Oct. 6, 1970 E. WEBER 3,531,959

SECURITY ATTACHMENT FOR CYLINDER LOCK

Filed Sept. 5, 1968

FIG-1

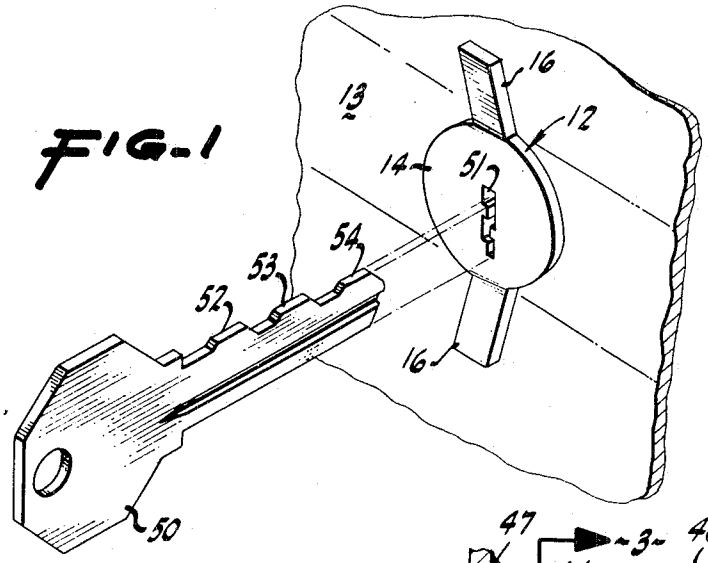


FIG-2

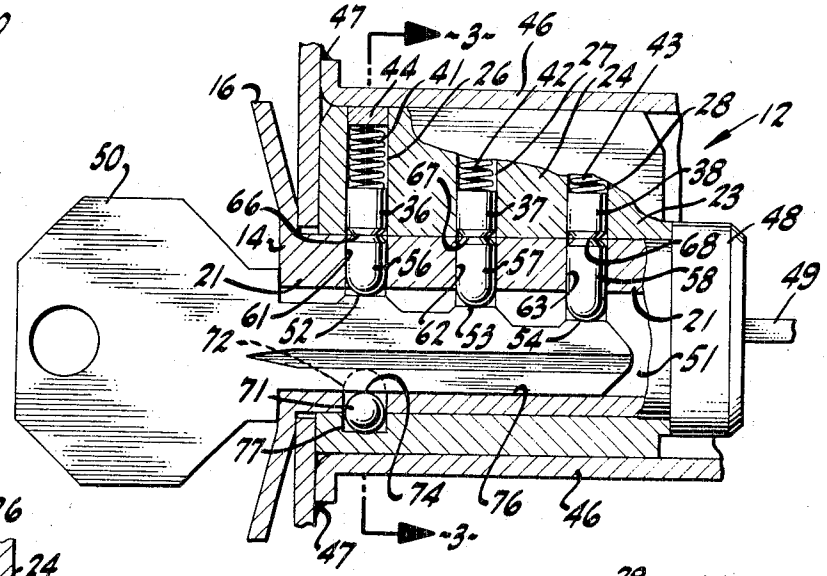


FIG-4

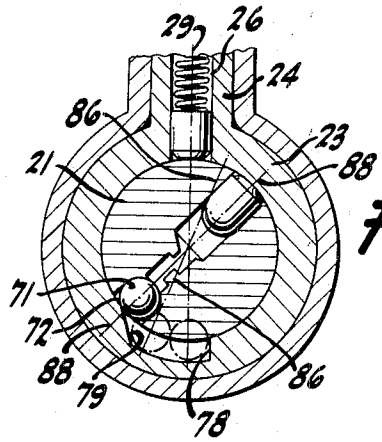


FIG-3

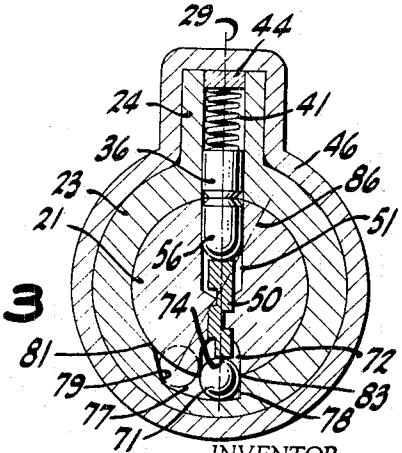
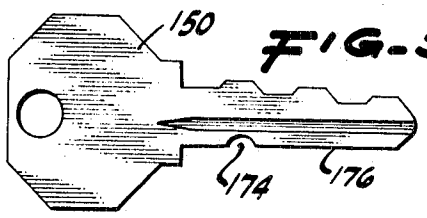


FIG-5



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SECURITY ATTACHMENT FOR CYLINDER LOCK

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ABSTRACT OF THE DISCLOSURE

In the bottom of the keyway of a lock cylinder there is formed an enlarged chamber capable of receiving a small metal ball. In the body of the lock encompassing the cylinder is a segmental groove having a depth about equal to the ball radius and having a ramp at one end. A portion of the groove is in registry with the ball in the enlarged chamber in the cylinder in beginning position. Thus the porper key can be inserted in the keyway and the cylinder rotated until the ball, carried along the groove by the rotating cylinder, encounters the ramp. At this juncture the ball is cammed up the ramp until it abuts the key. The key must thereupon be removed to allow further rotation of the cylinder into operative position. An exterior handle on the cylinder is rotated to return the cylinder and the ball to base position.

The invention relates generally to improvements in cylinder lock attachments and, more particularly, to ignition lock attachments which are effetcive to turn on the ignition switch only if the correct ignition key is used and only if the ignition key is removed from the lock at a predetermined juncture prior to the time the switch is closed.

It is widely known in law enforcement fields that one of the major causes of car thefts is the carelessness of the driver in leaving the key in the ignition switch while the car is unattended.

Many devices have been developed to try to counteract this undesirable habit. Most of such devices have been of the audio-visual warning type which become operable, for example, when the driver fails to remove the key and opens the door to leave the car. Such mechanisms have served moderately well but depend for the most part on electrical components which are somewhat costly and which inevitably become corroded or otherwise wear out.

