Feb. 18, 1941. E. W. NORTH ET AL 2,232,629

LATCH

Filed May 5, 1939

Fig. 1.

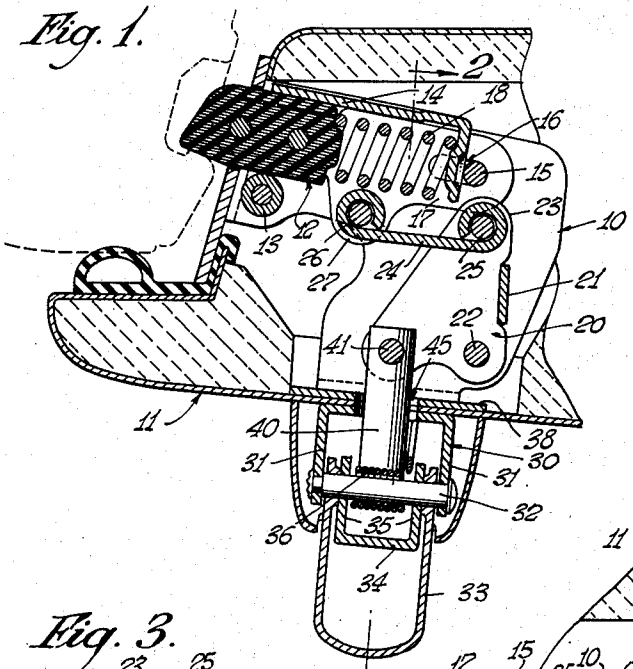


Fig. 2.

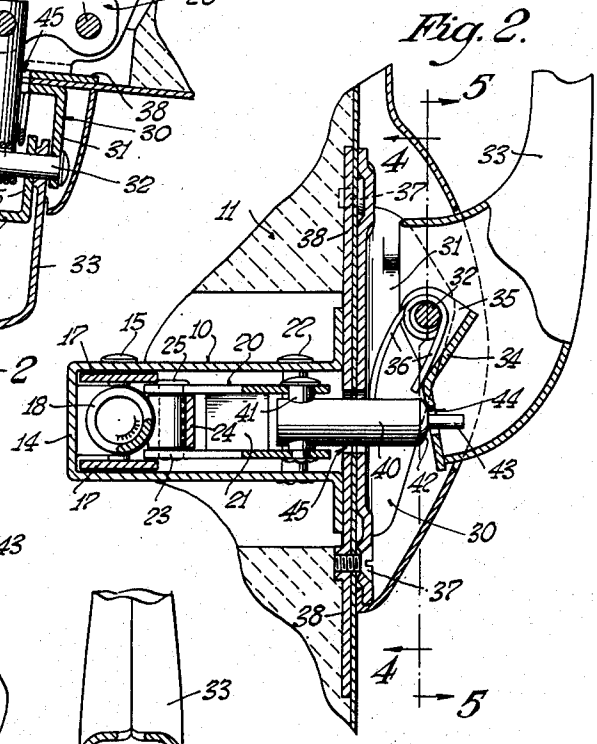


Fig. 3.

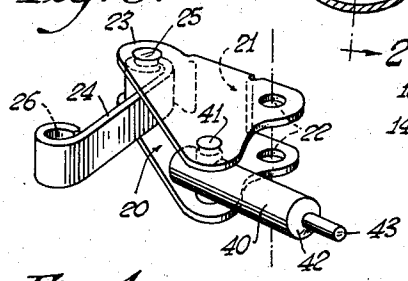
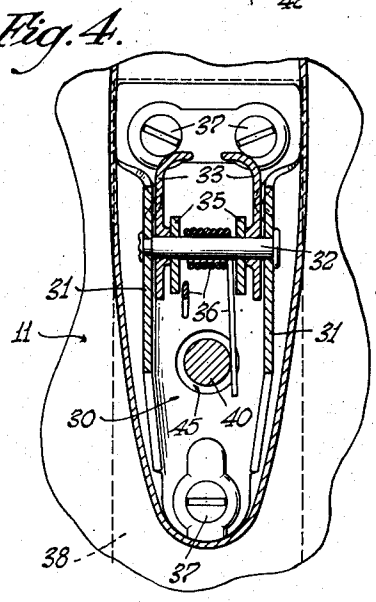


Fig. 4.



