Feb. 26, 1952 C. GLUBIAK 2,587,037

SELF-EJECTING KEY

Filed Jan. 27, 1950

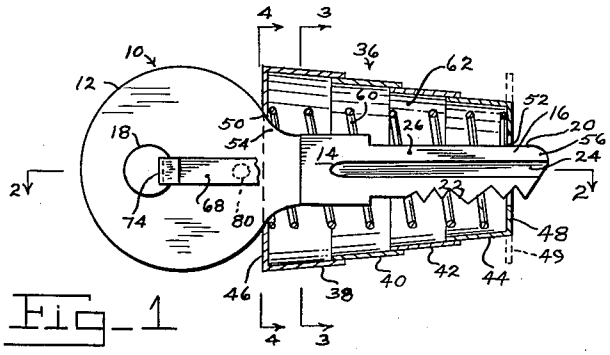


Fig. 1

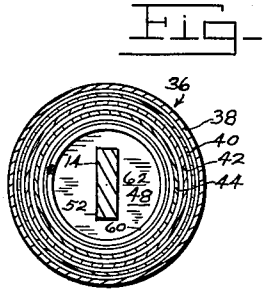


Fig. 3

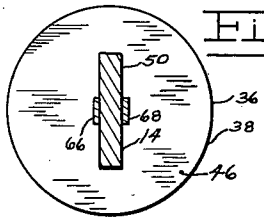


Fig. 4

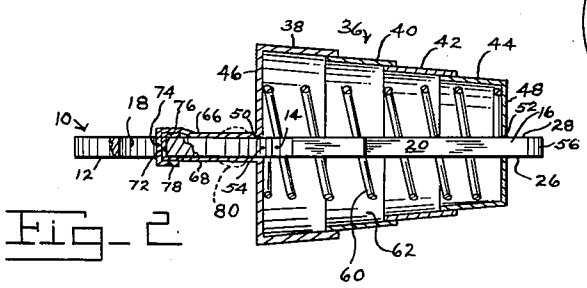


Fig. 2

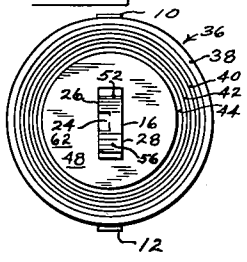


Fig. 5

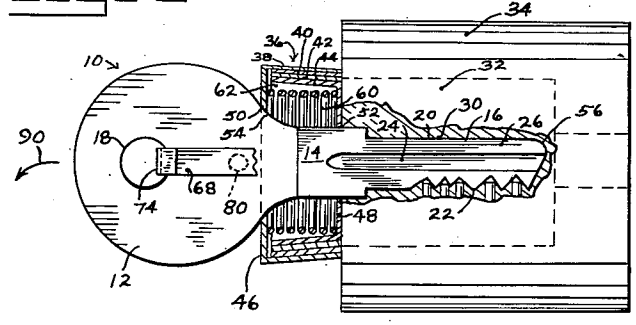


Fig. 6

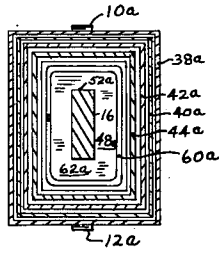


Fig. 7

INVENTOR
Casper Glubiak
BY
Peter Fries, Jr.
ATTORNEY

Patented Feb. 26, 1952

2,587,037

UNITED STATES PATENT OFFICE

2,587,037

SELF-EJECTING KEY

Casper Glubiak, New York, N. Y., assignor of fifteen per cent to Peter Fries, Jr., New York, N. Y.

Application January 27, 1950, Serial No. 140,836

7 Claims. (Cl. 70—414)

1

This invention relates to locking devices and to keys used in connection therewith.

An object of the invention is to provide a novel and improved locking device and key, in which the key is automatically separated from the locking device whenever the key is turned to a predetermined position in the locking device.

Another object of the invention is to provide a novel and improved locking key device which may be employed with existing locking devices, and which is so constructed that whenever the key is turned to any selected position, such as to unlocked positions, or to locked position, then the locking key device is automatically ejected from engagement with the locking device.

