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Fowler

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[54] **PROTECTIVE SHIELD FOR COIN BOX LOCKS AND KEY THEREFOR**

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[51] **Int. Cl.** **E05b 17/14**

[58] **Field of Search** 70/395, 396, 397, 398, 70/423, 399, 400, 424, 425, 426, 427, 70/428, 458

[56] **References Cited**

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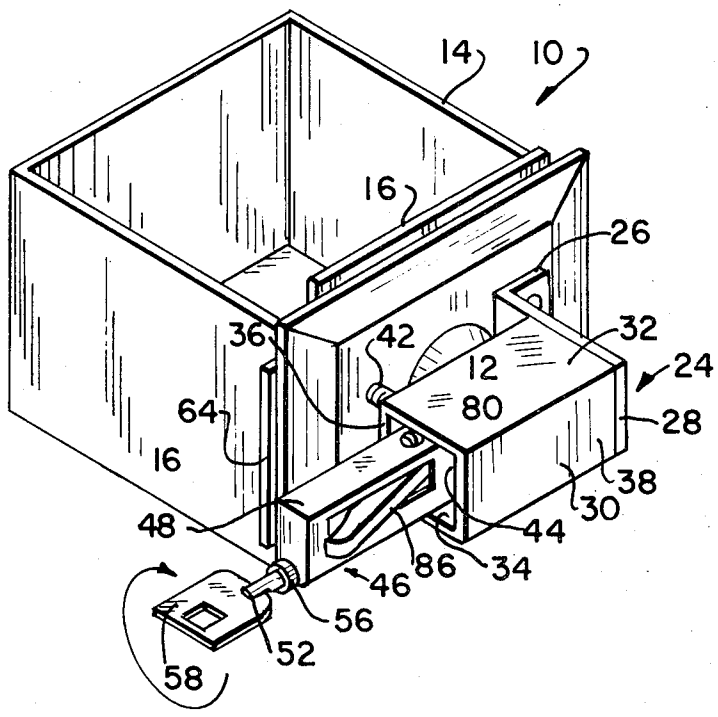
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Primary Examiner—Robert L. Wolfe
Attorney, Agent, or Firm—Edwards, Spangler, Wymore & Klaas

[57] **ABSTRACT**

This invention relates to a protective shield for coin box locks comprising a housing mounted in front of the latter that denies all direct axial access to the key slot in favor of a remotely located key-receiving opening at right angles thereto. It also encompasses a remotely-actuated right-angle-driven key operative to open the lock from a position outside the housing and displaced to one side of the axis of lock rotation. The invention further encompasses a push-pin and pivoted lever for actuating same from a remote position that cooperate with one another and with the wall of the housing facing the lock upon actuation to insert the key in the latter.

