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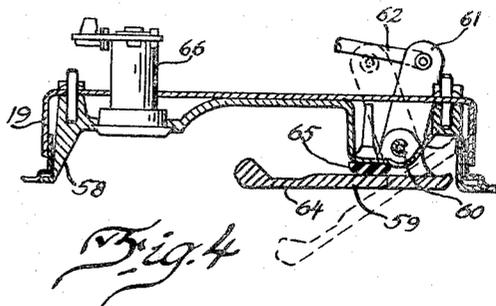
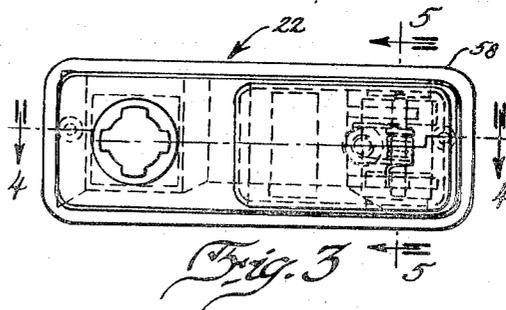
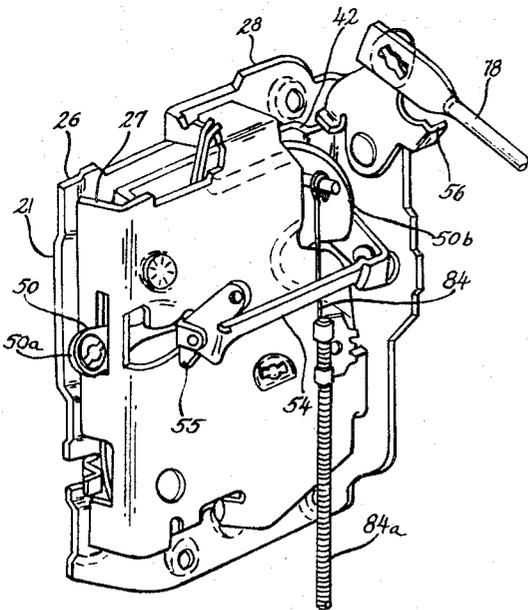
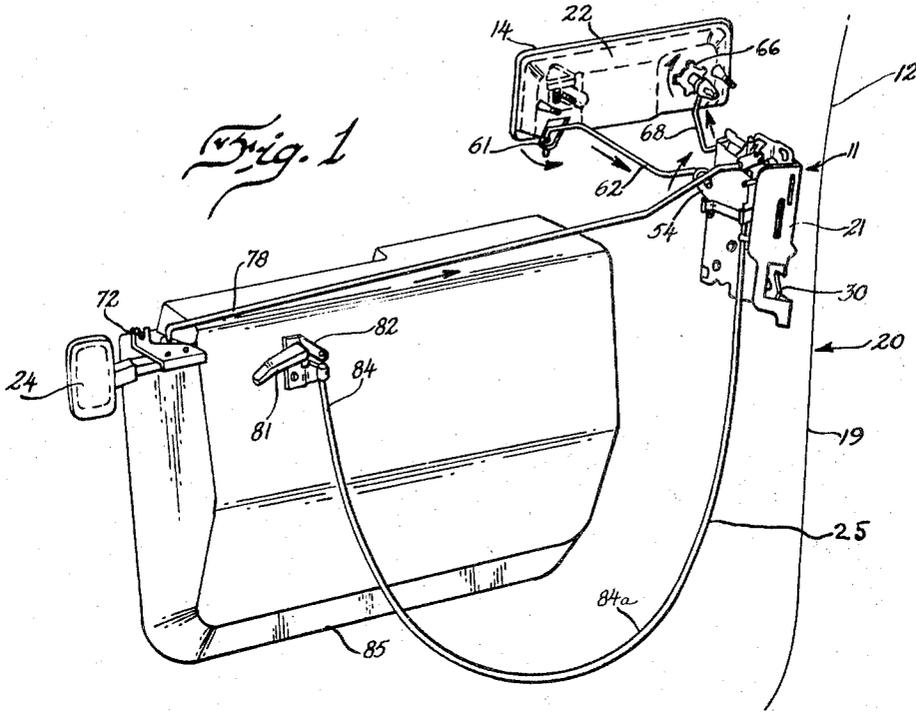
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3,400,962

