United States Patent [19]

Bargiel

[11] **3,926,140**

[45] **Dec. 16, 1975**

[54] **ACTUATING DEVICE FOR A CLOSURE ALARM MECHANISM**

[76] Inventor: **Joseph Bargiel,** 5245 Ambridge Drive, Agoura, Calif. 91301

[22] Filed: **Dec. 10, 1973**

[21] Appl. No.: **423,388**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 133,052, April 12, 1971, abandoned.

[52] **U.S. Cl.** **116/85;** 116/6; 116/91

[51] **Int. Cl.²** **G08B 13/08**

[58] **Field of Search** 116/6, 8, 75, 85, 86, 91, 116/100, 155, 156, 158, 161, 162, 167

[56] **References Cited**

UNITED STATES PATENTS

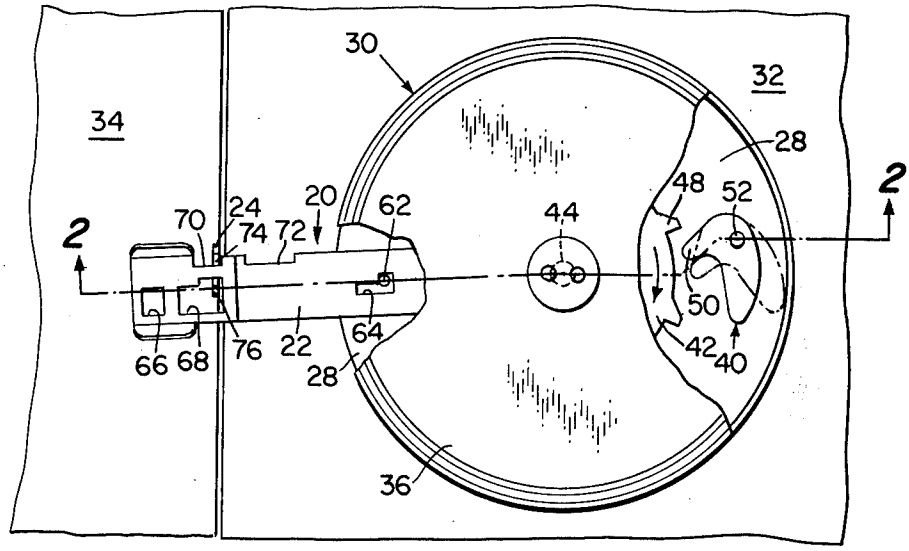
217,809	7/1879	McAdams, Jr.	116/86
1,282,089	10/1918	Lavryk	116/8
1,384,723	7/1921	Koziol	116/8
1,854,126	4/1932	Ferguson	116/86
1,859,345	5/1932	Schantz	116/86
2,691,357	10/1954	Owen	116/86

Primary Examiner—Richard C. Queisser
Assistant Examiner—Daniel M. Yasich
Attorney, Agent, or Firm—Dunlap & Codding

[57] **ABSTRACT**

In combination with a closure member, such as a door, an actuating device for activating an alarm mechanism to provide an indication of unauthorized entry. The activating device includes a slider which is manually movable to a first position, movable from the first position to a second position via the opening movement of the door, movable to a third position via the closing movement of the door, the alarm mechanism being maintained in a deactivated position in the first, the second and the third positions of the slider. The slider is moved to a fourth position for positioning the alarm mechanism in the activated position providing the output indication upon an unauthorized opening of the door.

