May 28, 1957 M. HUTTERER 2,793,892

LATCH MECHANISMS

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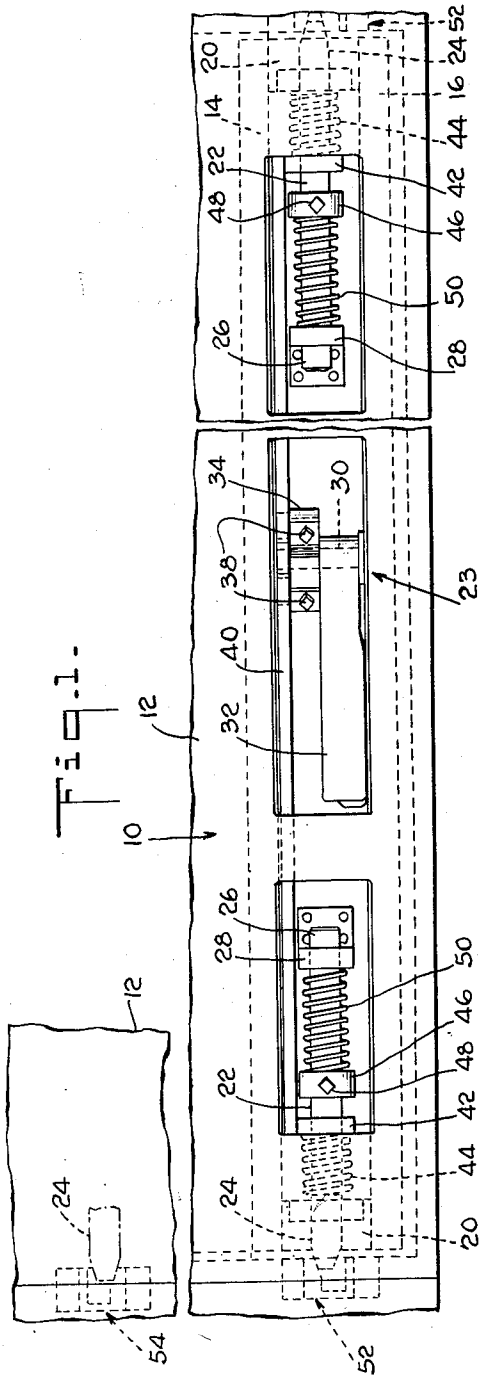


Fig. 1.

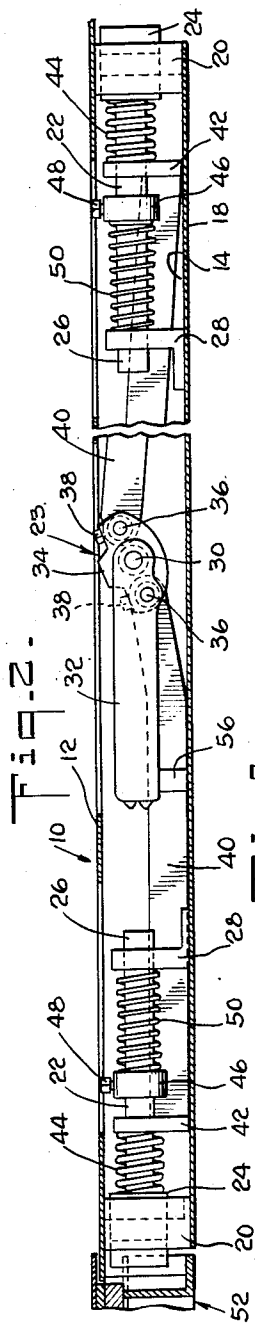


Fig. 2.

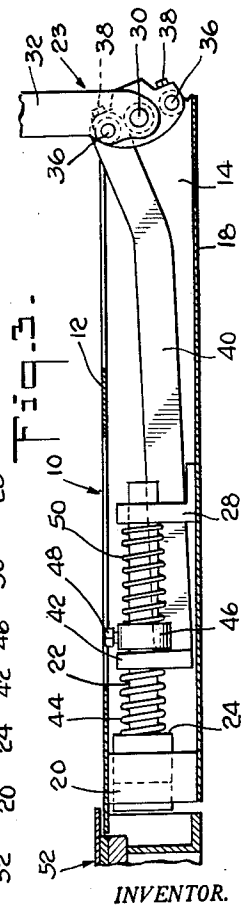


Fig. 3.

