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This invention relates to a new and improved lock which is simple in nature yet provides maximum protection in use. The lock art is a highly advanced field and many methods of locking and variations of locks have been previously devised. However, the highly simplified apparatus of subject invention presents a lock which not only eliminates all complexities in function as well as structure with reference to its locking capabilities but this improved lock apparatus is believed to present the first really effective and positive anti-jimmy lock.

The subject invention presents an improved lock of the type that may be called a "dead bolt" lock which is distinguished by the fact that the bolt used is fixed and rigid in contrast to the usual spring biased bolts employed almost universally in closure locks now on the market. It is well known that many attempts have been made previously to provide a safe, inexpensive lock that will defy efforts to force or pry it open, but none has met the requirements for such a lock and the need therefor with such complete effectiveness and satisfactory tested results as the lock of subject invention. This novel and simple lock, moreover, is readily adaptable for either electrical or mechanical control thereof as will be clear from the illustrative practical embodiment of the invention as presented herein.

The subject invention employs within a single housing unit the operable lock mechanism which, in use, is mounted on one of two elements to be locked together. The other portion of the lock which consists of a rigid fixed bar is fixed to the other of said two elements for cooperation with said operable lock mechanism. The lock mechanism in the housing consists of a transversely and rotatably mounted cylinder notched in one side thereof for cooperation with the fixed rigid bar and having a recess in the opposed side thereof for engagement with an aligned plunger element in a locking position. The plunger element is actuable by the turn of a key fitting into a tumbling type lock element such as a Yale tumbler unit to effect an unlocking action in an improved manner. The locking action of the mechanism is effected in automatic fashion by the simplified apparatus arrangement.

An object of the invention is to provide a new and improved, highly simplified "dead bolt" lock. A further object of the invention is to provide a new and novel compact anti-jimmy lock.

Another object of the invention is to provide a novel lock system employing a fixed bolt in conjunction with a notched rotatable cylinder having locking means enclosed and associated therewith in an improved manner whereby the engagement of the bolt in the notched portion of the cylinder by arcuate movement of the bolt relative thereto to engage the notched portion thereof will rotate the cylinder to effect an automatic locking action which is positive in nature, resulting in a lock that is difficult; if at all possible, to jimmy open.

Other objects and advantages of the invention will be come readily apparent from the following description taken in conjunction with the accompanying drawings wherein:

Fig. 1 shows a front view presenting an illustrative embodiment of the novel simplified lock as applied to a door in partial section. Fig. 2 shows a top view of the lock mechanism shown in Fig. 1 taken partially in section on a line 2--2 thereof. Fig. 3 shows a fragmentary detail view of the lock taken on line 3--3 of Fig. 1. Fig. 4 shows a modification of the novel lock mechanism as shown in Fig. 1. Fig. 5 is a detail showing of a portion of the lock mechanism taken on line 5--5 of Fig. 4 of the drawings. The practical embodiment of the subject invention shown and described herein consists of an application thereof as a door closure means. As can be seen with reference to the drawings a rectangular bar or bolt member 1 is provided which bar is fixed to the door D by means of screws so as to be unyielding. The bar 1 extends beyond the door D so as to overlap the door frame F when the door is closed. Fastened by means of set screw 5 to the door frame F in alignment with the bar 1 is a lock housing 2, which is preferably a casting and substantially rectangular in outline. The housing 2 has an end wall 3 and an intermediate partition 4 and the end of the housing arranged adjacent the door D is open. Spaced inwardly from the open end of the housing is a transversely mounted rotatable cylinder 5 having a notch 6 longitudinally thereof which is substantially triangular in cross section and cooperates with the bar 1. Pivot pin 7 fixed to the cylinder 5 extends from the ends thereof to bear in apertures in the housing 2 for rotation relative thereto. A spacer 8 is mounted on pin 7 at one end of the cylinder to space the cylinder from the housing wall thereby while to the other end of pin 7 is fixed a cam element 9 for rotation therewith and for purposes to be described.