19 Claims, 9 Drawing Figures



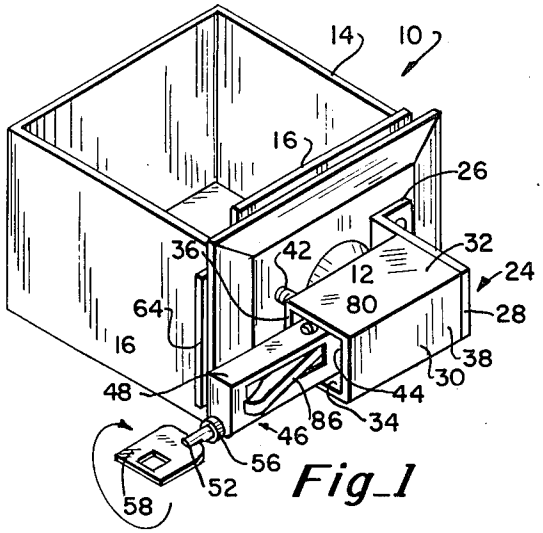


Fig_1

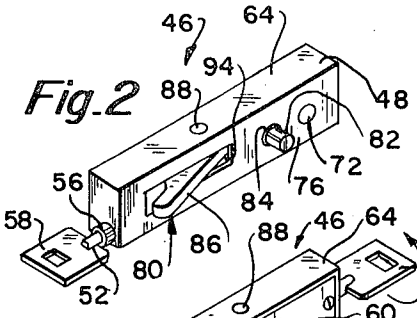


Fig_2

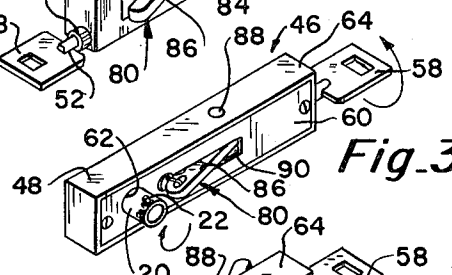


Fig_3

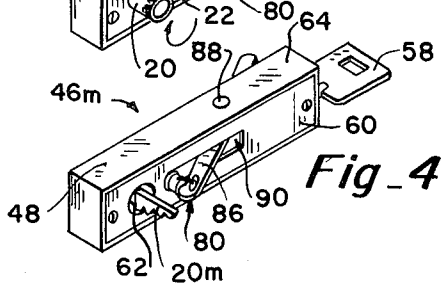


Fig_4

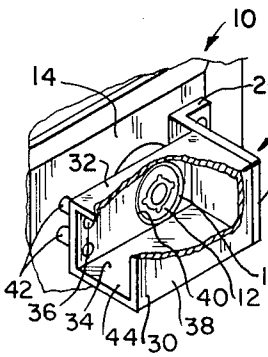


Fig_5

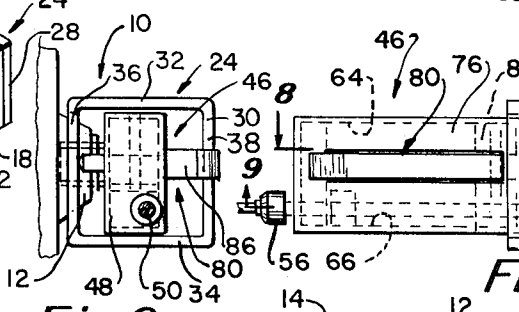


Fig_6

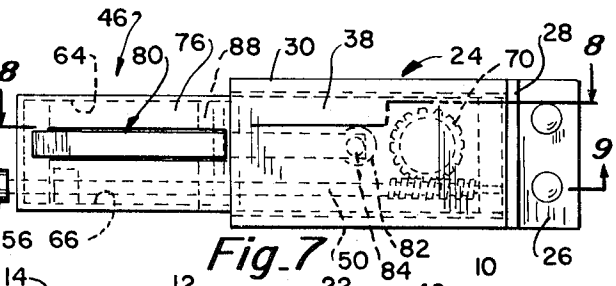


Fig_7

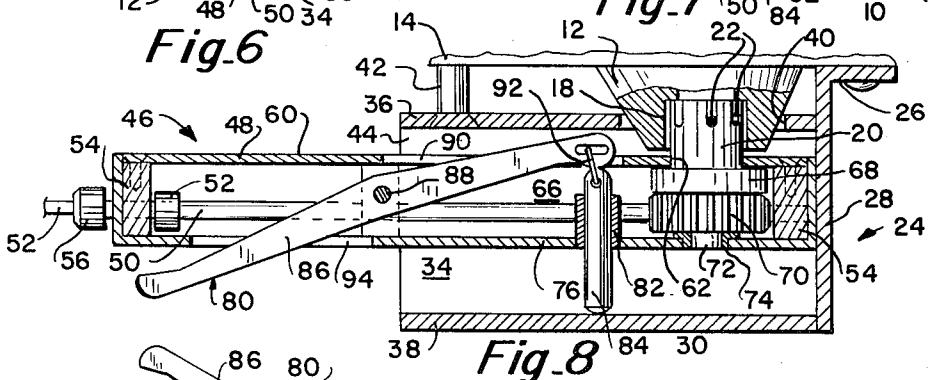


Fig_8

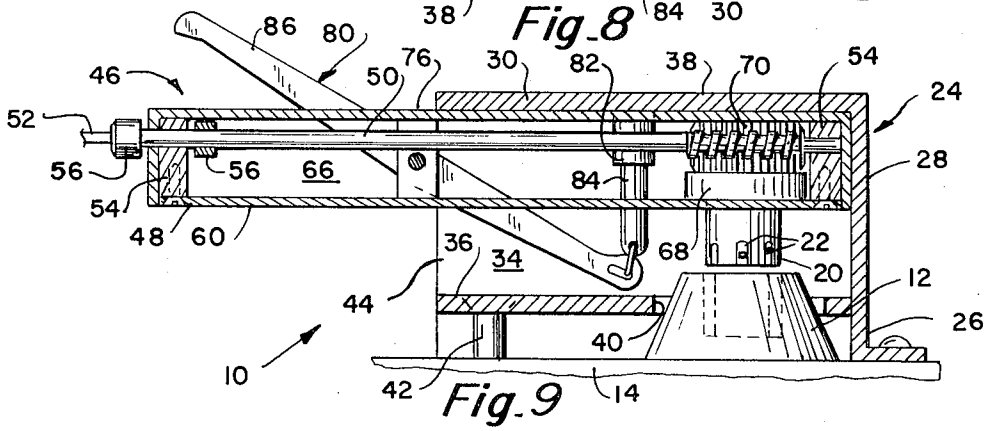


Fig_9

PROTECTIVE SHIELD FOR COIN BOX LOCKS AND KEY THEREFOR

Literally millions of coin operated vending machines are in everyday use, a high proportion of which are made available to the general public and left unattended. Many dispense products while others dispense services such as, for example, pay telephones, washing machines and clothes dryers. In contrast to most of the coin-operated product dispensers which are out in the open and generally under more or less constant public surveilance, laundry machines are quite often tucked away in a basement room of a small apartment house or the like where a few people at most are around and, oftentimes, no one at all. It is to the latter type of coin-operated vending machine that the instant invention is particularly well suited although it is by no means limited to such use.

The owners of coin-operated laundry and dry cleaning equipment suffer tremendous financial losses due to theft, much of which goes undetected. The thief rarely forcibly enters the coin box and empties same, but instead, opens the lock in a few seconds with a lock pick and takes only part of the money in the coin box before restoring it to its original locked condition. Since the operator has no practical way of monitoring the use of the machine, he may never realize that this equipment has been burglarized, especially when a clever thief leaves enough money to avoid any suspicion that it has been tampered with. For obvious reasons, no accurate information is available on the magnitude of this problem, but the best estimates place it in the millions of dollars annually in the United States alone.

