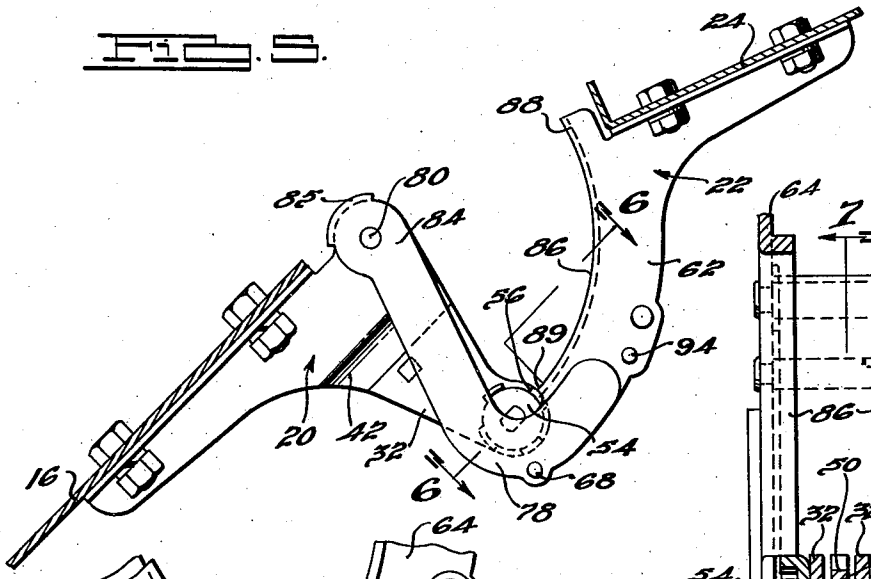
Attorneys

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HINGE STRUCTURE

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Fig. 5.



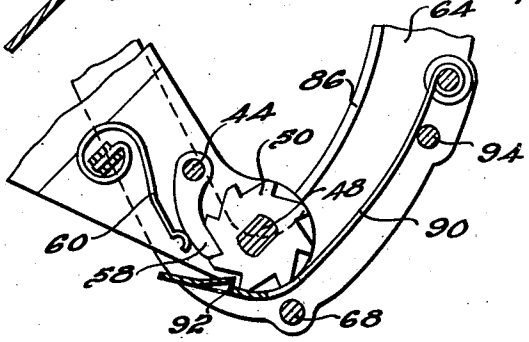


Fig. 7.

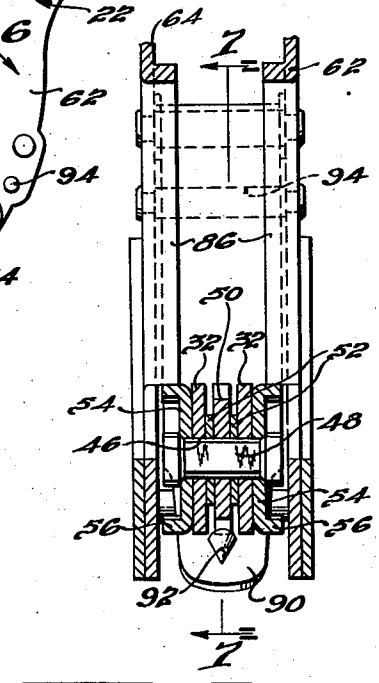


Fig. 6.

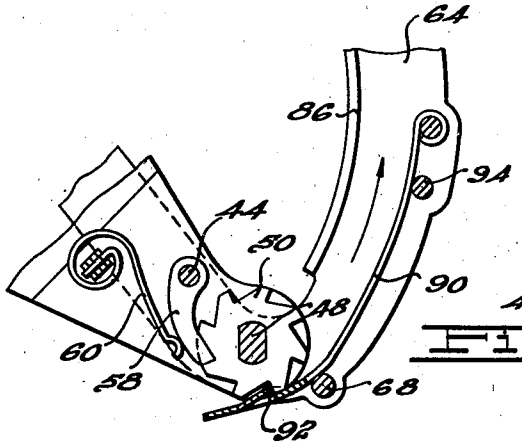


Fig. 8.

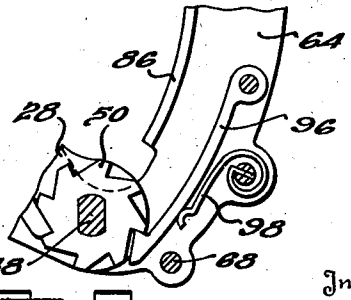


Fig. 9.

