April 22, 1952 J. H. VANDER VEER 2,594,253

EMERGENCY RELEASE MECHANISM FOR EXIT DOORS

Filed June 11, 1946 3 Sheets-Sheet 1

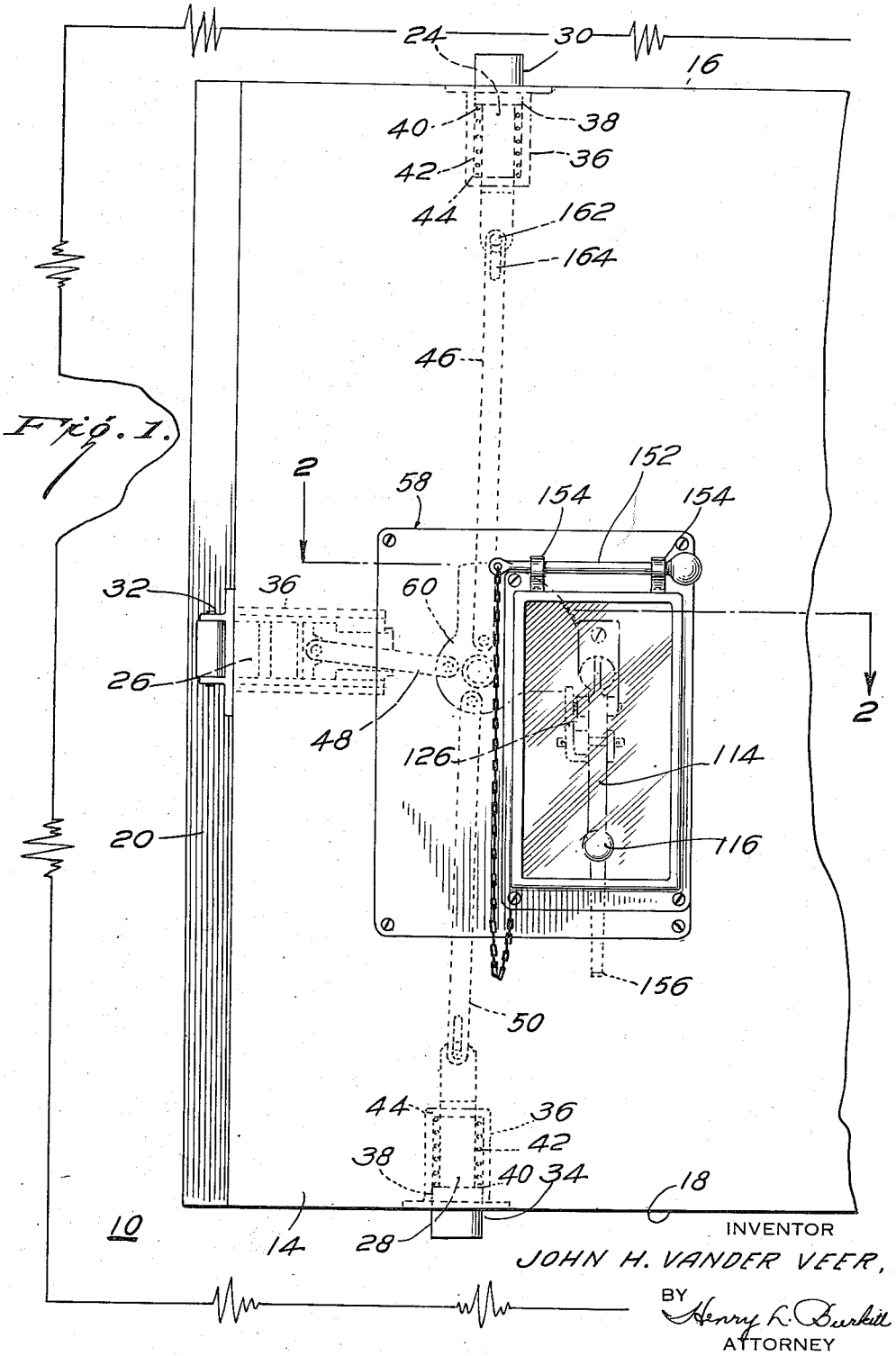


Fig. 1.

