

June 23, 1942.

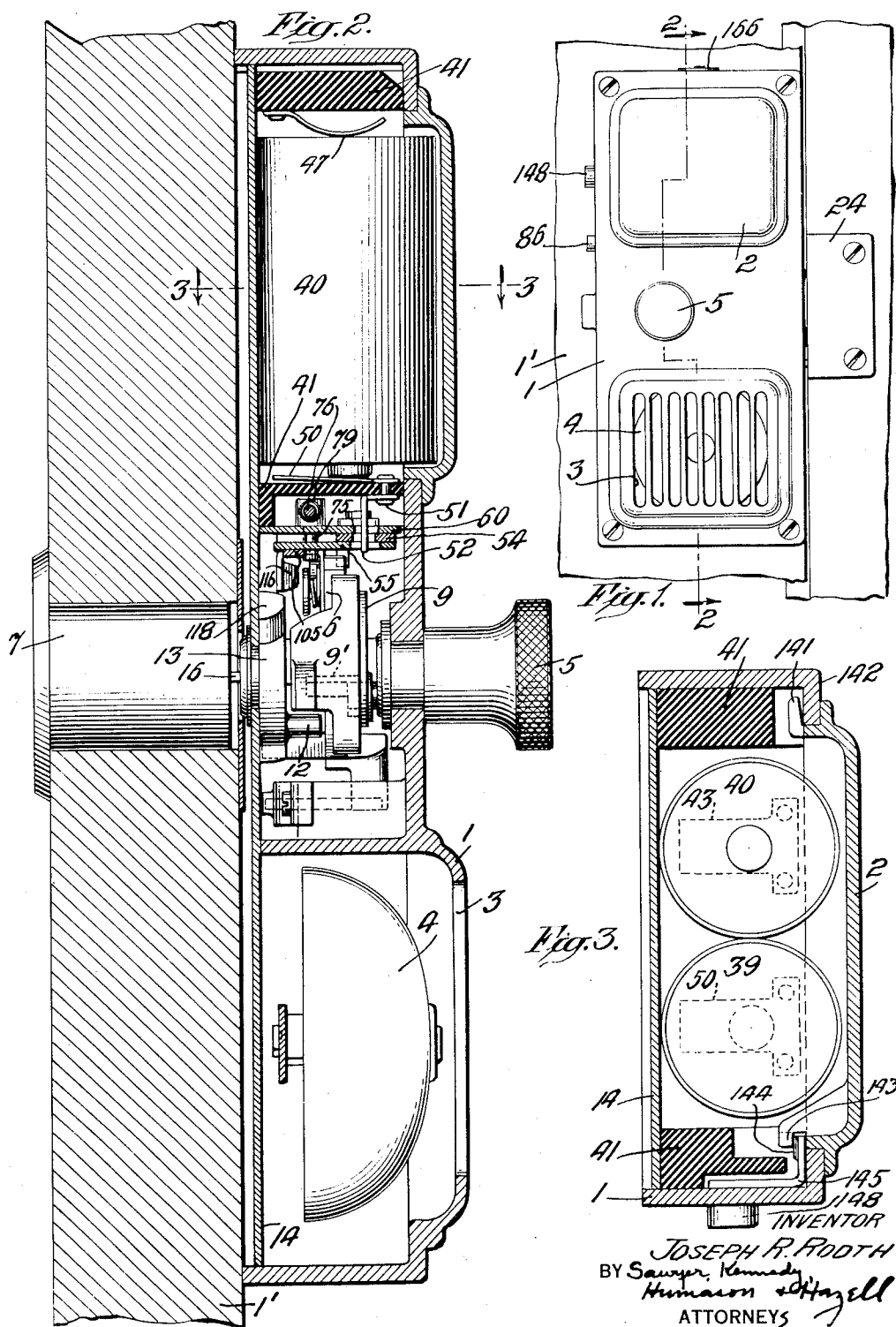
J. R. RODTH

2,287,572

ALARM LOCK

Filed Feb. 17, 1940

5 Sheets-Sheet 1



June 23, 1942.

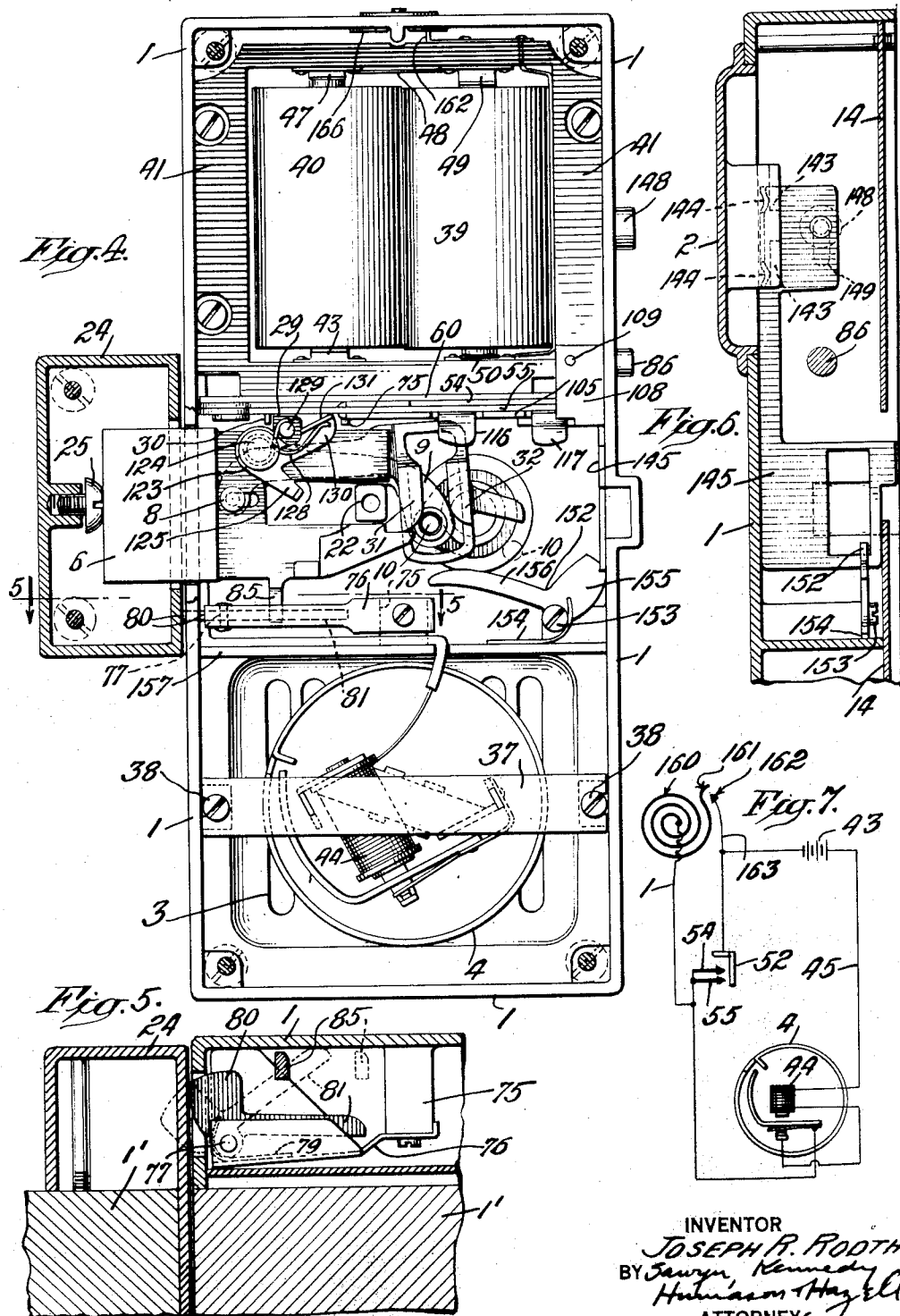
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2,287,572