It is therefore an object of the invention to provide a security attachment for a cylinder lock which is entirely mechanical in nature and which is as long-lived and reliable as the cylinder lock itself.

It is another object of the invention to provide an attachment which enhances the safety features of all types of cylinder locks, but which is of particular value when used in conection with ignition switch locks of the kind used in motor vehicles.

It is a further object of the invention to provide a lock attachment which is economical and fool-proof.

It is another object of the invention to provide a generally imroved security attachment for a cylinder lock.

Other objects, together with the foregoing, are attained in the embodiment described in the following description, and illustrated in the accompanying drawings in which:

FIG. 1 is a fragmentary front perspective view of a vehicle dashboard, showing the external handle portion of the attachment on an ignition switch lock;

FIG. 2 is a fragmentary median, vertical, longitudinal sectional view;

FIG. 3 is a transverse sectional view showing the parts in beginning position, the plane of the section being indicated by the line 3—3 in FIG. 2;

FIG. 4 is a view comparable to that of FIG. 3, but showing the parts in final position; and

FIG. 5 is a side elevational view of a key modified by the formation of a semi-circular recess on the bottom edge to extend the key's capabilities.

While the lock attachment of the invention is susceptible of numerous physical embodiments depending upon the environment and requirements of use, substantial numbers of the herein shown and described embodiment have been made, tested and used, and all have performed in an eminently satisfactory manner.

The lock attachment of the invention, generally designated by the reference numeral **12**, lends itself to use in substantially any kind of cylinder lock, but is of espeical utiilty in ignition switch locks located, for example, on the dashboard **13** of a motor vehicle.