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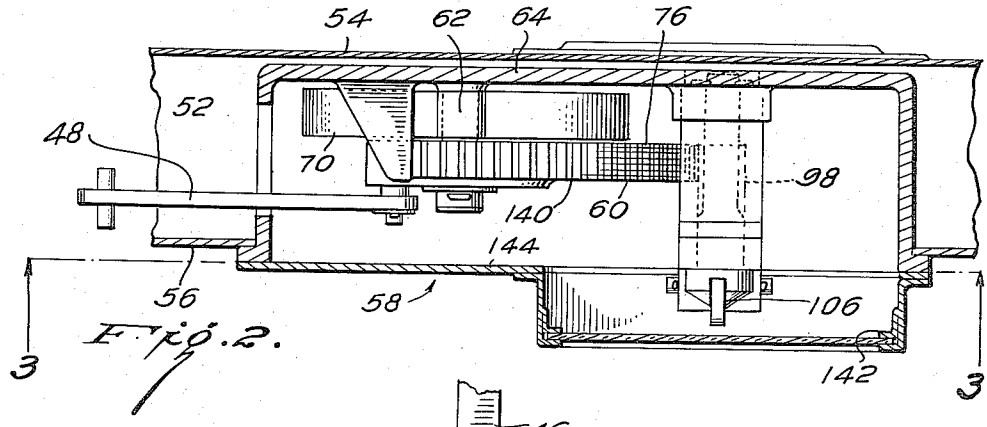


Fig. 2.

