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E. R. WEBER

1,484,692

LOCK

Filed March 9, 1921

2 Sheets-Sheet 1

Fig. 1

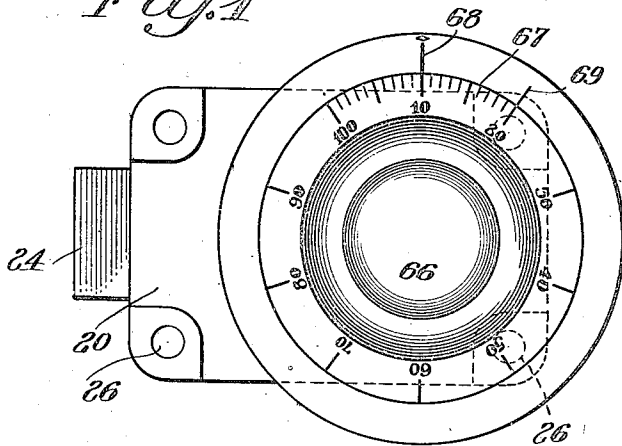


Fig. 2

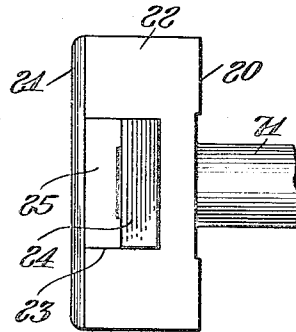


Fig. 12

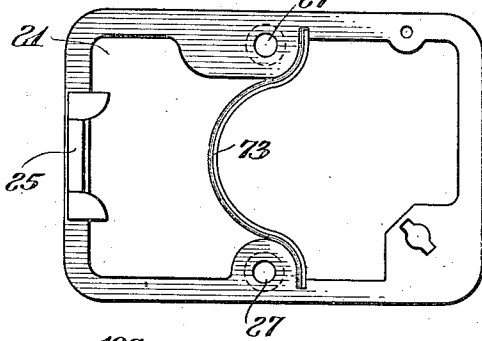


Fig. 7

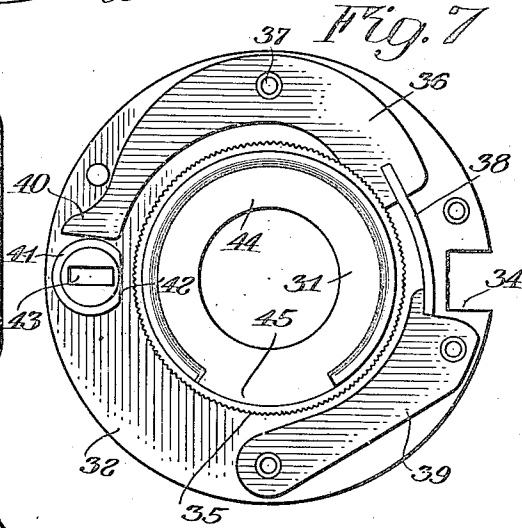


Fig. 11

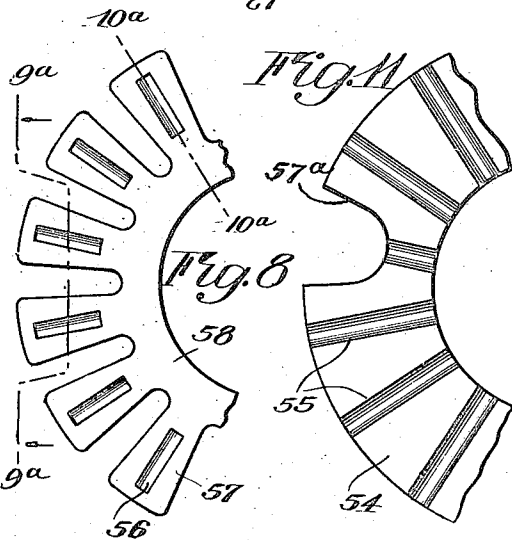


Fig. 9

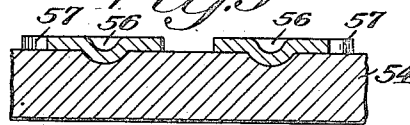
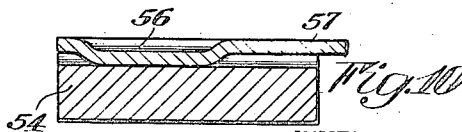


Fig. 10



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# UNITED STATES PATENT OFFICE.

