Aug. 20, 1957 H. W. YOUNG ET AL 2,803,479

LOCK MECHANISM

Filed March 16, 1955 2 Sheets-Sheet 1

Fig. 1.

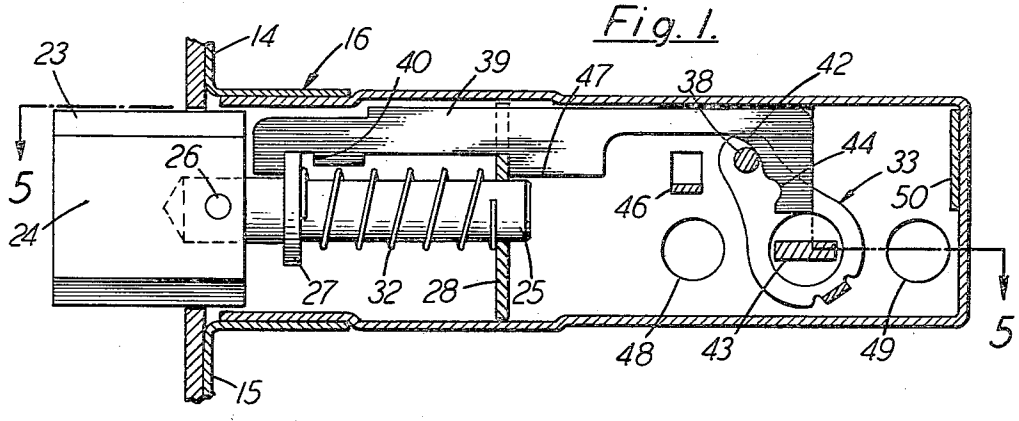


Fig. 2.

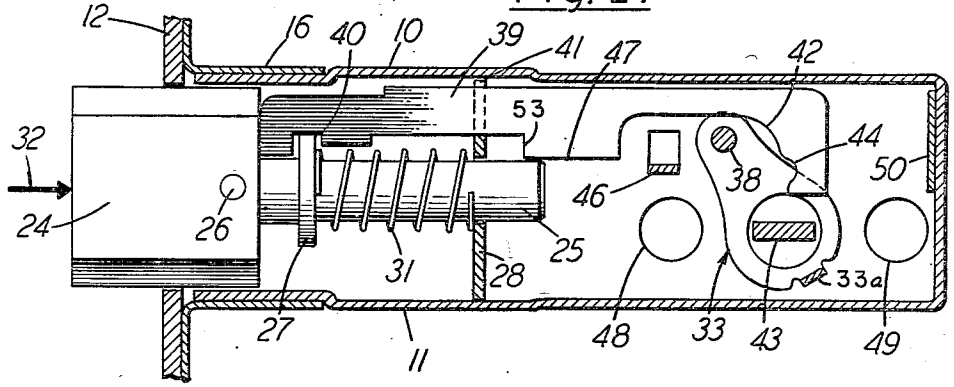
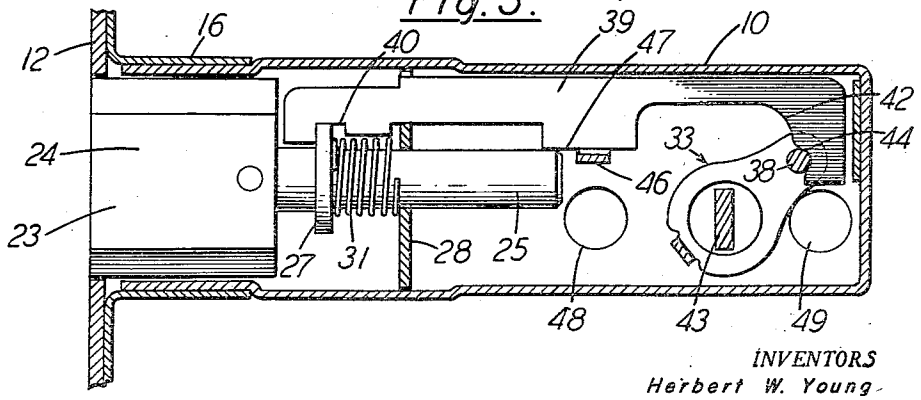


Fig. 3.