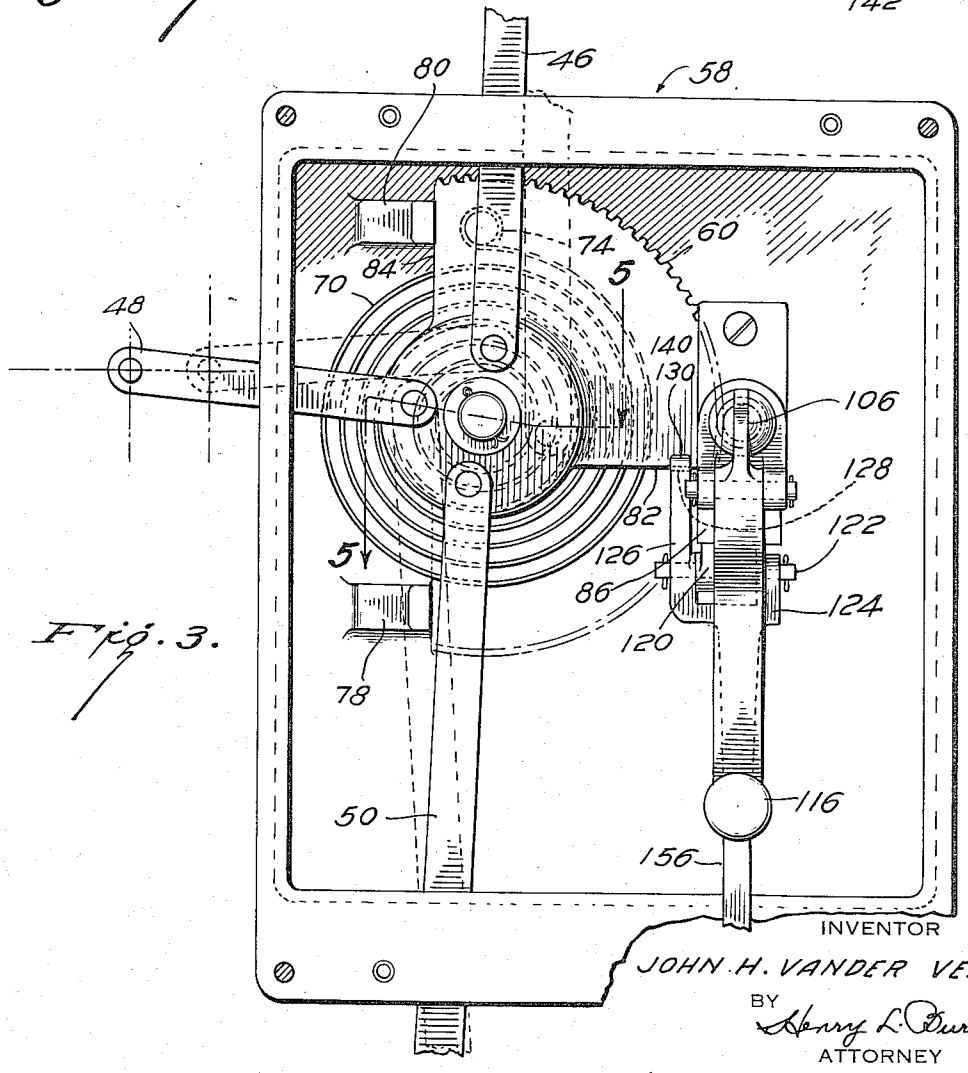


Fig. 3.

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EMERGENCY RELEASE MECHANISM FOR EXIT DOORS

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Fig. 4.

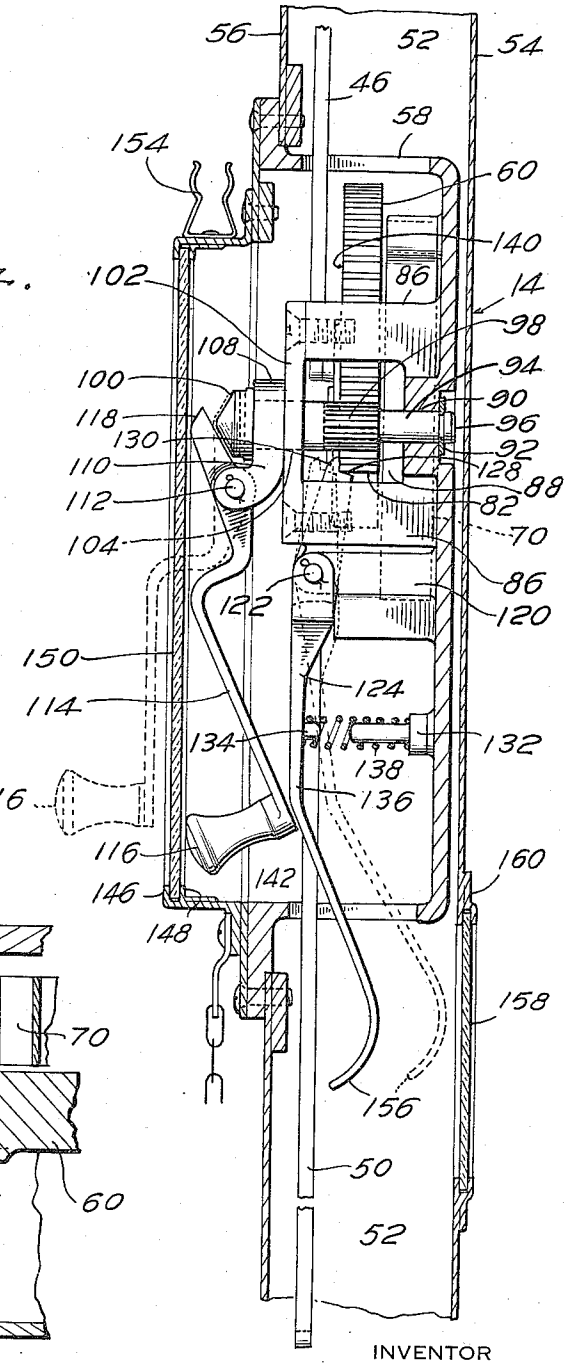
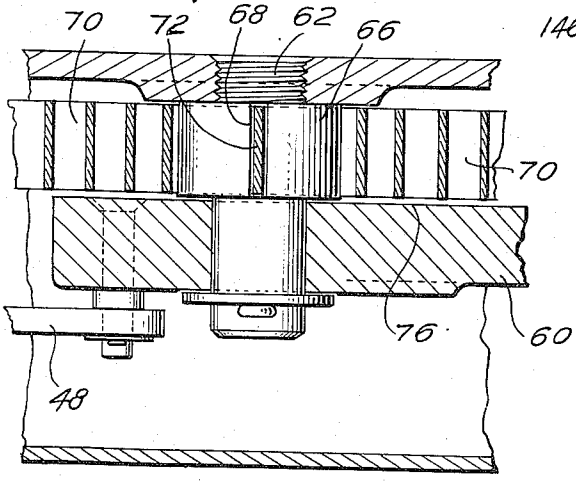


Fig. 5.



