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3,061,185

CASH REGISTER LOCKING SYSTEM

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FIG. 1

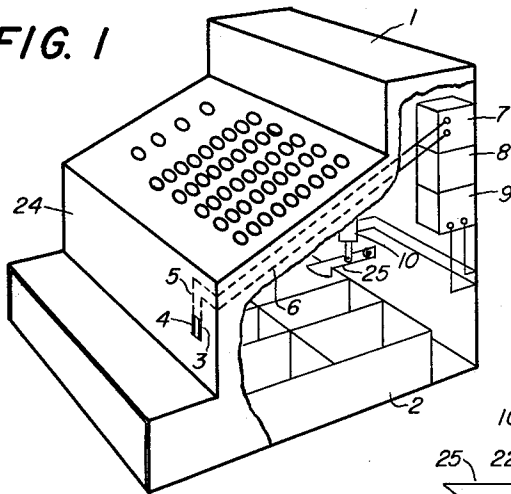
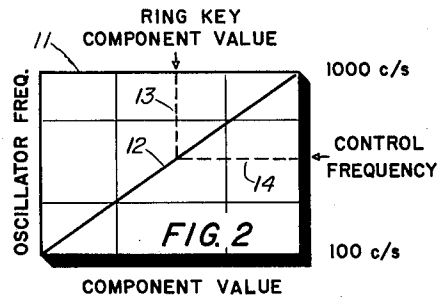
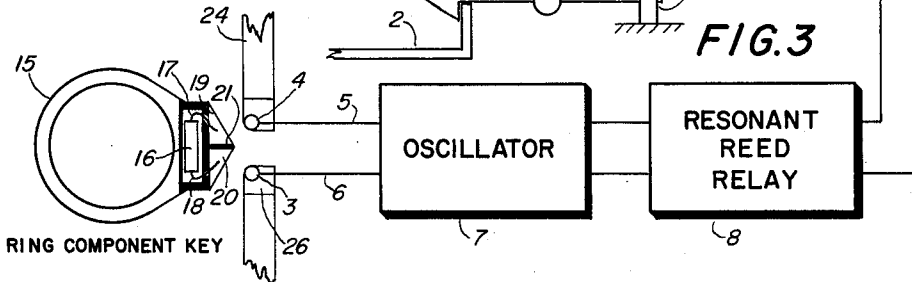


FIG. 4

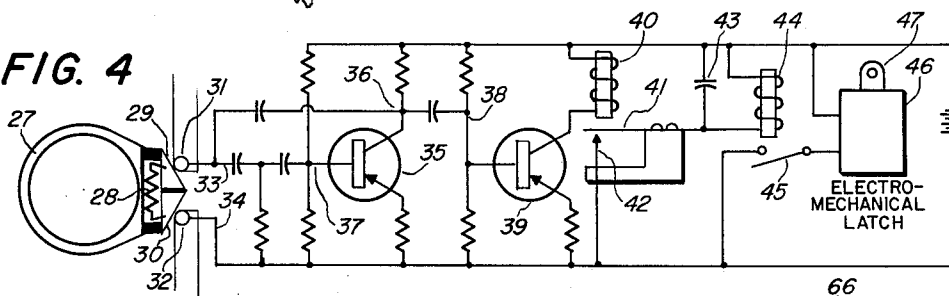
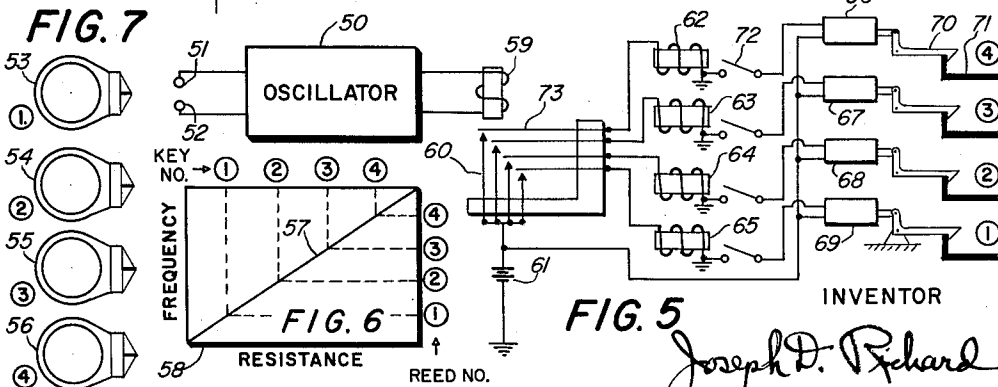