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LATCH MECHANISMS

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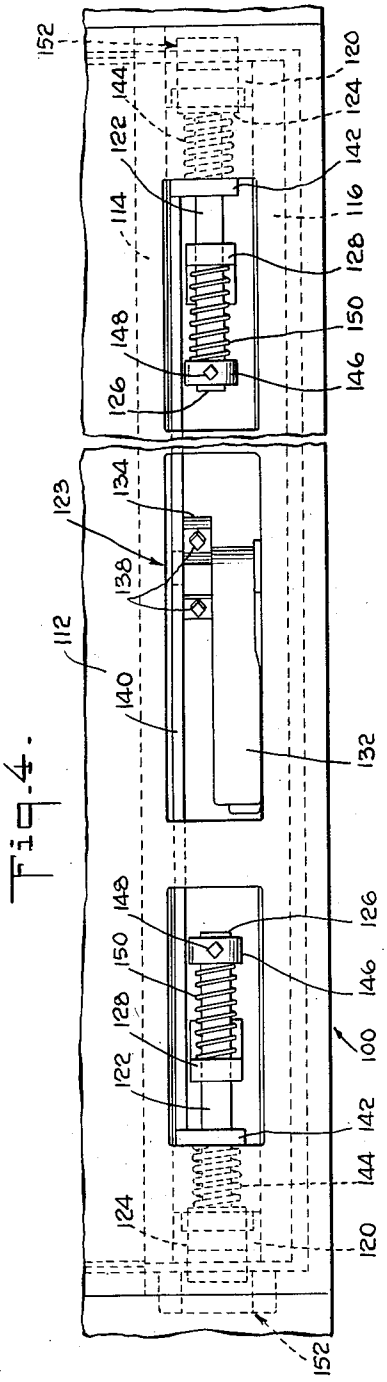



Fig-4.

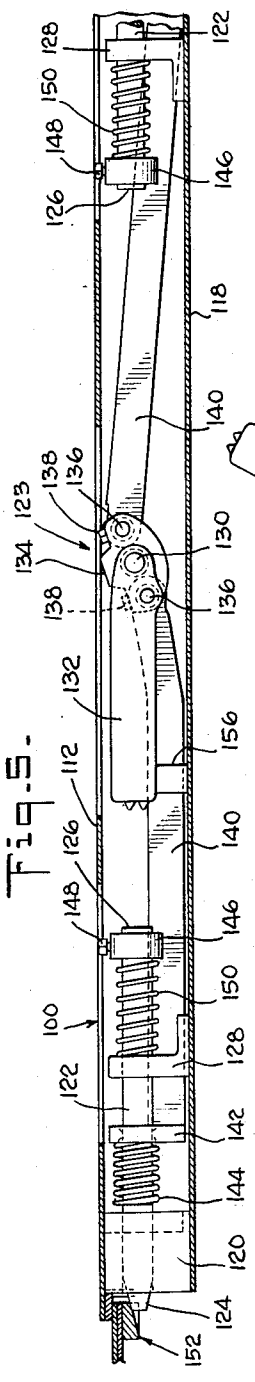



Fig-5.

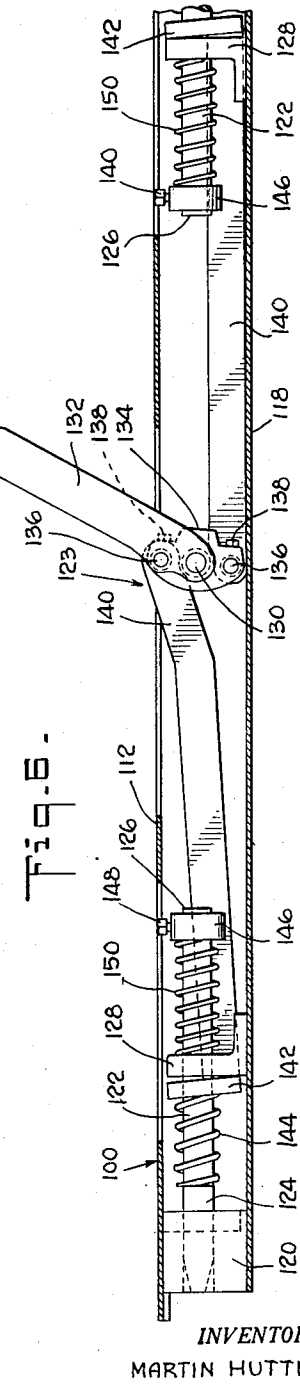



Fig-6.

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LATCH MECHANISMS

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Fig. 7.