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## LOCK.

Application filed March 9, 1921. Serial No. 450,917.

*To all whom it may concern:*

Be it known that I, EUGENE R. WEBER, a citizen of the United States, and a resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Locks; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference numerals marked thereon.

This invention has to do with locks and more particularly with the variety known as combination locks, the chief object of the invention being to provide a simple, inexpensive, and efficient lock of this type, having an improved and practical form of construction employing a minimum number of springs and independent of actuation by the force of gravity so as to be durable and reliable in operation in any position of arrangement on a door or other object. To these and other ends the invention consists in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Figure 1 is a front elevation of a lock embodying the present invention.

Figure 2 is an end elevation of the same.

Figures 3 and 4 are rear elevations of the same with the rear casing wall removed, showing the parts in different operating positions.

Figure 5 is a central sectional plan view.

Figure 6 is a detailed view substantially on the line 6<sup>a</sup>—6<sup>a</sup> of Figure 5.

Figure 7 is an enlarged detailed view substantially on the line 7<sup>a</sup>—7<sup>a</sup> of Figure 5.

Figure 8 is an enlarged fragmentary view of one of the plates forming a frictional driving connection in the lock.

Figures 9 and 10 are sectional views of the same on the lines 9<sup>a</sup>—9<sup>a</sup> and 10<sup>a</sup>—10<sup>a</sup> of Figure 8.

Figure 11 is an enlarged fragmentary view of a cooperating friction plate.

Figure 12 is an elevation of the inside of the rear wall of the casing substantially on the line 12<sup>a</sup>—12<sup>a</sup> of Figure 5.

Similar reference numerals throughout the several views indicate the same parts.

The present invention comprises a combination lock having an improved form of construction practically independent of actuation by springs or the force of gravity and adapted for use on either a right or left hand door, or in other words, in any position on a door, together with means preventing the violent release of the bolt, as has at times been attempted, by driving the operating spindle through the lock. Referring to the drawings for a more detailed description, there is shown a casing having front and rear walls 20 and 21, respectively, with a rearwardly extending peripheral flange 22 on the front wall, spacing the walls and enclosing the mechanism. Flange 22 has a recess 23 therein at one end of the casing in which is supported and guided a sliding bolt 24, and the rear wall 21 has a lug 25, Figures 2 and 5, projecting into opening 23 and also supporting and guiding the bolt. The front wall of the casing is formed with openings 26 for the reception of screws or other suitable means for securing it to a door and the rear wall 21 is provided with openings 27, in the half portion thereof adjacent the bolt, for the reception of screws threadedly engaging lugs on the front wall of the casing for securing the rear wall in place.

The combination mechanism proper for actuating the bolt comprises preferably a sleeve 29, Figure 5, carried by and projecting from either side of the front wall 20, and mounted exteriorly on the end of the sleeve projecting within the casing is a second sleeve 30 on which are rotatably supported a plurality of wheels 31 of which three are employed in the present instance. Each wheel carries on its periphery an outer part comprising a pair of spaced annular plates 32 adapted to be rotatably adjusted or set on the wheel by means presently to be described. The plates of each pair are fixed together as by means of rivets 33, and are provided with aligned peripheral recesses 34. The periphery of each wheel 31 is preferably formed between the plates 32 with a tooth surface 35 with which is adapted to engage the correspondingly toothed end of a lever 36 lying between each pair of plates and pivotally supported on the latter by means of a pin 37. Lever 36 is actuated by a leaf spring 38 to carry its toothed end out of engagement with the tooth periphery of

