May 24, 1938. G. E. STEEN 2,118,481

DOOR LOCK

Filed March 11, 1937 2 Sheets-Sheet 1

Fig. 1.

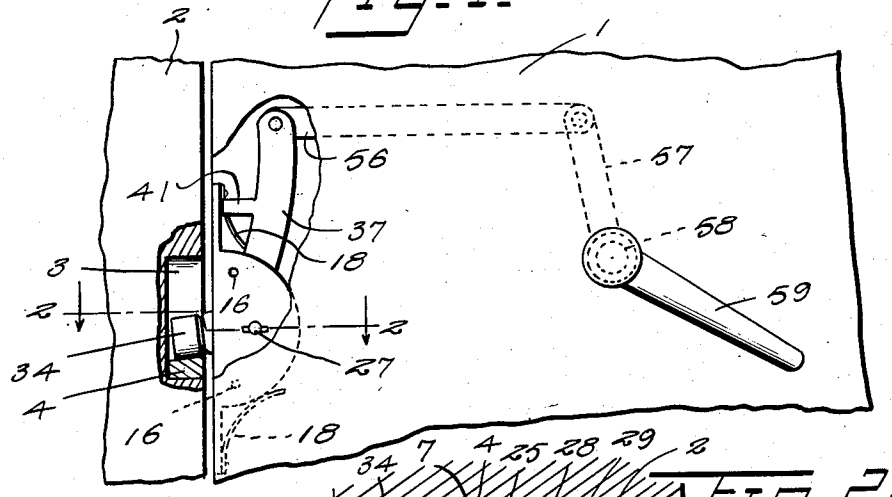


Fig. 2.

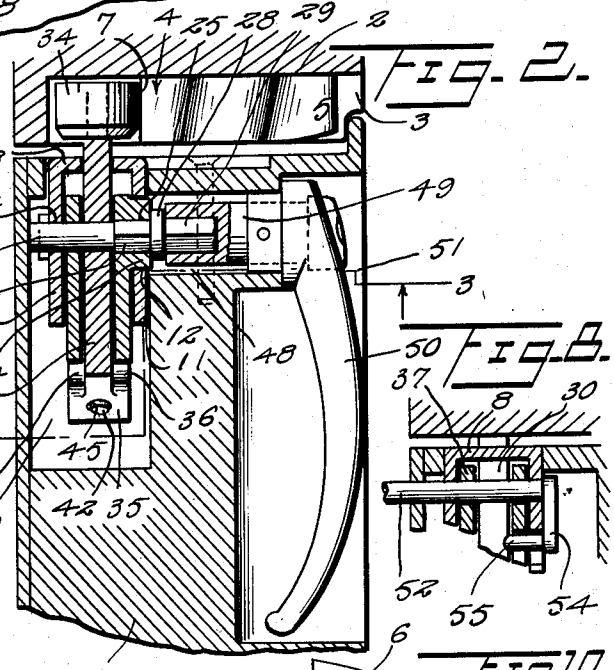


Fig. 3.

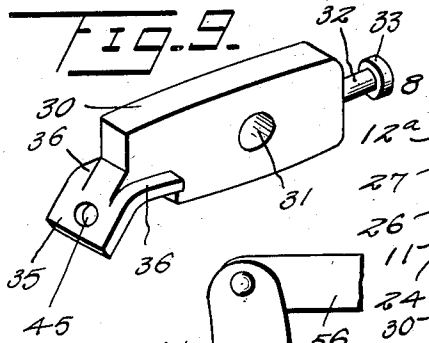


Fig. 8.

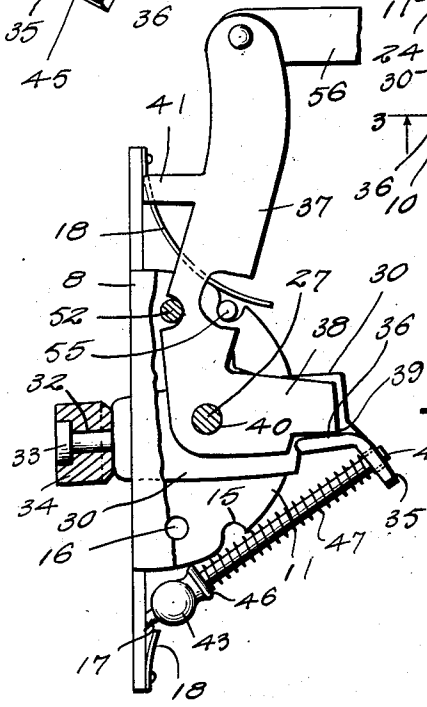


Fig. 10.