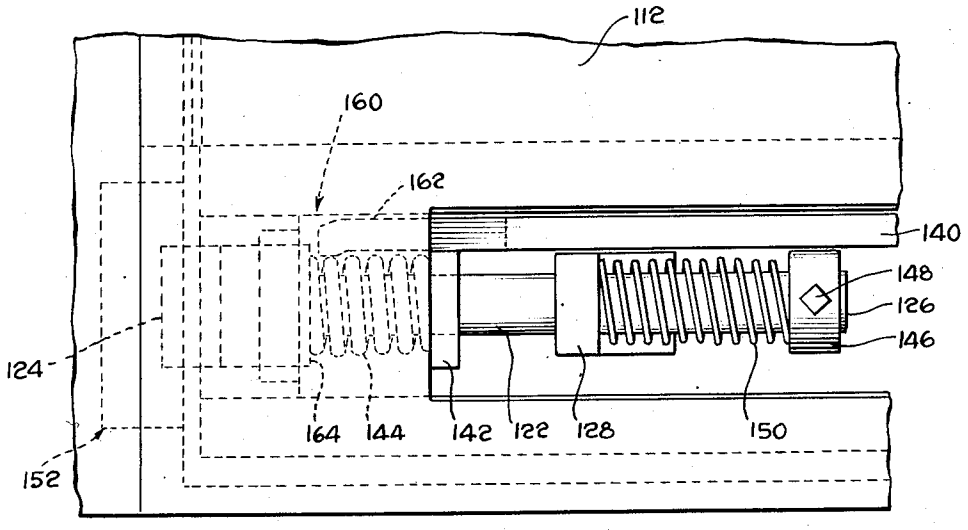



Fig. 8.

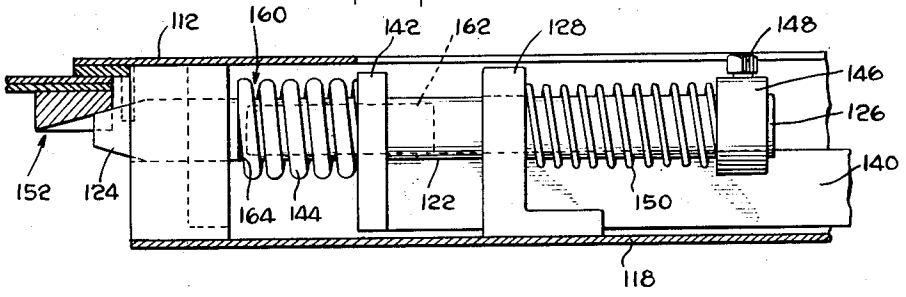
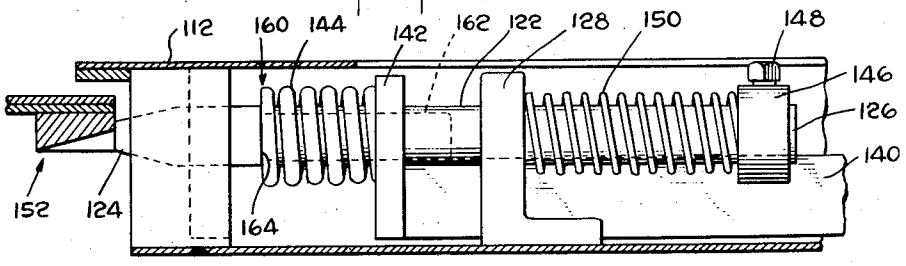



Fig. 9.




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United States Patent Office 2,793,892 Patented May 28, 1957



2,793,892

# LATCH MECHANISMS

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Application April 4, 1955, Serial No. 498,910

18 Claims. (Cl. 292—36)

The present invention relates to latch mechanisms for the doors of washing or cleaning machines or like devices although it is not necessarily limited thereto.

In cleaning machines, as well as in other structures having doors, it is desirable that manually operable locks secure the doors thereof in their open position or in their closed position, or alternately in either one of the two positions. To carry out the locking function latch mechanisms have been devised wherein their operations are aided by spring devices.

The desideratum of the instant invention is to provide a latch mechanism of novel durable construction operable easily and rapidly, and with a minimum of effort. In carrying out the teaching of the invention an object thereof is to provide a novel arrangement of structure including spring devices which function to aid in the manual operation of the mechanism to and from its latched position. The novel arrangement of structure is such as to utilize the force of certain of the springs when they are compressed, hence exerting their greatest or increased biasing force. The increased biasing force is directed to cooperate with the latch bolts and actuating structure therefor when the parts thereof are in their latched condition to securely retain the latch bolts from accidental displacement, as well as to exert forces on the latch bolt actuating structure to aid in the release of the mechanism when it is desired to remove the latch bolts from their latched condition.