wheel 31, spring 38 being preferably carried by a counter balance member 39 fixed to the plates 32. Lever 36 at its opposite end 40 is urged by spring 38 into engagement with a cam 41 rotatably carried by plates 32. Cam 41 has a flattened portion 42 and may be rotated by the insertion of a key in a slot 43 in the cam, it being understood that the cams 41 of the different wheels may be brought into alinement with each other for simultaneous adjustment by rotary adjustment of the wheels and turned by the insertion of the key in slots 43 to bring the flat sides 42 of the cams opposite the end 40 of lever 36 thereby allowing the lever to be swung by spring 38 to clear the wheels 31. This permits the turning of the plates 32 carried by the wheels, for the purpose of rotatably adjusting or setting the outer parts of plates on the wheels to vary the combination, as well understood in the art, and after such setting of the combination cam 41 may be again turned to bring its arcuate portion against lever 36 thereby swinging the latter and locking the pairs of plates to the wheel. Cams 41 of course can only be reached by the insertion of a key through an opening in the rear wall 21 of the casing.

Wheels 31 are rotated to operate the lock by means comprising a circular recess 44 formed in the upper side of each wheel about the sleeve 30 on which it rotates, the peripheral wall of this recess being preferably cut away or notched over a portion of its extent as at 45. Rotating on sleeve 30 within each recess 44 is a ring or fly 46 having a lug 47 playing in the notch 45 of the wheel, and depending from the bottom of each wheel, except the first or forward one, is a pin 48 rotating within the recess 40 of the adjacent wheel and movable into engagement with the lug 47 of fly 46 for the purpose of rotating the fly, and by engagement of lug 47 with the sides of notch 45, rotatably adjusting the adjacent wheel. Rotating within sleeve 30 at the rear end of the latter is another sleeve 49 having a laterally projecting cam flange or wheel 50, the sleeve being in threaded engagement with the rear end of a spindle 51 extending through the front wall of the casing and secured to the sleeve 49 as by means of a key 51<sup>a</sup>, Figure 4. Cam flange 50 is provided with a recess 52 for a purpose described hereafter. It is apparent from this construction that by rotating spindle 51 alternately to right and left the wheels 31 may be successively adjusted to bring the notches 34 in the outer parts or plates 32 thereof into registry with each other and opposite the fence of the lock to release the latter, as well understood in the art, and means are provided between the

spindle and bolt including a yielding frictional connection to retract the bolt by continued movement of the spindle when the wheels have been adjusted as described relative to the fence of the lock.

The means for retracting the bolt comprises preferably an annular projection or flange 53, Figure 5, extending rearwardly from flange 50 on which is rotatably carried a part or plate 54 formed on its rear surface with a series of depressions 55 with which are adapted to engage corresponding projections 56 on a plurality of resilient fingers 57 extending radially from an adjacent part or plate 58 fixed on flange 53, so that as spindle 51 is turned plate 58 is rotated and its projections bearing against plate 54 frictionally engage the depressions 55 of the latter and apply a yielding force to the plate tending to rotate the same. Plate 54 is preferably provided with a recess or aperture 57<sup>a</sup>, Figures 3 and 4, into which the fingers 57 may be manually bent one at a time to so set them as to increase frictional pressure on plate 54, when desired. Plate 54 is generally circular in shape with an extension on one side in which is formed a slot 59 slidably embracing a post 60 on one arm of a bolt actuating lever 61 pivotally carried at 62 on the casing. This end of lever 61 rides over the periphery of the cam or flange 50 which locks it against movement except when recess 52 of the flange is brought opposite the lever. The other arm of lever 61 is provided with a slot 63 loosely engaging a post 64 carried by the inner end of the bolt, so that the lever has play or lost motion relative to the bolt. Lever 61 also carries the fence 65 and it is apparent that with the combination wheels adjusted with their recesses 34 in registry with the fence, flange 50 may be rotated by means of the spindle, in accordance with a suitable combination, until its recess 52 registers with the end of lever 61, after which rotation of the spindle in a counter-clockwise direction, Figure 3, through the frictional connection described, swings lever 61 into recess 52 of flange 50. This movement of the lever is permitted independently of the bolt by the lost motion between slot 63 and post 64. Recess 52, as shown, has an inclined side, permitting entry of the adjacent end of the lever and the other or radially extending side of the recess then engages the lever, carries the fence into the recesses in the wheels, and thus positively retracts the bolt. This frictional connection which establishes positive connection between the spindle and bolt is, of course, independent of the action of gravity on the parts in any position of attachment of the lock to a door or other object, so that the lock is equally well adapted for use with either of its sides uppermost, or in any other position. The