10 Claims, 22 Drawing Figures



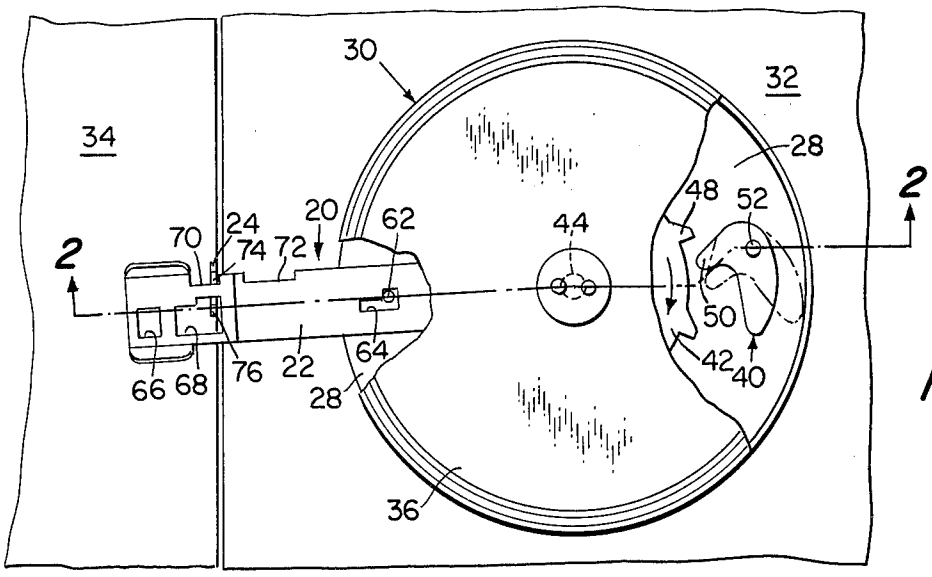


Fig. 1

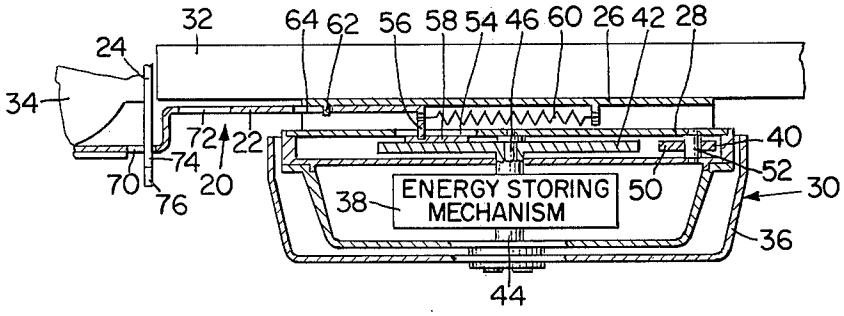


Fig. 2

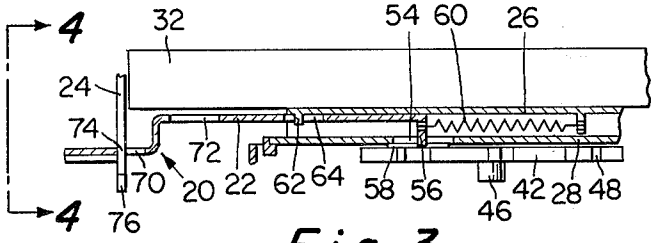


Fig. 3

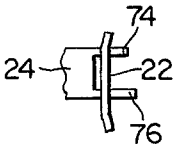


Fig. 4

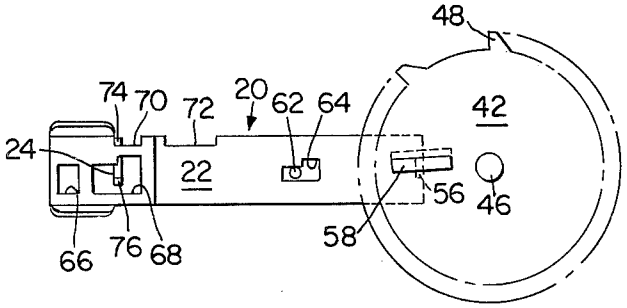


Fig. 5

INVENTOR
JOSEPH BARGIEL

BY JESSUP & BEECHER

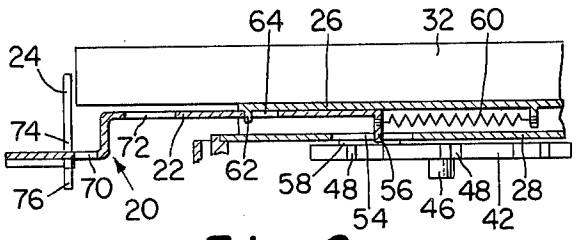


Fig. 6

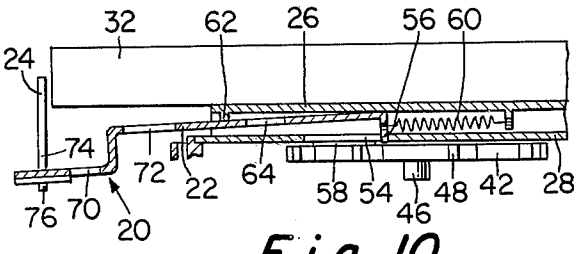


Fig. 10

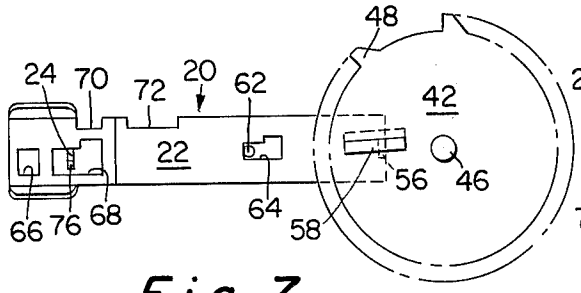


Fig. 7

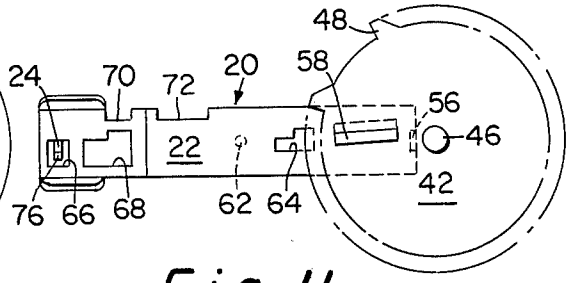


Fig. 11

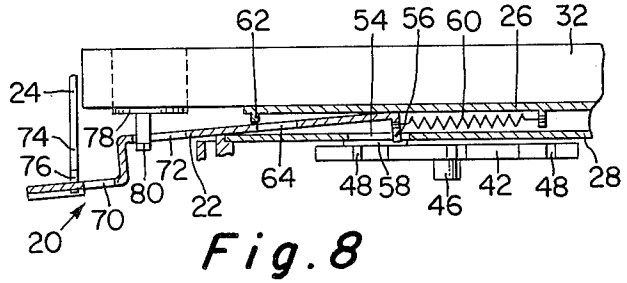


Fig. 8

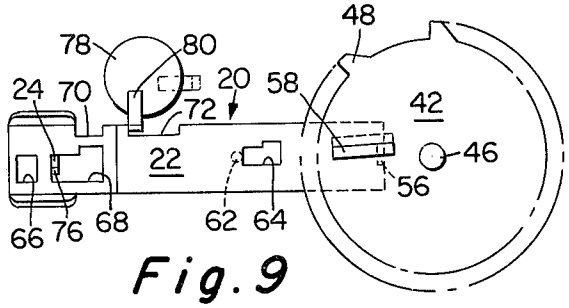


Fig. 9

INVENTOR
JOSEPH BARGIEL

BY JESSUP & BEECHER

Fig. 12.

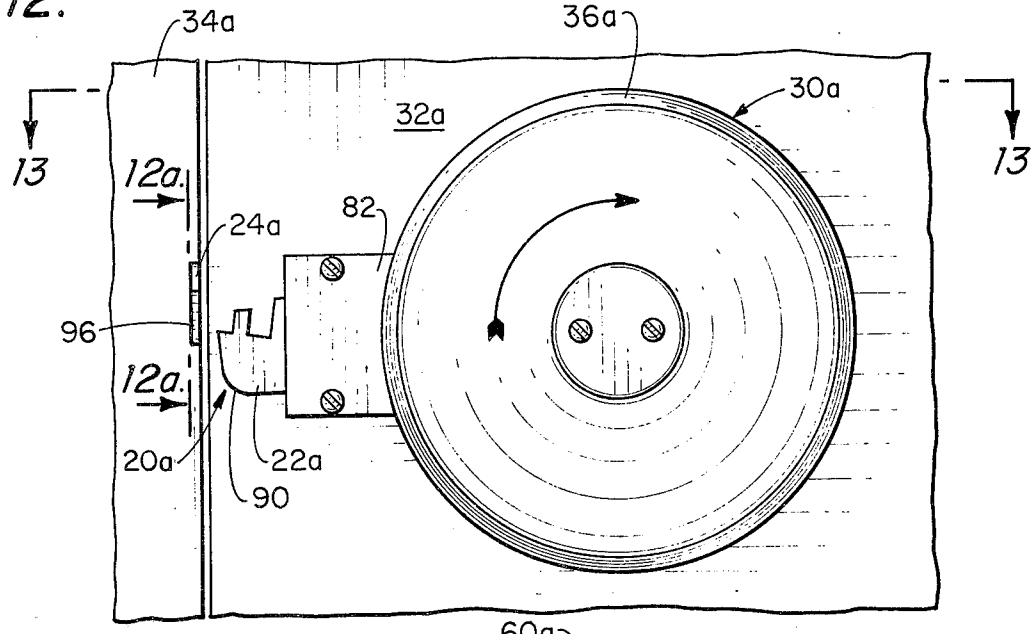


Fig. 13.

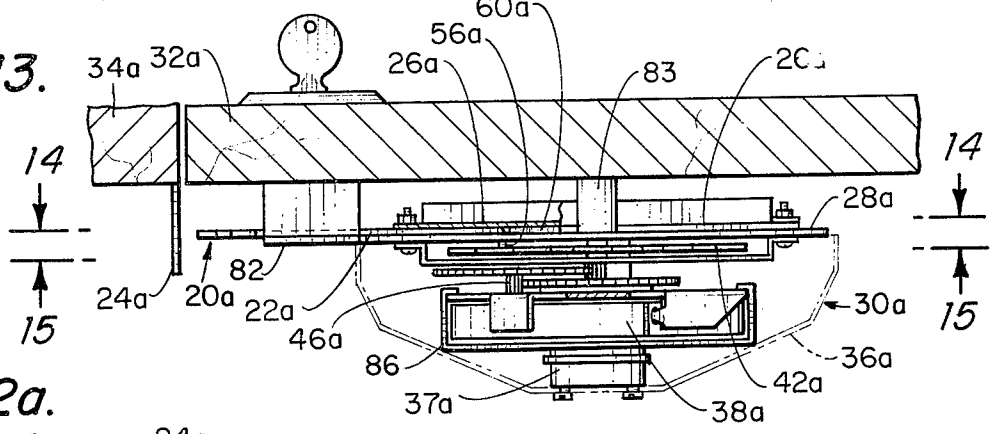


Fig. 12a.