Another object of the invention is to provide a manually operable latch bolt actuating mechanism utilizing an offset link connection which takes advantage of the spring forces acting on the latch bolts to hold them from accidental displacement after they have been moved to their latched positions.

Still another object is to provide a novel sturdy and inexpensive arrangement of structures which will interrupt the operation of the latch mechanism each time the latch bolts fail to move to their latched positions upon operation of the actuator.

Further objects of the invention are effected by the novel cooperating arrangement of the working mechanism to enable facile replacement of worn parts.

Other and further objects of my invention reside in the structures and arrangements hereinafter more fully described with reference to the accompanying drawings in which:

Fig. 1 is a composite plan view of the latch mechanism for a sliding door constructed in accordance with the principles of the invention and showing the upper and lower keepers.

Fig. 2 is a side view of the latch mechanism shown in Fig. 1.

Fig. 3 is a side view of the latch mechanism but with the parts thereof withdrawn from their latched condition.

Fig. 4 is a plan view of the latch mechanism for a hinged door constructed in accordance with the principles of the invention.



Fig. 5 is a partial side view of the hinged door shown in Fig. 4.

Fig. 6 is a partial side view similar to that shown in Fig. 5, but with the parts thereof in their unlatched positions.

Fig. 7 is a partial top view of the latch mechanism shown in Fig. 4 and incorporating a safety device construction in accordance with the principles of the invention.

Fig. 8 is a partial side view of the latch mechanism and safety device shown in Fig. 7, and

Fig. 9 is a partial side view similar to Fig. 8 showing the operation of the safety device when the latch bolts fail to move to their latched positions.

Referring now to Figs. 1, 2 and 3, the latch mechanism **10** there shown has been applied to a sliding door **12** of a cleaning machine. The mechanism **10** is contained in a housing having sides **14** and **16**, an interconnecting base **18** and opposite end blocks **20**. The housing in which the mechanism is contained is secured by any suitable means to the under side of the sliding door **12**. As can best be seen in Fig. 1, the door **12** is provided with openings, three of which are shown (not numbered) above the mechanism **10** to provide access thereto through the door for purposes which will become obvious as the description proceeds.

The latch mechanism **10** comprises a pair of spaced and oppositely disposed latch bolts **22** movable between latched (Figs. 1 and 2) and unlatched (Fig. 3) positions in response to the latching and unlatching movement of an actuator generally identified by the numeral **23**. The latch bolts **22** include enlarged heads **24** which may be rectangular as shown and which are longitudinally slidable and guided respectively in the end blocks **20**, while the shanks **26** of the latch bolts are guided along their rear portions in guides **28**. The guides **28** are formed as angles secured along the base portions thereof to the base **18** of the latch mechanism housing and are provided with openings to receive the shanks **26** of the bolts.

The actuator structure **23** adapted to cause the latch bolts **22** to move simultaneously, is pivotally mounted on pivot **30** between the sides **14** and **16** of the housing intermediate the spaced latch bolts **22**. The actuator structure **23** comprises a handle **32** rotatably mounted on the pivot **30** and includes a hub **34** having link connections **36**, each laterally offset or spaced from the pivot **30** of the handle. The link connections **36** may include pins which can be inserted in the hub **34** to be secured therein by set screws or bolts **38** and which may be removed from the hub when worn, to be replaced by similar pins.

The actuator structure **23** further includes a pair of links **40**, each of which is pivotally mounted at their one ends on the connecting pins **36**. The other end **42** of each of the links **40** is bent at an angle (a right angle being shown in the drawings) to slide freely along the shank **26** of the respective latch bolt **22** intermediate the guides **28** and the heads **24**, in response to the latching and unlatching pivoting movement of the handle **32**.

Positioned between the head **24** of the latch bolt **22** and the bent toe **42** of the link **40** is a relatively heavy resilient member shown in the drawings as a spring **44**. The resilient member **44** is adapted to exert a force on both the head **24** and the toe **42** at the same time because at all times its length is greater than the varying distance between the bolt head and link toe. On the other side of the toe **42**, between the latch bolt guide **28**, and adjustably movable along the shank **26** of the latch bolt, there is a collar or abutment member **46** having an adjusting set screw **48**. Between the adjustable collar **46** and the guide **28** is a further resilient member shown in the form of a spring **50** which, when compared to the first resilient member **44**, may be described as being relatively light.