In the embodiment disclosed herein the only external member is a circular plate **14**, or escutcheon, formed with a pair of oppositely projecting handles **16** affording the driver a convenient moment arm to rotate the escutcheon **14** at the appropriate junctures, as will be described.

The escutcheon plate **14** is mounted on the outer end of a lock cylinder **21**, or plug, rotatably mounted in an annular lock body **23** having an upwardly projecting elongated block portion **24** formed with a plurality of vertical, cylindrical recesses **26**, **27** and **28**. The vertical axes of the recesses lie in the median vertical plane **29** of the cylinder **21** (see FIGS. 3 and 4).

Vertically reciprocable in the recesses **26**, **27** and **28**, are upper pin tumblers **36**, **37** and **38**, respectively. The pins are biased downwardly by compression springs **41**, **42** and **43**, respectively, the upper ends of the springs being confined by suitable caps **44**, or closure plugs, mounted in the tops of the recesses.

A housing **46** encompasses the lock, the housing being secured to the back side of the dashboard as by welded flanges **47** (see FIG. 2).

The cylinder **21** is restrained against outward movement by a keeper **48**, and extending from the inner end of the cylinder is an operating member **49** utilized either to operate a latch bolt or an ignition switch contact, neither of which item is shown herein, being of conventional make.

The operating member **49** is actuated by rotation of a key **50** inserted within avertical keyway **51**. The key **50** has a conventional cross-section and is provided with the customary upstanding lugs **52**, **53** and **54** of variable height and arranged in a predetermined fashion to cooperate with lower pin tumblers **56**, **57** and **58**, respectively.

The lower pin tumblers **56**, **57** and **58** translate in throughbores **61**, **62** and **63**, respectively, formed radially in the cylinder **21**.

In the base, or initial, position, as appears most clearly in FIGS. 1, 2 and 3, the key lugs **52**, **53** and **54** are of the correct size and sequence with respect to the lower pin tumblers **56**, **57** and **58**. Consequently, the interfaces **66**, **67** and **68** shared by the three sets of pin tumblers are in alignment with the periphery of the cylinder (see FIGS. 2 and 3) and therefore the pins offer no significant resistance to rotation of the key **50**, the cylinder **21** and the operating member **49**.

As the cylinder begins to move away from the base position shown in FIG. 1, 2, and 3, the cylinder carries, or urges, along with it a small metal ball **71** such as a ball bearing. The upper part of the ball is located in the bottom of a slightly vertically elongated but substantially hemispherical chamber **72** formed in the bottom of the cylinder opposite the lower pin tumbler **56** (see FIGS. 2 and 3). The chamber **72** opens upwardly to the keyway **51** and therefore receives a portion **74** of the lower edge **76** of the key **50**.

The bottom part of the ball **71** is disposed within a circumferential segmental groove **77** formed in the lock body, the groove extending (see FIG. 3) from a vertical wall **78** at approximately 5:30 o'clock to an inclined ramp portion **79** commencing at about 6:30 o'clock and extending toward the left and upwardly, terminating at the interface **81** between the lock cylinder and the lock body at about a 7:00 o'clock location.

The groove **77** has a depth approximately equal to the radius of the ball **71**. Thus, about one-half the ball projects upwardly into the slightly vertically elongated but generally hemispherical chamber **72**. A lip **83** (see FIG. 3) formed by the intersection of the chamber **72** and the cylinder periphery engages the ball **71** at about the ball's equator. Consequently, as previously stated, the lip urges the ball along the groove, to the left (FIG. 3) and away from the vertical boundary wall **78**, as the key rotates the cylinder in a clockwise direction, this being the direction customarily followed in turning on an ignition switch.

As appears most clearly in FIG. 3, the bottom edge of the key, as at **74**, is spaced apart from the bottom path of the groove **77** a distance just slightly in excess of the ball diameter.