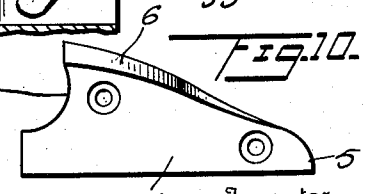


Fig. 5.

Inventor.

G. E. Steen

By Watson E. Coleman

Attorney

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Fig. 4.

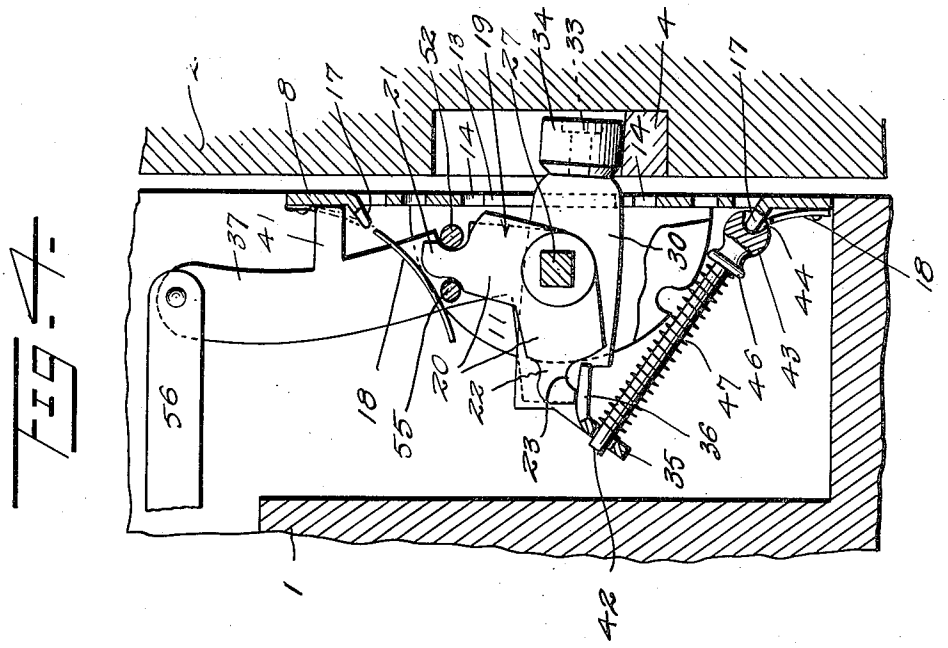


Fig. 3.