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EMERGENCY RELEASE MECHANISM FOR EXIT DOORS

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Application June 11, 1946, Serial No. 676,024

17 Claims. (Cl. 292—92)

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This invention relates to emergency release mechanism for exit doors.

On many vehicles now generally used as public carriers, emergency exits are required. Suitable latching means is necessary to keep the door locked until an exit, other than through the usual doors, becomes necessary. The bars or rods which usually hold such door in closed position require such great force to release the door that the emergency exit function is greatly impaired.

It is an object of the invention to construct mechanism for latching emergency exits for manipulation without exertion of great strength.

It is generally true that, when an emergency occurs, an individual may find himself practically paralyzed, his strength dissipated, and he may be unable to perform even the simplest mechanical operation. If, at such a time, a person were able to release, by some simple manipulation, a force which previously had been stored up, the effect of such paralysis would, of course, be minimized. Since an emergency probably would find the ordinary motive power of the vehicle disabled, so that such source of energy could not be relied upon for actuation of such safety means, some simple, separate mechanical means becomes necessary for such circumstances.

It is an object of the invention to provide apparatus for operating emergency exits for such vehicles, wherein the operation is carried on, or is made effective, by means of mechanism separate and distinct from the motive means of the vehicle.

To carry out certain of these purposes, a simple structure is provided for manipulation by a simple handle, so that a very small force may be all that is required to release the devices holding the door in place. This mechanism, on the other hand, when operated to secure the door in place, is effective for setting the device to assure immediate response, in emergency, for releasing the door.

It is an object of the invention to provide mechanism, simply constructed and operating by the application of minimum force, which can be placed in motion by the application of substantially inconsequential force for releasing a door of the type indicated.

Other objects of the invention will be set forth hereinafter, or will be apparent from the description and the drawings, in which is illustrated an embodiment exemplifying the invention.

The invention, however, is not intended to be restricted to any particular construction, or any particular arrangement of parts, or any particular application of any such construction or arrangement of parts, or any specific method of operation or use, or any of the various details thereof, even where specifically shown and described herein, as the same may be modified in various particulars, or may be applied in many varied relations, without departing from the spirit and scope of the claimed invention, of which the exemplifying embodiment, herein shown and described, is intended only to be illustrative, and only for the purpose of complying with the requirements of the statutes for disclosure of an operative embodiment, but not to show all of the various forms and modifications in which the invention might be embodied.

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On the drawings, in which the same reference characters refer to the same parts throughout, and in which is disclosed such a practical construction:

Fig. 1 is an elevational view of a part of a vehicle door and the frame associated therewith, the invention being shown embodied therein, the frame and threshold being shown diagrammatically, and the door being broken away;

Fig. 2 is a transverse cross-sectional view, to enlarged scale, on the line 2—2 of Fig. 1, parts being shown in elevation;

Fig. 3 is a vertical cross-sectional view on the line 3—3 of Fig. 2;

Fig. 4 is a vertical cross-sectional view taken transversely through Fig. 2; and

Fig. 5 is a detail cross-sectional view taken substantially on the line 5—5 of Fig. 3.

On the drawings, the wall 10 of a passenger carrying vehicle or bus has been illustrated. At an opening in the wall an emergency door 14 is hinged. This door is hinged with relation to a door frame 16 and a threshold 18. Suitable means, such as a rubber bumper or stripping 20 may be carried by the door, in overlapping relationship to the door framing, to seal the door, when closed. The door is retained in closed position by means of bolts 24, 26 and 28, the bolts 24 and 28 being received in strikes 30 and 34, respectively, and the bolt 26, with its roller-carrying extension 32, being receivable in a socket or keeper (not shown) cut into the vertical edge-face of wall 10. Each bolt is guided in a housing 36, and is projected from the housing through an opening 38 formed in the outer end of said housing to engage with its strike. Each bolt 24 and 28 may have an enlarged portion 40. A spring 42 may be retained around the bolt and between portion 40 and a wall 44 of its housing. With this arrangement it will be apparent that each spring 42 has a tendency to urge its asso-

ciated bolt into locking relationship with its strike or keeper element.

