

Nov. 11, 1958

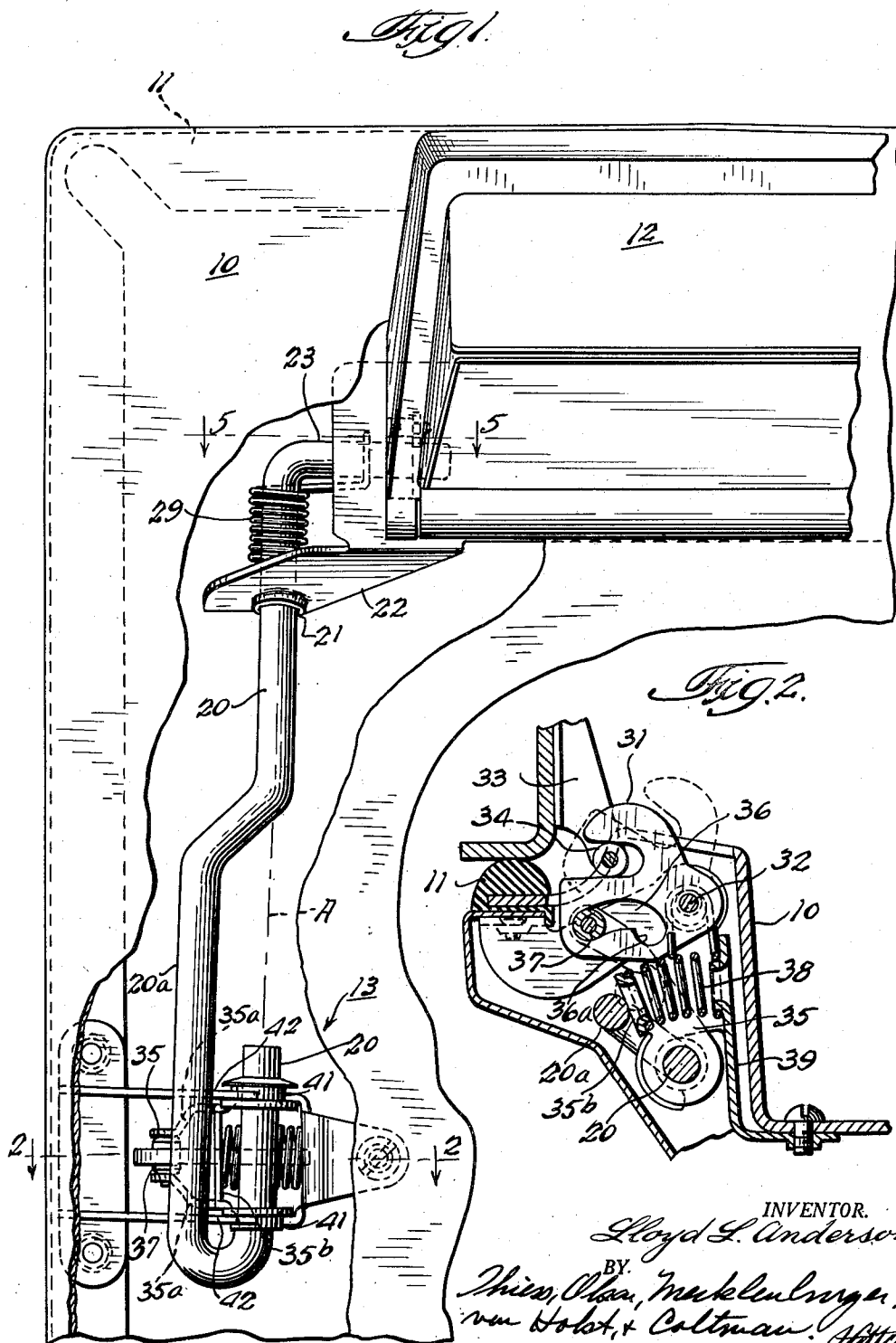
L. L. ANDERSON

2,859,999

LATCH MECHANISM

Filed March 16, 1956

2 Sheets-Sheet 1



Nov. 11, 1958

L. L. ANDERSON

2,859,999

LATCH MECHANISM

Filed March 16, 1956

2 Sheets-Sheet 2