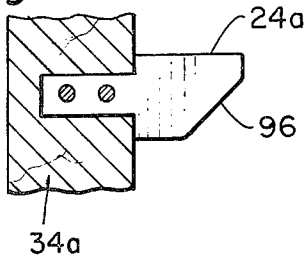


Fig. 14.

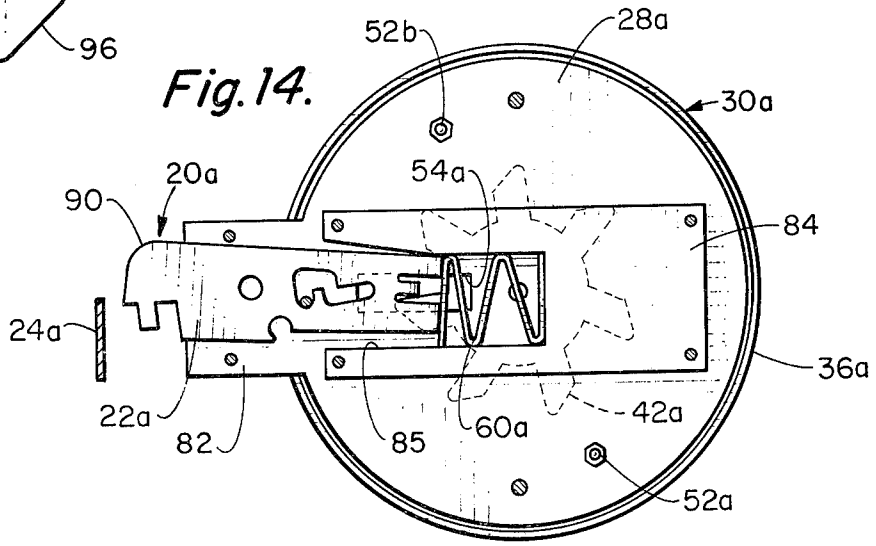


Fig. 15.

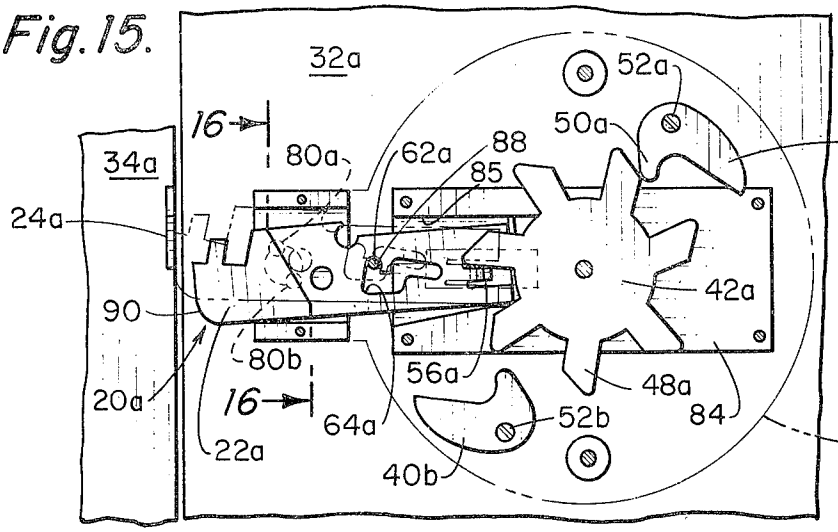


Fig. 16.

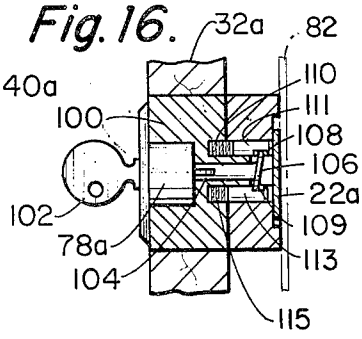


Fig. 17.

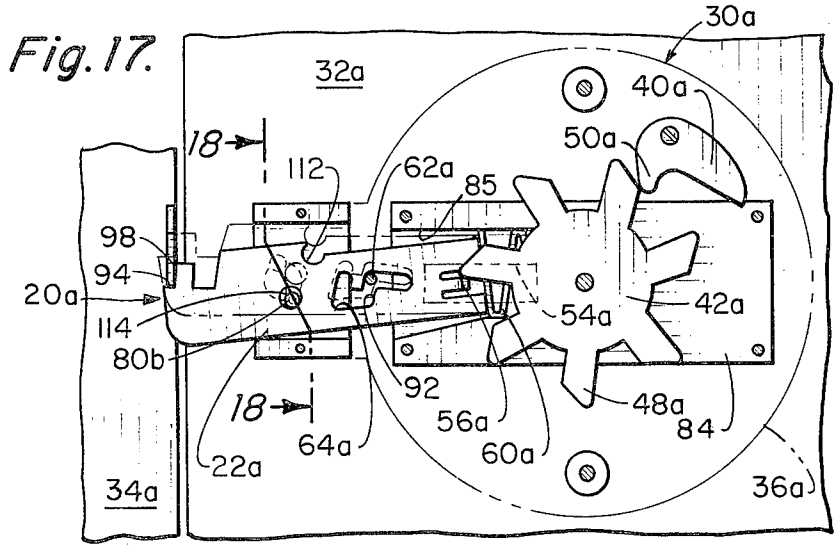


Fig. 18.

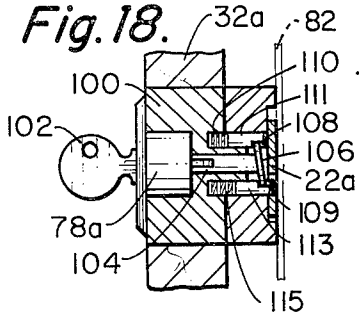


Fig. 19.

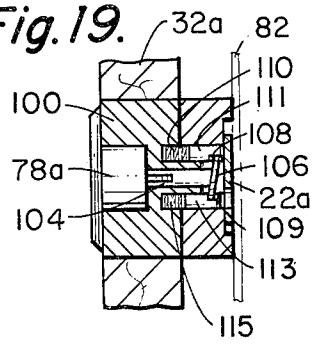


Fig. 20.

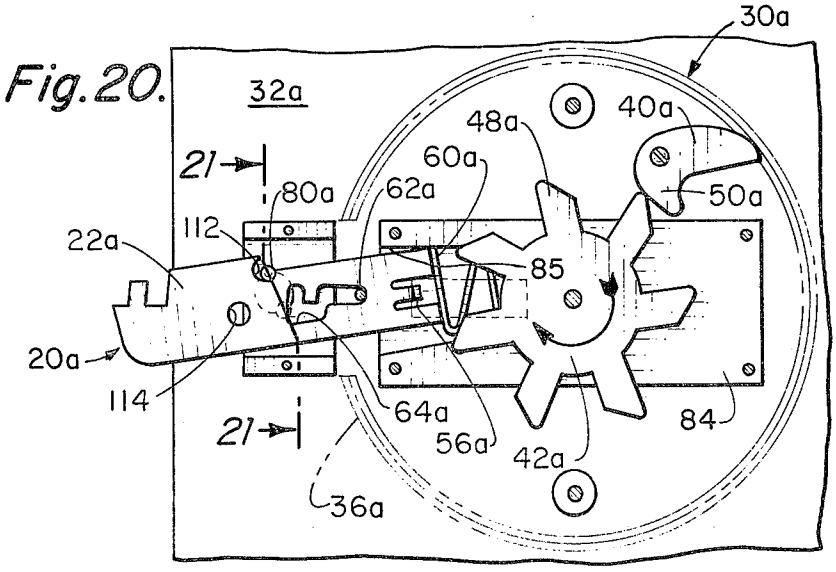
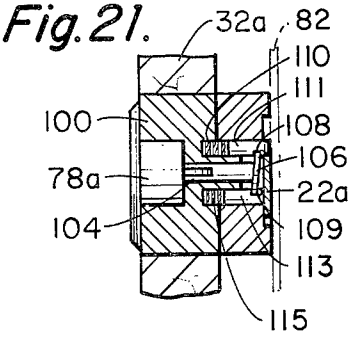


Fig. 21.