There are, of course, many workable solutions to this problem provided the size of the installation and the income derived therefrom will justify their cost. Unfortunately, the great majority of such installations include only a half dozen machines or so and nothing that is very sophisticated or expensive in the way of protective devices can be justified economically. The prior art attempts to solve this problem simply and inexpensively have only met with moderate success and it seems that in a matter of weeks following the introduction of some new protective device, the criminal element has found a way to render it ineffective. Noteworthy among the simpler and more practical solutions to the problem of coin box thefts are those exemplified in the Greenwald U.S. Pat. Nos. 3,334,501, 3,444,712, and 3,494,159 along with the U.S. patent to Hall, U.S. Pat. No. 3,343,386, all of which are characterized by a keyhole-shaped opening in the guard, the narrower neck of which is aligned with the lock, but not the larger part through which the head of the key must pass. Such a keyhole in the guard together with a section of reduced diameter on the shank of the key cooperate with one another to produce an assembly wherein the key must be inserted axially in misaligned relation to the lock, then moved laterally into the narrow neck of the keyhole-shaped slot in the shield before it can again be moved axially on into operative engagement with the lock. Unfortunately, the same pick that will open the unprotected lock will, in most instances, open the protected one provided the thief makes the simple modification of reducing the diameter of the shank of his pick to correspond with the narrow neck of the keyhole shaped slot in the guard. Admittedly, certain types of picks that require access to the head so that its actuating members can be set in conformity with the tumblers

of the lock being picked become somewhat more difficult, if not even impossible, to use but this is by no means true of all such picks, several of which work just as well as if the lock were left unprotected. All of these prior art protective shields have one thing in common, namely, a protective shield that requires the operator to shift the key from an axially-directed but misaligned position to a coaxial position before the lock can be actuated.