ALARM LOCK

Filed Feb. 17, 1940

5 Sheets-Sheet 2



June 23, 1942.

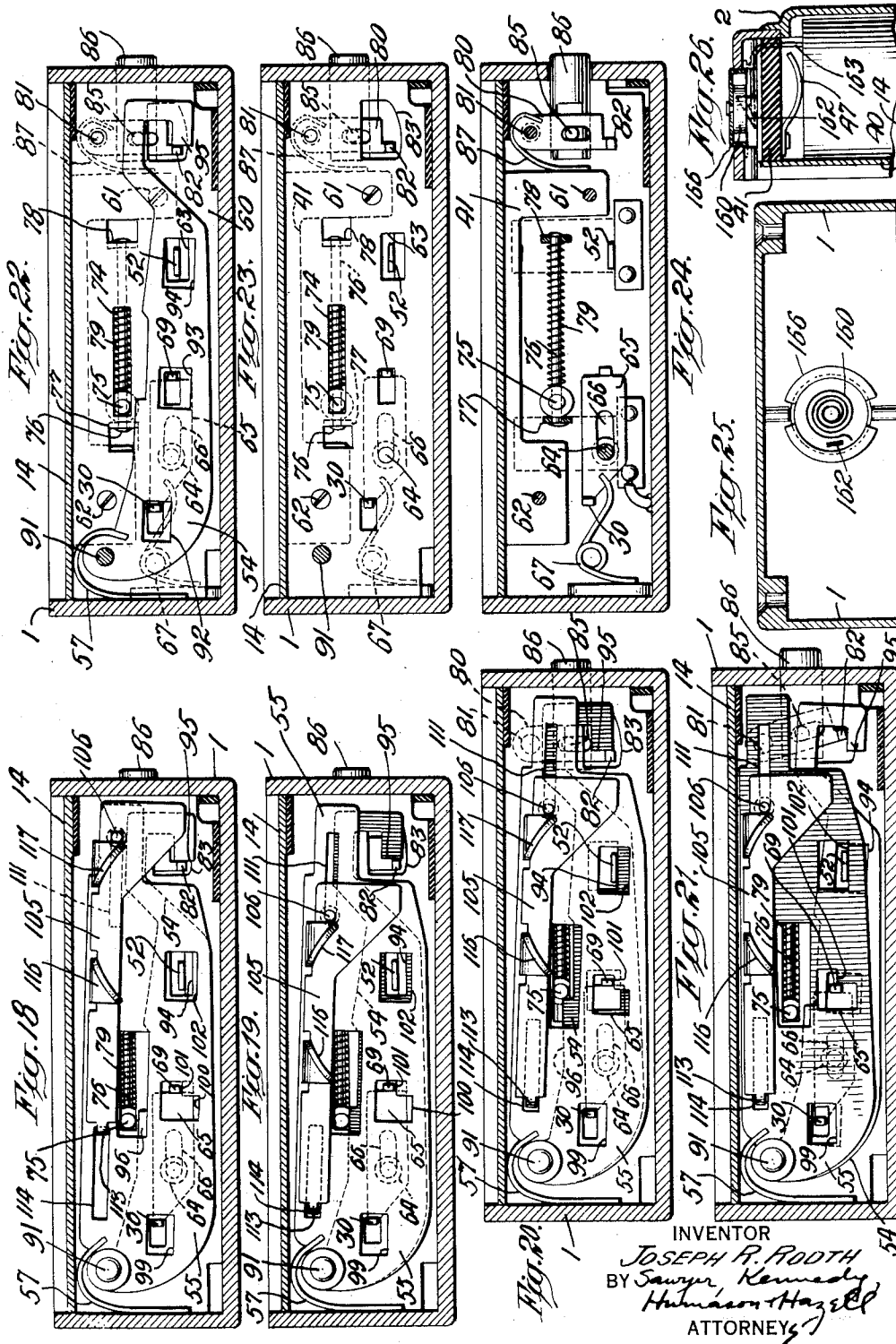
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2,287,572

ALARM LOCK

Filed Feb. 17, 1940

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June 23, 1942.