Therefore, when the cylinder **21** is rotated in a clockwise direction through about 25° of arc, so that the initially vertical plane **29** assumes the new attitude indicated by the plane **86** (see FIGS. 3 and 4) further rotation is rendered impossible unless the key is extracted from the lock.

In other words, with the key in the angular attitude of the plane **86**, the ball **71** has been brought into abutment with the bottom of the ramp **79**. Any further rotation at this juncture urges the ball upwardly against the adjacent bottom **74** of the key and rotation is halted.

As the driver feels this resistance to further rotation, the key **50** is removed, and concurrently, the fingers are used to grip the handles **16** and continue rotation. Removal of the key allows the ball to move upwardly into the chamber **72** (see FIG. 4) as the ball travels up the ramp **79** under the urgency of the cylinder lip **83**.

Upon reaching the top of the ramp, the ball **71** is fully lodged within the hemispherical chamber **72** and the plane of the keyway and ball is approximately as indicated by the reference numeral **88** in FIG. 4.

A slight additional clockwise rotation is effective to close the ignition switch terminals (not shown) thus starting the vehicle's engine.

The key **50**, having been extracted, is now preferably placed in the driver's pocket, or purse, for safekeeping.

When the vehicle has come to a stop and the engine is to be turned off, the driver takes hold of the handles **16** and rotates the cylinder in a counterclockwise direction, thereby opening the ignition switch and stopping the engine.

As the ball **71** is urged counter-clockwise and reaches the ramp **79** it moves downwardly by gravity as it traverses the ramp. The trailing wall of the hemispherical chamber **72** concurrently urges the ball toward and ultimately brings the ball into abutment with the vertical boundary wall **78**. At this juncture, the ball, the keyway and the cylinder have all resumed their initial positions and the device has completed its cycle.

FIG. 5 illustrates a variant form of key **150** which differs from the key **50** only in the fact that the bottom edge **176** of the key **150** has formed therein a semi-circular recess **174** which registers with the profile of the

hemispherical chamber **72**, as this chamber appears in broken line in FIG. 2. The recess **174** in other words, prevents interference from taking place between the ball **71** and the key portion **74** as the ball is being cammed up the ramp **79**. This means that the key **150** need not be removed from the lock in order to effect full closure of the ignition switch.

It can therefore be seen that I have provided an economical, yet foolproof and convenient security attachmeent for a cylinder lock.

What is claimed is:

1. A security attachment for a cylinder lock having a body formed with a plurality of recesses; cylinder rotatably disposed within the lock body and including a longitudinal keyway connecting with a plurality of radial throughbores arranged for registry with the body recesses in a predetermined angular position of the cylinder; and a plurality of upper and lower pin tumblers slidably disposed in the recess and throughbores, respectively, the upper pin tumblers being spring-urged toward the cylinder, and the lower pin tumblers each being of a predetermined length such that a predetermined key inserted against the lower pin tumblers is effective to position the junction of the upper and lower pin tumblers in registry with the outer periphery of the cylinder to permit rotation thereof, said attachment comprising:

(a) a handle mounted on the cylinder for selective rotation of the cylinder; and,

(b) a ball movable between a first position wherein said ball is located partially within a chamber in said cylinder, said chamber opening into said keyway, and partially within a segmental groove formed in the lock body, and a second position wherein said ball is located entirely within said chamber, said key being effective to prevent movement of said ball into said chamber until said key is removed from said keyway as said ball is moved by the walls of said chamber from said first position partially toward said second position, removal of said key affording free ingress of said ball into said chamber and permitting subsequent movement to said second position.

2. An attachment for a lock cylinder as in claim **1** wherein one end of said groove is defined by a substantially radial boundary wall limiting the movement of said ball, and the other end of said groove is defined by a ramp urging said ball entirely into said chamber as the cylinder is rotated carrying said ball in a direction from said boundary wall toward and onto said ramp.

3. A device as in claim **2** wherein said handle includes a pair of moment arm members mounted on the outer end of the cylinder.

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