It has now been found in accordance with the teaching of the instant invention that these and other limitations of the prior art coin box protective devices can, in large measure, be eliminated by the simple, yet unobvious, expedient of eliminating all axial access to the lock, both coaxial and offset, in favor of remotely located right angle access. A specially designed key with a right angle drive operable from a remote location outside the protective shield is used. The shield hides the lock as well as any pick being used to open same to a degree where it would be most difficult to observe it to say nothing of setting its tumbler actuating elements with no axial access thereto. Additionally, a push-pin connected to a pivotally mounted actuating lever carried by the key and accessible from outside the protective cover or shield coacts with the wall of the latter facing the key slot to bias the key axially into operative engagement with the lock.

It is, therefore, the principal object of the present invention to provide a novel and improved protective cover and associated key for use to prevent theft from vending machine coin boxes.

A second objective of the invention herein disclosed and claimed is to provide a device of the type aforementioned that is readily adaptable to existing coin boxes.

Another object of the within-described invention is to provide a coin box lock cover with a remote right-angled key access opening therein that effectively hides the key slot so that the lock becomes quite difficult to pick.

Still another objective is the provision of a special remotely operated key with a simple right angle drive that does not adapt itself well to patterning a pick thereafter.

An additional object is to provide a lever-actuated push-pin carried by the key which is operative upon remote actuation while inside the protective cover to engage any abutment forming wall of the latter so as to bias the head of said key into meshed engagement with the lock.

Further objects of the invention herein disclosed and claimed are to provide an essentially theft proof protective mechanism for coin box locks that is simple yet effective, inexpensive, rugged, safe, compact, versatile and one that is readily adaptable to various types and styles of both keys and locks.

Other objects will be in part apparent and in part pointed out specifically hereinafter in connection with the description of the drawings that follows, and in which:

FIG. 1 is a perspective view looking down and to the right upon a standard lockable coin box shown equipped with the protective covers of the present invention and with the novel key used therewith in place to open same;

FIG. 2 is a perspective view from the same vantage point as FIG. 1 and to the same scale as the latter showing the key alone;

FIG. 3 is a perspective view to the same scale as FIGS. 1 and 2 but showing the key from a vantage point above and to the left of its rear rather than its front face;

FIG. 4 is a perspective view to the same scale as FIGS. 1, 2 and 3 taken from the same vantage point as the latter Figure showing a modified form of key having a rotatable notched blade-type head as contrasted with the rotatable tubular head of FIG. 3;

FIG. 5 is a fragmentary perspective view similar to FIG. 1 and to the same scale as the latter revealing the protective cover broken away and shown in section to expose the coin box without the key in place;

FIG. 6 is a fragmentary left side elevation to a slightly enlarged scale showing the protective cover over the lock and key housed in the latter, the handle of the key having been removed to reveal the shank in section;

FIG. 7 is a front elevation to the same scale as FIG. 6 showing only the key and protective cover with portions of the latter along with the key case having been broken away to expose the interior construction;

FIG. 8 is a horizontal section to an enlarged scale taken along line 8—8 of FIG. 7; and,

FIG. 9 is a horizontal section to the same scale as FIG. 8 taken along line 9—9 of FIG. 7.