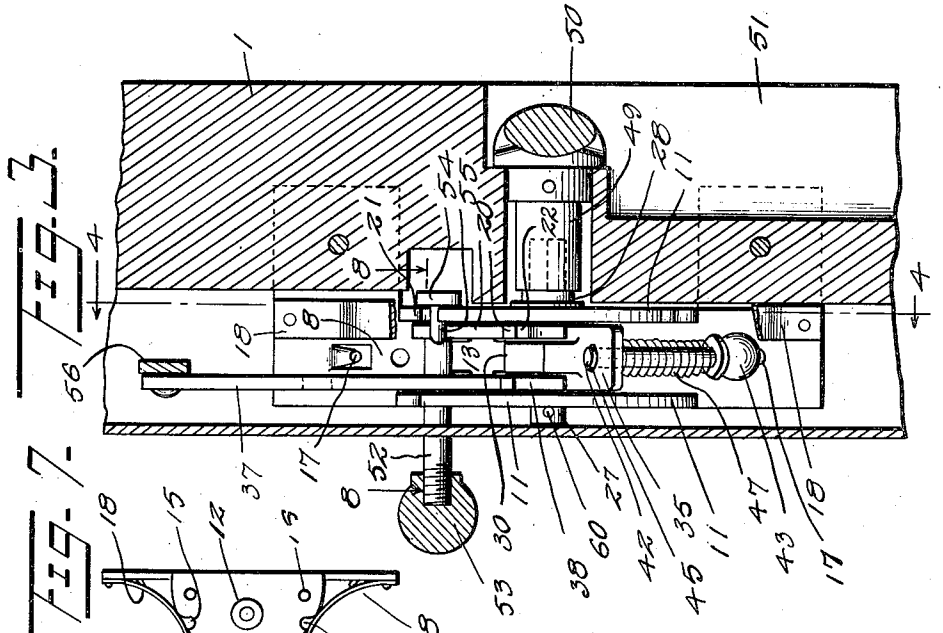


Fig. 5.

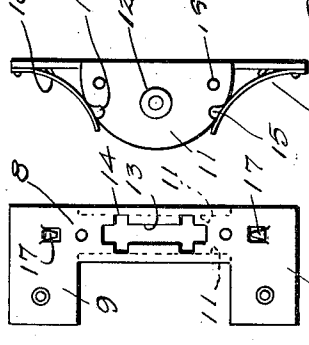


Fig. 7.

Inventor

G. E. Steen

By Watson E. Coleman

Attorney

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UNITED STATES PATENT OFFICE

2,118,481

DOOR LOCK

George E. Steen, Walsh, Colo.

Application March 11, 1937, Serial No. 130,380

10 Claims. (Cl. 292—220)

This invention relates to the class of locks and latches and pertains particularly to an improved lock for hinged closures such as automobile doors or the like.

The primary object of the present invention is to provide a new and novel type of door lock designed primarily for motor vehicle doors, which, by reason of its novel and compact construction, adapts it to motor vehicle doors in such a manner that it will not interfere in any respect with the usual window operating mechanism housed in the body of the door.

Another object of the invention is to provide a novel type of motor vehicle door lock employing an oscillating bolt which, because of the novel mechanism associated therewith for actuating it, may be made relatively short so that the entire lock mechanism when placed in the front edge of the door structure will extend only a relatively short distance into the same.

A still further object of the invention is to provide a lock of the character described in which the parts are so designed that they may be reversed in the frame or body portion of the lock so as to adapt any lock to any door of a motor vehicle.

A still further object of the invention is to provide in a lock of the character described novel means whereby the bolt may be secured against movement from the interior of the vehicle.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawings but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Figure 1 is a view in elevation of the interior of a door and the adjacent jamb showing the lock structure embodying the present invention mounted in the door.

Fig. 2 is a view taken substantially on the line 2—2 of Fig. 1, showing the relations of the several parts and the preferred manner of mounting the outside operating handle with respect to the door.

Fig. 3 is a vertical section taken substantially on the line 3—3 of Fig. 2.

Fig. 4 is a vertical section taken substantially on the line 4—4 of Fig. 3.

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 3.

Fig. 6 is a view of the lock face plate per se.

Fig. 7 is a view in side elevation of the face plate showing the lock mechanism supporting wings.

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 3.

Fig. 9 is a view in perspective of the oscillating bolt unit.

Fig. 10 is a view in elevation of the keeper plate.

Referring now more particularly to the drawings the numeral 1 generally designates a portion of a structure representing a motor vehicle door, while a portion of the adjacent door frame or jamb is indicated by the numeral 2. In the face of the jamb is formed a suitably horizontally disposed recess 3 which opens toward the outer side of the structure and also through the face of the jamb toward the adjacent swinging vertical edge of the door. Within this recess is secured a keeper plate 4 which is relatively long and tapers to a point at its outer end, as indicated at 5. From this point the top edge extends inwardly and upwardly in the form of a camming surface 6 which extends transversely of the plate 4 at the outer end and which gradually assumes an angle extending obliquely with respect to the sides of the plate, the angle being such as to gradually bring the face of the camming surface 6 toward the adjacent edge face of the door. Thus a roller unit mounted upon a normally horizontal axis and started over the cam surface 6 at the point 5 would gradually rise as it rode up on the surface and would maintain a flat contact with the surface until it reached the rear end thereof whereupon it would position within the keeper notch 7 at the rear end of the plate.