Mounted on the end wall 3 of the housing 2 and secured thereto as by bolt members is a modified solenoid 10 having a central passage arranged longitudinally thereof. Slidably mounted in the inner end of the solenoid passage is a plunger element 10' having an extremity of reduced diameter for cooperation with the cylinder 5 as will be described. Threadedly engaged in the inward end of plunger element 10' is a coaxial pin 11 of lesser diameter which pin extends outwardly of housing 2 and has spaced notches 12 and 12' respectively arranged therein. The outer end of the pin 11 has a head 13 secured thereto. A coil spring 30 encircles the pin 11 and bears at its respective ends on the inward end of the plunger 10' and on the solenoid housing to continuously bias the plunger element 10' in the direction of the cylinder 5. A slide latch member 14 is mounted on the outer side of the end wall 3 of the housing 2 and has spaced slots 19' therein for engagement by pins 19 secured to the wall 3 for slidable adjustment of the latch member in a manner which is believed to be obvious with reference to Figure 3 of the drawings. The latch member is bifurcated at its upper end 15 to provide a recess therein whereby the latch member may be adjusted to selectively engage in notches 12 and 12' in the pin 11 to selectively retain the plunger against rear movement to effect a night latch means for the lock as will be obvious or to effect a continuous unlocked condition for the lock when desired.