INVENTORS
Herbert W. Young
BY Paul H. Grevengoed
Glenn B. Golden
Attorney

Aug. 20, 1957 H. W. YOUNG ET AL 2,803,479

LOCK MECHANISM

Filed March 16, 1955 2 Sheets-Sheet 2

Fig. 4.

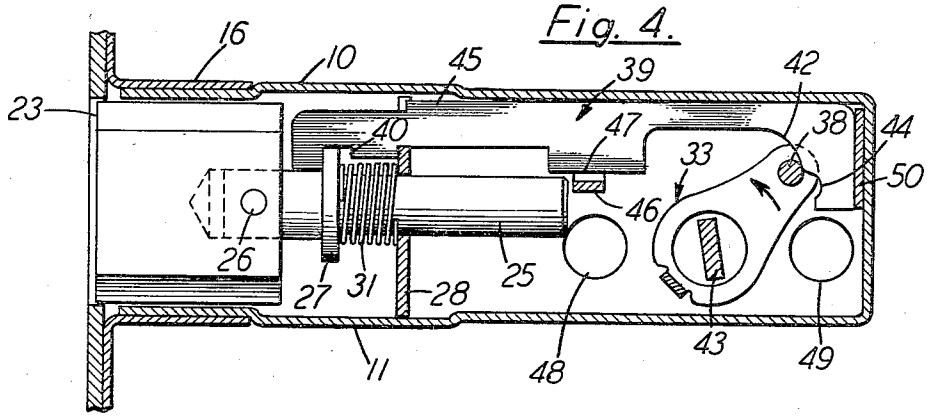


Fig. 5.

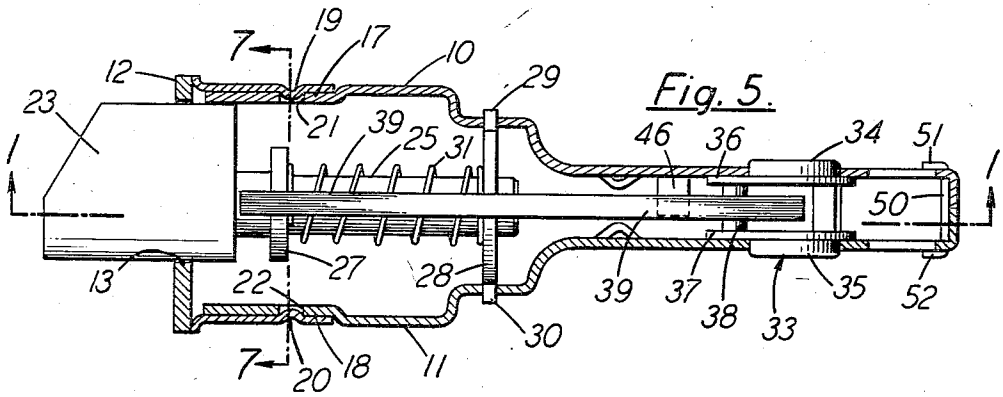


Fig. 6.

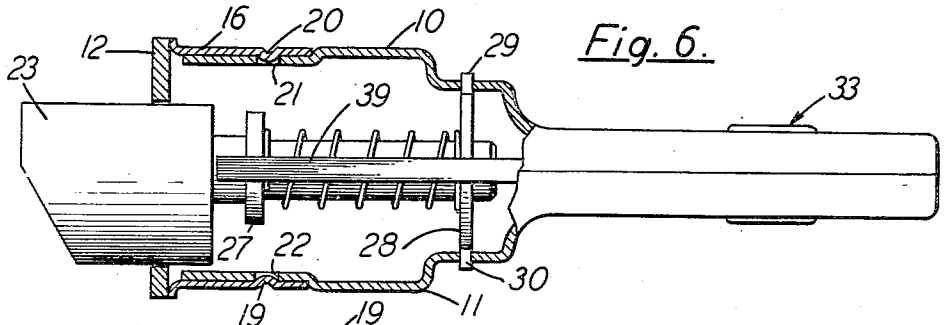
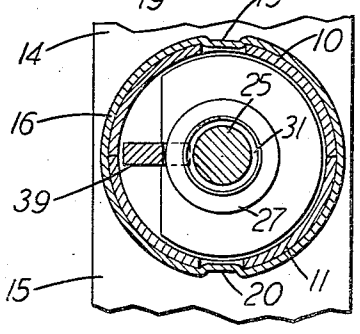


Fig. 7.