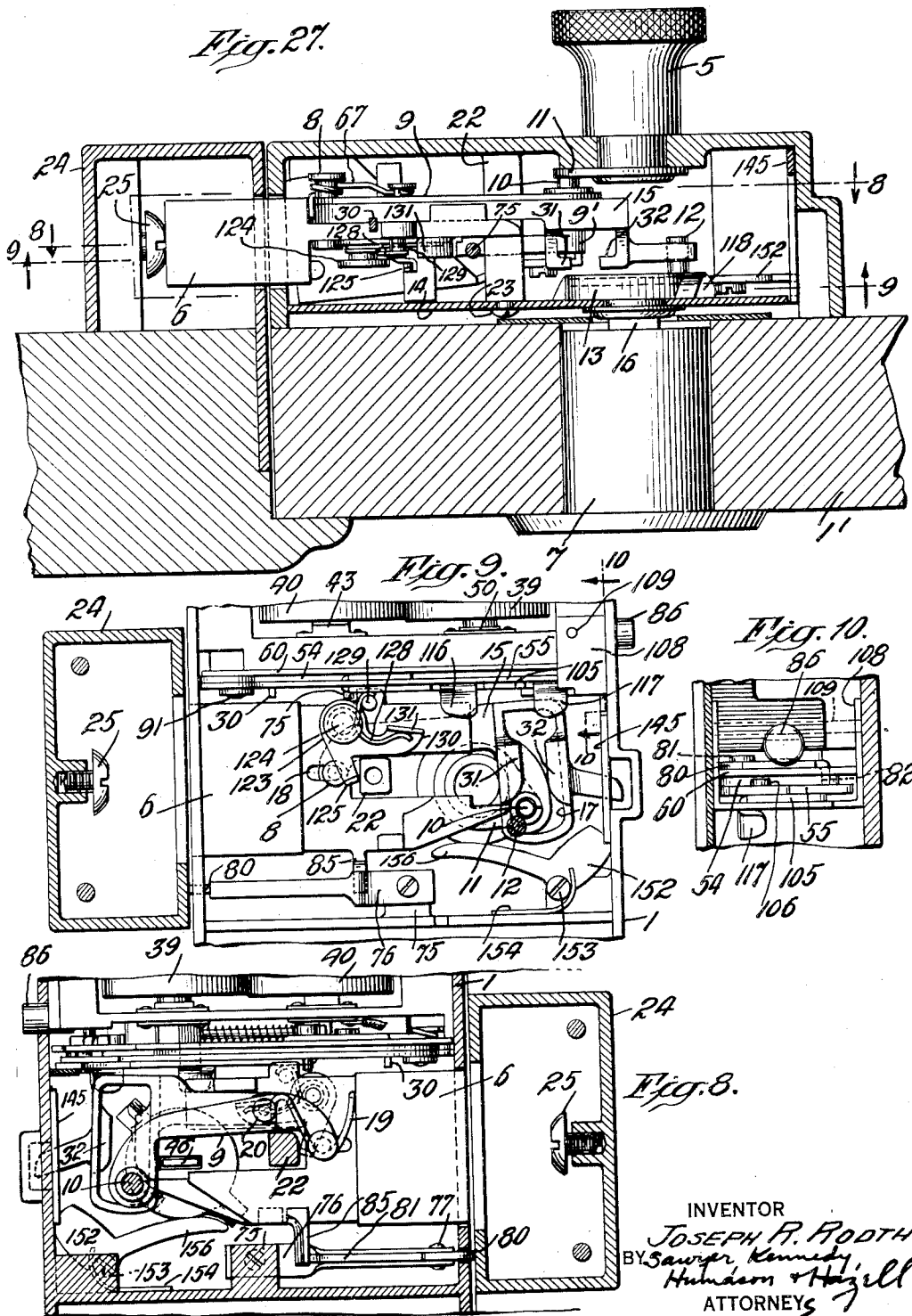
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ALARM LOCK

Filed Feb. 17, 1940

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UNITED STATES PATENT OFFICE

2,287,572

ALARM LOCK

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Application February 17, 1940, Serial No. 319,447

5 Claims. (Cl. 177-314)

The present invention relates to alarm locks, and more particularly to an improved construction of locking mechanisms including means for giving an audible signal if the lock is forced or opened from the outside by any means other than its proper key, and from the inside by any means other than its operating knob.

One object of the invention is to provide certain structural improvements in the alarm lock of my Patent No. 2,170,521, and at the same time to provide for the accomplishment of the desired results by relatively simple mechanism.

Another object is to provide means for giving an audible signal which becomes operable upon a predetermined rise of temperature.

One of the distinctive features of my prior patent is the provision of a certain switch opener carried by the bolt, and movable within the bolt itself to switch opening position. In the present invention the switch opening means has been improved, and although it is associated with the bolt, no movable parts are within the bolt itself.

It will be understood that in addition to these specific objects and features, the mechanism of the present invention is intended to accomplish the more general objects of providing alarm lock means inaccessible to tampering and capable of being readily installed by others than skilled workmen without alterations in the door structure itself or adjacent structure.

Further objects and advantages will appear from the following description taken in connection with the accompanying drawings illustrating a preferred embodiment of the invention and in which:

Fig. 1 is a front elevation showing the lock housing and strike applied in cooperating relationship to a door and door jamb;

Fig. 2 is a vertical transverse section through the lock housing of Fig. 1, taken on the line 2-2 thereof and on an enlarged scale;

Fig. 3 is a horizontal sectional view through the lock housing, taken on the line 3-3 of Fig. 2;

Fig. 4 is a vertical longitudinal sectional view through the lock housing;

Fig. 5 is a horizontal sectional view taken on line 5-5 of Fig. 4;

Fig. 6 is a vertical transverse sectional view through the upper portion of the lock housing;

Fig. 7 is a circuit diagram;

Fig. 8 is a vertical sectional view of the bolt portion of the lock housing, viewed from the rear or door side thereof, taken on line 8-8 of Fig. 27 and showing the bolt in unlocked position;

Fig. 9 is a similar section as seen from the opposite side and taken on line 9-9 of Fig. 27;

Fig. 10 is a fragmentary vertical sectional view taken on line 10-10 of Fig. 9;

Figs. 11 to 13 inclusive are perspective views each showing an individual member of the slide assembly with its associated parts;

Figs. 14 and 15 are perspective detail views;

Fig. 16 is a vertical longitudinal sectional view showing the inside of the cover plate and the cam member thereon;

Fig. 17 is a similar view of the same parts showing them in a different position;

Figs. 18 to 21 are horizontal sections showing parts of the slide assembly in different positions;

Figs. 22 to 24 are similar views showing associated parts in different positions;

Fig. 25 is an interior view of the top of the lock housing;

Fig. 26 is a vertical transverse sectional detail view showing certain parts within the housing above the battery;

Fig. 27 is a horizontal sectional view through the bolt portion of the lock housing.