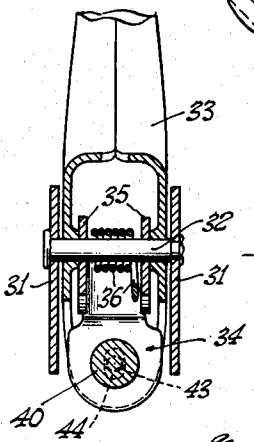


Fig. 5.

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Patented Feb. 18, 1941

2,232,629

UNITED STATES PATENT OFFICE

2,232,629

LATCH

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Application May 5, 1939, Serial No. 271,854

6 Claims. (Cl. 292—166)

This invention relates to improvements in latches, particularly those of the slam-shut varity adapted for use on refrigerator doors and the like.

One of the principal objects of the invention is the provision of improved lever mechanism for operatively interconnecting a reciprocable bolt and a handle member.

Another object is the provision of improved intermediate lever mechanism having impositive operative connection with a handle so that the bolt and associated parts may move without causing the handle to move when the bolt reciprocates responsive to slamming the door shut.

Another object is the arrangement of a number of operating levers in pivotal connection to effect retraction of the bolt in a particular manner, one of the levers being impositively connected with a handle by means also operative to keep said lever in a certain position of alignment for proper coaction both with the handle and the other levers.

Other objects, advantages and novel aspects of the invention reside in certain details of construction as well as the arrangement of parts and the mode of operation thereof in the illustrative embodiment described in view of the annexed drawing, in which:

Fig. 1 is a horizontal section through the improved latch and part of a refrigerator door;

Fig. 2 is a vertical section along line 2—2 of Fig. 1;

Fig. 3 is a perspective detail of the intermediate lever mechanism;

Fig. 4 is a fragmentary vertical section through the handle structure looking in the direction of line 4—4 of Fig. 2;

Fig. 5 is another fragmentary vertical section looking in the direction of line 5—5 of Fig. 2.

The improvements disclosed herein are in continuation of certain improvements set forth and claimed in our copending applicaton, Seral No. 271,853, filed of even date herewith, and which relate particularly to the arrangement of an intermediate operating lever and a link connecting the same with a bolt, so that the link moves almost in parallelism with the bolt, the intermediate lever being operated by a plunger bearing against the same in a direction almost normal to the line of reciprocation of the bolt and link.

The present invention relates more particularly to means for impositively connecting a handle with the intermediate lever.

In the arrangement of Fig. 1, the latch structure includes a housing bracket 10 attached in a suitable recess to a refrigerator door 11. Mounted for reciprocable movement in the bracket 10 is a bolt structure 12. The bolt properrides between a roller 13 and a wall portion 14 of the bracket, while the opposite end of the structure is guided by a pin 15 anchored in the bracket and projecting through an elongated slot 16 in parallel strap projections 17 flanking the bolt and constituting a rigid part of the bolt structure. A compression spring 18 normally urges the bolt into latched position.

Mounted within the bracket is an intermediate operating lever 20 in the form of a metal strap bent back upon itself with opposite triangularly shaped wall portions joined by an intermediate bight or wall portion 21. This lever is mounted for pivotal movement on a pin 22, so that one of its ends 23 may oscillate in an arc in the plane of reciprocation of the bolt and which arc is tangent to a line which is substantially in parallelism with the direction of reciprocation of the bolt.

The bolt and intermediate operating lever are interconnected by an elongated rigid link 24 which is pivotally attached at one end by pin means 25 secured in the end 23 of the intermediate operating lever, and at its opposite end by pin means 26 anchored in ear portions 27 of the parallel straps 17 flanking the bolt.