Secured in the front edge of the door body 1 is a vertically disposed lock face plate 8 which at each end has the lateral extensions 9 which form anchoring wings which are secured by suitable securing elements to the body of the door. The central part of the plate 8 overlies the chamber 10 formed in the body of the door to receive the lock parts and extending from the back of the plate are the integral spaced parallel wings 11 which are of semi-circular contour and each of which has a bolt passage 12 therethrough. This face plate 8 is provided with the longitudinally extending bolt slot 13 which is verticaly disposed when the lock is mounted in position and adjacent each end of this slot are the transversely

alined lateral slots 16, the purpose for which will be hereinafter pointed out.

Each of the wings 11 has formed in the edge thereof adjacent the plate 8, a latch pin receiving notch 15 and adjacent each of these notches 15 is an aperture 16 for the reception of the latch pin actuating shaft hereinafter referred to.

At each end of the face plate 8 there is formed upon its inner side the inwardly extending lug 17 and secured to each end of this plate upon its inner side is a leaf spring 18 which adjacent its free end bears against the edge of a wing 11. As will be hereinafter pointed out, one only of these springs is in operation after the lock has been installed in a door. However, the face plate is provided with two of the springs so that the lock may be inverted and the parts reversed if necessary to adapt the lock to a right or left hand operated door.

As will be seen upon reference to Fig. 2, the aperture 12 in that wing 11 which is nearest the outer side of the door, is of greater diameter than the aperture through the inner wing. In order to definitely distinguish these two apertures the one of the inner wing will be indicated by the numeral 12^a.

Disposed against the inner side of the outer wing 11 is a rocker unit 19 which is in the form of a bell crank, having the two arms 20 each of which terminates in the finger 21 which is joined to the arm by a narrow throat portion 22 so that a recess 23 is formed in the outer edge of the arm and at one side of the throat. This rocker 19 is provided with a circular boss 24 which fits into the aperture 12 and formed through the boss is a squared opening 25 for the reception of the short squared portion 26 of the bolt shaft 27 and the inner end of this portion terminates at the inner side of the rocker 19 and from this point to the inner end the shaft is circular. The outer end of the shaft is of squared or polygonal cross-section into the collar 28 as indicated at 29, so that this collar divides the two squared portions 26 and 29 and bears against the outer side of the circular boss 24.

The oscillating bolt illustrated in detail in Fig. 9, is indicated generally by the numeral 30. As shown, this bolt is in the form of an elongated flat body having the aperture 31 transversely therethrough, and substantially midway of its ends to receive the portion of the bolt 27 lying immediately adjacent the inner end of the squared part 26. This bolt 30 extends between and in parallel relation with the wings 11 and has one end projecting through the face plate slot 13. This projecting or outer end of the bolt carries a stem 32 which extends longitudinally of the bolt and terminates in the head 33, and encircling the stem and retained thereon by the head is a roller 34. This roller rides over the cam surface 6 of the keeper plate 4, and it is adapted to be disposed in the keeper notch 7 when the door carrying the lock is in closed position.

Extending from the inner end of the bolt 30 is the obliquely directed tongue 35 which is of greater width than the bolt and extends for a short distance longitudinally of the same so as to form on each side of the bolt the lateral cam flanges 36. The lateral recesses 14 in the ends of the long recess 13 are provided to facilitate the disposition of the bolt 30 in operative position when the parts of the lock are assembled, these recesses permitting the tongue 35 and the cam flanges 36 to enter between the wings 11. As shown in Fig. 3, the over-all width of the tongue 35 is only slightly less than the distance between the inner faces of the wings 11, so that the side edges of the tongue operate to guide the up and down or oscillatory movement of the inner end of the bolt 30 when the lock is operated. It will also be seen upon reference to Fig. 4 that the assembled relation of the bolt 30 and rocker 19 is such that one rocker finger 21 will rest upon the top of a cam flange 36 thus positioning the other rocker finger vertically and with the neck portion thereof between a notch 15 and the adjacent opening 16.