Referring in detail to the drawings, the lock housing 1 is formed with an opening at its back, this opening being closed by a cover plate 14 next to a door surface 1' when the lock is in place, and in its front is an opening closed by a small housing door 2. At the lower part of the front of the housing are openings 3 behind which a bell 4 is mounted. The housing 1 is secured to the door 1' by suitable screws. Into the housing 1 there is fitted a locking knob 5 to operate a bolt 6 independently of the key operation of a lock cylinder in the door. Opposite and operable independently of the knob 5 is any ordinary standard cylinder lock 7 which is attached separately to the door 1'. The bolt 6 is spring moved to locked and unlocked positions through a compression arm 15 which is loosely pivoted to the bolt by a pin 8 which is also the pivot for a rocking actuating arm 9, whose free end is provided with a circular opening into which fits a pin 10 (Fig. 27) fixed eccentrically on the knob arm 11, the arm 9 having an extended portion 9' beyond the pin 10 for engagement with a pin 12 on the cam ring 13, which is rotatably mounted on the inside of the back cover plate 14 and is moved by the cylinder lock 7 by means of the connecting rod 16. The pin 10 is moved clockwise, as viewed in Fig. 4, to the dotted line position during unlocking movement of the bolt 6, the parts then being in the positions shown in Fig. 9. The extended

portion 9' of arm 9 moves in a generally rectangular slot 17 (Figure 9) in the free end of the compression arm 15, the rotary motion of extended portion 9' giving to the compression arm 15 a rectilinear bolt moving motion to locked or unlocked position. The pin 8, which pivots compression arm 15 and actuating arm 9 to bolt 6, passes loosely through a slot 18 in the bolt 6. When the bolt 6 is withdrawn into the housing 1, as shown in Figs. 8 and 9, the pin 8 is pushed to one extreme end of the slot 18 by a spring 19 (Fig. 8) carried by compression arm 15 and bearing on an inner bolt head shoulder at one end, its intermediate portion being looped around the pin 8 on compression arm 15, and its other end bearing against a pin 20 fixed to the arm 9. As the spring 19 expands, one end of it forces the bolt 6 forward (Fig. 8) and the arm 9, which is pivoted on the pin 8, is forced downward by the other end until it bears on a lug 22. The lug 22 is stationary, being fixed to the front of the housing 1 and projecting inwardly of and horizontally across the housing. Its free end is tapped to receive a fastening screw 23 by which the back cover plate 14 is secured to the housing 1. When the knob pin 10 is moved clockwise, as viewed in Fig. 8, the arm 9 moves upward to its highest point and down again and the spring 19, during locking movement of the bolt 6, pushes the bolt into the strike 24, secured by screws to the door jamb, until it meets set screw 25 within the strike, as shown in Figs. 4 and 27. The set screw 25 causes the bolt to stop before the complete movement of the arm 9 has been effected, but as the arm is brought forward to its limit by the knob pin 10, it causes pivot pin 8 to move forward in the slot 18, thus further contracting the spring 19 and holding the bolt against screw 25 under pressure of this spring.

This spring pressure thus urges the bolt outwardly of the housing, but such movement is normally prevented by set screw 25 within the strike. As long as further movement of the bolt is thus prevented, the alarm will not sound, but if such movement occurs, as it would, for example, as a result of forcing the door open, or on forcing the parts to any position destroying this spring-urged abutting relationship of the bolt to the set screw, except key or knob return of the parts to unlocked position, the pressure of spring 19 on the bolt head shoulder will force the bolt outwardly of the housing to the extent permitted by the length of slot 18. This relatively slight outward bolt movement brings a lug 29, fixed on the top of the bolt shank, into actuating engagement with the trigger 30 of an alarm actuating slide and causes the alarm to sound as hereinafter more fully described. The invention, moreover, provides means preventing silencing of the alarm even though inwardly directed pressure be exerted on the bolt head from outside the housing after the alarm has been set off.

When the bolt is actuated by the lock cylinder, the cam ring 13, which is rotatably mounted on the inside of cover plate 14, is rocked by means of the connecting rod 16 of the lock cylinder. The pin 12, Fig. 9, moves over the pin 10 in the knob cam 11, and during locking movement by the lock cylinder, pin 12 engages the lug 9' of arm 9, and rocks it, and hence the bolt 6, into locked position, the pin 10 being moved with arm 9 and so rocking knob 5 during this movement. When the bolt in its forward movement

by pin 12 meets the set screw 25, the knob 11 and its pin 10, as shown in Fig. 4, have not quite moved to their extreme downward position of Fig. 4, which is below the knob axis. This condition is caused by the fact that, although the left end of spring 19, as viewed in Fig. 8, is urging arm 9, and hence knob pin 10, downwardly, the right hand end of spring 19 is urging compression arm 15 to the left, so that it presses toward the left against extension 9'. To relieve this pressure, and permit arm 9, pin 10 and knob cam 11 to reach the final position of Fig. 4, a cam 31 is formed on compression arm 15 over the rectangular slot in its free end, and during the final locking motion by the lock cylinder actuated pin 12, pin 12 momentarily bears on this cam and forces compression arm 15 to the left, as viewed in Fig. 4, against spring 19, moving the compression arm and its pivot pin 8 to the left far enough to relieve this pressure and allow the left end of spring 19, as viewed in Fig. 8, to force arm 9 and thus pin 10 and knob cam 11 down to their lowermost position, shown in Fig. 4. By this time pin 12 has passed off cam 31 so that cam 31 and compression arm 15 occupy their positions shown in Fig. 4, in which arm 9 is stopped by lug 22 as above described. When the bolt is moved to unlocked position by the key and lock cylinder, the foregoing motions are reversed, the bolt being returned by pin 12 acting on a cam 32 formed on compression arm 15 opposite cam 31. Pin 12 thus works in the passage between these two cams. By engaging the extension 9' of actuating arm 9, the pin 12 exerts a lifting action on arm 9, but because the extension is approximately semi-circular and is open at the bottom (see Fig. 2) the pin 12 has no lowering action on arm 9, this being accomplished by the left hand arm of spring 19 (Fig. 8). In this way pin 12 is free to rotate through 360° as required by present day standard lock cylinders, even though the knob 5 and pin 10 rock through only some 220° in the present construction.

The invention provides means for causing the alarm to be set off when the door is pried, when the knob is operated by unauthorized means or when there are dangerously high temperatures on the premises. The alarm is preferably an electric bell and the lock mechanism itself forms part of the alarm or bell circuit. As in the drawings, within the housing 1 is an electric bell 4 of a standard commercial construction. It is attached to the housing by means of a cross bar 37 (Fig. 4), which is secured to the housing 1 by two screws 38, the current being derived from the dry cell batteries 39 and 40, which are secured in a frame of insulating material 41, located within the upper part of the lock housing 1. They cannot be reached except through the small door 2, which can be opened only by means of the cylinder key, as more fully described hereinafter.