Fig. 3

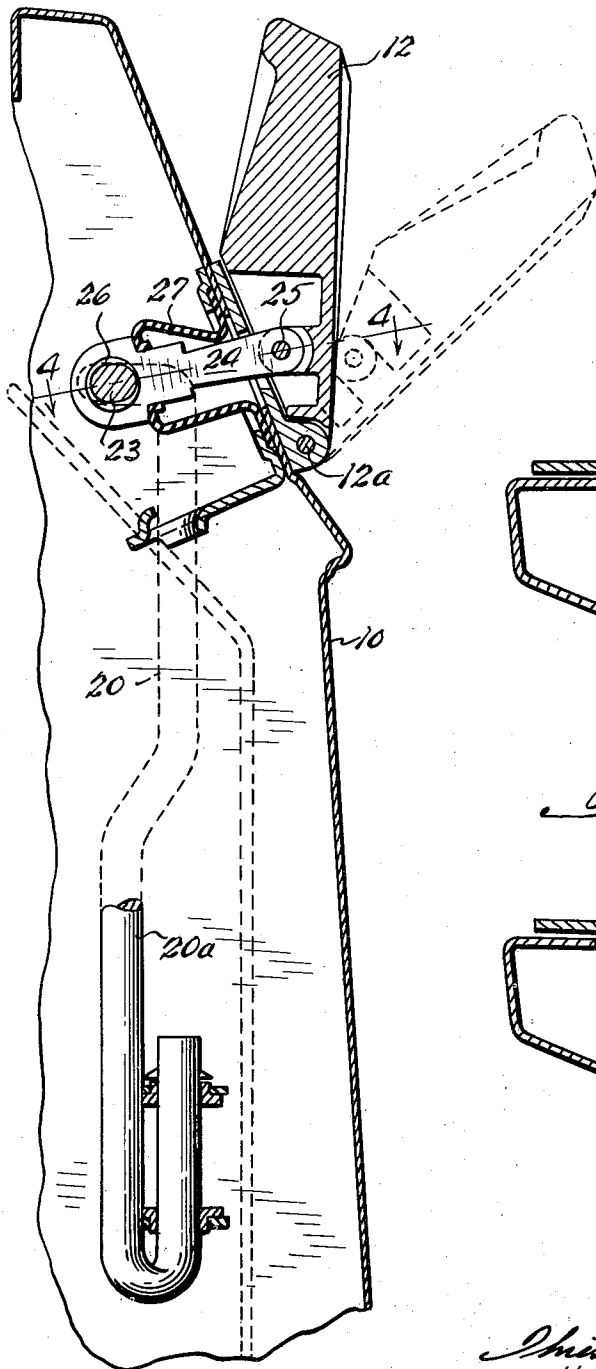


Fig. 4

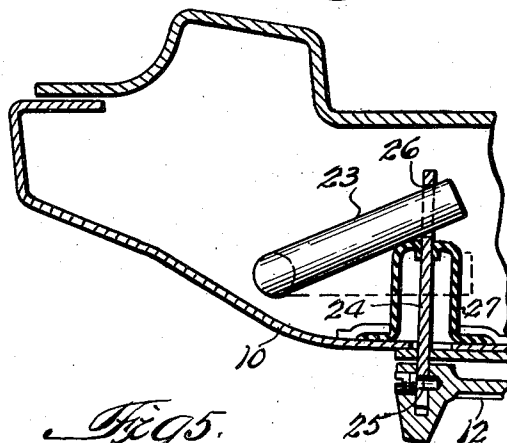
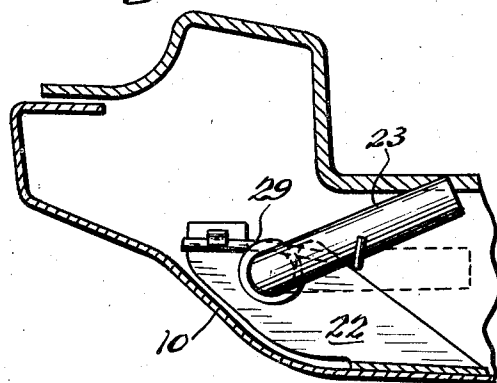


Fig. 5



INVENTOR.

BY.

Lloyd L. Anderson.
Miss. Chan. Mecklenburg,
van Holst, & Coltrane. Attys.