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UNITED STATES PATENT OFFICE

2,188,052

HINGE STRUCTURE

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Application January 21, 1937, Serial No. 121,437

5 Claims. (Cl. 16—138)

This invention relates to mechanism adapted to be used as a hinge or as a latch, or as a combination hinge and latch, of the type adaptable to hold a door, lid, or other pivoted member in open position and adapted to be automatically released from its latched position by a further opening movement of the member.

Objects of the invention are to provide a combination hinge and latch mechanism for use with a pivoted panel member of such a construction that when the lid is opened to a normal extent, the latch mechanism will operate to hold the panel in such position, and when it is desired to close the panel, another outward movement of the panel releases the latch mechanism whereby the panel may be returned to its closed position; to provide a combination hinge and latch structure having two members pivoted relative to each other, one of the members embracing the sides of the other member when the members are in their closed positions; to provide a rugged structure which does not work loose and rattle after use; and to provide a rugged mechanism of the type mentioned that is simple in construction, efficient in operation, and economical to produce.

Other objects of the invention will become apparent from the following specification, the drawings relating thereto, and from the claims hereinafter set forth.

In the drawings, in which like numerals are used to designate like parts in the several views throughout;

Figure 1 is a fragmentary side elevational view of a vehicle illustrating a mechanism embodying features of the present invention;

Fig. 2 is a partial side elevational view, showing parts in section, of the combination hinge and latch mechanism embodying features of the present invention;

Fig. 3 is a plan view taken substantially along the line 3—3 of Fig. 2;

Fig. 4 is a cross-sectional view, showing parts in elevation, taken substantially along the line 4—4 of Fig. 2;

Fig. 5 is a side elevational view of the mechanism shown in Fig. 2 with the mechanism in a locked open position;

Fig. 6 is a cross-sectional view taken substantially along the line 6—6 of Fig. 5;

Fig. 7 is a cross-sectional view showing parts in elevation, taken substantially along the line 7—7 of Fig. 6;

Fig. 8 is a view similar to Fig. 7 but showing the elements of the mechanism in different relative positions from those shown in Fig. 7; and

Fig. 9 is a fragmentary elevational view illustrating a modified structure for certain details of the present invention.

The present invention is adapted for use in connection with any pivoted closure, or the like, and is particularly applicable for use in connection with the rear deck, or rear panel, of motor vehicle bodies; and, accordingly, its application thereto will be described, and its application to other devices or members will be apparent therefrom. Rear deck panels of present day vehicle constructions are relatively large and heavy, and it is necessary to provide a rugged hinge and latch mechanism for properly hingedly mounting the rear deck panel to the vehicle. The structure of the present invention provides a rugged combination hinge and latch mechanism and is of such construction that the hinge does not loosen in use and affords a strong latch for maintaining the rear deck panel in an open position.

For a better understanding of the invention, reference may be had to the accompanying drawings, in which in Fig. 1 an automobile body 10 is illustrated having a rear wall 12 which is provided with an opening therethrough over which a rear deck door or panel 14 is hingedly mounted in a manner to be described in detail. Upon opening of the door 14, access may be had through the opening in the rear wall to a storage compartment between the rear seat 15 of the vehicle and the rear wall.

The door panel 14 is hingedly secured to a transversely extending bracket member 16 mounted within the vehicle structure at the rear of the seat 15, and above the storage space by means of a hinge structure generally indicated at 18. The hinge structure 18 comprises a first member 20 and a second member 22 pivotally connected together, the first member being secured to the bracket 16 and the second member being secured to a bracket 24, which in turn is suitably secured, as by spot welding, to the door panel 14 along the upper edge of the door panel 14.

The first member 20 includes a pair of similar elements 26 and 28, each of the elements having a base portion 30 and an outstanding arm portion 32 adjacent one end of the base portion 30. Each of the elements 26 and 28 is provided with an outwardly directed flange 34 along the edge of the base portion 30; and each of the flanges 34 is provided with elongated openings 36 therethrough for receiving bolts 38 for adjustably mounting the first member 20 to the bracket

member 16 through openings therein. The elements 26 and 28 are mounted in spaced relation to each other adjacent the base by means of a pin member 40 having reduced end portions forming shoulders which abut against the inner faces of the elements 26 and 28 to fix said elements in spaced relation to each other. The reduced end portions of the member 40 extend through openings in the members 26 and 28, and those portions of the member 40 which extend beyond the elements 26 and 28 are upset to fix the elements 26 and 28 relative to each other.