The numeral 37 designates a rock lever which is of substantial length and which has adjacent one end a laterally extending foot 38 which is formed adjacent its free end to provide a cam point 39. In the angle between the foot 38 and the lever 37 there is formed the aperture 40 and when this angle portion is disposed between the bolt 30 and the inner wing 11 the aperture has the rounded inner end of the shaft 27 extended therethrough so that the lever may be locked upon this shaft. The cam point extends over and rests upon the top of the adjacent and other one of the two cam flanges 36 as is clearly illustrated in Fig. 5. A stop 41 forming an integral part of the lever 37 abuts the inner face of the face plate so as to limit the movement of the lever in one direction.

The numeral 42 designates a rod which at one end has a ball 43 which is provided with a socket 44. This socket is designed to receive the lower one of the lugs 17 as shown in Fig. 4 and the other end of the rod is disposed in an aperture 45 which is formed through the bolt tongue 35. Interposed between this tongue and a collar 46 formed around the rod adjacent the ball 43, is a coiled expansion spring 47 which normally exerts an upward pressure against the underside of the tongue so as to lock the bolt in a direction to bring the roller carrying outer end thereof into the lower end of the slot 13. This also forces the cam flanges 36 against the rocker finger 21 and the cam point 39 and thus maintains the other rocker finger in the vertical position in which it is shown in Fig. 4 and the rock lever 37 in the same position.

The outer end of the shaft 27 extends through a suitable opening in the body of the door, such as is indicated by the numeral 48, to receive the inner end of the shaft 49 which is represented by a handle 50. This handle is preferably disposed in a recess 51 in the outer side of the door so that it will be out of the way and will not catch the clothing or cause injury in the event that a person is side-swiped by the car. Any suitable type of locking mechanism may be employed in association with the handle for securing the shaft 49 against rotation. Such handle locks are of common usage and therefore no detailed illustration of the same has been made. The handle 50 may be of any desired form, but it is preferred that in the present case it be of egg-shape or teardrop design.

Extending transversely of the wings 11 is a latch pin operating shaft 32 which passes through the upper ones of the apertures 16 and at one end extends beyond the inner side of the door body 1 where it may be supplied with a head 53 or any other means which will facilitate the reciprocation of this shaft. Upon its opposite end the shaft carries a right angularly extending arm 54 which in turn carries a latch pin 55 which extends from the inner side thereof in spaced

parallel relation with the shaft 52. The pin 55 is spaced from the shaft a distance sufficient to permit of its entrance into the adjacent notch 15 and when the pin is in the notch and the shaft 52 has been drawn inwardly so as to bring the arm 54 against the outer side of the adjacent wing, the pin will be positioned behind the back edge of the neck portion of the upstanding rocker arm 20, as illustrated in Fig. 4, and the shaft 52 will extend across the front edge of the neck so that the oscillation of the rocker 19 will be effectively prevented. By this means of stopping the oscillation of the rocker the lock can be secured from the inside of the door against oscillation by some one upon the outside. However, it will be apparent that the latch pin 55 only prevents the operation of the rocker 19 by the handle 50, but does not prevent the oscillation of the rock lever 37 and thus when this lever is oscillated its cam point 39 may bear down against the adjacent cam flange 36 and lift the outer end of the oscillating bolt.

The cam lever 37 is operable from the inside of the door through the medium of a link 56 which is secured at one end to the lever 37 and which has its other end secured to any suitable means operable from the inside of the door for reciprocating the link and oscillating the lever. Such means is here illustrated as being in the form of a crank arm 57 carried by a short inside handle operated shaft 58 to one end of which the inside handle 59 is attached. It will thus be obvious, upon reference to Fig. 1, that by oscillating the handle 59 toward the front edge of the door, the lever 37 will be swung back and the oscillation of the bolt to raise the outer end thereof from the keeper notch 37 will be effected.

The leaf spring 18 which lies above the upwardly directed rocker finger 21 co-operates with the spring 47 to maintain the outer or forward end of the oscillating bolt in its down position. The spring 18 exerts its effect upon the upper finger 21 as stated, whereas the spring 47 constantly exerts its force against the underside of the bolt carried tongue 35. When the rocker 19 is oscillated or rocked by the shaft 27 the upstanding rocker finger 21 will be forced rearwardly in a downwardly curving path against the underside of the leaf spring 18 and the forcing down of the inner end of the oscillating bolt will effect compression of the spring 47 as will be readily apparent.