The spring 30 affords a continuous bias of the plunger against the cylinder 5 effecting a locking thereof by engagement in a recess 17 therein on the side thereof opposite to the notch 6 therein. Also a limit pin 18 fixed in
3 the housing wall cooperates with a groove 21 in the cylinder 5 to limit the rotation thereof in use. Mounted on a wall of the housing 2 is a microswitch 16 for cooperation with the cam element 9, which microswitch is normally closed and operative on rotation of the camming element as the door is opened to effect a de-energization of the solenoid whereby automatic locking may be effected by the novel lock on merely closing the door as will be described. The operating means for opening the novel improved lock consists of a Yale type tumbler unit 31 as seen in Figure 1 of the drawings which has a shaft 32 operated by a turning of a special key in the tumbler unit, which shaft 32 has a cam element 33 connected thereto for engaging a microswitch 34 on turning of the key to energize the solenoid 10 to retract the plunger 10' from the recess 17 in the cylinder 5 to permit rotation of the cylinder by pressure against the door transmitted through the bar 1. In use of the lock, in a locked condition thereof as seen in Figures 1 and 2 of the drawings, the bar 1 is engaged in the notch 6 in the cylinder 5 with one surface thereof in engagement with one wall of the notch. Also at this point, the plunger 10' is in the recess 17 in the cylinder 5 under bias by the spring 30, preventing rotation of the cylinder by any application of pressure through the bar 1. By this particular structure of the locking elements presented, the rigid bar 1 cannot readily be jimmied, if at all, to open the door. To open the door, the special key which corresponds to the particular tumbler unit 31 must be inserted and turned. As the key is turned, the camming element 33 engages the microswitch 34 to complete the circuit to supply power from a suitable source to energize the solenoid and retract the plunger 10' against the bias of spring 30. As the solenoid is energized, pressure must be applied to the door to press the bar 1 against the spring 30 to rotate the cylinder as to permit the bar to clear so that the door may open. Because of the groove 22 being aligned with the recess 17 in the cylinder, the plunger need only be retracted a sufficient distance to enable the same to clear the recess. At the point where bar 1 clears the cylinder, the camming element 9 has rotated to engage the microswitch 16 to open the power circuit to de-energize the solenoid releasing the plunger to bias against the cylinder once more in the groove 22 therein. Accordingly, as the door is shut, the bar 1 engages the notch 6 on the cylinder 5, this being assured by the limited rotation of the pin 18 engaging in the groove 21 thereof. As the door rotates, the bar rotates the cylinder and upon complete closing of the door, the plunger being biased against the cylinder effectively is aligned with and enters the recess 17 once more to effect an automatic locking of the door by the mere closing thereof. If for any reason it is desired that the door not be automatically locked upon closing thereof, the head 13 of the pin 11 merely need be retracted against the bias of spring 30 and the latch member 14 adjusted to engage notch 12' in the pin 11 to retain the plunger in retracted position till the latch member is released. In this way, the door may be freely opened and shut when desired. Also, if for any reason a night type latch be desired so that the door may not be opened from the outside even by a key, then the latch member need merely be engaged in the notch 6 in the pin 11 and the plunger 10' then may not be retracted by any means so as to provide a positive anti-jimmy lock means thereby. Referring to Figures 4 and 5 of the drawings, a mechanical modification of the improved novel lock is shown therein. In this instance the only changes are that the solenoid is replaced by a spiral element 8 on the pin 7 in a manner which is believed to be so obvious as not to require detailed description thereof. Further while a similar tumbler unit 31 is provided, the cam 33 of the first embodiment is replaced by a bifurcated element 27 connected to the operating shaft 32 to receive the forward reduced portion of the plunger element 10' therebetween so that on insertion of a special key into unit 31 and turning thereof to rotate shaft 32, the bifurcated element 27 engages the enlarged portion of the plunger 10' as seen in Figures 4 and 5 to thrust the plunger 10' readily in a rearward direction to disengage the plunger from the recess 17 in the cylinder to permit the door to be pushed open by a key engaged in the lock. A key rotating the cylinder to rotate it as the key is turned sufficiently to cause the element 27 to effect a clearance of the plunger of the recess 17 in the cylinder 5. Here again as the door is closed, the spring 30 affords a continuous bias of the plunger to engage the cylinder causes the plunger 10' to re-enter the recess 17 as it becomes aligned with as the door is completely closed to provide an automatic lock of the door thereby. In this instance a safety feature is provided by the novel modification of the invention presented in Figures 4 and 5 of the drawings in that the key may not be taken out of the tumbler unit until the door is assiduously closed. A distinct advantage of this embodiment of the invention as in the first described the night latch and continuously open latch means 14 may be used in an identical manner and for identical purposes. While a key operated mechanism has been disclosed as means for initiating the unlocking of a lock in accordance with the invention obviously, various other types of control elements may be employed without departing from novelty in the invention. Due to the obvious simplicity and positive nature of the novel lock 1 against the cylinder 5 means enabled by the employment of the subject invention, a distinct advantage is obtained therefrom. The invention presents a highly simplified lock mechanism which cannot readily be jimmed open if at all and cannot be unlocked even with a key let alone by prying when the night latch mechanism is set. Also the locking action is positive and automatic in nature as effected by subject invention to present an ideally simple effective lock means having wide applicability. While a single embodiment and modification thereof of the subject invention has been presented herein, many other modifications and applications thereof will be readily apparent to those versed in the art and such is considered to lie within the scope of the invention. We claim: 1. A jimmy-proof lock comprising, a first housing, a notched cylinder rotatably mounted transversely of said housing adjacent one end thereof, a rigid bolt engaging in the notched portion thereof to effect a closure thereby, a solenoid including a housing therefor mounted in said first housing adjacent the other end thereof, a lock recess in said cylinder in the side thereof opposed to its notched portion, a spring biased plunger normally biased outwardly of said solenoid housing into engagement with said cylinder, said plunger and lock recess being in axial alignment when a locked condition obtains whereupon the plunger engages in the lock recess to prevent rotation of said cylinder and release of the rigid bolt, circuit means connected to said solenoid thereby affording a switchable power thereto, a normally open switch mounted in said first housing and connecting to the solenoid, key actuated control means mounted adjacent said normally open switch and operable to close the switch to energize said solenoid, said plunger being retracted thereby from engagement in said cylinder whereupon said cylinder is thereby locked again. In this condition, a normally closed switch means in said first housing in said circuit means and cam means connected for rotation with said cylinder and operable to engage and
open said normally closed switch means at a predetermined point to de-energize said solenoid so that said plunger is again biased against said cylinder so a locking action will automatically occur upon a closure being effected through rotation of said cylinder by said bolt to realign said lock recess with said plunger.

2. A lock comprising an outer housing, a notched cylinder rotatably mounted in said housing adjacent one end thereof for engagement with a rigid bolt in the notched portion thereof to effect a closure, a lock recess in said cylinder, an inner housing, a plunger mounted in said inner housing normally biased to housing said cylinder, said plunger and lock recess being in axial alignment when a closure is effected, the plunger being biased into said lock recess to prevent rotation of said cylinder and release of the rigid bolt, control means for retracting said plunger against the bias thereon to free said cylinder for rotation on application of pressure thereto through the rigid bolt to open said closure and an interrupter device provided in said control means for releasing the plunger to engage said cylinder as it is relatively displaced from axial alignment with said lock recess the cylinder is rotated by the bolt whereby on a closure being effected by engagement of said rigid bolt in the cylinder notch an automatic locking action occurs.