The outstanding arm portions 32 of the elements 26 and 28 are bent inwardly, as indicated at 42, so that the arm portions 32 are not spaced from each other to as great an extent as the base portions 30. A pin member 44, similar to the pin member 40, separates and fixes the arm portions 32 in spaced relation to each other adjacent the outer ends of the arm portions.

Aligned openings 46 are provided through the arm portions 32 adjacent the outer ends thereof which are adapted to rotatably receive therein a pivot pin 48. A ratchet wheel 50 is fixedly secured to the pivot pin 48 for rotation therewith and is interposed between the arm portions 32 of the elements 26 and 28 adjacent the outer ends thereof. Washers 52 are preferably interposed between the inner sides of the arm portions 32 and the ratchet-wheel 50 to maintain the ratchet-wheel 50 in alignment. The ends of the pivot pin 48 extend outwardly beyond the sides of the arms 32 and are preferably flattened on opposite sides, being substantially rectangular in cross section, as indicated for example in Fig. 7.

Detent wheels 54 are fixedly secured to the opposite projecting ends of the pivot pin 48 for rotation therewith. The construction and arrangement of the ratchet-wheel 50, the pivot pin 48, and the detent wheels 54, are such relative to the member 20 that rotation of the ratchet-wheel 50 causes corresponding rotation of the detent wheels 54. Each of the detent wheels is constructed with a plurality of outwardly directed abutments or stops 56 in equally spaced relation to each other, adjacent the outer periphery thereof, and substantially normal to the faces of the wheels. The abutments 56 provide spaces therebetween, the arrangement of the abutments and spaces being such that pairs of abutments and pairs of spaces, respectively, are diametrically opposed to each other for a reason to become more apparent hereinafter.

As best shown in Figs. 7 and 8, a stop pawl 58 is pivotally mounted on the pin 44 between the arm portions 32 and engages the teeth of the ratchet wheel 50 so as to prevent rotation of the ratchet-wheel in one direction and permit rotation in the opposite direction. A spring member 60 is fixedly secured relative to the arm portion 32 and engages the pawl 58 constantly urging it into engagement with the ratchet-wheel 50.

The second member 22 comprises a pair of similar elements 62 and 64 which are spaced and fixed relative to each other by a pin 66 similar in construction to the pin 40 and a pin 68 also similar in construction to the pin 40. Each of the elements 62 and 64 has a base portion 70 having outwardly directed flanges 72 with elongated openings 74 therethrough which receive bolts 76 for suitably securing the member 22 to the bracket member 24. Each of the elements 62 and 64 also has a U-shaped portion 78 integral with the base portion 70 adjacent the free ends thereof and the outer ends of the U-shaped portions embracing the outer sides of the base portions 30 of the elements 26 and 28, respectively, when the members are in closed position.

Openings are provided through the outer ends of the U-shaped portions which are adapted to receive therethrough a pivot pin 80 which also passes through the elements 26 and 28 to thereby pivotally mount the members 20 and 22 relative to each other. The pivot pin 80 may be provided with a sleeve 82 interposed between the inner faces of the elements 26 and 28 to rigidly maintain these elements in spaced relation. Strips 84 are fixed and extend over a portion of the length of the U-shaped portion to stiffen these portions; and inwardly directed flanges 85 of predetermined length are provided at the pivot ends of the strips 84 to provide stops and thereby limit the movement of the members 20 and 22 relative to each other.

The inner sides of the U-shaped portions of the elements 62 and 64 adjacent the base portion 70 are curved and have inwardly directed flanges 86 of predetermined length. When the hinge members 20 and 22 are in closed position, as shown in Figure 2, the flanges 86 extend outwardly beyond the abutments 56 of the detent wheels, as indicated at 88, and extend substantially diametrically across the detent wheels through diametrically opposed spaces provided between the abutments 56. The flanges 86 are preferably curved on an arc about the pivot pin 80 as a center, and the center of the pivot pin 48 for mounting the detent wheel also preferably lies substantially in the same arc.