The operation of the lever 37 is opposed only by the spring 47 and when this inside rock lever is actuated the spring 47 alone operates to restore the parts to inoperative or normal position. By providing the rock lever 19 with duplicate arms 20 and the face plate 8 with the wings 11 having duplicate notches 15 and apertures 16 at the top and bottom edges thereof, the parts for the lock may be inverted so as to adapt the lock to use upon either side of a motor vehicle. The spring 18 is therefore provided in duplicate as described and there are also provided the two lugs 17, altho when the lock is in use one of these springs 18 and one lug 17 will be idle.

When it is desired to reverse the parts, the retaining pin 60 which passes through the inner end of the shaft 27 and holds the same in position, is withdrawn so that the shaft 27 may be drawn out of the openings in the wings 11 and thus release the oscillating bolt, the rocker 19 and the rock lever 37. The rock lever may then be oscillated to the position where the finger 21 which previously engaged a cam flange 36, will be disposed adjacent the inner side of the face plate 8. The bolt 30 is withdrawn, passing the flanges 36 through the lower ones of the openings 14 and it is then inverted and returned by extending the flanges 36 through the upper openings 14 so as to bring one of the flanges 36 against the back face of that finger 21 which previously had been extended upwardly. The entire plate if then reversed will have the parts in the same position as shown in Fig. 4, and the rock lever 37 may be replaced so as to re-position it as shown in Fig. 5, and the entire assembly secured together by restoring the shaft 37 to its former position and securing it by the pin 60.

From the foregoing it will be readily apparent that a lock constructed in accordance with the present invention can be made to occupy a minimum of space in the body of the door without sacrificing any of its efficiency as a lock. With such a construction the disposition of the usual glass panel supporting and moving mechanism in the body of the door may be made without difficulty.

Having described my invention, what is claimed, is:

1. A lock of the character described, comprising a housing consisting of two spaced parallel walls and a connecting wall, said connecting wall constituting a face plate having a longitudinally extending bolt opening, said spaced walls having transversely alined shaft openings, one of said shaft openings being of greater diameter than the other, an elongated bolt body having a transverse shaft opening and disposed between and in parallel relation with the spaced walls with one end extended through the face plate opening, a shaft extending through said shaft openings and passing through the opening of said bolt, a rocker unit disposed between one side of the bolt and the spaced wall having the bolt opening of larger diameter, said rocker unit having a circular boss rotatably mounted in the adjacent wall opening and having a transverse passage of polygonal cross section, said shaft having a portion of polygonal cross section engaged in the said rocker unit opening, a handle coupled with the shaft for effecting its oscillation, a rocking lever freely oscillatably mounted on the shaft, means for effecting the oscillation of said lever, means forming a camming coupling between the rocker unit and the bolt and between the lever and the bolt whereby oscillation of the unit or lever in one direction will effect the oscillation of the bolt on the shaft, and resilient means normally urging the oscillation of the bolt in opposition to the unit and lever.

2. A lock of the character described, comprising a housing consisting of two spaced parallel walls and a connecting wall, said connecting wall constituting a face plate having a longitudinally extending bolt opening, said spaced walls having transversely alined shaft openings, one of said shaft openings being of greater diameter than the other, an elongated bolt body having a transverse shaft opening and disposed between and in parallel relation with the spaced walls with one end extended through the face plate opening, a shaft extending through said shaft openings and passing through the opening of said bolt, a rocker unit disposed between one side of the bolt and the spaced wall having the bolt opening of larger diameter, said rocker unit having a circular boss rotatably mounted in the adjacent wall opening and having a transverse passage of polygonal cross section, said shaft having a portion of

polygonal cross section engaged in the said rocker unit opening, a handle coupled with the shaft for effecting its oscillation, a rocking lever freely oscillatably mounted on the shaft, means for effecting the oscillation of said lever, means forming a camming coupling between the rocker unit and the bolt and between the lever and the bolt whereby oscillation of the unit or lever in one direction will effect oscillation of the bolt of the shaft, and resilient means normally urging the oscillation of the bolt in opposition to the unit and lever, said rocker unit constituting two divergently related duplicate parts whereby the unit may be inverted to bring either of said parts into contact with said camming means, said face plate being formed to facilitate the inversion of the bolt whereby the lock may be adapted to right or left hand use.