INVENTORS
Herbert W. Young
Paul H. Grevengoed
BY Glenn B. Morse
Attorney

United States Patent Office

2,803,479

Patented Aug. 20, 1957

2,803,479

LOCK MECHANISM

Herbert W. Young and Paul H. Grevengoed, Grand Rapids, Mich., assignors to Dexter Industries, Inc., Grand Rapids, Mich., a corporation of Michigan

Application March 16, 1955, Serial No. 494,662

4 Claims. (Cl. 292—169)

This invention is associated particularly with a type of mechanism commonly referred to as an "auxiliary" lock. Locks of this category are commonly used in conjunction with conventional latches where it is desirable to supplement the operation of the latch with a lock which may be operable either with a different key mechanism from that of the latch, or operated exclusively from the inside with a separate knob.

In view of the number of instances in which it is not desirable to have an auxiliary lock mechanism functioning, modifications of the mechanism have been developed for maintaining the bolt in retracted condition. This invention relates to this aspect of the device.

The central feature of this invention lies in the relationship of a radius arm (controlled by a manually-operated shaft or knob) and a cam surface on a retractor member which transfers forces from the radius arm to the bolt stem. This cam surface is formed in such a manner that a discontinuity is provided at a point engaged by the radius arm with the bolt in the fully retracted position. The effect of discontinuity is to create a jamming action between the retracting member and the radius arm such that the conventional biasing spring is incapable of moving the bolt to a projected position. The discontinuity, however, is formed in such a configuration that torque applied by the manually-operated knob or key will result in a pattern of forces at the discontinuity such that the radius arm can be moved in a direction to disengage itself from the discontinuity and permit projection of the bolt. Several subordinate features of construction are also provided by this invention which contribute to the operation outlined above.

The several features of the invention will be discussed in detail through an analysis of the particular embodiments illustrated in the accompanying drawings. Referring to the drawings,

Figure 1 presents a sectional elevation through the lock mechanism, with the bolt in the fully projected position.

Figure 2 presents a similar sectional elevation, with the mechanism in a condition which would be created when the bolt is partially retracted through beginning engagement with the keeper.

Figure 3 presents a view of the same mechanism, with the bolt in the fully retracted condition where it has been withdrawn by the operation of the radius arm, and is held in that condition through the interaction of the radius arm and the retractor.

Figure 4 illustrates the mechanism shown in the previous drawings at the moment of withdrawing the radius arm from engagement with the discontinuity of the cam surface of the retracting member.

Figure 5 presents a view on the plane 5—5 of Figure 1.

Figure 6 illustrates the same mechanism and condition as that of Figure 5, but with the position of the bolt and front plate rotated 180° about the axis of the mechanism with respect to the remainder of the housing.

Figure 7 presents a section on the plane 7—7 of Figure 5.

Referring to the drawings, a housing is provided which includes the opposite sections **10** and **11**, which meet along a plane parallel to the axis of the lock, and a front plate **12**. The front plate is provided with a bolt-receiving aperture **13**, and is secured to the flanges **14** and **15** of the collar **16** in a conventional manner. The collar **16** receives the forward portions **17** and **18** of the housing sections **10** and **11**, respectively, and is provided with detents **19** and **20** for engagement with the apertures **21** and **22** in the housing sections. With this arrangement, the front plate and the collar **16** may be considered as rotatably mounted on the housing sections **10** and **11**, with the engagement of the detent and the apertures **21** and **22** being left to determine the possible bolt positions which are 180° apart. In addition to providing the rotatable relationship between the front plate and the remainder of the housing, the collar **16** also serves to maintain the position of the housing sections, and establishes a snap-on assembly operation which is very economical and effective.

Since the bolt **23** is non-circular in cross section (due to the presence of the flat **24**), the engagement of the bolt with the similarly-formed opening **23** in the front plate creates a slidable but non-rotative relationship between the bolt and the front plate. Rotation of the front plate with respect to the housing therefore carries the bolt with it.