As shown in Fig. 4, the negative terminal 43 of the dry cell battery 40 is attached to the wire 45 (see also Fig. 7), which is connected to one terminal of the magnet coil 44 of the bell 4. The positive terminal of the battery 40 touches the contact spring 47, which is secured to the insulated frame 41, and is connected with a wire 49 to the contact spring 49 which engages the negative terminal of the battery 39. The positive terminal of the said battery touches the contact spring 50, attached to the frame 41 by means of the rivet 51 which conducts the current to a ter-

minal 52. The terminal 52 is entirely insulated from the housing 1. The terminal 52 projects into cooperating relation with certain tumblers 54 and 55 (Fig. 4) and the alarm circuit is closed when either tumbler 54 and 55 touches the terminal 52, as shown in Figs. 20 and 21, the current being carried through these tumblers to their respective springs 56 and 57, which bear against the wall of the metal housing 1. The current thus passes through the housing 1, the screws 38, the bar 37 to the vibrator of the bell 4, and so on to close the bell circuit as hereinafter more specifically described.

The mechanism which opens and closes the electric circuit is so arranged that once the alarm is set off it can be stopped only with the key, and to effect this the construction is as follows. The frame 41 which holds the batteries 39 and 40 has mounted on it a plate 60, which is held to the frame 41 (insulation) by two rivets 61 and 62 (Fig. 23). This plate 60 is the master plate to which several moving tumblers or triggers are attached, the terminal 52 passing through the opening 63 (Fig. 23) in the master plate 60 without contacting it. Attached to the plate 60 by means of a pin 64 is a sliding trigger 65 (Figs. 11, 23), which is provided with a guide slot 66, and the trigger spring 67. The trigger pin 39 of trigger 65 extends through the master plate 60, through the opening 68 therein, a second trigger pin 69 on trigger 65 extending through another opening 71 in the master plate 60. The trigger spring 67 bears against the part of the insulating frame 41, and urges the trigger 65 to the right, as viewed in Fig. 11, from which position it can be moved to the left the short distance permitted by slots 93 and 94 against pressure of the spring 67, being returned by the spring to the position of Figs. 11, 23 and 24.

The master plate 60 is longitudinally slotted at 74 to receive a tumbler release pin 75 which is slidable along a bar 76 fixedly mounted in a pair of lugs 77 and 78 turned up on the master plate. A coil spring 79 under compression surrounds the bar 76 and bears at one end against lug 78 and at the other end against the tumbler release pin 75, thus urging it constantly to the left as viewed in Fig. 11 and Figs. 18 to 24.

The master plate 60 also has mounted on it a manually operated rocking release arm 80, which is pivoted on plate 60 by a pin 81, and has a release finger 82 bent at a right angle and projecting through a release finger opening 83 in the master plate. The release arm 80 is slotted at 84 to receive the actuating pin 85 of a push button 86 mounted slidably in the casing 1 (Fig. 24) and projecting therebeyond to be accessible for manual operation. A spring 87 is fixed to the release arm 80 and bears against an adjacent portion of the insulating frame, thereby constantly urging release arm 80 and push button 86 toward the right as viewed in Fig. 24 and towards the outer push button position of Fig. 21.

Cooperating with the release finger 82 is a first circuit closing tumbler 54 (Fig. 12) pivotally mounted on the master plate 60 by a pin 91 (Fig. 22). The tumbler 54 is provided with openings 92, 93, and 94 to receive the trigger pin 39, release finger 82 and the terminal 52, respectively. Its free end is formed with a holding hook 95 cooperable with the release finger 82 (Figs. 21 and 22). The circuit closing tumbler 54 is always urged upwardly towards its position in Fig. 22 by its spring 55 bearing on the wall of casing 1. In Fig. 22 the push button 86 is in

inner position and the release finger 82 is urged against the edge of hook 95 on the free end of tumbler 54 without holding it down against its spring 55, the spring 56 holding the tumbler up with its upper edge contacting the tumbler holding pin 106 of a slide 105 (Fig. 13) hereinafter referred to, on the top edge of the tumbler 54 above its hook.

Depression of tumbler 54 lowers its hook 95 far enough to permit release finger 82 to move over the hook under the action of spring 87, and thereby hold the hook and tumbler 54 down in the position shown in Fig. 21, with the tumbler 54 out of contact with terminal 52.

Referring to Fig. 21, it will be seen that with the push button out, hooked tumbler 54 is held down free and clear of all trigger pins and terminal 52, and remains so as long as push button 86 is in its outer position with the release arm finger 82 holding down the tumbler by its hook 95. When the push button 86 is in its inner position, the release arm finger 82 is in the position of Fig. 18, 19 or 22, in which it no longer holds down the hook and tumbler 54, the tumbler, in these positions of the parts, bearing with its shoulder 96 upon the pin 75 in Fig. 19, or with its hooked end on pin 106 as in Fig. 18, or with the edge of its opening 94 on terminal 52 as in Fig. 20.

The slide 105 is moved to the position of Fig. 18 when, and only when, the bolt is key actuated to unlocked position. But upon every actuation of the bolt from locked to unlocked position, whether its movement is caused by key or knob, pin 75 is moved to the right, as hereinafter described, away from or off shoulder 96, against its coil spring pressure, which thereafter causes it to snap back to the position of Fig. 18 before the unlocking movement is quite completed. This riding off shoulder 96 by pin 75, when only pin 75 is holding down tumbler 54, permits tumbler 54 to move up and contact terminal 52 on knob return of the bolt to unlocked position. On key return of the bolt to unlocked position, pin 106 rides, as shown in Fig. 18, upon the upper edge of the hooked end of tumbler 54 before pin 75 leaves shoulder 96, thus moving the tumbler 54 down and holding it free of terminal 52. Before completion of the unlocking movement, pin 75 is spring returned to its position above shoulder 96, so that when slide 105 and its guide pin 106 move to the left during key locking movement of the bolt, tumbler 54 will be held down free of terminal 52 by the pin 75 even though pin 106 has moved away, as later described.

A second circuit closing tumbler 55 (Fig. 13) functions to close the bell circuit and cause sounding of the alarm when the door is pried or forced open, whether by a tool or by any other means. The tumbler 55 is rockably mounted on the pin 91 and is positioned adjacent and parallel to the tumbler 54 (Figs. 18 and 24). The spring 57, similar to the spring 56, has one end fast in the tumbler 55 and its other end free, but compressed and bearing on the adjacent wall of casing 1, to urge the tumbler 55 constantly upwardly about pivot pin 91. The trigger finger 39 of trigger slide 65 on master plate 60 extends through the opening 99 of tumbler 55, and the other trigger finger 69 of said trigger slide extends into the opening 100 in tumbler 55, the finger 69, in its right hand position of Fig. 18, bearing on a shoulder 101 of the edge defining the tumbler opening 100. Into a third opening

102 in said tumbler extends the terminal 52, normally without touching the tumbler. A clearance opening 104 is provided in the tumbler 55 in which travels the tumbler release pin 75 of master plate 60, above tumbler 54.