Links 46, 48 and 50 are connected to the respective bolts 24, 26 and 28. The links extend from the bolts, within the space 52 defined by the sheathing 54 and 56 forming the walls of door 14, and into a separate housing 58, retained upon the door. Within the housing, the links have pivotal connection, at regularly spaced radial intervals, with a segment gear 60. Gear 60 is rotatably mounted upon a stud 62 which is fixed in wall 64 of housing 58 in any suitable manner. Stud 62 has an enlarged section 66 including a plurality of slots 68. The gear abuts against section 66; a washer and cotter pin at the free end of the stud serve to retain the segment gear upon the stud.

A spring 70 may be wound helically around section 66. One end 72 of the spring is anchored to stud 62 by being caught in a slot 68. The other end of the spring is anchored to a pin 74 extending from face 76 of gear 60.

Two stops 78 and 80 may be provided, and may take the form of projections from wall 64. These stops extend into the plane of movement of gear 60, and will engage end edges 82 and 84, respectively, of the gear to limit its rotation in either direction. Spring 70 tends normally to bring edge 82 into engagement with stop 78.

Laterally spaced from stud 62, wall 64 is formed to provide a pair of bosses 86 between which is a recess 88, terminating in an opening 90 through the wall. A countersink 92 may be provided on the outer face of wall 64 immediately around opening 90. A pin or shaft 94 has a reduced end 96 extended through opening 90 and terminating in countersink 92. A notch formed on end 96 cooperates with a split washer sprung over the end to anchor pin 94 against movement out of opening 90. At the same time, the pin is permitted rotational movement in the bearing thus provided.

Intermediately of pin 94 is an enlarged portion 98 having gear teeth for engagement with the teeth of segment gear 60. Beyond portion 98 the pin has a diameter at least as great as the external diameter of the tooth section 98; then the pin terminates in an enlarged end or head 100. A small plate 102 is secured across bosses 86; the pin finds its other bearing in an opening 104 through that plate.

Head 100, which is positioned in front of plate 102, has a slot 106 in its end. On pin 94, between head 100 and plate 102, is received a collar 108. From collar 108, a pair of ears 110 extend downwardly and forwardly and provide means, at their ends, to receive a pivot pin 112. Upon this pin and between ears 110 a handle 114 is pivotally mounted. Handle 114 includes a manipulating section 116, extending in one direction from pin 112, and a finger 118 extending in the other direction. Finger 118 is of a width to fit snugly in slot 106. As shown in dotted lines on Fig. 4, handle 114 may be moved into such position that finger 118 is engaged in slot 106; or it may be swung around pin 112 so that section 116 is housed within housing 58, as shown in full lines, and finger 118 is disengaged from the slot.

The handle, when finger 118 is engaged in the slot, may be used to rotate portion 98, engaged with gear 60, to wind up spring 70. As portion 98 is rotated to wind up spring 70, gear 60 also is rotated, and causes links 46, 48 and 50 to move for proper actuation of bolts 24, 26 and 28 with relation to their respective strikes 30, 32 and 34.

Spring 70 preferably is wound up to a minimum tension to assure that gear 60 will at all times have sufficient potential energy to actuate the bolts with relation to their respective strikes.

Extending downwardly from the lower boss 86 is a transverse bearing or bracket 120. A pin 122 carried in bracket 120 may provide a bearing for a forked arm 124. One fork 126 of arm 124 may extend upwardly beside and beyond the lower boss 86, and may have a land 128 formed adjacent its end 130. A projection from wall 64 may be defined by means of a pin 132 fixed in the wall. Associated with that projection may be a projection 134 from the lower section 136 of arm 124. A spring 138 may be carried between pin 132 and projection 134, and may tend normally to press fork 126 against face 140 of gear 60. Thus, when gear 60 has been rotated to the position where edge 84 engages stop 80, land 128 will be urged beneath edge 82 to retain the gear against reverse movement, when handle 114 is disengaged from slot 106, and spring 70 might be effective for such reverse movement. Gear 60, under such circumstances, cannot rotate beyond the limit set by engagement of land 128 with edge 82.