SAFETY DOOR LATCH ARRANGEMENT

Filed Sept. 7, 1967

2 Sheets-Sheet 1



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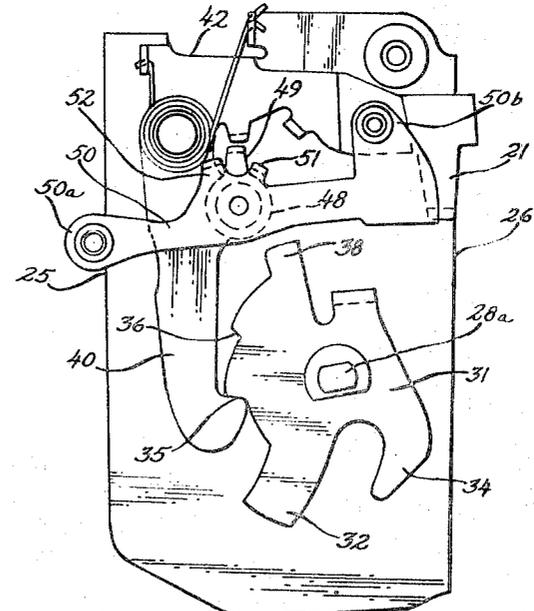
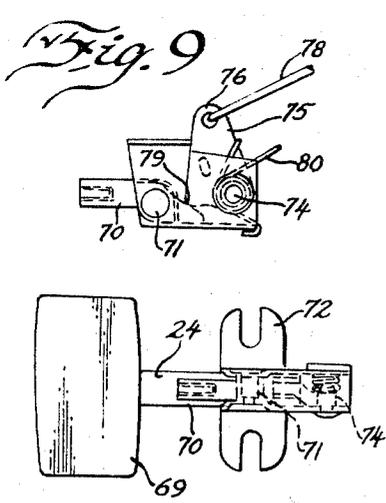
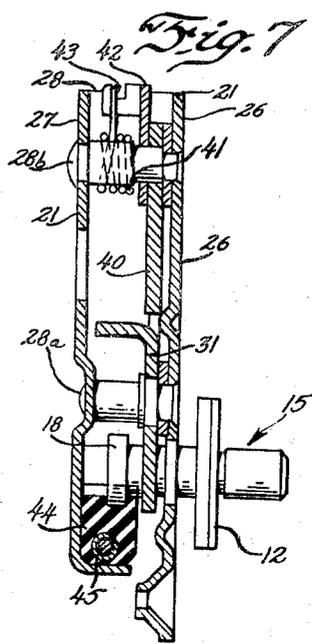
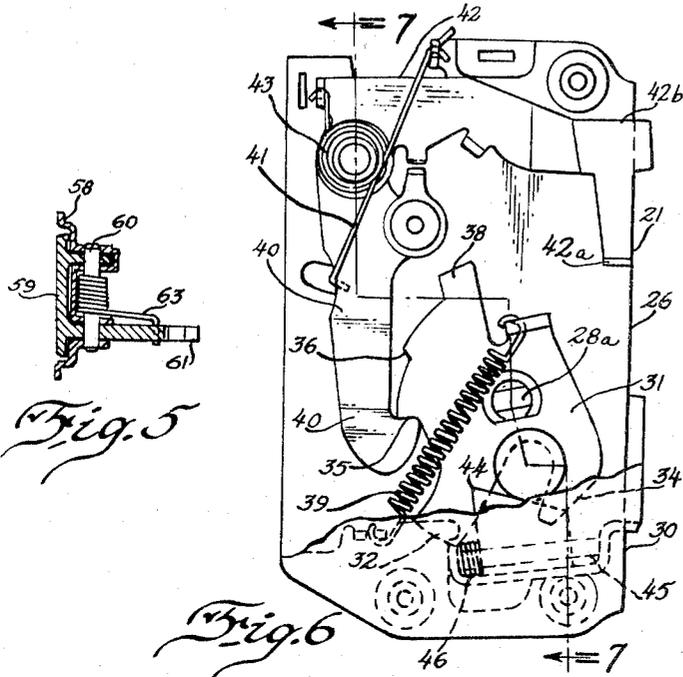
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SAFETY DOOR LATCH ARRANGEMENT