construction of this connection is particularly advantageous because of the large area of contact between the frictional parts which it provides, thus reducing the wearing action on the parts, while such parts, notwithstanding their comparatively large area, are located within the lines of the usual recessed or combination wheels so that the size of the mechanism as a whole is not appreciably increased. Furthermore, the form of the plate 58 with its spring fingers 57 permits of the setting or bending of the latter at any time so as to bear with greater pressure on plate 54 to increase the friction. This is accomplished by bringing such fingers one at a time over the aperture 57<sup>a</sup> in plate 54 and bending them downwardly into such aperture.

To provide for operation of the lock mechanism spindle 51 is extended through sleeve 29 of the front wall of the casing and has fixed on its forward end a knob 66 carrying the usual dial plate 67 marked with suitable numbers or other indicia adapted to be brought by rotation of the spindle selectively into registry with the general index mark 68 or with a special mark 69 on the periphery of a flange 70 fixed on a sleeve 71 which is in turn fixed on the forwardly projecting end of sleeve 29 of the casing.

It has frequently happened that persons attempting unauthorized operation of such locks have resorted to the expedient of removing the operating knob and driving the spindle through the mechanism to displace the rear wall of the casing and thereby remove the means supporting the bolt so that the latter is no longer effective. To the end of preventing the forcing of the lock in this manner the rear wall of the casing of the present device is preferably formed with a weakened section afforded by a groove 73, Figure 5 and 12, cut partially through the wall from side to side of the latter and located between the portion of the wall opposite the end of the spindle and the means for fastening the rear wall to the rest of the casing, so that in case the spindle is forced violently through the lock the corresponding end of the rear wall alone is broken off, the groove 73 localizing the fracture between the spindle and the securing means passing through openings 27 in the rear wall. The opposite end of the wall is thus left intact to support the bolt and prevent forcing of the door or other object secured by the lock.

It is to be noted that in the frictional actuating connection between the spindle and bolt, the plate 50 and other parts of the connection all lie radially inward of the cams 41 for setting the combination so as to clear the latter for the insertion of the key and the change in the combination at any time, and this connection is otherwise compact in ar-

angement requiring no material alteration or enlargement of the parts ordinarily employed in a lock of this type.

The operation of the device has already been indicated and requires no further description than to state that when knob 66 is operated to set up the combination with reference to the special index mark 69, cams 41 are brought into registry with each other and with the opening in the inner wall of the casing and by the insertion of a key the outer or notched part of the combination wheels may be released from the latter. The knob may then be rotated to adjust the wheels to any new combination after which the outer or notched parts of the wheel may again be locked thereto by turning the setting key. Employing the combination thus set up, the lock is operated in the usual manner to bring the various indicia forming the combination successively into registry with the index 68 so that the recesses of the combination wheels and of the flange 50 are brought into registry with the fence and lever 61, respectively, after which continued movement of the knob, through the frictional connection described, establishes a positive connection between the knob and bolt, and slides the bolt to release the door. Rotation of the knob in the opposite direction serves of course to extend the bolt to lock the door, and the weakened section of the rear wall of the casing is so located with reference to the arrangement of the other parts that should the spindle be driven violently through the lock, that portion of the rear wall only lying opposite the spindle is displaced, leaving the portion supporting the bolt intact so that the bolt is not released.

I claim as my invention:

1. A combination lock comprising selectively adjustable recessed wheels; a bolt, a fence movable with the latter, a spindle for adjusting said wheels and provided with bolt actuating means, a part rotatable on said spindle and connected with said bolt actuating means, and a frictional connection between said spindle and part to actuate the latter when the recesses in said wheels are adjusted to register with said fence.