ACTUATING DEVICE FOR A CLOSURE ALARM MECHANISM

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a continuation-in-part of the patent application entitled "ACTUATING DEVICE FOR A CLOSURE ALARM MECHANISM," Ser. No. 133,052, filed Apr. 12, 1971, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention is related generally to alarm systems and, more particularly, but not by way of limitation, to an actuating device connected to an entry door of a residence and activating an alarm mechanism upon the unauthorized opening of the entry door for providing an output indication of the unauthorized opening.

2. Description of the Prior Art

The use of residential alarm systems has been well-known for a substantial number of years. Such alarm systems are employed to emit a warning or annunciation of an unauthorized entry into the residence.

Most commonly the unauthorized entry into a residence is accomplished through an existing closure to the residence such as a door or window. For this reason alarm systems are normally employed in combination with a door or a window to warn of such unauthorized entrance. Conventional systems of the mechanical spring-wound type are normally employed only when the resident is at home. Heretofore, more complex electrical systems were employed when the resident was not at home. The primary purpose of such conventional spring-wound alarms has been to warn a sleeping resident against unauthorized entrance by a burglar or other person with harmful intentions.

It is also desirable to employ the use of an alarm system when the residence is not occupied as well as when it is occupied. An electrical system may be employed for such a purpose; however, such electrical alarm systems are quite expensive and normally prohibitive to the average homeowner or renter. Heretofore, a conventional spring-wound alarm has not been expeditiously applied to the door through which the resident leaves.

It would be desirable to design an alarm system which can be conventionally wound as by a spring, can be quickly and easily made ready for activation, is not triggered or activated upon the resident leaving the premises, but is triggered or activated upon unauthorized entry into the residence.

SUMMARY OF THE INVENTION

The actuating device of the present invention is to be employed in combination with an alarm mechanism which upon the actuating device being moved to a predetermined position permits activation of the alarm mechanism. The alarm mechanism and actuating device of the present invention is designed to be employed upon the interior side of a closure member having a movable portion such as a door. The actuating device includes an actuating bar and a slider. In normal usage, the actuating bar will be fixedly mounted to the stationary portion of the closure member such as the door jamb with the slider and the alarm mechanism being fixedly mounted to the door. However, it is to be understood that such an arrangement could be readily reversed. During normal usage of the door, the slider is positioned in a deactivated or unarmed position so that activation of the alarm mechanism does not occur. When it is decided that the resident leave the premises, to set the actuating device the resident manually moves the slider to a first position while the door is in the closed position. Upon the resident opening the door, the slider is caused to move to a second position. Upon the resident leaving the premises and shutting or closing the door, the slider is caused to move to a third position. In each of the first position, the second position and the third position, the alarm mechanism is not permitted to be activated. If the door is opened by an unauthorized person, as prior to the return of the resident, the slider is caused to move to a fourth position. The slider is continuously spring biased to each successive position. When in the fourth position the alarm mechanism is activated causing a quite loud, prolonged ringing of a bell or, in other words, providing an output indication of the unauthorized opening of the door. This ringing of the bell serves to warn neighbors or other nearby persons of the unauthorized entry into the residence. Under normal circumstances, upon return of the resident and the device is still in the position ready for activation, i.e., in the third position, a key-type of lock mechanism is employed by the resident to keep the alarm mechanism from ringing when the resident opens the door. The resident places the key within the lock and rotates the lock so as to retain the slider against movement from the third position to the fourth position, thereby preventing the positioning of the alarm mechanism in the activated position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially, cut-away front view of the actuating device of the present invention connected to a closure member and an alarm mechanism, the alarm mechanism being positioned in the deactivated position via a portion of the actuating device.

FIG. 2 is a cross-sectional view of the apparatus of FIG. 1 taken along line 2—2 of FIG. 1.

FIG. 3 is a fragmentary cross-sectional view of the actuating device of FIG. 1 showing the actuating device in the first position.

FIG. 4 is an end view of the actuating device of FIG. 1, taken along line 4—4 of FIG. 3.

FIG. 5 is a front view of the actuating device of FIG. 1, showing the slider portion of the actuating device in the first position as depicted in FIG. 3.

FIG. 6 is a view similar to FIG. 3, but showing the slider portion of the actuating device in the second position.

FIG. 7 is a view similar to FIG. 5, but showing the slider portion of the actuating device in the second position.

FIG. 8 is a view similar to FIG. 6, but showing the slider portion of the actuating device in the third position.

FIG. 9 is a view similar to FIG. 7, but showing the slider portion of the actuating device in the third position.

FIG. 10 is a view similar to FIG. 8, but showing the slider portion of the actuating device in the fourth position.

FIG. 11 is a view similar to FIG. 9, but with the slider portion of the actuating device in the fourth position.

FIG. 12 is an elevational view of a modified actuating device and cooperating alarm mechanism.

FIG. 12A is a fragmentary view taken along the line 12A—12A in FIG. 12.

FIG. 13 is a sectional view taken along the line 13—13 in FIG. 12, with the actuating device being shown in partial section.

FIG. 14 is a view taken along the line 14—14 in FIG. 13.

FIG. 15 is a view taken along the line 15—15 in FIG. 13.

FIG. 16 is a sectional view taken along the line 16—16 in FIG. 15.

FIG. 17 is a view similar to FIG. 15, but showing the modified actuating device in another position of operation.

FIG. 18 is a view taken along the line 18—18 in FIG. 17.

FIG. 19 is a view similar to FIG. 18, but showing the lock turned to another position with respect to the position of the lock shown in FIG. 18.

FIG. 20 is a view similar to FIGS. 15 and 17, but showing the modified actuating device in a still further position of operation.

FIG. 21 is a cross-sectional view taken along the line 21—21 in FIG. 20.

DETAILED DESCRIPTION OF THE SHOWN EMBODIMENT

Referring particularly to FIGS. 1, 2, 3, 4 and 5, shown therein and designated by the general reference numeral 20 is an actuating device constructed in accordance with the present invention, the actuating device generally including a slider 22 and an actuating bar 24. The slider 22 is movably mounted within a guide 26 shown in FIGS. 2 and 3. The guide 26 is fixedly secured to a back plate 28 (shown in FIGS. 1, 2 and 3) of an alarm mechanism 30 (shown in FIGS. 1 and 2), the alarm mechanism 30 having a deactivated position and an activated position and the alarm mechanism 30 providing an indication of an unauthorized opening of the movable portion of the closure member in the activated position thereof. The guide 26 is also adapted to be fixedly secured to a closure member having a movable portion and a stationary portion, the closure member being more particularly shown in the drawings as having a door 32 (movable portion) shown in FIGS. 1, 2 and 3, and door jamb 34 (stationary portion) shown in FIG. 1, located within a person's residence. The actuating bar 24 is shown in FIG. 1 as being adapted to be secured to the stationary portion of the closure member or, more particularly, the door jamb 34, and the guide 26 is shown in FIGS. 1, 2 and 3 as being mounted on the stationary portion of the closure member or, more particularly, the door 32. It is to be understood that the mounting could be reversed so that the guide 26 would be mounted to the stationary portion of the closure member, more particularly, the wall structure adjacent the door jamb 34 and the actuating bar 24 would be mounted upon the movable portion of the closure member or, more particularly, the door 32. It is also to be understood that the actuating device 20 and its associated alarm mechanism 30 could be mounted upon any closure member, and it is not the inventor's desire to limit this invention to only the door type of closure member.