Referring next to the drawings for a detailed description of the present invention and, initially, to FIG. 1 for this purpose, reference numeral 10 has been chosen to designate in a general way one type of standard coin box having a key lock 12 in the face of drawer 14 operative upon actuation to extend and retract ears 16 which lock the drawer into a suitable cavity (not shown) in the vending machine or the like. The particular lock 12 illustrated, is of conventional design and has a circular keyway 18 that accepts a tubular key 20 having axially-directed slots 22 in the surface thereof for actuating the tumblers (not shown). The invention is, of course, by no means limited to this type of lock and key therefor, the one shown being intended as only illustrative of one type thereof that can be used. In fact, FIG. 4 illustrates a modified form of the invention in which a bladed key 20m has been substituted for the tubular one shown in the remaining figures.

The guard subassembly has been indicated in a general way by reference numeral 24 and it has been most clearly illustrated in FIGS. 1 and 5–9, inclusive, to which detailed reference will now be made. Alongside the lock 12 fastened permanently to the face of the drawer is mounted an L-shaped bracket 26. The forwardly extending flange 28 of this bracket defines an end wall closing one end of tunnel-forming member 30.

In the particular form illustrated, tunnel-forming member 30 is a box-like member having a rectangular cross section defined by top wall 32, bottom wall 34, inside wall 36 and outside wall 38. All walls of the box-like tunnel forming member together with wall 28 of the bracket closing one end of the latter are all fabricated from hardened steel of the type which is most difficult to drill, bend, puncture or otherwise deform to gain direct access to the lock. The rear wall 36 extends from its attached edge parallel to the front of the drawer across the face of the lock and it includes an opening 40 therethrough providing direct axial access to the latter. The portion of inside tunnel wall remote from the edge thereof fastened to bracket 26 is permanently secured to the face of the drawer by suitable hardened steel fasteners 42.

As thus constructed, the guard subassembly 24 defines a blind tunnel, the only opening into which 44 is not only displaced laterally well to one side of lock 12 but, in addition, opens at right angles to the latter. In addition, the size of the tunnel thus formed is entirely too small to receive the hand and key, yet alone to actuate the latter. Furthermore, one is denied even a direct look at the lock or, for that matter, a lock pick designed in the manner of the key of the present invention, for the purpose of gaining unauthorized access to the coin drawer. Most picks, of course, require both a delicate "touch" to feel the lock tumblers as well as a close inspection of the pins or other appurtenances carried by the pick for the purpose of actuating the latter.

Next, with particular reference to all but FIG. 5 of the drawings, the subassembly designated broadly by reference numeral 46 which is used to actuate the lock will be set forth in detail. Such subassembly is made up of several parts, among which is an elongate housing 48 inside of which is mounted the right-angle drive mechanism 50 for the key 20. While housing 48 may take other forms than that shown, the elongate box-like configuration closed at both ends is as good as any and better than most others.

The right-angle key drive 50 comprises a shaft 52 journalled for rotation longitudinally of the housing within its endplates 54. Shaft collars 56 on the shaft bracket the outboard endplate 52 in the customary manner to prevent its moving axially. The outboard end of shaft 52 projects outside the housing and is fitted with a handle 58 or other suitable appurtenance for rotating same.

The inside wall 60 of the housing has an opening 62 therein (FIGS. 3, 4 and 8) within which the key 20 rotates. This key-receiving opening 62 is so located that it assumes a coaxial relationship with the keyway 18 in the lock 12 when the housing 48 is inserted all the way into the tunnel so that its inboard endplate shuts flange 28 of the bracket and its top and bottom walls 64 and 66, respectively, lie against the corresponding tunnel walls. An annular flange 68 encircles the inner end of the key and rides against the inside of inner housing wall 60 to limit the outward axial movement of the latter as shown in FIGS. 8 and 9. Immediately adjacent this flange is positioned pinion 70 having a stubshaft 72 depending therefrom that is journalled in bearing 74 in the outside housing wall 76, all of which are most clearly shown in FIG. 8. Shaft 52 carries the worm 78 that meshes with the pinion 70 to complete the right angle key drive 50. The length of the housing 48 is such as to project well beyond the open end of the tunnel where the handle 58 is readily accessible. In fact, the housing 48 is preferably made extra long, nearly twice the length of the tunnel, to accommodate the key insertion linkage associated therewith that has been broadly referred to by numeral 80 and to which detailed reference will now be made.