A further object of the invention is to provide a novel and improved locking key device which is insertable into a locking device for locking and unlocking the same upon turning the key between locked and unlocked positions, and in which automatic means including resilient biasing means is carried by the key, so that when the key is turned to a preselected and prearranged position in the locking device, at which the locking device does not continue to engage the key in prehensile fashion, said automatic means exerts its resilient bias between the key and the locking device, forcibly separating the locking key device with its key, from the locking device.

Still another object of the invention is to provide a novel and improved key biasing and ejecting device which includes a collapsible housing which is internally spring biased toward extended position, the housing being adapted to receive a locking key extending therein, so that upon disposition thereof in registry with the cylinder of a lock and pressure on the key to insert the same into the cylinder, the collapsible housing is collapsed to retracted position and the internal spring biasing means therein also compressed, and whereby, upon turning said key to a position in which no prehensile engagement of the key by the lock exists, the housing automatically expands to extended position, ejecting the key from the lock, and, where means is employed to secure the collapsible housing to the key, then also separating the housing from the lock, with the key.

Still a further object of the invention is to provide a novel and improved key biasing and ejecting device which will fit onto any type of key, to make the key into a self ejecting key, whereby the key will be automatically ejected form engagement with a lock upon turning the same to any predetermined position.

Still another object of the invention is to provide a novel and improved self ejecting key, and means for making any key self ejecting, which is simple in operation, inexpensive to manufacture, automatic and foolproof in use, and which will fit any lock, regardless of the design or size of the lock itself, being carried solely by the key and ejected from the lock at the same time and with the key, when the key is turned to any predetermined position in the lock.

2

Other objects and advantages of the invention will become apparent from the following description of a preferred embodiment thereof as illustrated in the accompanying drawings, forming a part hereof, and in which:

Figure 1 is a longitudinal sectional elevation of my improved and novel self-ejecting key, with its movable parts disposed in extended positions, prior to insertion of the key into a lock.

Figure 2 is a sectional plan view taken on plane 2—2 of Figure 1, but showing the key itself only partly sectioned.

Figure 3 is a transverse sectional elevation taken on plane 3—3 of Figure 1.

Figure 4 is a transverse sectional elevation taken on plane 4—4 of Figure 1.

Figure 5 is a right end elevation of the device shown in Figure 1.

Figure 6 is a sectional elevation taken on the same plane as Figure 1, but showing the positions of the movable parts of the self ejecting key, upon insertion of the key itself inside the cylinder of a lock, and prior to turning the key with the lock cylinder.

Figure 7 is a sectional elevation taken on the same plane as Figure 3, but showing a modified form of the invention, in which the telescoping housing is rectangular in cross section, instead of circular as shown in Figure 3.

Where locks are used, it has been found to be quite common an occurrence to discover that the key has been inadvertently left in the lock. For example, the ignition locking key on an automobile is frequently left inserted in the ignition lock, so that a prospective thief has no trouble whatever in starting the automobile engine, and quickly driving off with the owner's car.

The same thing happens in the locking of doors on buildings and dwellings, so that the owner has found that a thief can gain easy access to the building, by merely watching the door lock, and when the key is left inserted therein by the careless owner or employee, just waiting until he leaves, before readily unlocking the door and entering the building. The present invention provides means whereby the key cannot be left in-

serted in the lock at any time. As a result, a self ejecting key is formed, with resilient means carried right on the key, which is compressed upon insertion of the key into the lock, and, is thus available for automatically and instantly pushing the key out of the lock whenever the key is turned to a position at which the lock does not hold the key in engagement therein.

In order to understand clearly the nature of the invention and the best means for carrying it out, reference may now be had to the drawings, in which like numerals denote similar parts throughout the several views.

This application is a continuation of my copending patent application, Serial Number 126,470, filed November 10, 1949, for locking device and key ejector.

As shown, there is a key **10** with a rounded key body **12** connected by an integral neck portion **14** to the integral key shank **16**. There may be an aperture formed in the key body, as at **18**, for engagement in a key ring or the like. The key shank **16** may have one edge un-serrated, as at **20**, or straight, and may have a series of teeth or serrations **22** formed in the opposite edge thereof. A longitudinal groove **24** may be formed in one face **26** of the key shank, and other similar grooves may be formed in the opposite face **28** thereof.