An opening 142 may be provided in wall 144 of housing 58 for access to handle 114. After handle 114 has completed the operation of winding up spring 70 until arm 124 is moved to present land 128 beneath edge 82, handle 114 may be pushed into housing 58 beyond the outer edge 146 of an escutcheon 148 bounding opening 142. In this position, handle 114 is just in abutment with lower section 136 of arm 124. Also, in this position, a pane 150 of glass may be retained to cover the opening in escutcheon 148. Suitable means may be provided to facilitate placing and sealing this pane in position.

A hammer 152, chained to the housing, may be retained in suitable spring clamps 154 positioned, as, for instance, on top of escutcheon 148. In an emergency, hammer 152 may be withdrawn from the clamps, and used to break pane 150, and thus to provide access to handle 114 and section 136. Then, handle 114 is merely pushed inwardly, until it engages section 136; then it is pushed further to force the extension further inwardly, as, for instance, towards the dotted line position shown in Fig. 4. Land 128 now will be pushed from under edge 82, and gear 60 will be released so that spring 70 may rotate the gear. Rotation of the gear, under the action of spring 70, will cause the required movement of bolts 24, 26 and 28 with relation to their respective strikes, to remove them and automatically to release the door.

It may be desirable to actuate the emergency mechanism from outside of the bus. In such case, section 136 may have a finger 156 extending down into space 52. A window 158, formed by a pane of glass seated in an opening 160 in the outer sheathing 54 of the door, may be frangible to make finger 156 accessible in such case. Thus, by breaking window 158, it is possible to reach into space 52 and to actuate finger 156, thus to release gear 60, and to open the door.

It is to be noted that bolt 26 and its link 48 are positively pivoted to each other; bolts 24 and 28 are coupled to links 46 and 50 through a lost motion arrangement consisting of the pin 162 on the bolt engaged in a slot 164 on the link. Thus, link 48 will drive its bolt 26 and its extension 32 into its keeper positively. Since this is at the lateral edge of the door, this position is one which must be maintained closed. As for bolts 24 and

28, when gear 60 has been rotated to drive bolt 26 home, bolts 24 and 28 will be free to move into their respective strikes under the action of their respective springs; the seating of the bolts in the strikes will be effected by pushing the top and bottom of the door into position. Dirt in the bottom strike thus will not interfere with the locking of the door between bolt 26 and its strike. However, when gear 60 is released to the action of its spring, all bolts are withdrawn positively from their respective strikes.

Thus, in operation, handle 114 is swung to the dotted line position of Fig. 4. Then, finger 118 is engaged in slot 106, and fork 126 is pressed against face 140 of gear 60. Handle 114 is rotated to wind up spring 70 until the gear engages stop 80, when land 128 will come to rest under edge 82 of gear 60. This action has driven bolt 26 home, and has released bolts 24 and 28 for movement into their strikes. Handle 114 is now moved to the full line position of Fig. 4, thus disengaging finger 118 from slot 106, but not pressing section 136 to release gear 60. Pane 150 and window 158 are now suitably sealed closed, and the vehicle operated in the normal manner. In the event of an emergency, either pane 150 or window 158 may be broken, either by hammer 152, or by any other suitable means. In the event pane 150 is broken, handle 114 is pushed further inwardly; in the event window 158 is broken, finger 156 is pulled towards the operator. In either case, gear 60 is released to rotate under the action of the spring until it reaches its stop 78. This movement has withdrawn all bolts from their strikes automatically, and without effort on the part of the operator.

Many other changes could be effected in the particular construction, and in the methods of use and construction, and in specific details thereof, hereinbefore set forth, without substantially departing from the invention defined in the claims, the specific description being merely of an embodiment capable of illustrating certain principles of the invention.

What is claimed as new and useful is:

1. In a door latching mechanism, means for retaining the door in closed position, means for actuating the door-retaining means to door-retaining position including a pivoted member, means for limiting movement of the pivoted member, means for making the door-retaining means ineffective, the ineffective-making means including means for automatically storing energy on movement of the pivoted member to one of its limits, and means normally guarded against access thereto for releasing the energy-storing means to cause the pivoted member to make the door-retaining means ineffective.