Under some circumstances, since no direct frontal access to the lock is available due to the side opening guard 24 covering same, some difficulty may be experienced in inserting the key 20 into the keyway although, once inserted, the right angle drive 50 makes it easy to

turn same and actuate the lock. Nevertheless, some means for assisting the user to insert the key would be of considerable help and such a mechanism is the key insertion linkage **80.** Well down inside the housing **48,** a tubular pin guide **82** is fastened in the outside wall **76** and a push-pin **84** is mounted therein for reciprocating movement in a direction normal to the outside tunnel wall **30** when the lock actuating subassembly **46** is fully inserted into said tunnel as shown. A push-pin actuating lever **86** is pivotally attached intermediate its ends within housing **48** on a vertically disposed pivot pin **88** located between push-pin **84** and outboard end wall **54.** A horizontally disposed slot **90** is provided in the inside wall **60** of the housing to receive the inner end of the lever **88** attached to pin **84** by link **92** while the outer end of said lever emerges into accessible position on the outside of the housing through a similar slot **94** in the outside wall **76.** Link **92** is not intended to take any actuating forces as the lever acts directly on the pin; therefore, the link serves merely as a means for preventing loss of the pin and other well known pin retainers could be substituted therefor with no loss in function.

With the key-actuating subassembly **46** retracted axially into its disengaged position shown in full lines in FIG. **9,** the operator need only squeese lever **86** toward the outside wall **76** of the housing, whereupon, it will rock on its pivot **88** and the inner end thereof will engage the push-pin **84** so as to extend it in a direction opposite to that at which the key must move to engage the keyway. Once the pin contacts the inside surface of outer tunnel wall **30,** which it does almost immediately, it will cooperate therewith and with lever **80** to push the key **20** forwardly into the keyway **18** as represented by broken lines in FIG. **9** and full lines in FIG. **8;** whereupon, the drive mechanism **50** can be actuated to open the lock.

Finally, FIG. **4** merely shows a slightly modified form of lock actuating subassembly **46m** having as its only change the substitution of a bladed key **20m** for the tubular one **20** of the other Figures.

What is claimed is:

1. Anti-probe apparatus for use with a lock of the type actuated by insertion of a key into a keyway followed by rotation thereof which comprises in combination: guard means defining a tunnel having an opening in the side thereof intermediate its ends sized to provide access to the keyway when attached so as to register therewith and a second opening at one end displaced to one side of said access opening and disposed at right angles thereto; and, lock-actuating means including a housing insertable into said tunnel through the open end thereof, said housing being sized for relative transverse movement therein between a retracted position remote from the access opening in the side thereof and an extended position in close proximity to the latter, a key operative to actuate the lock journalled for rotation in the housing in position to enter the keyway upon relative transverse movement of said housing from its retracted into extended position, right angle drive means within said housing connected to said key and operative upon actuation to rotate same, and actuating means accessible through the open end of the tunnel operatively connected to said drive means.

2. The combination as set forth in claim **1** which includes a lever pivotally attached to the housing for rockable movement about an axis intermediate its ends, said lever having one end thereof accessible outside the end of the tunnel and its other end terminating inside the latter on the opposite side of the housing from the key, and said accessible end being operative upon movement thereof in the direction in which the key enters the keyway to force its inner end against the tunnel wall facing the latter thus biasing the housing into its extended position.

3. The combination as set forth in claim **1** in which:

means defining an abutment effective to limit the degree of penetration of the housing blocks the other end of the tunnel, said abutment-forming means and housing cooperating with one another upon insertion of the latter to position the key opposite the keyway.

4. The combination as set forth in claim **1** in which: both the tunnel and housing are of rectangular cross section with the latter being dimensioned to telescope into the former so as to permit relative transverse movement in the direction of key movement into the keyway while preventing essentially all relative transverse movement in a direction normal to the latter.