As is will known in the art, the key shank **16** is insertable into an opening **30** penetrating the lock cylinder **32** of a cylinder-type lock **34**. The lock **34** and its lock cylinder **32** have a number of pin recesses formed therein, spring pressed pin drivers being disposed in the portions of the recesses formed in the lock **34**, while matching pins are disposed in each of the portions of the recesses formed in the cylinder **32**. Upon insertion of the key shank **16** into the cylinder slot **30**, the teeth or serrations **22** on the key shank line up the series of pins and drivers to the exact intersection corresponding to the periphery of the lock cylinder **32**, allowing the key to turn the cylinder **32** about its axis, operating the lock.

The insertion of the key of proper combination, that is with each of its teeth of proper length, configuration and sequence, into the cylinder, permits the key to be turned, turning the cylinder therewith, between locked and unlocked positions, whereas, when the key is removed from the lock, the spring pressed drivers and pins block turning motion of the lock cylinder. In addition, it is well known in the art, that upon insertion of the key into the cylinder, the key being of proper combination for that cylinder arrangement, and turning of the key out of the angular position it occupied upon entry into the cylinder, then during its travel angularly to another position, at which the locked is in "unlocked" position, for example, the key is held by the lock against withdrawal therefrom. In other words, the arrangement of the lock is such that when the key is inserted into the cylinder and before turning of the key, the key may be withdrawn from the cylinder. But once the key is turned out of its angular position upon entry, then the key may not be withdrawn from the cylinder, but is held securely against withdrawal thereby, until its angular turning motion is continued to bring it to a preselected position corresponding to for example, "unlocked" position of the lock, assuming that its position at entry corresponded to "locked" position.

As this is all well known in the art, it will not be further described in detail except to say that,

when the key is inserted into the lock, as seen in Figure 6, it must then be turned through an angle about the axis of the cylinder, that is to say, turned clockwise as seen in Figure 4, to move the cylinder **32** to "unlocked" position. In some types of locks, the turning of the key to "unlocked" position, will disengage the key from prehensile engagement with the lock cylinder, and permit it to be withdrawn from the cylinder slot **30** by permitting it to be pulled out therefrom. Then, again, in some forms of lock, the key is held in prehensile engagement in the lock in all positions except that of "unlocked" position. The present invention is intended to eject the key automatically from the lock, whenever it is turned to any position in which there is no longer prehensile engagement with the lock, that is to say, when it is turned to any position in which it is free to be withdrawn from the lock upon merely pulling the key out of the lock. For convenience, any such position at which the key may be pulled freely out of the lock may be termed herein as a "key ejectable position" for convenience.

I provide for each key **10**, a housing generally indicated at **36**, and which may be termed an "ejection housing." As seen in Figures 1 to 6, the ejection housing **36** is generally circular in contour, and includes a number of frusto-conical hollow sections **38**, **40**, **42** and **44**. These sections are dimensioned and arranged to telescope one inside the other, as in Figure 6, when in retracted positions, and to be extended as in Figure 1, while retaining their telescopic mutually engaged relationships.

For this purpose, the section **38** has its smallest inside diameter at its right end as seen in Figure 1, smaller than the greatest outside diameter of the next section **40**. The section **40** has its smallest inside diameter at its right end, smaller than the greatest outside diameter of the next section **42**. And the section **42** has its smallest inside diameter at its right end, smaller than the greatest outside diameter of the next section **44**. As a result, it is impossible to withdraw any one of the sections, such as section **44**, rightwardly out of engagement with its next neighboring section such as **42**.

The end sections **38** and **44** have outer end walls **46** and **48** respectively, which are substantially in the form of discs extending inwardly radially from the perimeters of the frusto-conical surfaces of these sections. The end walls **46** and **48** may also be termed end flanges. Slots or apertures **50** and **52** are formed through the walls **46** and **48** respectively of the end sections **38** and **44** to receive, respectively, the shoulder **54** of the neck **14** of the key, and the outer end **56** of the key shank.