2. In door latching mechanism, bolting means for latching the door, a member for moving the bolting means into and out of latching position, a handle, the handle being mounted for movement into and out of position for actuating the member to move the bolting means to latching position, means for locking the member in latching position and for releasing the member for movement out of that position, and means for guarding the locking means and the handle when the handle has been moved into ineffective position.

3. In door latching mechanism, bolting means for latching the door, a member for moving the bolting means into and out of latching position, a handle for actuating the member to move the bolting means to latching position, the handle being movable into and out of actuating position, means for locking the member in latching position and for releasing the member for movement out of that position, the handle, when out of actuating position, and the locking means being substantially in alignment, and means for guarding the locking means and the handle when the handle has been moved out of actuating position.

4. In door latching mechanism, bolting means for latching the door, a member for moving the bolting means into and out of latching position, a handle for actuating the member to move the bolting means to latching position, the handle being movable into and out of actuating position, means for locking the member in latching position and for releasing the member for movement out of that position, the handle, when out of actuating position, and the locking means being substantially in alignment, and means for guarding the locking means and the handle when the handle has been moved out of actuating position and substantially into contact with the locking means.

5. In door latching mechanism, bolting means for latching the door, a member for moving the bolting means into and out of latching position, a handle for actuating the member to move the bolting means to latching position, the handle being movable into and out of actuating position, means for locking the member in latching position and for releasing the member for movement out of that position, the handle, when out of actuating position, and the locking means being substantially in alignment, and means for guarding the locking means and the handle when the handle has been moved out of actuating position and substantially into contact with the locking means, the locking means being actuated to release the member on further movement of the handle in the direction of movement away from actuating position.

6. In door latching mechanism, bolting means for latching the door, a rotatable member for moving the bolting means into and out of latching position, a handle for rotating the member to move the bolting means to latching position, a limit for movement of the member, means for retaining the member against return movement when moved to said movement limit, the handle being movable to ineffective position, and means for guarding the member-retaining means when the member has been moved to the movement limit and the handle when it is in ineffective position.

7. In door latching mechanism, bolting means for latching the door, a rotatable member for moving the bolting means into and out of latching position, the member having the form of the sector of a circle, means for rotating the member to actuate the bolting means, means for storing energy on rotation of the member in one direction, a stop to limit rotational movement of the member, means for engaging an edge of the member to retain the member at said limit of movement against movement under the action of the energy-storing means, means for releasing the engaging means, and means for guarding the edge-engaging means when the member has been moved to the movement limit and the handle when it is in ineffective position.

8. In door latching mechanism, bolting means for latching the door, a rotatable member for moving the bolting means into and out of latching position, the member having the form of the sector of a circle, means for rotating the mem-

ber to actuate the bolting means, means for storing energy on rotation of the member in one direction, a stop to limit rotational movement of the member, a retainer, the retainer being mounted for movement transversely of the path of movement of the member, the retainer providing means for engaging an edge of the member to retain the member at said limit of movement against movement under the action of the energy-storing means, means for releasing the retainer, and means for guarding the retainer when the member has been moved to the movement limit and the handle when it is in ineffective position.

9. In door latching mechanism, bolting means for latching the door, a rotatable member for moving the bolting means into and out of latching position, the member having the form of the sector of a circle, means for rotating the member to actuate the bolting means, means for storing energy on rotation of the member in one direction, a stop to limit rotational movement of the member, a retainer, the retainer being pivotally mounted for movement transversely of the path of movement of the member and normally being urged against the member, the retainer providing means for engaging an edge of the member to retain the member at said limit of movement against movement under the action of the energy-storing means, means for releasing the retainer, and means for guarding the retainer when the member has been moved to the movement limit and the handle when it is in ineffective position.