When the right hand trigger finger 63 of trigger slide 65 on the master plate, on which normally bears shoulder 101 of opening 100 in tumbler 55, is in the position of Fig. 18, the lower edge of opening 102 in tumbler 55 does not touch the terminal 52. When the trigger finger 30 moves to the left as viewed in Fig. 18, it rides beyond the shoulder 101 and over the lowermost part of the opening 100 (as viewed in Fig. 18), whereupon spring 57 moves tumbler 55 upwardly, bringing the lower edge of its opening 102 into contact with the terminal 52, thereby closing the alarm bell circuit and causing the alarm to sound.

Slidably mounted on the second tumbler 55 (Fig. 13) is the key cam plate slide 105, having the pin 106 at one end traveling in a guide slot 111 in tumbler 55, and at its other end having a guide extension 112 whose narrow neck 113 passes through a second guide slot 114 in said tumbler. The cam plate slide is moved on tumbler 55 by lugs on the key actuated cam ring 13, which is rotatably mounted on the inside of the cover plate 14, and for this purpose the slide 105 is provided with a pair of spaced and oppositely bent ears 115 and 117, by means of which the slide 105 is moved to left or right by the lugs 118 and 119 formed on the cam ring 13. On locking movement by the key, while the cam ring pin 12 is riding between the cams 31 and 32 of compression arm 15, and is thereby moving the bolt to locked position, cam ring lug 113 contacts ear 116 (Fig. 16) and moves slide 105 to the left along tumbler 55. (See also Figs. 18 and 19). As the cam ring 13 and its pin 12 rotate through 360°, the other lug 119 will, during cam ring rotation, meet ear 117 and ride up and over its bent surface, pressing the ear 117 and hence slide 105 and tumbler 55 downwardly about pivot 91 (as viewed in Fig. 19), the lug 119 then riding off ear 117 into the space between ears 116 and 117, releasing tumbler 55, which is then moved to its former upper position by its spring, the lug 119 then continuing its rotary motion for the remainder of its 360° movement without causing any action on any part.

On reverse rotation of the cam ring 13, by key movement of the bolt to unlocked position, lug 119 rides into the space between ears 116 and 117, then contacts ear 117 and moves it and thus slide 105 back to its former position (Fig. 16). Lug 119 rides upon and over ear 116, depressing it and slide 105, then into and accurately out of the space between these ears. This depression of slide 105 and its tumbler 55 depresses tumbler 54 by pin 106 until finger 82 engages hook 95 and tumbler 54 is re-latched in inoperative, or un-set, position.

Referring to Fig. 4, it will now be seen that if the normal locking relation between bolt 6 and set screw 25 has not been destroyed, and tumbler 54 is held down at its hook 95 by finger 82 (Fig. 21) the bolt may be returned to unlocked position by either key or knob without causing the alarm to sound, since finger 69 has never moved off shoulder 101 and tumbler 55 cannot rise and contact terminal 52.

If however, the normal locking relation between bolt 6 and set screw 25 has been destroyed in any manner permitting bolt 6 to move to the

left beyond its position in Fig. 4, lug 29 will thereby have moved finger 30 to the left, and thus moved finger 69 off shoulder 101 of tumbler 55, upon which this tumbler will move up, contact terminal 52 and so cause sounding of the alarm.

If the alarm has been caused to sound in this manner, inwardly directed pressure on bolt 6 will not silence it, since such pressure cannot have the effect of lowering tumbler 55, but only push finger 69 against the edge of opening 100 below the shoulder (Fig. 21). Nor will knob actuation of the bolt in any direction silence the alarm, because knob actuation of the bolt never depresses tumbler 55. Only key unlocking movement of the bolt will silence the alarm, by moving lug 29 away from finger 30 as a result of inward bolt movement, and depressing slide 105 to bring shoulder 101 of slide 55 lower than finger 69, whereupon spring 67 pushes the finger over the shoulder and so holds tumbler 55 down and out of contact with terminal 52, thus restoring tumbler 55 to the same circuit breaking position it occupied in normal door locked relation of bolt 6 to set screw 25, before lug 29 moved finger 30 to bring finger 69 off shoulder 101.

By setting the push button 86 in, and then locking the door from the outside by key movement of the bolt to its locking position against set screw 25, the alarm will be caused to sound if the bolt is knob actuated to unlocked position. Thus, even if an opening is made in the door and the knob thereby reached from the outside and actuated to unlock the door, the alarm will be sounded. After such push button depression and subsequent locking of the door by the key, the bolt can be moved to unlocked position without setting off the alarm only by key operation.

Fig. 9 shows the position of the parts before such setting and locking. When button 86 is pushed in from its position in Fig. 21 to its position in Fig. 18, tumbler 54 is no longer held down by release arm finger 82, and consequently moves upwardly, by spring 56, until its upper edge above its hook rests against the head of guide pin 106 on slide 105. If the door is now closed and the bolt 6 brought to locking position against set screw 25 by means of the key, slide 105 will thereby be moved by lug 118 to the position of Fig. 19, as already described. This moves pin 106 off slide 54, so that its upper edge shoulder 96 bears against tumbler release pin 75, and further upward movement of tumbler 54 is prevented only by this pin, which, in the position of Fig. 19 prevents the lower edge of tumbler opening 94 from contacting terminal 52.

Upon any unlocking movement of the bolt, whether by key or by knob, pin 75 is moved to the right a distance sufficient to bring it off shoulder 96. For this purpose (Figs. 4 and 9) a small bell crank lever 123 is pivoted at 124 on bolt 6, and has its lower arm 125 engageable with fastening screw lug 22, and its upper arm 130 engageable with pin 75. A spring 128 is coiled about the pivot 124 and has one end bearing on a fixed pin 129 on the bolt and its other end engaging a flange 131 on the upper bell crank arm 130, the tension of the spring being exerted in a direction to cause the bell crank lever to be urged constantly counterclockwise into the position of Fig. 4. During any locking movement of the bolt, arm 130 is dragged idly past pin 75, once past it snapping into the position of Fig. 4. On return motion of the bolt to unlocked position, whether by knob or by key, arm 130 engages pin 75 and pushes it to the right against the pressure of its coil spring 79 until lower bell

crank arm 125 meets fastening screw lug 22, whereupon the remainder of the unlocking movement of the bolt causes the bell crank lever 123 to rock clockwise enough to move its upper arm 130 away from pin 75, thus releasing the pin and allowing it to be returned to the left by its spring. In the completed unlocked position of the bolt, bell crank lever 123 occupies the position of Fig. 9, held there by lug 22. The first part of bolt unlocking movement carries lower arm 125 away from lug 22 and the bell crank lever is then free to be spring moved counterclockwise to its upper position, with its upper arm 130 in engageable relation to pin 75.