When in extended position, as in Figures 1 to 5, the end wall **48** is extended to a position near the key end **56**, but not so far as to block the key end **56** from extending beyond the end wall **48** as seen in Figures 1 and 2, so that it will be easy to make the initial insertion of the key end **56** into the lock cylinder **32** when needed. A spring **60** is disposed inside the housing chamber **62** formed inside the assembled telescoping sections **38** to **44**, the spring being such as to bear outwardly against the walls **46** and **48**, to tend to separate them as seen in Figures 1 and 2, to fully extended positions, shown in those two views. The end wall **46** may have two integral tongues **66** and **68**, extending from the marginal edges of the opening **50**, so that these tongues or fastening members or extensions **66** and **68**

may be bent along the side faces 26 and 28 of the key 10, and then bent over by insertion from opposite sides through the key aperture 18, as at 72 and 74, with their ends bent along the opposite key faces as at 76 and 78 respectively. This will secure the collapsible housing 36 upon the key 10 as shown.

Other means well known in the art, may be employed for this purpose, such as welding the end wall 46 to the key where the opening 50 touches the key at 54, or by inserting a bolt or rivet 80 through the tongues 66 and 68 and the intervening key body 12 as shown in broken lines in Figures 1, 2 and 6. In the latter event, the tongues 66 and 68 need not be made as long as shown in full lines in Figures 1 and 2, and may be cut off just to the left of the rivet 80, leaving sufficient metal to maintain the rivet 80 in contact with the tongues 66 and 68 and in secure engagement therewith.

From Figure 6, it is seen that, upon insertion of the right end 56 of the key shank into the lock cylinder 32, in the manner shown in that view, the effect is to compress all the telescoping sections 40, 42 and 44 inside the outermost section 38, compressing the spring 60 at the same time. Once the key shank has been inserted in this manner inside the cylinder 32 of the lock, the key may then be turned through an angle so as to turn the cylinder 32 through an angle counterclockwise as viewed in Figure 4, in the lock 34, for example, to "unlocked" position. As explained above, the key may be held prehensilely against withdrawal from the lock during this turning motion, and also at the end of such motion, which retains the telescoping sections 44, 42, 40 and 38 in mutually telescoped positions as seen in Figure 6.

Upon turning the key 10 back to its initial position at which it was upon penetrating the opening 30 in the cylinder 32, the key 10 is no longer prehensilely engaged by the lock, and is free to be withdrawn by a pull upon its body 12 toward the left as seen in Figures 1 and 2. The spring 60, which has been compressed in the process, is now free to exert its biasing force in a leftward direction as seen in Figure 6, tending to and spreading the walls 46 and 48 apart to the positions shown in Figure 1. This carries the key right out of the opening 30 in the cylinder 32 of the lock, with quite some force, moving it in a leftward direction as seen in Figure 6. At the same time, the momentum gained by the key 10 in its leftward motion under the force of the expanding spring 60, also pushes the wall 46 and the entire telescoping housing with its segments 38, 40, 42 and 44 to the left as seen in Figure 6, dislodging them entirely from the contact with the lock 34, and allowing the housing 36 and the key as a unit, to drop toward the left from the lock 34, in the direction of the arrow 90 shown in Figure 6. This carries the assembly of key and ejecting housing 36 right into the hand of the operator or user, if still present, or at least down on the floor therebelow if he has withdrawn his hand quite rapidly. In most cases, the action of the spring 60 will instantaneously throw the self ejecting key assembly 10 and 36 into the hand of the user, and necessarily remind him that he has forgotten to leisurely take it out of the lock; in fact he will no longer have the opportunity of taking it leisurely out of the lock, but will have it handed to him immediately upon turning it to the position shown in Figure 6 when it is no longer prehensilely held by the lock.

Figure 7 shows a modified form of the invention, in which the collapsible sections 38*a*, 40*a*, 42*a*, and 44*a*, are frusto-pyramidal instead of frusto-conical as was shown in Figures 1 and 3. The view shown in Figure 7 is similar to that of Figure 3, being taken substantially on the same plane, but it shows that the collapsible sections 38*a*, 40*a*, 42*a* and 44*a*, when viewed in cross section, are rectangular instead of circular. The sections shown in Figure 7, being hollow pyramids, they form an inner chamber 62*a*, in which is disposed a spring 60*a*, the coils of which are also substantially rectangular when viewed in section as in Figure 7, differing from the spring 60 of Figure 3, which is circular when viewed in section. Otherwise, the modified form shown in Figure 7 is similar to that of Figures 1 to 6, and functions in the same manner. It is seen that the substantially rectangular form shown in Figure 7 is somewhat narrower from left to right as seen in Figure 7.