3. A lock of the character described comprising a mechanism carrying casing consisting of two spaced parallel walls and a cross-connecting wall, the connecting wall having an elongated bolt opening and the parallel walls having transversely alined shaft openings one of which is of greater diameter than the other, a bolt comprising an elongated flat body disposed between the parallel walls and having one end extended through the face plate opening, the bolt having a transverse shaft opening, a rocker unit comprising two divergently related arms and disposed between the bolt and the wall having the larger diameter, a circular boss carried by the rocker and rotatably engaged in the adjacent wall opening, said rocker having a passage of polygonal cross section, a rock lever having one end interposed between the bolt and the other of said parallel walls and having a shaft opening, a shaft extending through said alined openings and the elements between the parallel walls, that portion of the shaft passing through the rocker unit corresponding in cross-section to the polygonal opening therethrough, a handle secured to one end of the shaft to facilitate the rocking of the same, a pair of cam flanges integral with the bolt, one of which flanges has an end of a rocker arm in contact therewith, a cam point carried by the rock lever and in contact with the other of said flanges, and resilient means coupled with the bolt and normally urging the oscillation of the same on said shaft in opposition to said rocker arm and lever cam point.

4. A lock structure comprising a mechanism housing consisting of two spaced parallel walls and a coupling transverse wall having an elongated bolt opening formed therethrough, the parallel walls having transversely alined shaft openings, one of which is of greater diameter than the other, a bolt comprising an elongated flat body disposed between the parallel walls and having an end extended through said bolt opening, said bolt having a transverse opening for supporting a shaft, a rocker unit comprising two divergently related arms and having an aperture of polygonal cross-section in the angle between the arms, the rocker being disposed between one of said two walls and the bolt and having a circular boss oscillatably mounted in the shaft opening of larger diameter, a shaft passing through said alined openings and through said rocker and bolt openings, the shaft and rocker being coupled against independent motion, a cam flange forming a part of said bolt and having the free end of one of said rocker arms slidably disposed thereagainst, the other of said arms normally extending upwardly, resilient means normally urging the oscillation of the bolt on the shaft in a direction opposed to the flange engaged arm, a handle coupled with the shaft to facilitate the oscillation of the rocker unit, and resilient means engaging the free end of the other rocker arm and co-acting with said first resilient means to oppose the oscillation of the unit.

5. A lock structure comprising a mechanism housing consisting of two spaced parallel walls and a coupling transverse wall having an elongated bolt opening formed therethrough, the parallel walls having transversely alined shaft openings, one of which is of greater diameter than the other, a bolt comprising an elongated flat body disposed between the parallel walls and having an end extended through said bolt opening, said bolt having a transverse opening for supporting a shaft, a rocker unit comprising two divergently related arms and having an aperture of polgonal cross-section in the angle between the arms, the rocker being disposed between one of said two walls and the bolt and having a circular boss oscillatably mounted in the shaft opening of larger diameter, a shaft passing through said alined openings and through said rocker and bolt openings, the shaft and rocker being coupled against independent motion, a cam flange forming a part of said bolt and having the free end of one of said rocker arms slidably disposed thereagainst, the other of said arms normally extending upwardly, resilient means normally urging the oscillation of the bolt on the shaft in a direction opposed to the flange engaged arm, a handle coupled with the shaft to facilitate the oscillation of the rocker unit, resilient means engaging the free end of the other rocker arm and co-acting with said first resilient means to oppose the oscillation of the unit, and latching means comprising a reciprocably mounted pin supported by the one of the said two walls adjacent to the rocker unit and extending across and opposing the movement of the upwardly extending one of said unit arms when in latching position.