The alarm mechanism 30 may take any of numerous forms and, in one form as shown in the drawings, the alarm mechanism 30 generally includes a bell 36 (shown in FIGS. 1 and 2), an energy-storing mechanism 38 (shown in FIG. 2), a clapper 40 (shown in FIGS. 1 and 2), and a hammer wheel 42. In one form, the energy-storing mechanism 38 generally includes a spring assembly which is connected through a gearing assembly to effect rotation of the hammer wheel 42. The gearing assembly functions to extend the duration of time of the ringing of the bell 36. For an example of an energy-storing mechanism 38, reference may be had to U.S. Pat. No. 1,854,126, issued Apr. 12, 1932, entitled "BURGLAR ALARM," by B. E. Ferguson.

The energy-storing mechanism 38 is connected through a wind-up shaft 44 (shown in FIGS. 1 and 2) to the bell 36. To store energy within the energy-storing mechanism 38, a person is to manually effect rotation of the bell 36 with the hammer wheel 42 being fixedly held. A ratchet system is included within the energy-storing mechanism 38 so as to prevent a release of energy through the shaft 44 and the bell 36. The energy-storing mechanism 38 is permitted to only release this energy through a shaft 46 (shown in FIGS. 2, 3 and 5) which is connected to the hammer wheel 42.

Located about the periphery of the hammer wheel 42 are a plurality of hammers 48 (shown in FIGS. 1, 3 and 5). The hammers 48 are adapted to come into contact with a butt end 50 of the clapper 40 shown in FIGS. 1 and 2. The clapper 40 is pivotally mounted by pin 52 (shown in FIGS. 1 and 2) upon the back plate 28. Upon each of the hammers 48 coming into contact with the butt end 50 of the clapper 40, the fore end of the clapper 40 is adapted to contact the interior of the bell 36. As a result, a loud ringing noise is produced and with the energy-storing mechanism 38 fully wound, this noise can be produced for a period of several minutes, the alarm mechanism 30 providing an audible output indication of an unauthorized opening of the movable portion of the closure member.

Formed within the back plate 28 is an elongated opening 54 as shown in FIGS. 2 and 3. As shown in FIGS. 2, 3 and 5, a pawl 56 is integrally connected at approximately a right angle to the slider 22 and extends through the opening 54 and is located directly adjacent the hammer wheel 42. As shown in FIGS. 2, 3 and 5, a protuberance 58 is formed on the hammer wheel 42 and is adapted to come into contact with the pawl 56. With the protuberance 58 in contact with the pawl 56, rotation of the hammer wheel 42 is prevented, thereby preventing the alarm mechanism 30 from being positioned in the activated position for providing the output indication in response to the unauthorized opening of the closure member.

Also connected to the pawl 56 of the slider 22 is a spring 60 (shown in FIGS. 2 and 3). The free end of the spring 60 is connected to the guide 26, the spring 60 biasing the slider 22 generally toward the fourth position of the slider 22 for activating the alarm mechanism 30, as will be described in greater detail below. It is to be noted that the movement of the slider 22 within the guide 26 is substantially lineal.

As shown in FIGS. 1, 2, 3 and 5, integrally secured to the guide 26 is a pin 62. The pin 62 is adapted to cooperate with an L-shaped slot 64 formed within the slider 22. Located adjacent the free end of the slider 22 is a rectangularly shaped opening 66, as shown in FIGS. 1 and 5. Located between opening 66 and slot 64 is an enlarged L-shaped slot 68 (shown in FIGS. 1 and 5). Formed within the edge of the slider 22 adjacent the

enlarged L-shaped slot **68** is a first recess or notch **70** (shown in FIGS. **1, 2, 3** and **5**). Spaced from the first recess **70** in the direction of the slot **64** is a second recess or notch **72** (shown in FIGS. **1, 2, 3** and **5**). The slider **22,** between the first recess **70** and the second recess **72,** is bent in the shape substantially of a right-angle jog.

The actuating bar **24** has an upper leg **74** and a lower leg **76.** The lower leg **76** is formed of a slightly greater length than the upper leg **74,** as noted from FIG. **4** of the drawings.

Formed within the door **32** is a lock **78,** shown in FIGS. **8** and **9.** The lock **78** is capable of being actuated or operated by means of a key (not shown in the drawings) to accomplish an authorized opening of the movable portion (the door **32**) of the closure member, the key moving a portion of the lock **78.** A pawl **80** is connected to the lock **78** and the key moves a portion of the lock **78** to effect the movement of the pawl **80.** The key is insertable within the lock **78** from the exterior side of the movable portion of the closure member (the door **32**). The lock **78** is located so the pawl **80** is capable of cooperating with the second recess **72,** i.e., the pawl **80** being connected to the lock **78** and movable to a position wherein the pawl **80** is disposed in the recess **72** for engaging the slider **32** and preventing the movement of the slider **22** from the third position when opening the movabale portion (the door **32**) of the closure member via operating the lock **78** with the key, as will be described further below.

The operation of the actuating device **20** of this invention will be described below and it will be assumed that the actuating device **20** and its associated alarm mechanism **30** are mounted upon the movable portion of the closure member (the door **32**) and the actuating bar **24** is mounted in a particular location on or near the stationary portion of the closure member, i.e., near the door jamb **34.**

During the time the residence is occupied and it is desired to set the alarm mechanism **30** in the deactivated position, the slider **22** is located in the unarmed position as shown in FIG. **1** of the drawings. In this deactivated position of the alarm mechanism **30** and unarmed position of the slider **22,** the pin **62** is located within the shortest leg portion of the L-shaped slot **64** and the slider **22** is canted slightly with respect to the normal lineal direction of movement of the slider **22,** the pin **62** engaging a portion of the slider **22** preventing movement of the slider **22** via the spring **60** and positioning the slider **22** in the unarmed position. In this deactivated position of the alarm mechanism **30** and unarmed position of the slider **22,** the slider **22** does not come into contact with the actuating bar **24** during the closing of the door **32** and the slider **22** will remain in the unarmed position during the opening and the closing of the door **32.**

Now it will be assumed that it is desired for the resident to set the alarm mechanism **30** prior to departing from the residence for a period of time. The resident then first effects rotation of the bell **36** to wind up the spring within the energy-storing mechanism **38.** The resident then grasps the slider **22** disengaging the slider **22** by removing the pin **62** out of cooperation with the shortest leg portion of the slot **64,** thereby allowing the slider **22** to slidingly move rightward under bias of the spring **60** a sufficient distance so that the upper leg **74** of the bar **24** is disposed within the first recess **70** and engages a portion of the slider **22** for preventing further movement of the slider **22.** This moves the slider **22** from the unarmed position shown in FIGS. **1** and **2** to the first position of the slider **22** shown in FIGS. **3** and **5.** It is assumed that the foregoing procedure is accomplished with the door **32** closed.