The structure thus far described, that is to say, the reciprocable bolt means and the intermediate operating lever 20 connected by the strap 24 with the bolt as set forth, constitutes a part of the improvement claimed in the aforementioned copending application which, per se, is not claimed herein. This arrangement is such that when the intermediate lever 20 is pivoted (clockwise Fig. 1) from its normal position into which it is urged by action of the spring 18, the link 24 will move with very little pivotal displacement relative to either the bolt or the intermediate operating lever, and such displacement as there is, is calculated to average out in a resultant path of movement of the link which will be nearly in parallelism with the linear reciprocation of the bolt so that the average pull of the link will be exerted in an almost straight line throughout the retractive movement of the bolt. The advantage of this arrangement is obvious, in that it provides a more constant load for the handle and maintains almost the same leverage ratios or mechanical advantage in the lever system, particularly as to the link 24, for retracting the bolt.

The particular feature of the present invention relates particularly to the means for im-

positively connecting an operating handle with the intermediate operating lever 20. As depicted in Figs. 1 and 2 particularly, the aforesaid latch is intended to cooperate with a handle structure which includes a channel-shaped mounting bracket 30 having opposite side walls 31 between which extends a pivot pin or pintle 32 upon which is pivoted a handle 33. The handle is preferably constructed by stamping so as to be hollow with its pivoted end portion open, and, as illustrated in Figs. 4 and 5 particularly, there is mounted in the open end a stamped bearing plate 34 provided with opposite upset ears 35 fitted onto the pintle 32. A spring 36 is coiled around the pintle with its ends bearing respectively against the stamping 34 and the bottom of the bracket 30 so as to pivot the handle into a normal position. The mounting bracket 30 for the handle is attached to the door in any suitable manner, preferably by means of screws 37 which thread into the mounting plate 38 of the latch.

Means operatively but impositively interconnecting the handle with the intermediate operating lever 20, includes a stud arm 40 pivotally attached by a pin 41 extended transversely through an end thereof for anchorage in the opposite surface portions of the lever 20 (Fig. 3). An opposite end of the stud is reduced to provide a shoulder 42 from which projects coaxially a pin portion 43. In assembled relation with the handle structure, the stud 40 passes loosely through a wide hold 45 in parts 30 and 38 and the pin 43 projects through an opening 44 in a part of the bearing stamping 34 which is disposed eccentrically of the pivotal axis 32 of the handle.

The handle structure is so mounted with respect to the latch that the pin portion 43 projecting through the opening 44 in the bearing member in the end of the handle, will align the stud 40 in a predetermined operating position relative to the rest of the latch operating mechanism and particularly the intermediate operating lever 20, in the manner illustrated substantially in Fig. 1. In other terms, the handle may move relative to the stud 40 or the stud may reciprocate relative to the handle, but the stud will nevertheless be in proper alignment relative to the lever 20.

In operation, referring first to Fig. 2, the handle 33 may be pulled downwardly (clockwise) to rock on the pivot 32, thus causing the eccentrically situated part of the bearing stamping 34 to bear against the shoulder 42 on the stud 40, whereupon (Fig. 1) the stud will transmit motion through its connecting pin 41 into the intermediate lever 20, thus rocking the latter about its pivot 22 so as to retract the link 24 and hence withdraw the bolt structure 12 from latched position.

Assuming that the door 11 is slammed shut with the latch bolt in normally latched position, the cammed nose portion of the bolt and keeper, as is usual in this type of latch, will cam the bolt into unlatched position against the tension of the spring 18, and as a consequence the link 24 and the lever 20 will be moved, as will be the stud 40, but this motion will not be transmitted to the handle because of the impositive operative association afforded by the means 42—43—44 so that the handle will not be moved, the latter being an obvious advantage commonly sought in this class of latch.

The invention in its broader aspects, therefore, provides an operative connection between a handle and an intermediate bolt operating leverage system, wherein the effort of the handle is transmitted always in a certain direction to the intermediate lever system, although the said lever system and the bolt associated therewith may nevertheless move in one direction independently of the handle. This invention is not to be restricted to any of the precisely described features of construction referred to for the purpose of characterizing a preferred embodiment of the invention except as may be provided in the appended claims.