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2 Sheets-Sheet 2



*Fig. 8*

*Fig. 10*

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3,400,962

**SAFETY DOOR LATCH ARRANGEMENT**

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9 Claims. (Cl. 292-216)

**ABSTRACT OF THE DISCLOSURE**

A vehicle door having a closure-operated forked latch bolt mechanism including a contactor with selective abutment connection with a latch bolt pawl, through a locking member pivoted on the pawl. Inside and outside handles swing away from the door on vertical axes for safety and are connected to rods which move in direction opposite to forward motion of the vehicle to actuate the contactor for release of the bolt, so that impact inertia will not move the rods to inadvertently release the bolt.

**BACKGROUND OF THE INVENTION**

*Field of the invention*

This invention pertains to door locks for vehicles and more particularly to a safety door latch arrangement.

*Description of the prior art*

The conventional door lock for a vehicle includes a latch adapted to engage a generally cylindrical striker or keeper mounted on a pillar of the vehicle and extending therefrom. The latch assembly may be of the double jawed or the forked rotor type. The rotor type has a pair of forks or tines for engaging the striker therebetween. The rotor also has detents for engagement by the pawl. Conventionally, the rotor, pawl, and the contactor for moving the pawl to free the rotor, are mounted in coplanar fashion. An outside handle having a pushbutton assembly is utilized to actuate the contactor to disengage the rotor from the striker. An inside remote handle is utilized in conjunction with a suitable rod to actuate the contactor. Locking of the latch is conventionally accomplished by use of a key lock cylinder having an extension for moving the coplanar locking lever which prevents movement of the pawl by the contactor. An inside locking knob located in the garnish molding also is adapted to move the locking lever.

The door latch described above, although generally satisfactory has several defects from the aspect of safety. The most important being that with the latch closed, but not locked, a collision from the side could depress the pushbutton thereby opening the latch. In addition, the vehicle occupant might inadvertently unlatch the door by the standard method of pulling up on the remote handle during a collision. Of course, any arrangement having substantial rod members that could move forward during a front end collision to open the latch must also be avoided.

**SUMMARY**

Applicant's safety latch arrangement is designed to prevent the opening of the latch due to front and side collisions. Specifically, applicant has provided as a substitute for the pushbutton, an outside handle that rotates about a generally vertical axis as a bell crank to force the rod connected thereto rearwardly to open the latch which is also contrary to the inertial load developed thereon during a front end collision. The latch is also modified by the addition of a lever rotatably mounted thereon to depress the contactor to release the pawl. The lever is connected for actuation to the rod. As a

consequence, of the above construction, side collisions cannot actuate the handle as in the case of the pushbutton, and further, if the handle is physically displaced it will pull forward on the rod from the handle bell crank to the latch, which is in the opposite direction to the unlatching movement. The remote handle is also designed to be moved by pulling the handle located near the door paneling, toward the interior of the body about a vertical axis. This construction inhibits inadvertent operation by the vehicle occupant. Through a suitable cam arrangement the remote rod to latch is moved also rearwardly to unlatch which is counter to the inertial loading on the lengthy rod encountered in a front end collision. The locking arrangement for the latch is also designed to be unaffected by inertial loading.