1

2,859,999

LATCH MECHANISM

Lloyd L. Anderson, Grand Rapids, Mich., assignor to Jervis Corporation, Grandville, Mich., a corporation of Michigan

Application March 16, 1956, Serial No. 572,133

9 Claims. (Cl. 292—336)

This invention relates to an improved latch mechanism for releasably holding a door member in closed position with respect to a cabinet member. It is an object of the invention to provide improved apparatus of that character.

The embodiment of the invention disclosed in the drawings and described herein is particularly suitable for application to a refrigerator compartment arranged near the bottom of a two-compartment refrigerator. One such application would be to a freezer compartment door or to a freezer drawer arranged below the cold storage compartment. Novel, cooperating features of the invention include simple but effective remote control apparatus, a highly efficient latch mechanism proper permitting operation thereof with a minimum of friction and play, an economical and efficient bearing arrangement for the remote control apparatus and certain elements of the latch mechanism proper, and control apparatus which is readily adapted to the control of two latch mechanisms proper, such as may be desired in a drawer application.

Accordingly, it is another object of the invention to provide improved remote control means for a latch mechanism proper.

It is another object of the invention to provide an improved latch mechanism proper wherein mechanical play and friction are reduced to a minimum.

It is another object of the invention to provide an improved bearing construction for latch control apparatus and for an associated latch mechanism proper.

It is another object of the invention to provide an improved common latch control apparatus for a plurality of latch mechanisms proper.

It is another object of the invention to provide an improved mechanical latch mechanism in which the manually operable handle is arranged remote from one or more latch mechanisms proper which are operated thereby.

It is still another object of the invention to provide a latch mechanism having various of the features specified above while being efficient, reliable and economical to manufacture.

This invention, together with further objects and advantages thereof, will best be understood by reference to the following description taken in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

In the drawings, in which like parts are designated by like reference numerals,

Figure 1 is a front elevational view, partially broken away, of a latch mechanism illustrating one embodiment of the invention;

Fig. 2 is a cross-sectional view of the latch mechanism proper of Fig. 1, taken along the line 2—2 thereof;

Fig. 3 is a side elevational view of the latch control apparatus of Fig. 1;

Fig. 4 is a cross-sectional view taken along the line 4—4 of Fig. 3; and

Fig. 5 is a cross-sectional view taken along the line 5—5 of Fig. 1, but omitting certain portions of the control apparatus in the interest of clarity.

2

As indicated above, a latch mechanism constructed in accordance with the present invention is particularly adapted for application to a freezer drawer located at the bottom of a household refrigerator, and the embodiment of the invention illustrated in the drawings and described herein is shown in such an application. It is to be understood, however, that the various individual and combined features of the invention are advantageous in various other applications.

In Fig. 1 the left-hand portion of the front panel of a freezer drawer 10 is shown in front elevation. A gasket 11 is preferably provided for sealing against air leakage. Where the freezer drawer is to be located at the bottom of a household refrigerator, it is desirable that the operating mechanism be located near the top of the drawer such that it is readily accessible. The left-hand portion of an operating handle 12 is shown near the top of the drawer 10. It is also desirable that the latch mechanisms proper be arranged at opposite sides of the drawer approximately half-way between the top and bottom, such positioning of the latch mechanisms proper providing more uniform compression of the gasket 11 with a given rigidity of the drawer 10. Accordingly the latch mechanism proper 13 shown at the left-hand side of the drawer 10 is arranged half-way along the height of the drawer. The important factor in this arrangement of the handle 12 and the latch mechanism proper 13 is that they are relatively remote from each other and hence must be connected by elongated control apparatus.

The principal element of the control apparatus consists of a rod 20 which extends from a position adjacent the handle 12 to a position adjacent the latch mechanism proper 13, as may be seen in Figs. 1 and 3. Near the upper end of the rod 20 it passes through an opening 21 in a fixed arm 22, and near the bottom end thereof it is supported in a bearing subsequently to be described. The rod is thereby rotatable about an axis designated A in Figs. 1 and 3. At the extreme upper end of the rod 20 is an arm 23, which in the illustrated embodiment of the invention is integral with the rod 20 and is formed by bending the rod.