It will now be seen that, although pin 75 is moved off shoulder 96 by any unlocking movement of the bolt, yet if the bolt is unlocked by the key, slide 135 will thereby be moved to the position of Fig. 18, so that slide pin 106 rides on and holds down tumbler 54 before bell crank arm 130 reaches pin 75 and pushes it off shoulder 96. Thus, on key movement of the bolt to unlocked position, tumbler 54 cannot move up to contact terminal 52 and sound the alarm. If, however, the bolt is moved to unlocked position by the knob instead of by the key, slide 135 will not be moved to the right or at all, since there will be no movement of lugs 118 and 119, and the slide guide pin 106 will remain to the left, as in Fig. 19, and since tumbler 54 is now held down only by pin 75, the moment pin 75 is moved off shoulder 96 by the upper bell crank arm 130, slide 54 moves upwardly by its spring 56, the lower edge of its opening 94 contacts terminal 52, thereby completing the alarm circuit and causing the alarm to sound.

If it is not desired to have the alarm sounded in this manner by knob operation after key locking, the push button 86 is simply not depressed, so that tumbler 54 is held down by finger 82 on tumbler hook 95 and the tumbler 54 cannot rise to sound the alarm whatever the movements of pins 106 and 75 until the push button is depressed and the hook released.

If the alarm has been set off by knob operation after key locking as above described, the key must be used to shut off the alarm. To shut off the alarm in such case, the door is closed and locked by the key, which moves slide 135 to the right, depresses pin 106 and thereby relatches slide 54 under finger 82, thus stopping the alarm.

The foregoing setting of the mechanism to cause knob unlocking to sound the alarm does not affect the means already described for causing the alarm to sound by any outward movement of the bolt 6 beyond that determined by the set screw 25.

The reason for closing the door is merely to make use of set screw 25 to prevent the bolt from moving so far out of its casing that finger 69 is pushed off shoulder 101 on tumbler 55 by engagement of bolt lug 29 with finger 30, since that would allow tumbler 55 to rise and thereby itself cause sounding of the alarm.

It will be understood that the lugs 118 and 119, and pin 12 on key operated cam ring 13 are so located on the ring with respect to the connecting rod 16 that although the key may have to be given some additional rotary motion to withdraw it after the cam ring lugs and pin have completed moving their cooperating parts, such additional movement of the key is an idle one so far as those parts are concerned. Since there is only one pin 12 on the cam ring, and the lugs 118 and 119 are

180° apart, the ring may be rotated enough idly to permit key withdrawal without performing any of its mechanism actuating functions.

Referring now in more detail to the battery door 2 provided in the upper front of the casing 1, (Figs. 1, 3) a projection 141 on one side of the door fits within and behind the casing front 142, and on the other side the door is provided with a pair of lugs or projections 143, each fitting within the casing behind one of a pair of similarly spaced keeper flanges 144 on a manually operable lock slide 145 (Fig. 6). The lock slide is movable along the right hand side wall of casing 1 as viewed in Fig. 4, in which its upper part is covered by the exposed portion of insulation battery casing 41, this upper part (Fig. 6) having a slide shifting button 148 projecting through a short slot 149 in the casing side wall. Manual downward movement of lock slide 145 by its shift button 148 (Figs. 4, 6), that is, away from the observer as viewed in Fig. 3, will move the locking or keeper flanges 144 downwardly beyond the door lugs 143, thus freeing the door lugs and permitting the door 2 to be completely removed from the casing.

Key controlled means are provided to prevent such door unlocking movement of the lock slide 145, unless the key is inserted in the cylinder 7 and cam ring 13 is turned by it. Referring to Fig. 4, this means includes a bell crank lever 152 pivoted at 153 to part of the casing 1 and having a spring 154 urging its locking arm 155 into the position of Fig. 4 and its actuating arm 156 into the path of lugs 118 and 119 of cam ring 13. The free end of the spring 154 bears against the upper surface of a partition 157 extending from side to side of the casing 1 above the alarm bell 4. When the slide shift button 143 is in its upper position lever arm 155 blocks the slide 145 against downward or unlocking movement unless the key to cylinder 7 is inserted therein and cam ring 13 thereby turned to rock lever arm 1 downwardly, that is, counterclockwise as viewed in Fig. 4, which movement rocks locking arm 155 to the left and clears the path for the battery door locking slide to be moved downwardly to battery door unlocking position by manual downward pressure on slide shifting button 148. Upon key removal and manual movement of button 148 to its upper position, arm 155 snaps under the bottom of lock slide 145, so that, except by preliminary use of the key, the battery door cannot be opened.

The lugs 118 and 119 and lever actuating arm 156 are so arranged with respect to each other that actuating arm 156 is neither rocked nor contacted by either lug unless the cylinder key has been inserted and turned out of its inserting position, which is its withdrawing position, in the cylinder. Thus the cylinder key is required not only to shut off the alarm, once it has started to sound, but also to open the battery door, so that the batteries are unreachable for manipulation except by the lock key itself.

The means provided by the invention for setting off the alarm upon dangerous rise in temperature is shown diagrammatically in Fig. 7, and includes a thermostatic spiral spring 160, whose tendency is to uncoil upon increase in temperature, so that its outer end 161 may contact the terminal 162 of a wire 163 connected as shown in Fig. 7 in the alarm circuit. The inner end of the thermostatic coil is permanently connected to the casing 1, the coil in cup 166 itself being secured to the inside top face of the casing as shown in

Figs. 25 and 26. Upon a predetermined rise in temperature contact between the wire terminal 162 and the outer end 161 of the coil closes the alarm circuit and causes the alarm to sound.