While conceivably various arrangements could be devised to perform all of the functions of applicant's latch arrangement, it is felt that applicant has provided a unique and economical arrangement which minimizes the possibility of unlatching the door upon either type collision and upon inadvertent contact by the vehicle occupant of the latch controls.

It is therefore an object of this invention to provide a new and improved vehicle safety door latch arrangement.

Another object of this invention is to provide a vehicle safety door latch arrangement in which the elements are so positioned and constructed as to minimize the possibility of unlatching the door upon front and side collisions.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIGURE 1 is a perspective view, taken from the inside of the vehicle, of the safety door latch arrangement mounted on the right front door with the door details removed in the interest of clarity;

FIGURE 2 is an enlarged perspective view of the latch taken from a direction opposite that of FIGURE 1;

FIGURE 3 is a front view of the outside handle assembly taken from outside the vehicle;

FIGURE 4 is a sectional view taken along line 4-4 of FIGURE 3;

FIGURE 5 is a sectional view taken along line 5-5 of FIGURE 3;

FIGURE 6 is a view of the latch of FIGURE 2 but with the cover plate partially removed in the interest of clarity and without a locking arrangement;

FIGURE 7 is a sectional view taken along line 7-7 of FIGURE 6;

FIGURE 8 is a view of the inside remote handle assembly for the latch;

FIGURE 9 is a top view of the remote handle assembly; and

FIGURE 10 is a view similar to FIGURE 6 showing preferred locking arrangement for the latch.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring to FIGURES 1, 6 and 7, 11 indicates generally a door lock for vehicle 12. Door lock 11 is composed of safety door latch assembly 14 and striker 15 which is conventionally mounted on a pillar of vehicle 12. Striker 15 has safety collar 18 located on one end thereof. Collar 18 is designed to inhibit longitudinal separation of striker 15 from latch assembly 14.

Vehicle 12 has a door 19 which, as shown in FIGURE 1, is the front right door therefor. Door 19 has a front end adapted to be attached to vehicle 12 by a hinge (not shown) and a rear end 20 which is located farther to the rear of vehicle 12 than the front end. Located predominantly in the rear end 20 of door 19 is safety latch arrangement 14.

Safety latch arrangement 14 includes latch 21, outside handle assembly 22, inside remote handle assembly 24, the connections therebetween and preferably the locking arrangement 25 for the latch.

Latch 21, as best shown in FIGURES 2, 6 and 7 consist of support plate 26 adapted to be mounted in door 19 by means of capscrews or the like. Attached to main support plate 26 by welding is cover 27. Cover 27 and plate 26 form a case 28 for the internal parts of latch 21. Plate 26 has an opening 30 for the entrance therein of striker 15.

Rotatably mounted in case 28 on pin 28a is rotor 31. Rotor 31 is of the forked variety having a pair of tines 32 and 34 for the engagement therebetween of striker 15. Rotor 31 has detent 35 for a fully latched position and detent 36 for a partially latched safety position and also a stop 38. Spring 39 urges rotor 31 to an unlatched position.

Rotatably mounted in case 28 on pin 28b for engaging the rotor detents is pawl 40. Spring 41 urges pawl 40 toward rotor 31. Also rotatably mounted in case 28 on pin 28b is contactor 42. Contactor member 42 is adapted to contact pawl 40 to move same about its pivot and away from contact with rotor 31. Spring 43 urges contactor 42 away from pawl 40. Rotor 31, pawl 40 and contactor 42 lie in substantially the same plane.

Mounted in cover 27 is wedge 44 which is adapted to contact safety collar 18. Wedge 44 moves on pin 45 against spring 46. Wedge 44 takes up production tolerances relating to door hinges in a conventional manner to eliminate door rattles.