The member 50 exerts a force against both the guide 28 and the collar 46 which is relatively lighter than the force exerted by the resilient member 44 between the latch bolt head 24 and the link toe 42. In resolving the forces of both of the resilient members 44 and 50 it will be recognized that the member 50, due to its abutting relationship with the stationary guide 28 and the collar 46 will constantly urge the latch bolt head 24 beyond the end blocks 20 and into their latched positions.

Hence when the handle 32 is in any of its positions between the latched, over-the-center toggle position shown in Figs. 1 and 2, and its unlatched vertical position shown in Fig. 3, the force exerted by the spring 50 will be sufficient to extend the head 24 of the latch bolt 22 beyond the ends of the blocks 20 of the housing. This provision is generally deemed necessary in the case of a sliding door used in a cleaning machine since it serves to secure the door from falling after it has been slid upwardly to its open position.

In Fig. 1 there is a partial showing of the door and two sets of keepers 52 and 54. It will be noted that the upper and lower sets of keepers are offset laterally relative to each other. The lower keepers 52 are adapted to be engaged by the heads of the latch bolts 22 when the door is in its closed position, while the upper offset keepers 54, although also adapted to be engaged by the heads of the latch bolts, are so positioned and offset laterally that the force exerted by the springs 50 in moving the bolts into engagement with the same when the door is open is very easily overcome to release the engagement therebetween.

*Operation*

When it is desired to close the door 12, it is slid to where the bolt heads 24 of the latch mechanism 10 are in line with the lower keepers 52. The handle 32 of the actuator 23 is pivoted about the pivot 30 to slide the offset connected links 40 relative to the shanks 26 of the bolts 22. As the handle is pivoted downwardly toward the latched position the toe 42, by way of its abutment with the resilient member 44, exerts a force on the head 24 to urge the same toward the latched position. This force, it will be recognized, is in addition to the force exerted against the abutment collar 46 by the spring 50 which tends to constantly urge the bolt 22 toward its latched condition.

Continued pivoting of the handle will cause the link toe 42 to compress the relatively heavy resilient member 44. In turn, as the member 44 is compressed in response to the movement of the actuator structure 23 and to the shortening of the distance between the head 24 and the link toe 42 it exerts an increasingly greater force against the head to urge the same toward latching engagement with the keeper 52. When the handle 32 is moved to and beyond a point where the link pivot connections 36 pass beyond the horizontal plane of the pivot 30 they function as an over-the-center toggle device. With the pivots and links 40 in this latched over-the-center position the handle may seat against a rest block 46 (see Fig. 2) while the force exerted against link 40 by the heavy member 44 retains the actuator structure in its latched over-the-center condition.

Thus, it will be recognized that advantage is taken of the members 44 when they are compressed and exerting their greatest force to retain the bolts 22 latched and the latch bolt actuator structure 23 in its over-the-center position.

To release the mechanism 10 it is merely necessary to lift the handle 32 against the pressure exerted by the members 44 just sufficiently to move the link connections 36 beyond the horizontal plane of the pivot 30. Once the handle 32 is so moved the forces exerted by the relatively heavy resilient members 44 are utilized to aid in the continued operation toward the unlatched condition, in spite of the latching force constantly applied to the bolt 22 by the relatively lighter members 50.



After the handle 32 has passed beyond its latched over-the-center toggle position continued movement toward the vertical position shown in Fig. 3 will withdraw the bolts 22 from engagement with the keepers 52. Naturally the amount of handle pivoting movement necessary to release the bolts will depend upon the length of the fulcrum arm or the distance that the link connections 36 are offset from the pivot 30. When the latch mechanism 10 is disengaged from the lower keeper 52 the door 12 can be slid upwardly. If the handle 32 is then released the bolts 22 will automatically be moved beyond the ends 20 and into engagement with the upper keepers 54.

If desired, advantage may be taken of all the resilient members, namely the heavy and light members 44 and 50 on each side of the latch mechanism to retain the actuator structure 23 in its over-the-center position rather than just utilizing the heavy members 44 as previously described. Hence, by so adjusting the collar 46 along the shank 26 of the latch bolt 22 so that it will abut the toe 42 of the link 40 when the mechanism 10 is in its latched position, the force of member 50 may be exerted on the link 40 in addition to the force exerted by the member 44.