FIG. 7



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CASH REGISTER LOCKING SYSTEM

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4 Claims. (Cl. 235—22)

The present invention relates generally to lock and key systems. More specifically the present invention is directed to a locking system for cash registers wherein the cash drawer may be securely maintained in a closed position by means of an electromechanical latch which may be actuated by a removable key.

A locking system is described in which an electromechanical bolt or latch is controlled by an electronic circuit which is actuated by a key comprising at least one electronic circuit element of a specific value. In a preferred embodiment, an electronic component of a specific value is molded into a removable key assembly. By means of suitable contacts, the key component may be temporarily connected into an oscillator circuit so that a specific frequency signal is generated. A resonant reed relay, or other frequency discriminator, tuned to the specific frequency, actuates the control circuit which releases the cash drawer latch or bolt.

In accordance with my present invention, an electronic locking system is employed in combination with a cash register. In a preferred embodiment of this invention the key assembly consists of at least one electronic component which is built into a ring suitable for wearing on the finger. The ring key containing the electronic component is fitted with electrical contacts which are arranged and spaced to mate with corresponding contacts on a cash register. When the ring contacts are momentarily held against the cash register contacts, the electronic component in the ring is connected into the frequency determining circuit of an oscillator built into the cash register. When the value of the key component is of the correct value, the oscillator frequency will be of the exact value to actuate the unlock mechanism. Similar rings containing electronic components of all other values would not actuate the unlock mechanism.

In the past, cash registers have been usually left unlocked during business hours. Sometimes the cash register is left locked with the key in the receptacle. Less frequently, the cash registers may be locked at all times when not in use. For this latter situation, each sales person must have a key which is usually kept on a ribbon around the neck. The key must be used each time the cash register is operated. Usually the sales clerk will have money in one hand and frequently merchandise in the other when operating the cash register. The use of a conventional key for each operation of a cash register has proven to be extremely inconvenient and it is for this reason that they are generally left unlocked. Certain dishonest persons, perhaps failing to realize that ill gotten goods can never bring happiness, have taken advantage of these circumstances and have availed themselves of the contents of many of these unlocked cash drawers. These nefarious activities have resulted in lower margins of profit and feelings of frustration and dissatisfaction among those shopkeepers who have been victimized.

An outstanding objection to the locking systems used on cash registers in the past has been the inconvenience of using a conventional key for each operation of the machine. This inconvenience has resulted in cash registers frequently being left unlocked and occasionally being pilfered.

Another outstanding objection to the cash register locking systems used in the past has been the ease with which the keys could be duplicated for dishonest purposes.

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The present invention provides a cash register locking system which is devoid of the abovementioned disadvantages and which at the same time is economical and otherwise practical.

5 An object of my invention is to provide a cash register locking system in which the key need not be inserted in a receptacle and turned as with a conventional key.

Another object of the present invention is to provide a cash register locking system which may be worn on the finger as a ring thereby eliminating the inconvenience of carrying a loose key of the conventional type.

A further object of the present invention is to provide a cash register lock and key system in which the key may not be duplicated without destroying the original key. Any desired number of keys may be made originally but none may be later duplicated without exact knowledge of their construction.

Other objects and advantages will become more apparent from a study of the following specifications and drawings in which:

FIGURE 1 is a schematic drawing and block diagram showing the methods and apparatus of my invention. The relative organization between the key receptacle, oscillator, reed relay, control relay, electromechanical latch, and the locked cash drawer is shown.