A pawl member 90 is pivotally secured at one end to the member 22 intermediate the elements 62 and 64; and preferably is in the form of a spring strip which extends along the curved portion of the U-shaped portion and is bent inwardly adjacent its end. A projection 92 is formed on the pawl 90 adjacent its end and is adapted to engage the ratchet-wheel, in a manner to be described more in detail hereinafter, to rotate the ratchet-wheel a predetermined distance. A pin 94 is suitably secured to the elements 62 and 64 extending therebetween and engages the back surface of the pawl 90 and constantly urges it in a direction towards the ratchet-wheel, so as to insure engagement with, and operation of, the ratchet-wheel when the hinge is open.

As a modified structure, as shown in Figure 9, the strip spring pawl 90 may be replaced with a solid pawl member 96 which is pivotally secured to the elements 62 and 64 of the member 22 and which is resiliently urged into engagement with the ratchet-wheel by means of a spring 98 fixedly secured to the member 22.

In Figs. 1 to 4, the door panel 14 and the hinge 18 are illustrated in a closed position; and in order to provide an effective seal between the vehicle and the panel 14 around the edges there the rear wall 12 is provided with an outwardly opening channel 102 around the edges of the opening into the storage compartment, and a resilient member 104, preferably of sponge rubber, is mounted in the outwardly opening channel 102. The door panel 14 is flanged inwardly around its edges as indicated at 106 and when the panel is closed the inwardly directed flange engages the resilient member 104 and provides an effective seal between the door panel and the vehicle body.

When the members 20 and 22 of the hinge 18 are in a closed position, as indicated in Figs. 2 to 4,

the sides of the U-shaped portions 78 adjacent the pivot pin 80 snugly and slidably embrace the opposite outer surfaces of the base portions 30 of the member 20, these parts thus interlocking to positively prevent any movement except about the pivot pin 80, and thus provide a rigid hinge structure for firmly holding the panel in its proper position when closed. When the members 20 and 22 are in closed position, as shown in Fig. 2, the projecting end 88 of the flange 86 extends outwardly through the abutments 56 of and beyond the detent wheel 54 so that there is no possibility of the wheel 54 turning when the panel is closed so as to bring one pair of the abutments 56 into line with the ends of the flanges 86 and locking the door panel against outward or opening movement.

In the embodiment illustrated, the detent wheel is provided with four equally spaced abutments 56 therearound, thus providing four equally spaced spaces between the abutments; but it is to be understood that this number of abutments may be varied within the scope and teachings of the present invention. With four equally spaced abutments and four equally spaced spaces, it is evident that the ratchet 50 is provided with eight teeth so that each tooth has a corresponding space or abutment upon rotation of the ratchet.

As the door panel 14 is opened or moved outwardly, the member 22 is pivoted about the pin 80 relative to the member 20 and the flanges 86 pass across the detent wheels 54 through the spaces above mentioned. As the member 22 approaches its outermost position of travel, the engaging portion 92 of the pawl 90 engages a tooth of the ratchet-wheel 50, and continued outward movement of the member 22 causes rotation of the ratchet wheel and therefore rotation of the detent wheels 54. Also, as the member 22 reaches its outermost position, the flange 86 is of such length that the inner end 89 of the flange has passed across and beyond the periphery of the detent wheel 50, permitting the movement of the detent wheel and causing one of the abutments 56 to be placed in line with and behind the flange 86 adjacent the end 89, as shown in Figure 5. The door panel 14 may then be permitted to recede slightly and this will cause a slightly reverse movement of the member 22 relative to the member 20, and as one of the abutments 56 has at this time been moved to a position in line with the end 89 of each of the flanges 86, the ends 89 will strike against the abutments 56 and further downward movement of the member 22 is thereby prevented. A door panel 14 is thereby locked in its open position and is held in that position until released.

To release the door panel from its locked position and permit it to be closed, the panel 14 is again moved outwardly, as shown in Fig. 8, and the engaging portion 92 of the pawl 90 again engages a tooth of the ratchet-wheel 50, causing rotation of the ratchet-wheel and also rotation of the detent wheel to thereby rotate the abutments 56 and move the abutments away from alignment with the flanges 86. The flange 86 may then pass through the spaces between the abutments 56 and the door may be dropped to its complete position and again assume the position shown in Fig. 2.