In Figs. 4, 5 and 6 the embodiment of the latch mechanism 100 is shown utilized with a hinged or flap door 112 of a cleaning machine. The latch mechanism 100 is substantially the same as the mechanism 10 shown in Figs. 1, 2 and 3 and as described above, except, however, that the relative positions of the abutment collar 46 and the stationary guide 28 of the mechanism 10 are reversed in the mechanism 100. In flap or hinge type doors 112 it is important that the latch bolts be withdrawn within the mechanism housing so that when the door is slammed closed there will be no impact by the bolts against the walls surrounding the door, thus eliminating the detrimental wear of the latch bolts and respective walls so prevalent in the use of doors in which the bolt of the latch mechanism constantly remains extended to slam, rub and wear against the bolt keeper and the associated structure.

Inasmuch as the latch mechanism 100 shown in Figs. 4, 5 and 6 is so similar in structure to the mechanism 10 in Figs. 1, 2 and 3, similar parts will be identified by similar numbers with the addition of a prefix numeral 1. It will be recognized that these is only a single set of latch bolt keepers 152 (Fig. 4) instead of the two sets 52 and 54 disclosed in the embodiment shown in Figs. 1, 2 and 3, the reason being that in the latch mechanism 10 the bolts 22 are constantly urged by springs 50 beyond the ends of the door 12 so that they will engage with the upper keepers 54 to hold the door open after being slid upwardly to its open position. In the instant embodiment 100 in Figs. 4, 5 and 6, the door 112 is swung or pivoted on a hinge (not shown) between its open and closed positions. When it is swung to its open position any other suitable locking means (not shown) may be employed to retain it open. Hence there is no need for upper keepers as shown in Figs. 1, 2 and 3.

Referring now to Figs. 4, 5 and 6, with the stationary angular guide 128 fixed to the base 118 of the housing intermediate the end of the shank 126 and the head 124 of the latch bolt 122, and the relatively light resilient member or spring 150 positioned between it and the abutment collar 146 secured to the end of the shank, it will exert a force on the collar to urge the latch bolt into the housing and to its unlatched position at all times. When the latch bolt 122 is urged to its unlatched position its head will be drawn within the confines of the latch mechanism housing. Further, by exerting a force against the latch bolt 122 the member 150 compresses the relatively heavy resilient member 144 to urge the actuating structure 123 toward its unlatched position.

*Operation*

When the hinged door 112 is swung to its closed position wherein the latch bolt mechanism 100 is lined up with

the keepers **152** on both sides thereof, by manually moving the handle **132** about its pivot **130**, the toe **142** of the link **140** will slide along and relative to the shank **126** of the latch bolt **122** to compress the relatively heavy resilient member **144** between it and the head **124**. Understandably, continued pivoting of the handle **132** of the actuator structure **123** will compress the member **144** and at the same time, by virtue of the force exerted by the member **144** against the head **124**, the latch bolt **122** will be moved into engagement with the keeper **152**. Because of the link connection in the actuator structure **123**, both latch bolts **122** positioned on opposite ends of the latch mechanism **100** will be caused to move simultaneously into engagement with their respective latch keepers **152**.

Once again, advantage is taken of the increased force exerted by the compressed resilient member **144** to retain the head **124** of the latch bolt in engagement with its keeper, and at the same time to exert a force against the toe **142** of the link **140** to retain the handle **132** of the actuator structure in its over-the-center toggle position as shown in Figs. 4 and 5. When the actuator structure is in its latched position as shown in Figs. 4 and 5, the force of the resilient member **144** is supplemented by the force exerted by the relatively lighter member **150** to retain the structure **123** in its over-the-center latched position.

In order to release the mechanism **100** from its latched position as shown in Figs. 4 and 5, it is merely necessary to lift the handle **132** slightly against the forces exerted by the resilient members **144** and **150** until the link connections **136** move to the unlatched sides of the over-the-center position of the pivot **130**. At that time the resilient members **144** and **150** then exert their forces against the link toe **142** to aid in the unlatching movement of the actuator structure **123**.

Figs. 7, 8 and 9 disclose a safety device generally identified by the numeral **160**. As the description proceeds it will become clear that the safety device **160**, although shown with the latch mechanism **100**, is also applicable to the latch mechanism **10**.

Safety device **160** comprises a stop member **162** secured in any suitable manner, as by welding, to the rear side of the link toe **142**. The member **162**, being elongated, extends beyond the forward end of the toe **142** toward the latch bolt head **124**. The latch bolt head **124** has a flat stop surface **164** against which the forward end of the resilient member **144** rests. The two stops **162** and **164** are adapted to cooperate with each other in an abutting relationship when, if for any reason, the head **124** of the bolt **122** should fail to enter the latch keeper **152** (see Fig. 9).