FIGURE 2 shows the relationship between the specific value of the electronic component in the ring key and the control frequency of the locking system shown in FIGURES 1 and 3.

FIGURE 3 shows a functional diagram of the cash register locking system according to my invention. The relative organization between the ring component key, key receptacle contacts, oscillator, reed relay, power relay, electromechanical latch, and cash drawer is clearly shown.

FIGURE 4 shows, in more detail, a practical cash register locking system including a ring component key wherein a resistor is the critical valued component. A transistor oscillator circuit, reed relay driving circuit, power relay, and solenoid latch are also shown.

FIGURE 5 shows schematically a cash register locking system suitable for use with a multi-drawer cash register. Four separate cash drawers are controlled by four different control frequencies from the oscillator.

FIGURE 6 shows the relationship between the four specific values of resistance required in the various ring component keys which would be required to produce the four specific oscillator frequencies needed to open the four separate cash drawers shown in FIGURE 5.

FIGURE 7 shows four different ring component keys, each of which contains one of the four specific values of resistance shown in FIGURE 6.

Referring again to FIGURE 1, a cash register 1 as shown in which the cash drawer 2 is locked in the close position by means of the latch 25. The latch 25 releases the drawer 2 when the solenoid 10 is actuated through the relay 9. The relay 9 is closed in response to the actuation of reed relay 8 when the oscillator 7 produces a frequency which matches the resonance of the reed relay 8. A pair of exposed electrical contacts 3 and 4 are shown mounted in the front panel 24 of the cash register 1. A pair of wires 5 and 6 connect the said pair of electrical contacts 3 and 4 into the frequency determining circuit of the oscillator 7. Thus the frequency of the oscillator 7 is made dependent on the value of the electrical component which might be inserted between the contacts 3 and 4 on the front panel 24 of the cash register 1. Any type of electrical component may be used which can be used as a frequency determining component in an oscillator circuit. For practical reasons, resistors and capacitors are best suited for this purpose.

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FIGURE 2 shows the plotted relationship 12 between various component values and the corresponding oscillator frequencies for a typical oscillator suitable for use in the locking system of FIGURES 1 and 3. It can be seen that for a specific component value 13 mounted within the component key 15 a specific oscillator frequency 14 will result when the ring contacts 19 and 20 are placed against the exposed contacts 3 and 4 which are shown mounted in the front panel 24 of the cash register 1.

FIGURE 3 shows a ring component key 15 containing an electronic component 16 having two terminals 17 and 18 which are connected to the tapered contacts 19 and 20 which are separated by the insulator 21. When the said tapered contacts of the ring are placed against the contacts 3 and 4 on the cash register, the electronic component 16 is then connected into the frequency determining circuit of the oscillator 7 by means of the wires 5 and 6. When the oscillator 7 drives the resonant reed relay 8 at the precise resonant frequency of the control reed, the relay 9 is closed thereby actuating the solenoid 10 which withdraws the linkage 22 and thus releases the latch 25 and allowing the cash drawer 2 to be opened.

FIGURE 4 shows a transistor oscillator circuit in which the three resistors and three capacitors in the feedback circuit of the transistor 35 determine the frequency of oscillation. This is a transistor version of the well known phase shift oscillator. The phase shift circuit is between the collector lead 36 and the base lead 37 of the transistor 35. One of the resistors 28 is in the circuit only when the component ring 27 contacts 29 and 30 are placed against the contacts 31 and 32. The resistor 28 is then connected across the leads 33 and 34 and the phase shift circuit is complete. When the ring is thus inserted, the frequency of the oscillator coincides exactly with the resonant frequency of the reed 41 of the reed relay. The oscillator signal is coupled to the base lead 38 of the amplifying transistor 39 which drives the coil 40 of the resonant reed relay. When the coil 40 is driven at the resonant frequency of the reed 41, intermittent contact is made with the fixed contact 42 thus actuating the coil 44 of the control relay and closing the contacts 45. The capacitor 43 allows the control relay contacts 45 to be held down continuously despite the intermittent closure of the reed contacts 41, 42. When the control relay contacts 45 are closed, the solenoid 46 is actuated thus releasing the latch mechanism by means of the linkage 47.