If a locking arrangement is desired in connection with latch 21, FIGURE 10 discloses a preferred embodiment therefor. Specifically pawl 40 has rotatably mounted thereon free wheeling member 48 having abutment 49 thereon. Locking member 50 is rotatably mounted on cover 27. Locking member 50 has projections 51 and 52 which engage abutment 49 therebetween. Rotation of locking member 50 moves abutment 49 into and out of position for contact with contactor 42 for actuation of latch 21. Locking member 50 is adapted for engagement at its ends 50a and 50b by an inside and an outside lock actuating means.

To move contactor 42 during the unlatching process, lever 54 (see FIGURES 1 and 2) is rotatably mounted on plate 26 and cover 27 of case 28. Lever 54 is adapted to extend into case 28 to contact the contactor 42 at flange 42a to move same. Lever 54 also has stop 55 to limit rotation thereof in connection with cover 27. Lever 54 is also adapted for connection to outside actuating means. Also rotatably mounted on plate 26 is lever 56. Lever 56 is also adapted to contact the contactor 42 at surface 42b to move same when actuated by an inside latch actuation means.

The outside latch actuating means (as shown best in FIGURES 1, 3, 4 and 5) includes outside handle assembly 22. Handle assembly 22 is made up of housing 58 attached to the exterior of door 19 by screws or the like. Handle 59 is rotatably mounted on pin 60 for movement about a generally vertical axis. Handle 59 has an inner portion 61 which is connected to rod 62 for actuation thereof. Rod 62 is in turn connected to lever 54. Spring 63 biases handle 59 to a closed position as shown in solid lines. The outside portion 64 of handle 59 is adapted to be gripped by a vehicle operator to move same to an unlatched position as shown in broken lines. Rubber bumper 65 provides a stop for handle 59. Outside lock actuating means consists of key lock cylinder 66 which is mounted in housing 58 rearward of handle 59. Cylinder 66 has rod 68 attached thereto and is in turn attached to locking member 50 at 50a for actuating same. Obviously key lock cylinder 66 is not needed on any rear doors of the vehicle 12.

Inside latch actuating means, as best shown in FIGURES 1, 2, 8 and 9, includes remote handle assembly 24.

Remote handle assembly 24 consists of remote handle 69 attached by a capscrew or the like to extension 70. Extension 70 is rotatably mounted on pin 71 located in bracket 72. Bracket 72 is attached to the inside wall of door 19 forward of latch 21. Also rotatably mounted on a pin 74 of bracket 72 is cam 75. Cam 75 has an outer portion 76 which is connected to rod 78 which in turn is connected to lever 56 for actuation thereof. Cam 75 also has an inner portion 79 having a cam surface for contact with extension 70. Spring 80 urges cam 75 forward and handle 69 into contact therewith. Movement of handle 69 inward from bracket 72 causes extension 70 to move cam 75 to force rod 78 rearward to actuate lever 56 to unlatch the latch 21.

Inside lock actuating means (see FIGURES 1 and 2) consists of an inside locking handle 81 mounted on crank 82 for actuation thereof. Crank 82 is attached to door 19 by a suitable bracket. Connected between crank 82 and locking member 50 at end 50b is cable 84 located in sheath 84a. Movement of handle 81 downward moves locking member 50 to lock latch 21. Locking handle 81 may be recessed in armrest 85 to prevent inadvertent operation of same.

From viewing FIGURE 1 it can be seen that in a forward collision, the inertia imparted to rods 62 and 78 cannot contribute to movement of contactor 42 via lever 54 or lever 56 inasmuch as the rods must be moved rearwardly (as shown by the arrows) toward latch 21 to actuate lever 54 or 56. Also flexible cable 84 in sheath 84a due to the long loop does not have a tendency to move locking member 50.