As may be seen best in Fig. 3, the handle 12 is pivotable about a pin or pins 12a located near the bottom of the handle. The handle 12 may thereby pivot outwardly of the drawer 10 to the position illustrated by the dotted lines in Fig. 3. A link 24 is pivotally connected to the handle 12 through a pin 25 and has an opening 26 for receiving the arm 23 near the free end thereof, all as best seen in Figs. 3 and 4.

As the handle 12 is pulled outwardly, the arm 23 will be drawn forward, pivoting the rod 20 about its axis A in a clockwise direction as viewed from the top (see Fig. 4). A soft rubber or plastic member 27 is preferably arranged as shown in Figs. 3 and 4 to seal the opening in the outer wall of the drawer front which is necessarily provided to permit the link 24 to extend therethrough. The sealing element 27 readily collapses to permit operation of the handle 12, the link 24, and the arm 23.

A relatively light spring 29 is arranged around the upper end of the rod 20, as best seen in Fig. 1, for biasing the rod 20 and the handle 12 to their normal positions. The lower end of the spring 29 engages the arm 22, as seen best in Fig. 5, while the upper end thereof engages the arm 23.

It will now be seen that an outward pull on the handle 12 rotates the rod 20 in a clockwise direction as viewed from above, and that the spring 29 biases the rod 20 in a counterclockwise direction and thereby normally maintains the handle 12 in the position shown in solid lines in Fig. 3.

Movement of the rod 20 by the handle 12 is, of course, employed to operate the latch mechanism proper 13:

3

More particularly, clockwise movement of the rod as induced by an outward pull on the handle 12 serves to release the latch mechanism. The latch mechanism disclosed in the drawings is of the type which cocks when it is released, whereby it stays in the released position until tripped by re-engagement with the keeper. Upon being tripped, the latch mechanism exerts a powerful closing force which serves to compress the gasket 11. This assures sealing of the drawer each time that it is closed without depending upon the operator closing the drawer with sufficient force to compress the gasket directly.

In Fig. 2 a latch bolt 31 may be seen which is pivotally mounted on the drawer 10 through a pin 32. When the latch bolt 31 is in the position illustrated in solid lines in Fig. 2, it will be seen that it latchingly engages the keeper 33, and, more particularly, a keeper roller 34. However, when the latch bolt pivots to the position illustrated by the dotted lines in Fig. 2, the keeper roller 34 is released, whereby the drawer 10 can be drawn open.

Also pivotally mounted on the drawer is a bolt actuator 35. The latch bolt 31 and the bolt actuator 35 are interconnected through a slot 36 in the latch bolt and the roller 37 rotatably mounted on the actuator 35.

When the actuator 35 is in the position illustrated in Fig. 2, its roller 37 is arranged at the left-hand end of the slot 36 whereby the latch bolt 31 is maintained in its latching position, illustrated by solid lines of Fig. 2. However, when the actuator 35 pivots in a clockwise direction, as viewed in Fig. 2, the roller 37 passes to the right-hand end of the slot 36. This slot bends rather sharply downward in Fig. 2 at its extreme right-hand end with the result that as the roller 37 passes to the right-hand end of the slot, the latch bolt is free to move to its released position, as shown in dotted lines in Fig. 2.

As may be seen in Fig. 1, the bolt actuator 35 actually consists of a pair of arms 35a with an interconnecting web portion 35b. As may be seen in Figs. 1 and 2, a relatively powerful spring 38 is compressed between the web portion 35b of the actuator and a bracket 39 which is fixed with respect to the drawer 10. The spring 38 urges the actuator in a counterclockwise direction and urges the roller 37 toward the left-hand end of the slot 36. When the actuator 35 is pivoted in a clockwise direction against the action of the spring 38 such that the roller 37 passes to the right-hand end of the slot 36, the roller 37 bears against a shoulder 36a which extends substantially perpendicular to the direction of movement of the roller 37 and stands substantially perpendicular to a line drawn from the center of the pivot pin 32 to the center of the roller 37. Under these conditions, the powerful spring 38 is restrained until such time as the latch bolt 31 is pivoted a small amount in a counterclockwise direction by contact of the keeper roller 34 thereagainst upon closing of the drawer. This lifts the roller 37 relatively off the shoulder 36a whereupon the spring 38 drives the roller 37 forcibly toward the left-hand end of the slot 36. The shape of the slot is such that substantial movement of the roller 37 along the slot 36 produces a relatively small counterclockwise movement of the latch bolt 31 whereby the latch mechanism draws the drawer 10 forcefully toward its fully closed position with a wedging action. This, of course, compresses the gasket to minimize the leakage of air.