FIGURE 5 shows in block diagram and schematically a cash register locking system in which a plurality of cash drawers are separately locked. The oscillator 50 will oscillate at four specific frequencies when resistances of four specific values are connected across the contacts 51 and 52. The oscillator 50 drives the coil 59 of a resonant reed relay having four resonant reeds tuned to the four specific frequencies. For example at one specific oscillator frequency the resonant reed 73 will vibrate and make intermittent contact with the fixed contact 60. Intermittent closure of the contacts 60 and the reed 73 actuates the coil 62 of the first control relay thereby closing the contacts 72 and energizing the solenoid coil 66 and releasing the latch 70 which locks the cash drawer 71. In a similar manner, the other three resonant reeds of the resonant reed relay control the latching of the other three cash drawers. In actual practice a capacitor should be placed across the relay coils 62, 63, 64, and 65 so that the corresponding relay contacts will not chatter due to the intermittent closure of the resonant reed relay contacts. In the interest of simplicity these capacitors have been omitted from the drawing.

In FIGURE 6 the diagram 58 shows the plotted relationship 57 between the resistance value inserted between contacts 51 and 52 and the resulting frequency of the oscillator 50. If four ring component keys are provided as in FIGURE 7, each having a resistor of a specific value as shown in FIGURE 6, a different oscillator frequency

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will be produced when each of the four ring keys are inserted between the contacts 51 and 52. These four specific frequencies correspond exactly to the resonant frequencies of the four reeds shown in FIGURE 5.

FIGURE 7 shows four apparently identical ring component keys. However each ring contains a resistor of a different value. Each ring when inserted between the contacts 51 and 52 can cause the oscillator 50 to produce only one of the four specific frequencies needed to actuate one of the resonant reeds of the reed relay. Each one of the four ring component keys is thus able to unlock one of the cash drawers of the cash register.

In these specifications and drawings an oscillator is used as the control circuit and the frequency of the oscillator is determined by the value of one or more circuit elements in the removable ring key assembly. A resonant reed relay is shown as the preferred frequency discriminator because of its selectivity and stability and because it can perform simultaneous switching and discriminating functions. Other types of frequency discriminator could also be used such as a band pass filter. The electromechanical bolt or latch may consist of a conventional bevelled spring latch mechanically coupled to a solenoid which may be actuated either directly by the reed relay contacts or preferably by an intermediate relay.

Resonant reed relays are well known in the art and are commercially available over the frequency range of 20 cycles per second to 1600 cycles per second or greater. Power levels of a few milliwatts are sufficient to actuate them. Typical bandwidth ranges between 0.2% and 2.0%. Resonant reed relays have extremely high selectivity; they are reliable, inexpensive, and require a minimum of associated electronic circuitry. The length of the vibrating reed may be set so that it responds to a specific narrow band of frequencies corresponding to the mechanical resonance of the reed. When energy is applied magnetically from the relay coil at the resonant frequency, the reed vibrates with sufficient amplitude so as to make intermittent contact with a closely spaced second contact member. The reed relay contacts make only intermittently contact and can pass a limited electrical current and for these reasons the reed relays are usually used to actuate an auxiliary relay which controls the power circuits.

As can be seen from the foregoing specifications and drawings I have provided, in combination with a cash register, a locking system which is secure and convenient and which overcomes the serious disadvantages of ordinary lock and key systems which have in the past discouraged the routine locking of cash drawers.

While I have described particular embodiments of my invention for purposes of illustration, it will be understood that various modifications and adaptations thereof may be suggested to those skilled in the art without departing from the spirit and scope of the invention as defined in the following claims.