From the above it is evident that a rugged and efficient combination hinge and latch mechanism is provided by the present invention.

Formal changes may be made in the specific embodiments of the invention described without departing from the spirit and substance of the broad invention, the scope of which is commensurate with the appended claims.

What is claimed is:

1. A hinge and latch mechanism comprising a first member and a second member, said second member having a U-shaped portion pivotally connected to said first member adjacent one end of said U-shaped portion, said first member having a projecting portion extending transversely of said U-shaped portion, a ratchet-wheel rotatively mounted adjacent the end of said projecting portion, a detent wheel fixedly secured for rotation with said ratchet-wheel, the U-shaped portion of said second member having an abutment which strikes against the detent wheel or passes thereby depending upon the rotative position of said detent wheel, and means on said second member engaging said ratchet-wheel to rotate said ratchet-wheel upon relative pivotal movement of said first and second members to thereby rotate said detent wheel alternately to its stopping and clear positions.

2. A hinge and latch mechanism comprising a first member and a second member, said second member having a U-shaped portion pivotally connected to said first member adjacent one end of said U-shaped portion, said first member having an arm, a ratchet-wheel rotatively mounted on said arm, a detent wheel fixedly secured for rotation with said ratchet-wheel, said detent wheel having spaced projections adjacent the outer periphery thereof and extending outwardly from the face of said wheel, the U-shaped portion of said second member having an inwardly directed flange of predetermined length, and means on said second member engaging said ratchet-wheel to rotate said ratchet-wheel upon relative pivotal movement of said first and second members, the construction and arrangement of said detent wheel, said flange and said last named means being such that upon reversal of alternately opposite movement between said first and second members beyond a predetermined range of movement, one of said projections on said detent wheel will be caused to be alternately moved into abutting relation with said flange and prevent movement of said members relative to each other in one direction, and upon further relative movement of said members relative to each other will be moved to a clear position to permit said flange to pass by said detent wheel.

3. A hinge and latch mechanism comprising a first member having a base and an arm extending outwardly from said base, a ratchet-wheel rotatively mounted on said arm, detent wheels on opposite sides of said arm fixedly secured for rotation with said ratchet-wheel, a second member having spaced U-shaped portions, said U-shaped portions being pivotally connected to said base adjacent one end of said U-shaped portions and embracing the sides of said base, said U-shaped portions having curved inwardly directed flanges which strike against the detent wheels or pass thereby depending upon the rotative position of said detent wheels, and means on said second member engaging said ratchet-wheel to rotate said ratchet-wheel upon relative pivotal movement of said first and second members to thereby rotate said detent wheels alternately to their stopping and clear positions.

4. A hinge and latch mechanism comprising a first member having a base and arm, a ratchet-wheel rotatively mounted on said arm, detent wheels fixedly secured for rotation with said

ratchet-wheel, said detent wheels each having outwardly directed projections at spaced intervals around the periphery thereof, a second member having substantially U-shaped portions pivotally connected to said base adjacent the outer ends of said U-shaped portions, said U-shaped portions having inwardly directed curved flanges of predetermined length, which strike against projections on said detent wheels or pass by said detent wheels in the spaces between said projections depending upon the rotative position of said detent wheel, and means on said second member engaging said ratchet-wheel to rotate said ratchet-wheel upon relative pivotal movement of said first and second members to thereby rotate said detent wheels alternately to their stopping and clear position.

5. A hinge and latch mechanism comprising a first member and a second member, said second member having a substantially U-shaped portion pivotally connected to said first member adjacent one end of said U-shaped portion, said first member having an arm, a ratchet-wheel rotatively mounted on said arm, a detent wheel fixedly secured for rotation with said ratchet-wheel, said detent wheel having equally spaced projections around the periphery thereof substantially normal to the face of the detent wheel, the U-shaped portion of said second member having an inwardly directed curved flange of predetermined length, which strikes against one of the projections of said detent wheel or passes through the spaces between said projections depending upon the rotative position of said detent wheel, and means on said second member engaging said ratchet-wheel to rotate said ratchet-wheel upon relative pivotal movement of said first and second members to thereby position one of the projections on said detent wheel alternately to a position in line with said flange to lock said first and second members relative to each other against movement in one direction, and to a position clear of said flange to permit relative movement in the same direction of said first and second members.

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