6. A lock structure comprising a mechanism housing consisting of two spaced parallel walls and a coupling transverse wall having an elongated bolt opening formed therethrough, the parallel walls having transversely alined shaft openings, one of which is of greater diameter than the other, a bolt comprising an elongated flat body disposed between the parallel walls and having an end extended through said bolt opening, said bolt having a transverse opening for supporting a shaft, a rocker unit comprising two divergently related arms and having an aperture of polygonal cross-section in the angle between the arms, the rocker being disposed between one of said two walls and the bolt and having a circular boss oscillatably mounted in the shaft opening of larger diameter, a shaft passing through said alined openings and through said rocker and bolt openings, the shaft and rocker being coupled against independent motion, a cam flange forming a part of said bolt and having the free end of one of said rocker arms slidably disposed thereagainst, the other of said arms normally extending upwardly, resilient means normally urging the oscillation of the bolt on the shaft in a direction opposed to the flange engaged arm, a handle coupled with the shaft to facilitate the oscillation of the rocker unit, resilient means engaging the free end of the other rocker arm and co-acting with said first resilient means to oppose the oscillation of the unit, and latching means comprising a reciprocably

mounted pin supported by the one of the said two walls adjacent to the rocker unit and extending across and opposing the movement of the upwardly extending one of said unit arms when in latching position, the last mentioned one of said walls being provided with duplicate means for reciprocably supporting said latch pin and said cross-connecting walls being formed to facilitate the inversion of said oscillating bolt, said duplicate means and said last mentioned wall means facilitating the reversal of the lock parts to adapt the lock to right or left hand use.

7. A lock, comprising a casing having two side walls and an apertured connecting wall therebetween, a shaft passing through and coupling the side walls and freely oscillatable therein, a bolt lying between the side walls and mounted for free oscillation on the shaft, an end of the bolt passing through the said apertured wall for engagement with a keeper, means for oscillating the shaft, an arm fixed to the shaft and oscillating coaxially with the same and with the bolt, the arm having a free end, a cam forming element carried by the bolt, and the said free end of the arm having direct contact with said cam element upon the opposite side of the shaft from the keeper-engaging end of the bolt whereby oscillation of the bolt on the shaft will be effected immediately upon the beginning of and by rotating the shaft.

8. A lock, comprising a casing having two side walls and an apertured connecting wall therebetween, a shaft passing through and coupling the side walls and freely oscillatable therein, a bolt lying between the side walls and mounted for free oscillation on the shaft, an end of the bolt passing through the said apertured wall for engagement with a keeper, means for oscillating the shaft, an arm fixed at one end to the shaft to move coaxially therewith and with the bolt and in a plane paralleling a side face of the bolt, and a cam flange projecting from the said face of the bolt and located beyond the shaft from the first end of the bolt, the said cam being constantly engaged by the other end of the arm, and resilient means engaging the cam carrying end of the bolt and opposing movement of said engaged end by the arm.

9. A lock, comprising a casing having two side walls and an apertured connecting wall therebetween, a shaft passing through and coupling the side walls and freely oscillatable therein, a bolt lying between the side walls and mounted for free oscillation on the shaft, an end of the bolt passing through the said apertured wall for engagement with a keeper, means for oscillating the shaft, an arm fixed at one end to the shaft to move coaxially therewith and with the bolt and in a plane paralleling a side face of the bolt, a cam flange projecting from the said face of the bolt and located beyond the shaft from the first end of the bolt, the said cam flange being engaged directly by the other end of the arm, a second arm integral with the first arm and forming an angle therewith, shiftable securing means carried by a side wall and engageable with the second arm to retain the arms against oscillation, and means exerting yieldable pressure against the cam carrying end of the bolt and opposing the movement of the same by the arm contacting therewith.

10. A lock, comprising a casing consisting of two side walls and a connecting face wall, the latter wall having a bolt opening therethrough, a shaft passing transversely through and connecting said side walls, a bolt lying between and in parallel relation with the side walls and traversed by the shaft on which it is freely oscillatable, said bolt having one end passing through the bolt opening for engagement with a keeper, a cam flange integral with the bolt at the other end and projecting from one side face thereof, an apertured tongue projecting from the said other end of the bolt and disposed obliquely thereto, an arm fixed to the shaft and extending in a parallel plane with the said side face of the bolt, the other end of said arm bearing against said cam flange, a pin rockably mounted at one end against the said face wall and having its other end extending through the aperture of said tongue, an expansible spring encircling the pin and having one end bearing against the said tongue to normally urge the oscillation of the bolt in a direction to oppose the flange engaging end of the arm, and means facilitating the oscillation of the shaft.

GEORGE E. STEEN.