Having thus fully described my invention I claim:

1. In a cash register locking system wherein the cash drawer is secured by a latching device releasable by means of a removable key, the apparatus which comprises: a detachable key assembly having at least one electronic component of a specific value, the said component being mounted in a ring suitable for wearing on the finger; an electronic control circuit responsive to electronic components of the said specific value; means for temporarily connecting the said electronic component of the key assembly into the responsive input of the said control circuit; power switching means responsive to the said electronic control circuit; an electromechanical latching device, suitable for securing a cash drawer, responsive to the said power switching means, the said latching device thereby being releasable by the temporary connection of the said ring shaped key assembly into the said control input.

2. In a cash register locking system wherein the cash

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drawer is secured by a latching mechanism, such as a bolt, releasable by means of a removable key, the apparatus which comprises: a removable key assembly having at least one electronic component of a specific value, the said component being mounted in a ring suitable for wearing on the finger; a first pair of electrical contacts integral with the said ring key to which the terminals of the said electronic component are connected; a key receptacle comprising a second pair of electrical contacts against which the said first pair of electrical contacts may be held, the said key receptacle being mounted on a cash register; an electrical discriminating control circuit responsive to electronic components of the type and specific value as the said component in the ring key assembly, the input of the said discriminating control circuit being connectable to the said ring key electronic component through the said second electrical contact assembly when the said ring key assembly is held against it; electrical switching means responsive to the said electrical discriminating control circuit; electromechanical latching means actuated in response to the closure of said electrical switching means; and means for securing the aforementioned cash drawer in a closed position with the said electromechanical latching means until the said removable ring key assembly is pressed against the said receptacle.

3. In a cash register locking system wherein the cash drawer is secured by a latching mechanism releasable by means of a removable key, the apparatus which comprises: a detachable key assembly having at least one electronic component of a specific value, the said component being mounted in a ring suitable for wearing on the finger; a first pair of electrical contacts integral with the said ring key assembly to which the terminals of the said electronic component are connected; a second pair of electrical contacts mounted on a cash register, the said second pair of contacts being arranged to mate with the said first pair of electrical contacts upon light pressure of the ring key assembly; an electronic oscillator circuit, the frequency of which may be determined by the value of the said electronic component in the said ring key assembly; means for connecting the said electronic component into the said oscillator circuit, a specific oscillator frequency thereby resulting, the said connection being through the said first and second pairs of electrical contacts; frequency discriminating means responsive only to signals of the said specific frequency; switching means responsive to the output of the said frequency discriminator, the said switch being thereby closed only in response to signals of the said specific frequency; and electromechanical latching means responsive to the closure of the said switching means, the said latch being capable of securely maintaining the cash drawer in a closed position until being actuated by the said switching means.

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4. In a cash register locking system wherein the cash drawer is secured by a latching device releasable by means of a removable key, the apparatus which comprises: a key assembly consisting of a ring suitable for wearing on the finger into which at least one electronic component of a specific value is mounted; a first pair of electrical contacts integral with the said ring key assembly to which the terminals of the said electronic component are connected; a second pair of electrical contacts mounted on a cash register, the said second pair of contacts being arranged to mate with the said first pair of electrical contacts upon light pressure of the said ring key assembly; an electronic oscillator circuit, the frequency of which may be determined by the value of the said electronic component in the said ring key assembly; means for connecting the said electronic component into the said oscillator circuit, a specific oscillator frequency thereby resulting, when the said ring key contacts are pressed against the said second pair of contacts mounted on the cash register; a resonant reed relay, the contacts of which close only in response to signals of the said specific frequency from the said oscillator; power switching means effected through the closure of the contacts of the said resonant reed relay, the said power switching means being thereby actuated whenever signals of the said specific frequency are produced by the said oscillator; and electromechanical latching means responsive to the said power switching means, the said latch being capable of maintaining the cash drawer in a closed position until being actuated by the said power switching means.

No references cited.