10. In door latching mechanism, bolting means for latching the door, a segmental gear, the bolting means being connected to the gear, stops for engaging the edges of the gear at limits of its movement, means for rotating the gear including a handle pivoted for movement into and out of operating position, a finger, means to urge the finger normally against the gear, the finger being urged into position beneath one edge of the gear at one limit of movement, means for moving the finger out of position beneath the edge of the gear, and means for guarding the finger-moving means and the handle when it is in ineffective position.

11. In door latching mechanism, bolting means for latching the door, a segmental gear, the bolting means being connected to the gear, stops for engaging the edges of the gear at limits of its movement, means for rotating the gear including a handle pivoted for movement into and out of operating position, a finger pivotally mounted for movement substantially in the same plane as that of movement of the handle into and out of operating position, means to urge the finger normally against the gear, the finger being urged into position beneath one edge of the gear at one limit of movement, means for moving the finger out of position beneath the edge of the gear, and means for guarding the finger-moving means and the handle when it is in ineffective position.

12. In door latching mechanism, bolting means for latching the door, a segmental gear, the bolting means being connected to the gear, stops for engaging the edges of the gear at limits of its movement, means for rotating the gear including a handle pivoted for movement into and out of operating position, a finger pivotally mounted for movement substantially in the same plane as that of the movement of the handle into and out of operating position, means to urge the finger normally against the gear, the finger being urged into position beneath one edge of the gear at one limit of movement, means for moving the finger out of position beneath the edge of the gear, and means for housing the handle and the finger when the gear has been moved to move the bolting means to latching position.

13. In door latching mechanism, bolting means for latching the door, a segmental gear, the bolting means being connected to the gear, a coiled spring constantly in tension to move the gear to move the bolting means out of latching position, stops for engaging the edges of the gear at limits of its movement, means for rotating the gear including a handle pivoted for movement into and out of operating position, a finger pivotally mounted for movement substantially in the same plane as that of the movement of the handle into and out of operating position, means to urge the finger normally against the gear, the finger being urged into position beneath one edge of the gear at one limit of movement, means for moving the finger out of position beneath the edge of the gear, and means for housing the handle and the finger when the gear has been moved to move the bolting means to latching position.

14. In door latching mechanism, bolting means for latching the door, a segmental gear, means extending from the gear for actuating the bolting means, a coiled spring constantly in tension to rotate the gear to move the bolting means out of latching position, stops for engaging the edges of the gear at limits of its movement, means for rotating the gear including a handle pivoted for movement into and out of operating position, the handle, when out of operating position, being capable of being contained entirely within the housing, a finger pivotally mounted for movement substantially in the same plane as that of the movement of the handle into and out of operating position, means to urge the finger normally against the gear, the finger being urged into position beneath one edge of the gear at one limit of movement, means for moving the finger out of position beneath the edge of the gear, and means for guarding the handle and the finger against unauthorized movement when the gear has been moved to move the bolting means to latching position.

15. In door latching mechanism, bolting means for latching the door, a segmental gear, means extending from the gear for actuating the bolting means, a coiled spring constantly in tension to rotate the gear to move the bolting means out of latching position, stops for engaging the edges of the gear at limits of its movement, means for rotating the gear including a handle pivoted for movement into and out of operating position, means including a finger pivotally mounted for movement substantially in the same plane as that of the movement of the handle into and out of operating position, means to urge the finger normally against the gear, the finger being urged into position beneath one edge of the gear at one limit of movement, means for moving the finger out of position beneath the edge of the gear, and means for guarding the handle and the finger against unauthorized movement when the gear has been moved to move the bolting means to latching position.

16. Emergency door latching mechanism, including means for retaining the door in closed position, said means being biased to assume a normally inactive position, means for propelling the retaining means to position for retaining the door in closed position, means automatically effective when the retaining means has been pro-

pelled to retain the propelling means to prevent return of the retaining means to inactive position, and a single actuating member for driving the propelling means and for moving the automatic effective means to ineffective position.

17. Emergency door latching mechanism, including means for retaining the door in closed position, said means being biased to assume a normally inactive position, means for propelling the retaining means to position for retaining the door in closed position, means automatically effectve when the retaining means has been propelled to retain the propelling means to prevent return of the retaining means to inactive position, and a handle for the propelling means, the handle being releasable from the propelling means to free the retaining means to be governed solely by the return-preventing means.

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