The bolt **23** is fitted with a stem **25** which is secured to the bolt **23** by a pin **26**. The stem **25** has an annular shoulder **27**, and the inner end of the stem **25** (which is circular in cross section) is slideably received within the central aperture of a transverse plate **28**. This plate is positioned through the engagement of the opposite tongues **29** and **30** with suitable apertures in the housing sections **10** and **11**, respectively. A spring **31** operates between the plate **28** and the annular shoulder **27** to continuously apply a biasing action urging the bolt **23** to the fully projected position.

The retraction of the bolt **23** to the position illustrated in Figure 4 may be accomplished in either of two ways. Figure 2 illustrates the condition in which the bolt has been shoved part way toward the retracted condition through exterior forces as might be applied by the keeper in the direction of the arrow **32**. Figure 3 illustrates the fully retracted position created through the operation of the radius arm (manually controlled) generally indicated at **33**. The radius arm itself is preferably formed of two opposite components, each of which includes a hub portion **34** and **35**, and a plate portion as shown at **36** and **37** (refer to Figure 5). The plate portions are both arranged perpendicularly to the axis of rotation of the radius arm unit which is established through the engagement of the hubs **34** and **35** with suitable apertures in the housing sections **10** and **11**, respectively. Preferably, the hub and plate portions are formed out of a single piece of sheet metal, connected for convenience in manufacturing, by the strip **33***a*. The plate portions **36** and **37** are connected by a pin **38** which cooperates with a retracting member **39** for the transfer of forces from the pin to the bolt through the annular shoulder **27**, the stem **25**, and the pin **26**.

The retracting member **39** is essentially a plate having the configuration indicated in Figures 1, 2, 3, and 4.

The forward portion of the retractor is provided with a notch **40** which receives the annular shoulder **27** of the bolt stem **25**, the forward wall of this notch being utilized to apply a rearward force to the shoulder **27**, in response to rotation of the radius arm **33**, to induce sliding movement of the bolt against the biasing effect of the spring **31**.

The retractor **39** is slideably received within a radially-open slot **41** in the transverse plate **28**, and the rearward

end of the retractor is formed in a cam surface **42** which cooperates with the pin **38** of the radius arm unit **33**. Rotation of the radius arm **33** under forces applied at the driving slot **43**, in a clockwise direction, to the position illustrated in Figure 3 causes the pin **38** to move along the cam surface **42** until it arrives in engagement with the discontinuity **44**. The formation of the discontinuity **44** is such that while the spring **31** is not capable (no matter what strength it might have) of moving the bolt toward projected position from the condition illustrated in Figure 3, it will not seriously interfere with the movement of the radius arm in a counterclockwise direction under the application of torque from a manually-operated-operated member, delivered at the driving slot **43**.

The sliding movement of the retractor **39** is guided through the engagement of the upper surface **45** of that member with the inside of the housing. Additionally, the ear **46** may be bent from the material of the housing section **10** to stabilize the retractor **39** when in the fully retracted condition. If desired, the ear **46** may also be positioned to act as a stop to limit the counterclockwise rotation of the radius arm **33**. When the ear **46** serves to position the retractor **39**, it operates in cooperation with the bearing portion **47** of the retractor.

The provision of the holes **48** and **49** (and similar holes in the opposite housing section) form no part of this invention, and are for the purpose of accommodating transverse bolts used in securing the latch with respect to the door and the escutcheon assembly. A locking plate **50** having deformable tabs **51** and **52** is preferably utilized in connection with suitable apertures in the housing section **10** and **11**, with the tabs being bent as shown in Figure 5 on assembly to lock the inner extremity of the housing sections together. This arrangement is conventional in the design of this type of mechanism.

The radially-open slot **41** permits the retracting member **39** to be assembled from the side; and when the notch **40** is in engagement with the shoulder **27**, the surface **53** of the retractor function as a stop limiting the outward movement of the bolt. This arrangement produces an economical assembly operation in which the bolt stem can be inserted in the central opening in the plate **28** (with the spring **31** in position), followed by the placement of the retractor member. A sub-assembly is created thereby which can then be inserted in the housing as a unit.