2. A combination lock comprising selectively adjustable recessed wheels, a bolt, a fence movable with the latter, a spindle for adjusting said wheels and provided with bolt actuating means, a plate rotatable on said spindle and connected with said bolt actuating means, and a second plate fixed on said spindle and frictionally engaging said first plate to rotate the latter with said spindle when the recesses of said wheels are adjusted to register with said fence.

3. A combination lock comprising selectively adjustable recessed wheels, a bolt, a

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 fence movable with the latter, a spindle for adjusting said wheels, normally disestablished means for positively connecting said spindle and bolt, a part movably carried by  
 5 said spindle and connected with said means for establishing the latter, and a frictional connection between said spindle and part to  
 10 actuate the latter when the recesses in said wheels are adjusted to register with said fence.

4. A combination lock comprising selectively adjustable recessed wheels, a bolt, a lever for moving the latter, a fence movable with said lever and bolt, a spindle provided  
 15 with means for adjusting said wheels and for engaging said lever in one position of the latter, a part movably carried by said spindle and connected with said lever to  
 20 move the same to position for engagement by said spindle means, and means fixed on said spindle frictionally engaging said part to move the same and said lever when the  
 25 recesses in said wheels are adjusted to register with said fence.

5. A combination lock comprising selectively adjustable recessed wheels, a bolt, a lever for moving the latter, a fence movable with said lever and bolt, a spindle provided  
 30 with means for adjusting said wheels, a plate rotatable on said spindle and connected with said lever to move the same, a resilient flange fixed on said spindle, and cooperating projections and recesses in said  
 35 flange and plate for frictionally rotating the latter to move said lever when the recesses in said wheels are adjusted to register with said fence.

6. A combination lock comprising selectively adjustable wheels, a bolt, a lever loosely connected with said bolt, a fence  
 40 movable with said bolt, a spindle for adjusting said wheels and moving the lever, a part movably carried by the spindle and connected with said lever to move the latter  
 45 independently of the bolt to and from position for cooperation with the spindle, and a second part fixed to the spindle and frictionally cooperating with said first part to move the same and said lever when said  
 50 wheels are adjusted relatively to said fence by said spindle.

7. A combination lock comprising selectively adjustable wheels, a spindle for adjusting the latter having a cam flange there-

on, a bolt, a fence movable with the bolt, a  
 55 lever loosely connected with said bolt, a recessed plate rotatable on the spindle and connected with the lever to move the same independently of the bolt to and from co-  
 60 operation with said cam flange, and a second plate fixed on the spindle in frictional engagement with said first plate to move the same and said lever when said wheels and cam flange are adjusted relatively to said  
 65 fence and lever respectively.

8. A combination lock comprising selectively rotatable wheels each having an outer part adjustably set thereon and provided  
 70 with a recess, setting means on said outer parts for varying the combination of the lock, a bolt, a fence movable with the latter, a spindle for rotating said wheels and provided with means for actuating said bolt,  
 75 a plate rotatably carried by said spindle and lying radially inwardly of said setting means to expose the latter, a connection between said plate and bolt actuating means, and frictional means connecting said spindle  
 80 and plate to rotate the latter when the recesses in said outer wheel parts are rotated into registry with said fence.

9. A combination lock comprising a casing having a rear wall, a bolt in said casing supported by a portion of said wall,  
 85 combination mechanism in said casing for actuating said bolt, and a spindle for operating said mechanism extending into said casing opposite a portion thereof spaced  
 90 from said portion supporting the bolt, said rear wall having a weakened section between the portions thereof adjacent said bolt and spindle.

10. A combination lock comprising a casing having spaced front and rear walls, a bolt supported in said casing between said  
 95 walls, means for securing said walls together adjacent said bolt, combination mechanism in said casing for actuating said bolt, and a spindle extending through the front wall of said casing opposite a portion of  
 100 said rear wall spaced from said bolt and securing means, said rear wall having a weakened section between said securing means and said spindle to localize fracture thereat under excessive pressure from said  
 105 spindle.

EUGENE R. WEBER.