When the safety device **160** is employed it may be utilized on the link toes **142** at both ends of the latch mechanism or at just one end if desired. If they are utilized at both ends, failure of either one of the two latch bolts **122** to move into latching engagement with their respective keepers **152** will stop the actuator structure **123** from continued movement into its over-the-center toggle latching position.

Fig. 9 discloses the operation of the safety device **160** when the bolt head **124** fails to engage properly in the keeper **152**. Pivoting movement of the handle (not shown) tends to urge the head **124** toward engagement with the keeper **152**. If for any reason the head **124** does not enter the keeper **152** its stop surface **164** will not move sufficiently forward to enable the link **140**, toe **142** and stop member **162** to move the full distance of their normal latching movement. As a consequence, the stop member **162** will abut the stop surface **164** to prevent the continued pivoting movement of the actuating structure **123**. This will provide a clear visual indication of trouble and will safely stop the latching operation of the actuator structure of the latch mechanism.

It will be recognized that the position of the stop member **162** on the link **140** as described is not necessarily controlling and that the same may be positioned anywhere along the length of the link as long as it may be made to cooperate with the latch bolt **122** to control the operation of the actuator structure **123** in response to the operation thereof. Hence, it is possible that the member **162** may be so positioned on the link **140** to cooperate with the rear of the shank **126** rather than with the head **124**.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to several preferred embodiments thereof, it will be understood that various omissions and substitutions and changes in the form and details of the devices illustrated and in their operations may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.

I claim:

1. In a latch mechanism, a latch bolt, a latch bolt actuator having latching and unlatching movement, and operable resilient means between said actuator and latch bolt to aid the movement of the bolt between latched and unlatched positions in response to the corresponding latching and unlatching movement of said actuator.

2. In a latch mechanism, a latch bolt movable between latched and unlatched positions, latch bolt actuator means movable between latching and unlatching positions, and resilient means compressible between said actuator and said latch bolt by the latching movement of said actuator to move said latch bolt to its latched position.

3. In a latch mechanism, a latch bolt movable between latched and unlatched positions, actuator means having latching and unlatching movement, and means exerting a force on said latch bolt, said force exerting means being caused to exert an increasingly greater force on said bolt to move the same to its latching position by the latching movement of said actuator means and to exert an increasingly greater force on said actuator means as the same is moved through its unlatching movement to assist the same in said latter movement.

4. In a latch mechanism, a latch bolt, a latch bolt actuator having latching and unlatching movement, operable resilient means between said actuator and latch bolt to aid the movement of the bolt between latched and unlatched positions in response to corresponding latching and unlatching movement of said actuator, stationary guide means at an end of said latch bolt, an abutment on said latch bolt, and spring means between said guide and abutment constantly urging said bolt to its latched position.

5. In a latch mechanism, a latch bolt, a latch bolt actuator having latching and unlatching movement, operable resilient means between said actuator and latch bolt to move the bolt between latched and unlatched positions in response to corresponding latching and unlatching movement of said actuator, stationary guide means intermediate the ends of said latch bolt, abutment means on said latch bolt at an end thereof, and spring means between said guide and abutment constantly urging said latch bolt to its unlatched position.

6. In a latch mechanism for a cleaning machine door, an actuator means including a manually operable handle, a link and an over-the-center toggle connection therebetween, a latch bolt movable between latched and unlatched positions in response to manual operation of said handle from one side of the center of said toggle connection to the other, and resilient means compressible by the movement of said handle to one side of the center of said toggle connection to urge said latch bolt to its latched position and to exert a force on said link to retain the handle to said one side of the center of said toggle connection.

7. In a latch mechanism for a cleaning machine door, a latch bolt movable to and from a latched position, an

actuator including a manually pivotable handle, link means and an over-the-center toggle connection therebetween, said toggle connection between said link and handle being laterally offset from the pivot of said handle, and resilient means cooperating with said latch bolt and link to exert a force on the latch bolt, said force increasing as said handle is pivoted to one side of the over-the-center connection to urge said latch bolt to its latched position and said resilient means exerting a force on said link increasing as the handle is pivoted to the other side of the over-the-center connection to urge the same in its latter pivoting direction.