5. The combination as set forth in claim **1** in which: the guard means is opaque and shaped to permit only limited oblique visual access to the keyway.

6. The combination as set forth in claim **1** in which: the right angle drive means comprises a worm and pinion gear train.

7. The combination as set forth in claim **1** in which: wall means defines a closure for the other end of the tunnel effective to deny both physical and visual access thereto.

8. The combination as set forth in claim **1** in which: the interior dimensions of the tunnel are selected such as to effectively deny direct manual access to the keyway of the nature required to insert and turn a key therein.

9. The combination as set forth in claim **2** in which: the lever is pivoted inside the housing, a push-pin is mounted within the wall of the housing remote from the lock for reciprocating movement from a retracted position into an extended position engaging said tunnel wall facing the latter, and in which the inner end of the lever becomes operative upon actuation of the accessible end thereof to engage the pin and extend same.

10. The combination as set forth in claim **6** in which: a shaft is journalled for rotation in the housing about an axis normal to the axis of key rotation displaced to one side thereof, the worm is mounted on said shaft for conjoint rotation therewith, the pinion is mounted on the key in meshed engagement with the pinion, and the actuating means is operatively attached to the end of the shaft accessible through the open end of the tunnel.

11. The subcombination of a guard for use as a protective cover over a keyway in a key lock forming an integral part of a structure to be protected which comprises: a tubular member permanently attached to the structure to be protected in position covering the keyway, said member defining a tunnel having an opening in the side thereof intermediate its ends registering with said keyway and provide access thereto and a second opening at one end thereof displaced to one side of said access opening and disposed at right angles thereto.

12. The subcombination as set forth in claim **11** in which: the guard means is opaque and shaped to permit only limited oblique visual access to the keyway.

13. The subcombination as set forth in claim 11 in which: wall means defines a closure for the other end of the tunnel effective to deny both physical and visual access thereto.

14. The subcombination as set forth in claim 11 in which: the interior dimensions of the tunnel are selected such as to effectively deny direct manual access to the keyway of the nature required to insert and turn a key therein.

15. The subcombination of a lock-actuating mechanism for use with a key lock guarded by a protective cover defining a side-opening tunnel providing the only access thereto through an entryway displaced to one side of the keyway which comprises: a housing insertable into said tunnel through the entryway thereto, said housing being sized for relative transverse movement therein between a retracted position remote from the access opening in the side thereof and an extended position in close proximity to the latter, a key operative to actuate the lock journalled for rotation in the housing in position to enter the keyway upon relative transverse movement of said housing from its retracted into extended position, right angle drive means within said housing connected to said key and operative upon actuation to rotate same, and actuating means accessible through the entryway into said tunnel operatively connected to said drive means.

16. The subcombination as set forth in claim 15 which includes: a lever pivotally attached to the housing for rockable movement about an axis intermediate its ends, said lever having one end thereof accessible outside the end of the tunnel and its other end terminating inside the latter on the opposite side of the housing from the key, and said accessible end being operative upon movement thereof in the direction in which the key enters the keyway to force its inner end against the tunnel wall facing the latter thus biasing the housing into its extended position.

17. The subcombination as set forth in claim 15 in which: the right angle drive means comprises a worm and pinion gear train.

18. The subcombination as set forth in claim 16 in which: the lever is pivoted inside the housing, a push-pin is mounted within the wall of the housing remote from the lock for reciprocating movement from a retracted position into an extended position engaging said tunnel wall facing the latter, and in which the inner end of the lever becomes operative upon actuation of the accessible end thereof to engage the pin and extend same.

19. The subcombination as set forth in claim 17 in which: a shaft is journalled for rotation in the housing about an axis normal to the axis of key rotation displaced to one side thereof, the worm is mounted on said shaft for conjoint rotation therewith, the pinion is mounted on the key in meshed engagement with the pinion, and the actuating means is operatively attached to the end of the shaft accessible through the open end of the tunnel.

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