Release of the latch mechanism is accomplished by movement through an arcuate path of a portion 20a of the rod 20 which is offset from the pivotal axis A of the rod. In Fig. 2 it will be seen that the offset rod portion 20a bears against the bolt actuator web 35b whereby clockwise rotation of the rod 20 produces clockwise rotation of the bolt actuator 35. Attention is directed to the fact that the offset rod portion 20a bears against the bolt actuator at a point directly opposite and in line with the axis of the main latch spring 38. With

4

this arrangement, the force transmitted by the rod 20 for releasing the latch mechanism is applied almost directly to the spring 38. This eliminates any intermediate members or portions of members which must transmit this latch releasing force, and thereby eliminates the mechanical play and friction which are necessarily involved in such intermediate members.

The pivotal mounting of the lower end of the rod 20 and of the actuator 35 has been referred to above only briefly. Reference to Fig. 1 reveals that the arms 35a of the bolt actuator have openings therein about which the material forming the arms is punched outwardly to form hollow cylindrical portions 41. These cylindrical portions are axially aligned with each other and are received within suitable openings in a latch housing structure 42. The housing 42 thereby serves as a bearing, and the hollow cylindrical portions 41 of the actuator 35 act as a journal to permit pivotal movement of the bolt actuator. The rod 20 extends through the two hollow cylindrical portions 41 whereby the cylindrical portions 41 of the actuator serve as bearings and the rod itself acts as a journal to permit pivotal movement of the rod 20. This provides an effective and very inexpensive bearing construction for pivotal movement of two parts, namely, the rod 20 and the bolt actuator 35. Furthermore, these two members are thereby pivotable about a common axis. Accordingly, as the offset rod portion 20a moves to pivot the bolt actuator 35 against the action of the spring 38, there is no relative movement between these parts. Thus, during releasing of the latch mechanism, when the largest forces are being transmitted through the control apparatus, there is neither sliding friction nor bearing friction between the rod 20 and the bolt actuator 35, since they are rotating or pivoting in unison.

It will be understood that if two latch mechanisms proper 13 are required, as may be the case where the invention is applied to a drawer 10, the handle 12 may extend over a substantial portion of the width of the door. The remainder of the control apparatus, along with the entire latch mechanism proper, may then be repeated at the other end of the handle 12; that is, at the other side of the drawer 10. It will further be understood that if the invention is applied to a door, wherein a single latch mechanism proper is required, the apparatus shown in the drawings suffices for the complete installation.

It has now been shown that the present invention in its complete form incorporates novel cooperating features, including an effective and efficient remote control apparatus which is readily adapted to the control of two latch mechanisms proper, a highly efficient latch mechanism proper which may be operated with a minimum of friction and mechanical play, and a very economical and efficient common bearing arrangement for both the remote control apparatus and the bolt actuator of the latch mechanism proper. These various features of the complete invention operate to good advantage in cooperation with each other. However, each feature may be used to advantage individually.

While the present description sets forth a preferred embodiment of the invention, numerous changes may be made in the construction without deviating from the spirit of the invention, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

I claim:

1. In a latch mechanism having a housing and a bolt member mounted on said housing for movement between a latched position and a released position: a bolt actuator pivotally mounted on said housing for controlling the position of said bolt member, said bolt actuator being spring-biased to urge said bolt member toward latched position, an operating member for causing pivotal

5

movement of said bolt actuator in a direction to release said bolt member, said operating member comprising a portion mounted for pivotal movement about an axis common with the pivotal axis of said bolt actuator and another portion arranged to bear against said bolt actuator.

2. In a latch mechanism having a housing and a bolt member mounted on said housing for movement between a latched position and a released position: a bolt actuator pivotally mounted on said housing for controlling the position of said bolt member, an operating member for causing pivotal movement of said bolt actuator in a direction to release said bolt member, said operating member comprising a portion mounted for pivotal movement about an axis common with the pivotal axis of said bolt actuator and another portion arranged to bear against said bolt actuator, and a helical spring compressed between said housing and said bolt actuator and urging said bolt actuator in a direction to move said bolt member toward keeper-engaging position.