Although I have described my invention in specific terms, it will be understood that various changes may be made in size, shape, materials and arrangement without departing from the spirit and scope of the invention as claimed. It will also be understood that the wall 48 in Figure 1 may be extended radially outwards to form also a circular flange 49 indicated in broken lines in that view. It will be further understood that where extreme economy is desired, the construction may be modified by eliminating the telescoping sections 38, 40, 42, 44, 46 and 48, and securing the left end portion or coil of the spring 60 as seen in Figure 1, directly to the key portion 54, by welding, or some convenient manner as by securing to the strips 66 and 68.

I claim:

1. A self ejecting key comprising a key body, a key shank extending forwardly from said key body, said key shank having a pattern formed therein adapted to engage with the mechanism of a lock for unlocking the same, upon insertion into said lock, a first end wall secured to said key body and movable therewith, resilient means extending along and encircling said key shank, with one end in contact with said first end wall, a second end wall disposed in contact with the other end of said resilient means and having an opening through which said shank extends, and constructed and arranged so that upon insertion of said key shank into said lock, said second end wall, coming into contact with said lock, is forced to move toward said first end wall, compressing said resilient means therebetween, whereby resilient bias is exerted by said compressed resilient means tending to restore said first and second end walls to their original spacing, so that, upon release of the key inserting force, said resilient bias ejects said key shank from said lock, said construction being characterized further in that a first telescoping member is carried by said first end wall, and a second telescoping member is carried by said second end wall, and comprising means inter-engaging said telescoping members to prevent their separation, and whereby, upon compression of said resilient means, said first and second telescoping members increase their telescopic engagement.

2. The construction according to claim 1, wherein the said first and second telescoping members comprise hollow frusto-cones.

3. The construction according to claim 1, wherein the said first and second telescoping members comprise hollow frusto-pyramids.

4. The construction according to claim 1, wherein at least one additional telescoping member is disposed between said first and second telescoping members and constructed and arranged for telescopically interconnecting them, and defining with them a telescopic housing inside which said resilient means is confined, and through which said key shank extends.

5. The construction according to claim 4, wherein said first and second telescoping members and said at least one additional telescoping member all comprise hollow frusto-cones.

6. The construction according to claim 4, wherein said first and second telescoping members and said at least one additional telescoping member all comprise hollow frusto-pyramids.

7. A self ejecting key comprising a key body, a key shank extending forwardly from said key body, said key shank having a pattern formed therein adapted to engage with the mechanism of a lock for unlocking the same, upon insertion into said lock, a first end wall secured to said key body and movable therewith, resilient means extending along and encircling said key shank, with one end in contact with said first end wall, a second end wall disposed in contact with the other end of said resilient means, and having an opening through which said shank extends, and constructed and arranged so that upon insertion of said key shank into said lock, said second end wall, coming into contact with said lock, is forced to move toward said first end wall, compressing said resilient means therebetween, whereby resilient bias is exerted by said compressed resilient means tending to restore said first and second end walls to their original spacing, so that, upon release of the key inserting force, said resilient bias ejects said key shank from said lock, and wherein a first telescoping walled member is carried by said first end wall, and a second telescoping walled member is carried by said second end wall, said first and second telescoping members being constructed and arranged to mutually inter-engage each other and to at least partially telescope with each other, and whereby, upon compression of said resilient means by insertion of said key into a lock, said first and second telescoping members increase their degree of telescopic engagement.

CASPER GLUBIAK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,745,836	Miller et al.	Feb. 4, 1930
1,974,953	Evans	Sept. 25, 1934
2,271,048	Spiro	Jan. 27, 1942
2,295,356	Rathbun	Sept. 8, 1942
2,488,240	Rumsey	Nov. 15, 1949
2,498,288	Moebes et al.	Feb. 21, 1950
2,500,198	Mullan	Mar. 14, 1950
2,514,940	Doss et al.	July 11, 1950