Upon the resident leaving the premises and opening the door **32,** the slider **22** is disengaged from the bar **24** thereby allowing the slider **22** to be biasingly moved via the spring **60** rightward a slight distance until the pin **62** disposed within the longest leg of the slot **64** engages a portion of the slider **22** preventing further movement of the slider **22** via the spring **60** and positioning the slider **22** in the second position, as shown in FIGS. **6** and **7.**

After the resident has passed exteriorly of the premises, the door **32** is closed and the upper leg **74** comes into contact with and engages the rear side of the slider **22.** As a result, the slider **22** is pivoted laterally a sufficient distance so that the pin **62** becomes completely disengaged from the slot **64,** thereby allowing the slider **22** to slide or to be moved via the spring **60** until the longest leg of the slot **68** comes into contact with and is engaged by the lower leg **76** of the actuating bar **24,** thereby preventing further movement of the slider **22** and positioning the slider **22** in the third position, as shown in FIGS. **8** and **9.** As a result, the slider **22** is prevented from further movement. It is to be noted that in the first position of the slider **22** (FIGS. **3** and **5**), which was established by the resident manually moving the slider **22** from the unarmed position to the first position, in the second position of the slider **22** (FIGS. **6** and **7**), which resulted when the door **32** was opened disengaging the slider **22** from the actuating bar **24** and allowing the slider **22** to be moved via the spring **60** from the first position to the second position, and the third position of the slider **22** (FIGS. **8** and **9**), which occurred when the door **32** was closed causing the actuating bar **24** to engage the slider **24,** disengaging the slider **22** from the pin **62** allowing the slider **22** to be moved via the spring **60** from the second to the third position, the pawl **56** is in continuous contact with the protuberance **58,** thereby preventing rotation of the hammer wheel **42** and thus preventing the alarm mechanism **30** from being positioned in the activated position for providing the output indication.

Let it now be assumed that unauthorized entrance through the door **32** into the unoccupied residence occurs. Upon the door **32** being opened, the slot **68** is caused to be moved out of engagement with the lower leg **76** of the actuating bar **24,** as the door **32** swings away from the door jamb **34,** thereby disengaging the slider **22** from the actuating bar **24** allowing the slider **22** to be moved via the spring **60** from the third position to the fourth position. It is to be understood that the longitudinal movement of the slider **22** is caused by the spring **60.** The slider **22** moves sufficiently rightward so that the pawl **56** moves out of engagement with the protuberance **58,** thereby positioning the slider **22** in the fourth position. Therefore, the hammer wheel **42** is premitted to rotate, such rotation being effected by means of the energy-storing mechanism **38** when the slider **22** is positioned in the fourth position. Thereupon, the hammers **48** come into contact with the butt end **50** of the clapper **40** positioning the alarm mechanism **30** in the activated position. The resulting loud ringing (the audible output indication) over an extended duration should make known the unauthorized entrance to any person within several hundred feet of the premises. The output indication of the alarm mech-

anism **30** should act as a deterrent for continued unauthorized entrance.

If the resident or other authorized person returns to the residence and finds the alarm mechanism **30** is in the deactivated position and the door **32** closed, the person can open the door **32** without effecting actuation of the alarm mechanism **30** or, in other words, without positioning the alarm mechanism in the activated position by using the key to operate the lock **78** for gaining authorized entry. The resident places a key within the lock **78** and pivots or moves the lock **78** in a manner causing the pivoting movement of the pawl **80.** The pawl **80** is caused to be moved into cooperation with the recess **72** and in abutting or engaging relationship with a portion of the slider **22,** thereby preventing movement of the slider **22** from the third position when the door **32** is opened. Therefore, upon opening of the door **32,** although the slider **22** has been disengaged from the lower leg **76** of the actuating bar **24,** movement of the slider **22** from the third position is prevented by the pawl **80** engaging a portion of the slider **22.** Once the resident or other authorized person has gained entrance within the residence, that person may then reset the actuating device **20** to the deactivated or unarmed position (FIGS. **1** and **2**) or to the first position (FIGS. **3** and **5**), if desired.

EMBODIMENT OF FIGS. 12 THROUGH 21

FIGS. **12** through **21** illustrate a modified actuating device **20***a* constructed in accordance with the present invention in which the modified slider **22***a* moves in a single plane and the slider **22***a* is not required to move out of that plane, in a manner similar to the slider **22** described before. In the description which follows, for ease of correlation with corresponding parts of the actuating device **20,** the same numerals have been used followed by a lower-case letter.

In FIG. **12,** the alarm mechanism **30***a* is shown consisting of the bell **36***a* forming a significant portion of an annunciator means which provides an indication of the unauthorized opening of the movable portion of the closure member or door **32***a* to which it is mounted. The door **32***a* is hingedly mounted within a frame having a door jamb **34***a* to which is secured an inwardly extending modified actuating bar **24***a*, forming a stop member for the slider **22***a* and in effect constituting a trigger for the annunciator means.

A circular modified back plate **28***a*, shown in FIG. **13,** having a radial extension **82,** is mounted by means of spacer posts **83** to the door **32***a*. The back plate **28***a* forms one side of a flat guide channel for the slider **22***a*, the other side being formed by the modified guide **26***a* between which is sandwiched a spacer plate **84** having a large notch **85** therein. As best seen in FIG. **14,** the slider **22***a* is free to slide horizontally in the notch **85,** the slider **22***a* being biased outwardly thereof by a serpentine spring **60***a* positioned in the notch **85** and having one end engaging the slider **22***a* and the opposite end engaging one end of the slider **22***a*. Pivoted to the back plate **28***a*, on the opposite side from the slider **22***a*, is the hammer wheel **42***a* forming a significant portion of the annunciator means. The wheel **42***a* is linked by a modified geared shaft **46***a* to the inner end of the modified energy-storing mechanism **38** *a*, the energy-storing mechanism **38***a* being more particularly a clock spring. The outer end of the energy-storing mechanism **38***a* is secured to a case **86** (shown in FIG. **13**) which is in turn secured to the bell **36***a*. Conventional ratchet mechanism (not shown) allows the bell **36***a* and hence the outer end of the spring type energy-storing mechanism **38***a* to be wound in a clockwise direction (FIG. **12**), thereby storing energy in the spring type energy-storing mechanism **38***a* but with the ratchet preventing unwinding. A torque is thus applied to the hammer wheel **42***a* in a clockwise direction, as shown in FIG. **20,** but rotation of the wheel **42***a* is blocked by the pawl **56***a* bent laterally out from the slider **22***a* and extending through a slot or opening **54***a* formed in the back plate **28***a*. The pawl **56***a* intercepts one of the modified hammers **48***a* which strike the clapper **40***a* in the same manner as described before with respect to the actuating device **20.**

It will be noted that the large notch **85** in the spacer plate **84** is of sufficient width to allow some lateral sliding of the slider **22***a*, while still confining all motion of the slider **22***a* to the single plane in which the slider **22***a* is disposed.

In FIG. **15,** the slider **22***a* is shown in solid-lines in the unarmed position. The pin **62***a* mounted on the back plate **28***a* extends into a somewhat serpentine shaped modified slot **64***a* formed in the slider **22***a*.