3. In a latch mechanism having a housing and a bolt member mounted on said housing for movement between a latched position and a released position: a bolt actuator pivotally mounted on said housing for controlling the position of said bolt member, said bolt actuator being spring-biased to urge said bolt member toward latched position, an operating member for causing pivotal movement of said bolt actuator in a direction to release said bolt member, said operating member comprising an elongated rod-like member mounted for rotation about its longitudinal axis, said longitudinal axis being common with the axis of rotation of said bolt actuator, one end of said operating member being bent back upon itself to form generally parallel spaced-apart portions, one of said portions lying along said pivotal axis and being supported by bearing means, the other of said portions being pivotably movable about said axis and arranged to bear against said bolt actuator.

4. In a latch mechanism having a housing and a bolt member mounted on said housing for movement between a latched position and a released position: a bolt actuator mounted on said housing for controlling the position of said bolt member, said bolt actuator having a hollow cylindrical portion receivable within an opening in said housing whereby said bolt actuator is pivotable with respect to said housing, said bolt actuator being spring-biased to urge said bolt member toward latched position, and an operating member for causing pivotal movement of said bolt actuator in a direction to release said bolt member, said operating member comprising an elongated rod-like element bent back upon itself adjacent one end to form two spaced-apart portions, one of said portions extending within said hollow cylindrical portion of said bolt actuator whereby said operating member is rotatable with respect to said housing and said bolt actuator about the pivotal axis of said bolt actuator, said other portion being arranged to bear against said bolt actuator.

5. In a latch mechanism having a housing and a bolt member mounted on said housing for movement between a latched position and a released position: a bolt actuator mounted on said housing for controlling the position of said bolt member, said bolt actuator having a hollow cylindrical portion receivable within an opening in said housing whereby said bolt actuator is pivotable with respect to said housing, said bolt actuator being spring-biased to urge said bolt member toward latched position, an operating member for causing pivotal movement of said bolt actuator in a direction to release said bolt member, said operating member comprising an elongated rod-like element bent back upon itself adjacent one end to form two spaced-apart portions, one of said portions extending within said hollow cylindrical portion of said bolt actuator whereby said operating member is rotatable with respect to said housing and said bolt actuator about the pivotal axis of said bolt actuator, said other portion

6

being arranged to bear against said bolt actuator, and a helical spring compressed between said housing and said bolt actuator and urging said bolt actuator in a direction to move said bolt member toward keeper-engaging position.

6. In latch apparatus for securing a closure to a cabinet at two spaced-apart points, a pair of latch mechanisms proper, and a common latch releasing mechanism, each of said latch mechanisms proper comprising a housing, a bolt member mounted on said housing for movement between a latched position and a released position: a bolt actuator mounted on said housing for controlling the position of said bolt member, said bolt actuator having a hollow cylindrical portion receivable within an opening in said housing whereby said bolt actuator is pivotable with respect to said housing, and a helical spring compressed between said housing and said bolt actuator and urging said bolt actuator in a direction to move said bolt member toward keeper-engaging position, an operating member for each of said latch mechanisms proper for causing pivotal movement of the corresponding bolt actuator in a direction to release said bolt member, each of said operating members comprising an elongated rod-like element bent back upon itself adjacent one end to form two spaced-apart portions, one of said portions extending within said hollow cylindrical portion of said bolt actuator whereby said operating member is rotatable with respect to said housing and said bolt actuator about the pivotal axis of said bolt actuator, said other portion being arranged to bear against said bolt actuator, said operating member and said spring being so arranged that the force of said spring is co-linear with the force applied to said bolt actuator by said operating member, each of said elongated rod-like elements having an arm adjacent its other end extending away from the pivotal axis thereof, said common latch releasing mechanism extending between said other ends of said two elongated rod-like elements and being operatively connected to said two arms to pivot said rod-like elements and release said latch mechanism proper simultaneously.