3. The structure as set forth in claim 2 and a first latching element connected to said plunger and having spaced notches therein, a second latching element connected to said housing, said first latching element being selectively engageable by said second latching element in the spaced notches thereof to selectively prevent the automatic locking action or retraction of said plunger.

4. The structure as set forth in claim 2 and a pin connected to the plunger, spaced notches in said pin, and a bifurcated latch means connected to said housing and adjustable to selectively engage said notches whereby respectively to prevent the automatic locking action or to prevent any operation of the lock whatsoever.

5. A jimmy-proof lock comprising, in combination, a rigid bolt member adapted for connection to one of two elements of a lock housing adapted for connection to the other of said two elements in alignment with said bolt member, a notched rotatable cylinder mounted transversely of said housing and receiving the rigid bolt in the notch thereof when a locked relation of said two elements obtains, said cylinder having a stepped groove therein affording a central recess providing a first latch recess cooperated latch means in said housing engaging in the recess provided by the stepped groove in the cylinder when said two elements are interlocked, key operated control means operatively connected with said second latch means for retraction thereof in said stepped groove clear of the recess therein for unlocking, said second latch means having an extension from said housing with spaced notches therein, and means sidably mounted on one wall of said housing and selectively engageable with said notches in said extension to selectively prevent unlocking or locking of said latch means.

6. A jimmy proof lock comprising, a first housing, a notched cylinder rotatably mounted adjacent one end thereof for engagement with a rigid bolt in the notched portion thereof to effect a closure, a solenoid including a housing therefor mounted in said first housing at the other end thereof, a lock recess in said cylinder, a spring biased plunger normally biased outwardly of said solenoid housing into engagement with said cylinder, said solenoid housing, said plunger and lock recess being in axial alignment when a closure is effected, the plunger being biased into said lock recess to prevent rotation of said cylinder and release of said rigid bolt, a power circuit connected to said solenoid to afford a power supply thereto, control means mounted in said first housing for closing said power circuit to energize said solenoid, thereby retracting said plunger to free said cylinder for rotation on application of pressure thereto through said rigid bolt to open said closure, a normally closed switch in said power circuit and means connected for rotation with said cylinder operable on a predetermined rotation of said cylinder to open said switch and said power circuit whereby said plunger is again biased into engagement with said cylinder so that an automatic locking action occurs on a closure being effected by an engagement of the rigid bolt in the notched cylinder to rotate said cylinder to obtain an axial alignment of said recess and said plunger.

7. The structure as set forth in claim 6 and means selectively fixed positions relative said cylinder to selectively prevent automatic locking action on a closure being effected or prevent an opening of said closure after a locking action has been effected.

8. A jimmy proof lock comprising, a first housing, a notched cylinder rotatably mounted transversely of said housing adjacent one end thereof, a rigid bolt engaging in the notch thereof to effect a closure thereby, a solenoid including a housing therefor mounted in said first housing adjacent the other end thereof, a lock recess in said cylinder in the side thereof opposed to its notched portion, a spring biased plunger normally biased outwardly of said solenoid housing into engagement with said cylinder, said plunger and lock recess being in axial alignment when a locked condition obtains whereupon the plunger engages in the lock recess to prevent rotation of said cylinder and release of the rigid bolt, circuit means connected to said solenoid affording a source of power thereby, a normally open switch mounted in said first housing and connected in the circuit means to the solenoid, key actuated control means mounted adjacent said normally open switch and operable to close the switch to energize said solenoid, said plunger being retracting thereby from engagement in said cylinder whereupon said cylinder is rotatable on application of pressure through the rigid bolt to effect an unlocking action, a normally closed switch means in said first housing in said circuit means, cam means connected for rotation with said cylinder and operable to engage and open said normally closed switch means at a predetermined rotation to de-energize said solenoid so that said plunger is again biased against said cylinder so a locking action will automatically occur upon a closure being effected through rotation of said cylinder by said bolt to realign said lock recess with said plunger and a pin threadedly connected in the inner end of the plunger and extending outwardly of said first housing, said pin being operable to axially adjust said plunger, spaced notches in said pin adjacent the outer end thereof, and a latch member on said housing and operable to selectively engage in one of said notches on axial adjustment of said plunger to selectively prevent either the projection or retraction of said plunger from its adjusted position.

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