In the position in which the slider **22***a* is shown in full lines in FIG. **15,** the slider **22***a* is prevented from being pushed to the left by the spring **60***a*, by virtue of a shoulder **88** on the slider **22***a* which extends into the serpentine slot **64***a* and intercepts the pin **62***a*, thereby limiting leftward movement of the slider **22***a*. In this position, the end **90** of the slider **22***a* is stopped short of the edge of the door **32***a* and does not come into contact with the actuating bar **24***a* secured to the door jamb **34***a*. In this position, the actuating device is locked out of operation.

When the lefthand end of the slider **22***a* is pushed up to the position shown in phantom in FIG. **15,** the slider **22***a* slides to the left and the end **90** butts against the actuating bar **24***a*. This is the first position of the slider **22***a*. In the first position of the slider **22***a*, the slider **22***a* is prevented from further leftward movement by the engagement between the end **90** and the actuating bar **24***a*. From the first position, the actuating device **20***a* is ready to be positioned in the second and the third positions whenever the resident opens and then closes the door **32***a*.

The positioning of the actuating device **20***a* in the second and the third positions is illustrated in FIG. **17.** When the door **32***a* is opened, the end **90** of the slider **22***a* is freed from the restraint imposed by the actuating bar **24***a* or, in other words, disengaged from the actuating bar **24***a*. The slider **22***a* slides to the left to the phantom position shown in FIG. **17,** where further movement is restrained or prevented by the engagement of the pin **62***a* with a shoulder **92** formed on the lower edge of the serpentine slot **64***a*. This opening of the door **32***a*, a transient condition as the occupant leaves the room, places the actuating device **20***a* in the second position.

When the door **32***a* is closed, the actuating device **20***a* moves to the third position by virtue of the engagement of a notched surface **94** formed on the end **90** of the slider **22***a* with the sloping cam surface formed on the underface of the actuating bar **24***a*. This cams the end **90** of the slider **22***a* downward to the position shown in solid lines in FIG. **17.** This downward pivoting of the slider **22***a* causes the shoulder **92** to clear the pin **62***a* so that, at this juncture, the only thing restraining or preventing the slider **22***a* from further leftward movement

(by the spring 60*a*) is a vertical surface 98 (FIG. 19) formed on the slider 22*a* at the righthand side of the notch 94, which bears against the actuating bar 24*a*. The end 90 and the notch surface 98 are thus engageable with the actuating bar 24*a* to restrain or prevent the slider 22*a* from being moved via the bias of the spring 60*a*. The door 32*a* is now closed and the actuating device 20*a* is positioned in the third position, the slider 22*a* being movable to the fourth position for positioning the alarm mechanism 30*a* in the activated position in response to the unauthorized opening of the door 32*a*.

When the door 32*a* is opened, the surface 98 is disengaged or freed from the restraint of the actuating bar 24*a*, and the slider 22*a* is moved fully to the left to the fourth position shown in FIG. 20, being stopped at that point by the engagement of the pin 62*a* with the righthand end of the serpentine slot 64*a*. This last movement from the third position of the slider 22*a* (shown in FIG. 17) to the fourth position of the slider 22*a* (shown in FIG. 20) is sufficient to free the pawl 56*a* from the end of the hammer 48*a*, and the hammer wheel 42*a* is now free to be rotated in a clockwise direction (FIG. 20) by the spring type energy-storing mechanism 38*a* through the geared shaft 46*a*. As the wheel 42*a* rotates, each of the hammers 48*a* strikes the butt end 50*a* of the clapper 40*a*, causing the other end of the clapper 40*a* to strike repeatedly against the inner surface of the bell 36*a* and effect the required annunciation, i.e., sound the alarm and provide the output indication of an unauthorized opening of the door 32*a*.

This form of the invention also includes locking device which serves the function of locking the alarm mechanism 30*a* in an activated position (FIG. 20), thereby preventing an intruder, even though he is inside the room, from stopping the alarm mechanism 30*a* by pushing in on the slider 22*a*. The locking device also serves the function of allowing the authorized occupant to block operation of the alarm mechanism 30*a* when he returns to his own room and turns the key.

The locking device is incorporated into a structure which in conjunction with the radial extension 82 of the back plate 28*a* also serves to provide added support for the slider 22*a* in its sliding motion in the notch 85. As shown in FIG. 16, the locking device comprises an insert 100 which is inserted in a hole formed in the door 32*a*. The insert 100 contains a conventional key-operated lock 78*a*, the turning of which by the key 102 causes a pin 104 to rotate 180°. The end of the pin 104 is cut on a bias and has secured thereto a disk or washer 106 keyed at top and bottom into grooves 108 and 109 in a respective pair of actuating pawls or pins 111 and 113. The grooves 108 and 109 are substantially wider than the thickness of the washer 106, thereby allowing each of the pins 111 and 113 to be biased against the slider 22*a* by a spring 110 and 115, respectively, except when restrained by the engagement of the washer 106 against the left side of the grooves 108 and 109, as shown for example in FIG. 18. The spring 110 biases the pin 111 and the spring 115 biases the pin 113. One pin 111 or 113 is thus biased against the slider 22*a*, depending on the rotative position of the central pin 104.

The position shown in FIG. 16 is the normal position for the lock 78*a* in which the pin 104 is turned so as to cause the locking pin 113 to be held retracted by the washer 106, while the pin 111 is allowed to be biased to the right by the spring 110. The spring 110 thus biases the pin 111 against the face of the slider 22*a*, where the pin 111 is in position to serve the locking function in the manner which will now be described.

While the actuating device 20*a* is being positioned in the unarmed position, the first position, the second position and the third position, the pin 111 is not moved, the end of the pin 111 merely sliding across the face of the slider 22*a* as the slider 22*a* goes through the motions depicted in FIGS. 15 and 17. However, when the slider 22*a* is positioned in the fourth position, as shown in FIG. 20, a rounded notch 112 formed on the upper surface of the slider 22*a* is positioned generally opposite the pin 111, the pin 111 is extended into the notch 112 by the spring 110, and the parts then occupy the position shown in FIG. 20. Thereafter, it is virtually impossible to move the slider 22*a* to the right until the lock 78*a* is rotated, with consequent retraction of the pin 111. Therefore, an intruder, once he has set off the alarm mechanism 30*a*, cannot stop it simply by pushing in on the slider 22*a*. Only one having the key 102 can bring the alarm mechanism 30*a* to a stop before the spring 38*a* has run down. This he does simply by rotating the pin 104 180°, thereby retracting the pin 111 from the notch 112, following which the slider 22*a* may be pushed to the right, causing the pawl 56*a* to re-engage one of the hammers 48*a* of the wheel 42*a*, thereby stopping the ringing of the alarm mechanism 30*a*.

The lock 78*a* also serves the function of allowing the authorized occupant to re-enter the room without sounding the alarm mechanism 30*a*, even though the actuating device 20*a* has been placed in the third position shown in solid lines in FIG. 17. Assuming the occupant, leaving the lock 78*a* in the normal condition shown in FIG. 16, leaves the room after positioning the slider 22*a* in the first position of FIG. 17. As explained hereinbefore, the opening and subsequent closing of the door 32*a* will cause the actuating device 20*a* to be positioned in the third position as shown in solid lines in FIG. 17. The authorized occupant, when returning to the room, now inserts the key 102 and turns the lock 78*a* to the position shown in FIG. 18. In this position, the lower pin 113 is now free to be biased to the right and into a locking hole 114 formed in the slider 22*a*. This locks the slider 22*a* against further movement in either direction, and the occupant may then re-enter the room without positioning the alarm mechanism 30*a* in the activated position. After re-entering the room, the authorized occupant merely turns the lock 78*a* to normal position, shown in FIG. 16, and simultaneously pushes the slider 22*a* back into the unarmed position shown in solid lines in FIG. 15.