7. In latch apparatus for securing a drawer in closed position with respect to a cabinet at points adjacent the opposite sides thereof and substantially midway between the top and bottom of said drawer, a pair of latch mechanisms proper adjacent said points and a common latch releasing mechanism adjacent the top of said drawer, each of said latch mechanisms proper comprising a housing, a bolt member mounted on said housing, and a bolt actuator mounted on said housing for controlling the position of said bolt member, said bolt actuator having a pair of vertically, axially aligned hollow cylindrical portions receivable within a pair of vertically aligned openings in said housing whereby said bolt actuator is pivotable with respect to said housing about a vertical axis, said bolt actuator being spring-biased to urge said bolt member toward latched position, said common latch releasing mechanism including manually operable apparatus adjacent the center of the top of said drawer and an operating member for each of said latch mechanisms proper for causing pivotal movement of said bolt actuator in a direction to release said bolt member, each of said operating members comprising an elongated rod-like element bent back upon itself adjacent one end to form two spaced-apart portions, one of said portions extending within said hollow cylindrical portions of said bolt actuator whereby said operating member is rotatable with respect to said housing and said bolt actuator about the vertical pivotal axis of said bolt actuator, said other portion being arranged to bear against said bolt actuator, each of said elongated rod-like elements extending from the associated latch mechanism proper to a point adjacent the top of said drawer and having an arm adjacent its upper end extending away from the pivotal axis thereof, said manually operable apparatus extending between said upper ends of said two elongated rod-like elements and being oper-

actively connected to said two arms to pivot said rod-like elements and release said latch mechanisms proper simultaneously.

8. A latch mechanism for releasably holding a closure member in closed position with respect to a cabinet member comprising in combination, a latch assembly, an operating member operatively connected to said latch assembly, and a manually operative apparatus connected to said operating member to effect movement thereof and unlatching of said latch assembly; said latch assembly comprising a housing, a bolt member having a keeper receiving slot and an actuation camming slot, said bolt member being pivotally mounted on said housing and movable between a latched and an unlatched position, an actuating arm pivotally mounted on said housing and carrying a bolt engaging member which is adapted to operatively ride within said actuator camming slot to effect movement of said bolt member between its latched and unlatched positions, an actuation spring biasing said actuating arm in a direction to effect latching of said bolt member, said operating member having one portion mounted for pivotal movement about an axis common with the pivotal axis of said actuating arm and another portion adapted to bear against said actuating arm for causing pivotal movement of said actuating arm in a direction to effect unlatching of said bolt member, the bolt-unlatching force being applied to said actuating arm by said operating member in a direction substantially opposite to that being applied by said actuation spring, said manually operative apparatus including a lever-like handle element pivotally connected to the closure member, and a linking element operatively connected between said handle element and said operating member to effect rotation of said operating member upon movement of said handle element whereby said latch bolt is caused to move into its unlatched position.

9. A latch mechanism for releasably holding a closure member in closed position with respect to a cabinet member comprising in combination, a latch assembly, an operating member operatively connected to said latch assembly,

bly, and a manually operative apparatus connected to said operating member to effect movement thereof and unlatching of said latch assembly; said latch assembly comprising a housing, a bolt member having a keeper receiving slot and an actuation camming slot, said bolt member being pivotally mounted on said housing and movable between a latched and an unlatched position, an actuating arm pivotally mounted on said housing and carrying a bolt engaging member which is adapted to operatively ride within said actuator camming slot to effect movement of said bolt member between its latched and unlatched positions, an actuation spring biasing said actuating arm in a direction to effect latching of said bolt member, said operating member comprising an elongated rod-like element bent back upon itself adjacent one end to form two parallel portions and bent at substantially a right angle adjacent the other end to form an outwardly extending arm, one portion mounted for pivotal movement about an axis common with the pivotal axis of said actuating arm and another portion adapted to bear against said actuating arm for causing pivotal movement of said actuating arm in a direction to effect unlatching of said bolt member, the bolt-unlatching force being applied to said actuating arm by said operating member in a direction substantially opposite to that being applied by said actuation spring, said manually operative apparatus including a lever-like handle element pivotally connected to the closure member, and a linking element operatively connected between said handle element and the outwardly extending arm adjacent the end of said rod-like element, whereby movement of said handle element will effect axial rotation of said rod-like element and cause movement of said bolt member toward its unlatched position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,172,467	Geddes	Sept. 12, 1939
2,249,644	Anderson	July 15, 1941
2,348,955	Buchanan	May 16, 1944
2,359,150	Peglow	Sept. 26, 1944