The particular embodiments of the present invention which have been illustrated and discussed herein are for illustrative purposes only, and are not to be considered as a limitation upon the scope of the appended claims. In these claims, it is our intent to claim the entire invention disclosed herein, except as we are limited by the prior art.

We claim:

1. A lock, comprising: a housing having a front aperture; a bolt slideably mounted in said aperture; biasing means urging said bolt outwardly; bolt-retracting means including a radius arm mounted in said housing for rotation on an axis which is transverse with respect to the sliding movement of said bolt, said radius arm having a pin adjacent the outer end thereof extending in a direction parallel to the axis of rotation of said radius arm; a retractor member having the forward end thereof in engagement with a portion of said bolt, and the rearward end formed in a cam surface for cooperation with said pin, said cam surface having a depression adapted to receive a portion of said pin with said bolt in retracted position, and with said radius arm disposed substantially midway between a position parallel to said axis and perpendicular thereto, said depression being shaped to cause a jamming action between said radius arm and retractor member whereby said biasing means is restrained from moving said bolt, said depression and cam surface further being shaped to provide for the manual actuation of said radius arm whereby said pin is moved out of engagement with said depression as said radius arm is rotated in a direction corresponding to the projected position of said bolt.

2. A lock, comprising: a housing having a front aperture; a bolt slideably mounted in said aperture; biasing means urging said bolt outwardly; bolt-retracting means including a radius arm mounted in said housing for rotation on an axis which is transverse with respect to the sliding movement of said bolt, said radius arm having an abutment adjacent the outer end thereof extending in a direction parallel to the axis of rotation of said radius arm; a retractor member having the forward end thereof in engagement with a portion of said bolt, and the rearward end formed in a cam surface for cooperation with said abutment, said cam surface having a discontinuity adapted to receive a portion of said abutment with said bolt in retracted position, and with said radius arm disposed substantially midway between a position parallel to said axis and perpendicular thereto, said discontinuity being shaped to cause a jamming action between said radius arm and retractor member whereby said biasing means is restrained from moving said bolt, said discontinuity and cam surface further being shaped to provide for the manual actuation of said radius arm whereby said abutment is moved out of engagement with said discontinuity as said radius arm is rotated in a direction corresponding to the projected position of said bolt.

3. A lock, comprising: a housing having a front aperture; a bolt slideably mounted in said aperture; biasing means urging said bolt outwardly; bolt-retracting means including a radius arm mounted in said housing for rotation on an axis which is transverse with respect to the sliding movement of said bolt; a retractor member having the forward end thereof in engagement with a portion of said bolt, and the rearward end formed in a cam surface for cooperation with said radius arm, said cam surface having a discontinuity adapted to receive a portion of said radius arm with said bolt in retracted position, and with said radius arm disposed substantially midway between a position parallel to said axis and perpendicular thereto, said discontinuity being shaped to cause a jamming action between said radius arm and retractor member whereby said biasing means is retrained from moving said bolt, said discontinuity and cam surface further being shaped to provide for the manual actuation of said radius arm whereby said radius arm is moved out of engagement with said discontinuity as said radius arm is rotated in a direction corresponding to the projected position of said bolt.

4. A lock, comprising: an axially split housing having opposite sections, and having a front aperture; a transverse plate having portions engaging said sections and normally fixed with respect thereto, and having a central hole and also a radially-open slot intersecting the edge of said plate; a bolt slideably mounted in said aperture, and having a stem engaging said hole; biasing means urging said bolt outwardly, and acting between said plate and a surface fixed with respect to said bolt; bolt-retracting means including a radius arm mounted in said housing for rotation on an axis which is transverse with respect to the sliding movement of said bolt; and a retractor member slideably received in said radially-open slot and having the forward end thereof in engagement with a portion of said bolt, the rearward end of said retractor member being formed for cooperation with said radius arm, said retractor member also having a surface disposed to engage the inner surface of said plate with said bolt in projected position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,174,958	Backhouse	Oct. 3, 1939
2,447,190	Lickteig	Aug. 17, 1948
2,533,023	Lickteig	Dec. 5, 1950