In the event of a side collision, from a perusal of FIGURES 1, 3, 4 and 5, it can be seen that in the event the entire outside handle assembly 22 is driven inward, rod 62 will be driven forward and away from latch 21 which is opposite the direction of movement of same to unlatch the latch. Stop 55 will prevent further movement of same. Similarly rod 78 would be moved in a direction opposite that needed to open latch 21. A side collision will also not materially affect locking member 50.

In operation (see FIGURES 1, 2, 4 and 6) movement of handle 59 outward from the vehicle and the latch forces rod 62 rearward and rotates lever 54 which in turn moves contactor 42 at flange 42a which eventually frees the pawl 40 and thus rotor 31 from the striker. Spring 63 returns handle 59 to the vertical position when same is released. Opening the latch from the inside of the vehicle requires movement of handle 69 toward the inside of the vehicle away from bracket 72 (see also FIGURES 8 and 9). Extension 70 forces the movement of cam 75 and rod 78 attached thereto is also forced rearward to rotate lever 56. Lever 56 moves contactor 42 at 42b which moves the pawl when the free wheeling member 48 is in position thus releasing the rotor 31 from the striker 15.

Locking of latch 21 from the inside of the vehicle 12 can be accomplished by inserting a key in key cylinder 66 and turning same counterclockwise. Rod 68 upon movement of cylinder 66 will pull locking member 50 at 50a upward which will move free wheeling member 48 via projections 51 and 52 out of range of contactor 42 at abutment 49. Turning the key in the opposite direction will again bring free wheeling member 48 into range for movement by contactor 42.

Locking of latch 21 from the outside of the vehicle 12 can be accomplished by pressing down on locking handle 81. This will cause crank 82 via cable 84 to pull the other end 50b of locking member 50 downward. Member 50 via projections 51 and 52 will then move free wheeling member 48 out of range of contactor 42. Movement of locking handle 81 in the opposite direction will again place latch 21 in the latched but unlocked condition.

Having thus described the invention, it will be apparent to those skilled in the art that various modifications and

changes can be made without departing from the spirit of the invention or the scope of the appended claims.

What is claimed is:

1. A safety door latch arrangement for a vehicle having a door hinged at the end closest the front of the vehicle and the latch located at the other end, said arrangement comprising:
  - (a) a latch case adapted for mounting on the door, said case having an opening for the extension therein of a pillar mounted striker;
  - (b) a rotor rotatably mounted in said case, said rotor having a detent located thereon, said rotor also having a pair of tines adapted for engaging therebetween the striker;
  - (c) a pawl rotatably mounted in said case, said pawl being adapted for engaging said detent;
  - (d) a contactor member rotatably mounted in said case, said contactor member being adapted for contacting said pawl to move said pawl to free said rotor from the striker;
  - (e) a lever rotatably mounted on said case, a portion of said lever extending into said case and being adapted to contact said contactor to move same;
  - (f) a rod connected to said lever for actuation thereof; and
  - (g) a handle adapted for rotatable mounting on the outside of the vehicle door forward of said latch, for movement about a generally vertical axis, the inner part of said handle being connected to said rod, said handle being adapted upon movement outward of said vehicle and said latch, to force said rod rearward to rotate said lever to move said contactor to open said latch.
2. The safety door latch arrangement of claim 1 in which said rotor, pawl and contactor lie in substantially a single plane.
3. The safety door latch arrangement of claim 2 further comprising:
  - (a) a second lever rotatably mounted on said case, a portion of said second lever extending into said case and being adapted to contact said contactor to move same;
  - (b) a second rod connected to said second lever for actuation thereof;
  - (c) a cam adapted for rotatable mounting on the inside of the vehicle forward of said latch for movement about a generally vertical axis, said cam being connected to said second rod; and
  - (d) a remote handle adapted for rotatable mounting on the inside of the vehicle forward of said cam and adjacent thereto for movement about a generally vertical axis, said remote handle being adapted upon movement inward of said vehicle and said cam, to contact and move said cam to force said second rod attached thereto rearward to rotate said second lever to move said contactor to open said latch.
4. The safety door latch arrangement of claim 3 further comprising:
  - (a) first spring means for biasing said rotor to an open position relative to the striker;
  - (b) second spring means for biasing said pawl toward said rotor;
  - (c) third spring means for biasing said contactor away from said pawl;
  - (d) fourth spring means for biasing said handle toward the outside of the vehicle and said latch; and
  - (e) fifth spring means for biasing said cam forward of said latch and said remote handle in contact with said cam toward said cam.
5. A safety door latch arrangement for a vehicle having a door hinged at the end closest the front of the vehicle and the latch located at the other end, said arrangement comprising:
  - (a) a latch case adapted for mounting on the door,