Having thus described our invention, what we claim as new and desire to protect by Letters Patent is:

1. A latch having, in combination, a reciprocable bolt, lever mechanism operatively linked with the bolt for reciprocation thereof, a rocking handle structure and impositive connecting means in the form of an elongated member pivotally connected near one of its ends with said lever mechanism and having a reduced portion at its opposite end providing a pin and shoulder, said pin extending through an opening in a part of said handle structure, said part bearing against said shoulder when the handle structure is rocked in a certain direction to move the elongated member and said lever mechanism to effect retraction of said bolt.

2. In a latch structure of the type which includes a substantially linearly reciprocable bolt, a pivoted intermediate operating lever, a rigid link pivotally connected to said bolt and intermediate operating lever and arranged to move along a resultant path which is substantially in parallelism with the line of reciprocation of the bolt when the intermediate operating lever is pivoted, operating mechanism comprising a stud member pivotally connected near one of its ends to said intermediate operating lever for reciprocable movement in a direction approximately at right angles to the direction of said line of reciprocation of the bolt to pivot said intermediate lever and effect movement of the bolt, and a handle structure arranged to rock in the direction of reciprocation of said stud member, said handle structure having a part with an opening situated eccentrically of the rocking axis of the handle structure in alignment with the opposite end of said stud member, said opposite end being reduced to provide an axially extending pin with a shoulder, said pin extending into said opening in the handle part for bearing engagement of the latter against said shoulder when the handle is rocked in a certain direction to move the bolt, said stud member being maintained in alignment for reciprocable movement as aforesaid by engagement in said opening in the handle part.

3. In a latch, the combination with an approximately linearly reciprocable latch bolt and intermediate lever mechanism for reciprocating the same by application of forces applied to said intermediate lever mechanism in a direction which is approximately normal to the line of reciprocation of the bolt, of operating means including: a handle structure arranged to rock in said normal direction and impositive connecting means in the form of an elongated member having pivotal connection at one of its ends with said intermediate lever mechanism and having coaxially aligned pin and slot connection at its opposite end with a part of said handle structure which is eccentric of the rocking axis thereof, whereby said elongated member will be main-

tained in alignment for movement in said normal direction responsive to or independently of rocking movement of the handle structure.

4. In a latch of the class described including a rocking handle and an operating lever arranged for oscillation responsive to rocking movement of the handle, impositive connecting means including: a stud having pivotal connection near one of its ends with said lever and having coaxially aligned pin and slot engagement at its opposite end with a part of the handle disposed eccentrically of the rocking axis thereof, whereby said stud is aligned for reciprocable movement in the direction of rocking movement of the handle and can be moved independently of said handle or by rocking movement of said handle in a particular direction.

5. In a latch, a bolt arranged to move back and forth in approximately linear motion, an operating element mounted to move in a direction toward the line of movement of the bolt, an intermediate lever mounted to rock about an axis extending in a direction transversely to the movement of the bolt and at one side thereof and pivotally connected with said operating element and a straight link, the pivotal axis of said link being parallel with the pivotal axis of said intermediate lever, said link being pivotally connected with said bolt at one side thereof and disposed to move approximately in the direction of movement of the bolt responsive to rocking said intermediate lever, the pivotal axes of the link with respect to the bolt and of the intermediate lever with respect to the pivotal axes of the link and said operating element being each disposed with respect to the other so as to minimize the pivotal displacement of the link in movements of the bolt as aforesaid, whereby to maintain an approximately constant leverage ratio between the connections of the link with the bolt and intermediate lever during movements of the bolt by action of said lever.

6. In a latch, in combination, a bolt mounted for movement back and forth in an approximately straight line, a link pivotally attached at one side of the bolt with its pivotal axis disposed in a plane approximately parallel to the direction of movement of the bolt, an intermediate lever mounted at one side of the bolt to rock about an axis parallel with the pivotal connection of said link to the bolt, said intermediate lever being pivotally connected to an end of said link opposite the connection of the latter to the bolt at a point on the intermediate lever away from the rocking axis thereof toward the bolt, and means for applying an operating force to said intermediate lever at a point thereon spaced from its rocking axis in triangular relationship to the pivotal connection of the intermediate lever with said link whereby to move said intermediate lever with a consequent movement of said bolt and a minimum pivotal displacement of said link with respect to the bolt and intermediate lever.

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