While the actuating device 20*a* has been pictured with the major portion, i.e., including the bell 36*a*, being mounted on the door 32*a*, it is obvious that the positions of the parts may be reversed and the major portion may be mounted stationarily on the door frame with only the actuating bar 24*a* being mounted on the door 32*a*.

Similarly, the actuating device 20 as shown in FIG. 1 may be mounted on the opposite side of the door 32*a*, i.e., where the door 32*a* hinges from the other side. In this event, the actuating device 20 will be upside down from the position of the actuating device 20*a* shown in FIG. 12. To meet this contingency, a second clapper 40*b* is provided, as shown in FIG. 15, pivoted on a pin 52*b*, diametric from the clapper 40*a*. Thus, even though one clapper may be held out of engagement by the wheel 42*a* by virtue of gravity, the other clapper,

i.e., the uppermost clapper, may be brought into engagement with the wheel and will serve to effectuate the annunciation, or, in other words, to provide the output indication indicating the unauthorized opening of the door.

I claim:

1. An actuating device adapted to be mounted on a closure member having a stationary portion and a movable portion, for indicating the unauthorized opening of the movable portion of the closure member, the device comprising:

an alarm mechanism, having a deactivated position, and an activated position, providing the indication of the unauthorized opening of the movable portion of the closure member in the activated position;

a slider movably mounted on the closure member for selective movement to an unarmed position, a first position, a second position, a third position and a fourth position, the slider having a portion connectable to a portion of the alarm mechanism, the slider being connected to the alarm mechanism in the unarmed position, the first position, the second position and the third position of the slider and the slider being disconnected from the alarm mechanism in the fourth position of the slider, the alarm mechanism being positioned in the deactivated position when connected to the slider and the alarm mechanism being positioned in the activated position when disconnected from the slider in the fourth position of the slider;

bias means connected to the slider for biasingly moving the slider toward the fourth position of the slider; and

means removably engageable with portions of the slider for cooperatingly positioning the slider in the unarmed position, the first position, the second position and the third position, said means engaging one portion of the slider preventing movement of the slider via the bias means and positioning the slider in the unarmed position, said means being disengageable from the slider allowing the slider to be moved via the bias means from the unarmed position to the first position wherein said means engages another portion of the slider preventing movement of the slider via the bias means and positioning the slider in the first position, said means being disengageable from the slider via the opening of the movable portion of the closure member allowing the slider to be moved via the bias means from the first position to the second position wherein said means engages one other portion of the slider preventing movement of the slider via the bias means and positioning the slider in the second position, said means being disengageable from the slider via the closing of the movable portion of the closure member allowing the slider to be moved via the bias means from the second position to the third position wherein said means engages one other portion of the slider preventing movement of the slider via the bias means and positioning the slider in the third position, and said means being disengageable from the slider via the unauthorized opening of the movable portion of the closure member allowing the slider to be moved via the bias means from the third position to the fourth position disengaging the slider from the alarm mechanism and positioning the alarm mechanism in the activated position.

2. The actuating device of claim 1 wherein the closure member includes a lock or the like operated by a key or the like to accomplish an authorized opening of the movable portion of the closure member, and wherein the device is defined further to include:

means connected to the lock and movable to a position engaging a portion of the slider preventing movement of the slider via the bias means from the third position to the fourth position when opening the movable portion of the closure member via operating the lock with a key.

3. The actuating device of claim 1 wherein the bias means is defined further as including a spring, having one end connected to the closure member and the opposite end connected to the slider, biasing the slider toward the fourth position of the slider.

4. The actuating device of claim 1 wherein the slider includes a slot formed through a portion thereof; and wherein the means removably engageable with portions of the slider is defined further to include:

a guide connected to the closure member; and

a pin formed on a portion of the guide removably disposable in the slot formed in the slider and removably engageable with a portion of the slider formed via the slot in the slider, the pin being disposed in the slot and engaging a portion of the slider formed via the slot in the slider in the unarmed position of the slider and preventing the movement of the slider via the bias means from the unarmed position.

5. The actuating device of claim 4 wherein the slot in the slider forms one portion of the slider engageable with the pin in the unarmed position of the slider and another portion of the slider engageable with the pin in the second position of the slider, the slider being movable to a position disengaging the pin from the portion of the slider engaging the pin in the unarmed position of the slider, thereby allowing the slider to be moved via the bias means from the unarmed position.

6. The actuating device of claim 5 wherein the slider includes a first recess formed in a portion thereof; and wherein the means removably engageable with portions of the slider is defined further to include:

an actuating bar connected to the closure member, having a portion removably engageable with a portion of the slider formed via the first recess in the slider in the first position of the slider, the slider being moved via the bias means from the unarmed position to the first position of the slider wherein the actuating bar engages a portion of the slider formed via the first recess in the slider preventing movement of the slider via the bias means and positioning the slider in the first position, and the actuating bar being disengaged from the portion of the slider formed via the first recess upon the opening of the movable portion of the closure member allowing the slider to be moved via the bias means from the first position of the slider to the second position of the slider wherein the pin engages the other portion formed in the slider via the slot preventing movement of the slider and positioning the slider in the second position.

7. The actuating device of claim 6 wherein the actuating bar is defined further to include a portion engageable with the slider for moving the slider to a position disengaging the pin from the slider, the actuating bar

engaging the slider upon the closing of the movable portion of the closure member and moving the slider from the second position of the slider to a position of the slider disengaging the pin from the slider, thereby allowing the slider to be moved via the bias means from the second position to the thrid position of the slider.

8. The actuating device of claim **7** wherein the slider includes another slot formed through a portion thereof, having a portion engageable with a portion of the actuating arm for positioning the slider in the third position; and wherein the actuating arm is defined further to include a portion engageable with the portion of the slider formed via the last-mentioned slot for engaging the actuating bar in the third position of the slider, the actuating bar engaging the slider upon the closing of the movable portion of the closure member for moving the slide from the second position and allowing the slider to be moved via the bias means to the third position wherein the actuating arm engages the portion formed in the slider via the last-mentioned slot preventing movement of the slider and positioning the slider in the third position.

9. The actuating device of claim **7** wherein the portion of the actuating bar engaging the slider in the third position of the slider is defined further as being disengaged from the slider via the opening of the movable portion of the closure member thereby allowing the slider to be moved via the bias means from the third position to the fourth position of the slider, the slider being disengaged from the alarm mechanism in the fourth position of the slider thereby activating the alarm mechanism to provide the indication of the unauthorized opening of the movable portion of the closure member.

10. The actuating device of claim **1** defined further to include:

a spacer plate connected to the alarm mechanism having a notch formed in one end thereof, one end portion of the slider being slidingly disposed in the notch formed in the spacer plate; and

wherein the bias means is defined further to include a spring disposed in the notch in the spacer plate having one end engaging the spacer plate and the opposite end engaging the slider biasing the slider toward the fourth position.

* * * * *