The mechanism may include the safety device, shown in Fig. 5, for preventing the bolt from being moved to its outermost or alarm sounding position when the door 1' has not been closed but which is optionally operable while the door is open to permit the bolt to move to alarm sounding position for testing, for example. Referring to Fig. 5, a lug 75 formed on the inner side of casing 1, carries an arm 76 to which is pivoted at 77 a small bell crank lever 78, constantly urged counter-clockwise by a flat leaf spring 79. One arm 80 of this lever protrudes through a slot in the casing and when the door 1' has not been closed, the arm 80 and the other arm 81 of the bell crank lever, constituting the bolt stop, occupy the dotted line positions of Fig. 5. In this position arm 81 moves into the path of a lug 85 on the lower part of the bolt 6 and thereby prevents the bolt from moving from dotted line position to full line position, the full line position being the normal locked position of Fig. 4.

If the door has been closed, however, arm 80 strikes keeper 24 causing stop arm 81 to be rocked clockwise to the full line position of Fig. 5 where it is free and clear of the path of travel of bolt lug 85. Thus, when the door has once been closed and locked, no tampering with this bell crank lever will have any effect on the alarm mechanism or its operation. It will be evident that if the door 1' has not been closed, the bell crank lever may be manually moved to the full line position of Fig. 5 for the purpose of testing the alarm. On being manually released, it will return to dotted line position of Fig. 5 in which it does not interfere with unlocking movement of the bolt, but once unlocking bolt movement has occurred, the bell crank lever will prevent bolt locking movement unless it is rocked clockwise either manually when door 1' is open, or by contacting keeper 24 when door 1' has been closed.

What is claimed is:

1. An alarm lock mechanism including a lock casing, key actuated cylinder lock, bolt, keeper, bolt shifting knob, circuit controlled audible alarm, an electric circuit therefor including a source of current, a bolt controlled circuit closer in said circuit, knob actuated means for moving said bolt, key actuated means for moving said bolt and said knob actuated means, bolt abutment stop means within the keeper for limiting bolt movement outwardly of the casing to normal locking position within the keeper, and spring means associated with the bolt within the casing and urging said bolt further outwardly of the casing, and bolt actuated means in the casing operable by such further bolt movement outwardly of the casing for bringing said circuit closer into circuit closing alarm sounding position.

2. An alarm lock mechanism including a lock casing, key actuated cylinder lock, bolt, keeper, bolt shifting knob, circuit controlled audible alarm, an electric circuit therefor including a source of current, a bolt controlled first circuit closer in said circuit, knob actuated means for moving said bolt, key actuated means for moving said bolt and said knob actuated means, bolt abutment stop means within the keeper for limiting bolt movement outwardly of the casing to normal locking position within the keeper, and spring means associated with the bolt within the

casing and urging said bolt further outwardly of the casing, bolt actuated means in the casing operable by such further bolt movement outwardly of the casing for bringing said circuit closer into circuit closing alarm sounding position, a second circuit closer in said circuit and constantly urged toward circuit closing position, manually controlled setting means for bringing said second circuit closer from inoperative position into preparatory circuit closing position, knob released holding means for holding said second circuit closer out of circuit closing position, means actuated by knob unlocking bolt movement for moving said holding means out of holding position, said second circuit closer being thereupon movable to circuit closing, alarm sounding position, and key controlled means for returning said second circuit closer to inoperative position.

3. An alarm lock mechanism including a lock casing, key actuated cylinder lock, bolt, keeper, bolt shifting knob, circuit controlled audible alarm, an electric circuit therefor, a bolt controlled circuit closer in said circuit including a source of current, knob actuated means for moving said bolt and said knob actuated means, bolt abutment stop means within the keeper for limiting bolt movement outwardly of the casing to normal locking position within the keeper, and spring means associated with the bolt within the casing and urging said bolt further outwardly of the casing, bolt actuated means in the casing operable by such further bolt movement outwardly of the casing for bringing said circuit closer into circuit closing alarm sounding position, a circuit current source within said casing, a casing door giving access to said current source, and a lock within said casing for said door and moved by said key actuated means into door unlocking position.

4. An alarm lock mechanism including a lock casing, a key actuated cylinder lock, a bolt, a cooperating keeper, a bolt shifting knob, a circuit controlled audible alarm, an electric circuit therefor, including a source of current, having a circuit closing terminal contactor, a bolt controlled spring pressed circuit closing tumbler urged constantly toward circuit closing contact with said terminal contactor, a holding device bearing on said tumbler and normally preventing such contact, a bolt actuating arm, a bolt spring yieldingly connecting said arm with said bolt and urging said bolt in an outward direction with respect to said casing, knob controlled means for rocking said bolt actuating arm and thereby said bolt into locking and unlocking positions, cylinder lock controlled means for rocking said bolt actuating arm and said knob controlled means into locking and unlocking positions, bolt abutment stop means within the keeper for limiting bolt movement outwardly of the casing to normal locking position within the keeper against the pressure of said bolt spring, and means movable with additional bolt movement beyond normal locking position for releasing said holding means from said tumbler and thereby freeing it for circuit closing, alarm actuating contact with said terminal contactor.

5. An alarm lock mechanism including a lock casing, a key actuated cylinder lock, a bolt, a cooperating keeper, a bolt shifting knob, a circuit controlled audible alarm having a circuit closing terminal contactor, a first bolt controlled spring pressed circuit closing tumbler urged con-

stantly toward circuit closing contact with said terminal contactor, a holding device bearing on said tumbler and normally preventing such contact, a bolt actuating arm, a bolt spring yieldingly connecting said arm with said bolt and urging said bolt in an outward direction with respect to said casing, knob controlled means for rocking said bolt actuating arm and thereby said bolt into locking and unlocking positions, cylinder lock controlled means for rocking said bolt actuating arm and thereby said bolt and said knob controlled means into locking and unlocking positions, bolt abutment stop means within the keeper for limiting bolt movement outwardly of the casing to normal locking position within the keeper against the pressure of said bolt spring, means movable with additional bolt movement beyond normal locking position for releasing said holding means from said tumbler and thereby freeing said tumbler for circuit closing, alarm actuating contact with said terminal contactor, a second bolt controlled spring pressed

circuit closing tumbler urged constantly toward circuit closing contact with said terminal contactor, manually operable locking means for maintaining said second circuit closing tumbler in inoperative position and releasing it therefrom into preparatory circuit closing position, tumbler holding means bearing on said second tumbler for preventing its movement from preparatory position to circuit closing position, bolt controlled means for removing said holding means from said tumbler and freeing it for circuit closing alarm sounding movement, tumbler return means for restoring said second tumbler to inoperative position in held relation to said manually operable locking means, and a cylinder lock controlled actuator associated with said tumbler return means for moving it to tumbler returning position by cylinder lock movement of said bolt to unlocked position and in advance of the freeing of said tumbler by said tumbler holding means.

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