said case having an opening for the extension therein of a pillar mounted striker;

- (b) a rotor rotatably mounted in said case, said rotor having a detent located thereon, said rotor also having a pair of tines adapted for engaging therebetween the striker;
  - (c) a pawl rotatably mounted in said case, said pawl being adapted for engaging said detent;
  - (d) a free wheeling member rotatably mounted on said pawl, said member having an abutment thereon;
  - (e) a contactor member rotatably mounted in said case, said contactor being adapted to contact said free wheeling member abutment to move said pawl to free said rotor from the striker;
  - (f) a locking member rotatably mounted in said case, locking member having a pair of projections adapted to engage said free wheeling member abutment therebetween to rotate same toward said contactor for movement therewith and away from said contactor to avoid contact therewith;
  - (g) lock actuating means for moving said locking member;
  - (h) a lever rotatably mounted on said case, a portion of said lever extending into said case and being adapted to contact said contactor to move same;
  - (i) a rod connected to said lever for actuation thereof; and
  - (j) a handle adapted for rotatable mounting on the outside of the vehicle door forward of said latch for movement about a generally vertical axis, the inner part of said handle being connected to said rod, said handle being adapted upon movement outward of said vehicle and said latch to force said rod rearward to rotate said lever to move said contactor to open said latch.
6. A safety door latch arrangement of claim 5 further comprising:
- (a) a second lever rotatably mounted on said case, a portion of said second lever extending into said case and being adapted to contact said contactor to move same;
  - (b) a second rod connected to said second lever for actuation thereof;
  - (c) a cam adapted for rotatable mounting on the inside of the vehicle forward of said latch for movement about a generally vertical axis, said cam being connected to said second rod; and
  - (d) a remote handle adapted for rotatable mounting on the inside of the vehicle forward of said cam and adjacent thereto for movement about a generally vertical axis, said remote handle being adapted upon movement inward of said vehicle and said cam to contact and move said cam to force said second rod attached thereto rearward to rotate said second lever to move said contactor to open said latch.
7. The safety door latch arrangement of claim 6 further comprising:
- (a) first spring means for biasing said rotor to an open position relative to the striker;
  - (b) second spring means for biasing said pawl toward said rotor;
  - (c) third spring means for biasing said contactor away from said abutment of said free wheeling member;
  - (d) fourth spring means for biasing said handle toward the outside of the vehicle and said latch; and
  - (e) fifth spring means for biasing said cam forward of said latch, and said remote handle in contact with the cam toward said cam.
8. The safety door latch arrangement of claim 7 in which said lock actuating means includes an outside lock actuating means located outward and forward of said latch, said outside means comprising:
- (a) a key cylinder located adjacent said handle; and
  - (b) a third rod extending between said cylinder and

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said locking member for actuation thereof by said cylinder.

9. The safety door latch arrangement of claim 8 in which said lock actuating means also includes an inside means located inward and forward of said latch, said inside means comprising:

(a) a flexible cable connected to said locking member; and

(b) a crank rotatably mounted on the inside of the vehicle forward of the latch, said crank being connected to said cable for actuation of said locking member.

(c) a locking handle mounted on said crank for actuation thereof.

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