8. In a latch mechanism for a cleaning machine door, a latch bolt having a head movable between latched and unlatched positions, an actuator therefor including a pivotable handle, link means spaced from said head and movable in response to the pivoting of the handle to vary the space between said head and link and over-the-center toggle means including replaceable interconnecting means between said link and handle, and means cooperating with said head and link to exert increasing compressive forces against said head in accordance with the decreasing variation of said space between said link and head.

9. In a latch mechanism, a latch bolt, a latch bolt actuator having latching and unlatching movement, operable resilient means between said actuator and latch bolt to aid the movement of the bolt between latched and unlatched positions in response to the latching and unlatching movement of said actuator, stationary guide means at an end of said latch bolt, an abutment on said latch bolt, and spring means between said guide and abutment constantly urging said bolt to its latched position.

10. In a latch mechanism, a latch bolt, a latch bolt actuator having latching and unlatching movement, operable resilient means between said actuator and latch bolt to aid the movement of the bolt between latched and unlatched positions in response to the latching and unlatching movement of said actuator, stationary guide means intermediate the ends of said latch bolt, abutment means on said latch bolt at an end thereof, and spring means between said guide and abutment constantly urging said latch bolt to its unlatched position.

11. A latch mechanism for the door of a cleaning machine comprising a spaced pair of oppositely disposed latch bolts movable between latched and unlatched positions, a movable actuator for causing simultaneous movement of said latch bolts between their latched and unlatched positions, said actuator including a link cooperating with each of said spaced latch bolts and movable relative thereto in response to movement of said actuator, and resilient means compressible between each of said links and latch bolts respectively to urge said latch bolts to their latched positions in accordance with a predetermined relative movement of said links relative to their respective bolts.

12. A latch mechanism as in claim 11, wherein said actuator includes a handle and over-the-center connecting means spaced from said handle providing connections between said handle and said links.

13. A latch mechanism as in claim 11, wherein there is a stationary guide means at one end of each of said latch bolts, abutment means on each of said latch bolts, and spring means between each of said guides and abutment means constantly urging said bolt to its latched position.

14. A latch mechanism as in claim 11, wherein there is a stationary guide means intermediate the ends of each of said latch bolts, abutment means on each of said latch bolts and at the ends thereof, and spring means between said guides and abutment means constantly urging said latch bolt to its unlatched position.

15. In a latch mechanism, a latch bolt movable to and from a latched position, stop means on said latch bolt, an operable actuator including a link movable relative to said latch bolt stop means, stop means on said link to cooperate with said latch bolt stop means to limit the operation of said actuator and movement of said link relative to said latch bolt upon failure of said latch bolt to move to its latched position.

16. In a latch mechanism, a pivotable handle, links operably connected with said handle for movement in response to the pivoting of the handle, over-the-center connecting means spaced from said handle and connecting said links with said handle and on each side thereof, a spaced pair of latch bolts, resilient means between one of each of said bolts and links to move the same to their latched positions in response to latching movement of said links by said handle, stop means on each of said latch bolts, and stop means on each of said links cooperating with said first named stop means to stop the movement of said links and pivoting of said handle upon failure of one of said latch bolts to move to its latched position.

17. In a latch mechanism, a pivotable handle, links operably connected with said handle for movement in response to the pivoting of the handle, over-the-center connecting means spaced from said handle and connecting said links with said handle and on each side thereof, a spaced pair of latch bolts, resilient means between one of each of said bolts and links to move the same to their latched positions in response to latching movement of said links by said handle, stop means on each of said latch bolts, stop means on each of said links cooperating with said first named stop means to stop the movement of said links and pivoting of said handle upon failure of one of said latch bolts to move to its latched position, a stationary guide means at one end of each of said latch bolts, abutment means on each of said latch bolts, and spring means between each of said guides and abutment means constantly urging said bolt to its latched position.

18. In a latch mechanism, a pivotable handle, links operatably connected with said handle for movement in response to the pivoting of the handle, over-the-center connecting means spaced from said handle and connecting said links with said handle and on each side thereof, a spaced pair of latch bolts, resilient means between one of each of said bolts and links to move the same to their latched positions in response to latching movement of said links by said handle, stop means on each of said latch bolts, stop means on each of said links cooperating with said first named stop means to stop the movement of said links and pivoting of said handle upon failure of one of said latch bolts to move to its latched position, stationary guide means intermediate the ends of each of said latch bolts, abutment means on each of said latch bolts and at the ends thereof, and spring means between said guides and abutment means constantly urging said latch bolt to its unlatched position.

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