

[54] **ELECTRICALLY OPERATED COIN BOX LOCK**

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[51] Int. Cl. **E05c 1/08**

[58] Field of Search... 70/85, 86, 87, 276, 278, 282;
232/15, 16, 31, 43.2; 292/144, 201; 312/215,
222, 333

[56]

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[57]

ABSTRACT

This invention relates to an electrically actuated coin box locking device for vending machines and the like. The electrically actuated locking device comprises a solenoid having a spring loaded plunger which is positioned to engage a staple coupled to the machine. When the plunger engages the staple the coin box cannot be removed from the machine. The solenoid is actuated by an appropriate signal having a particular characteristic.

10 Claims, 4 Drawing Figures

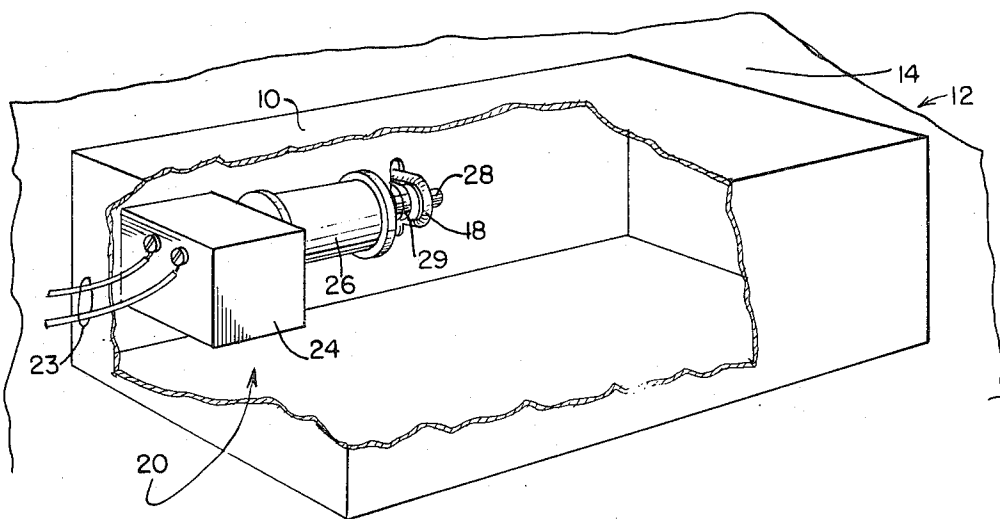


FIG. 1

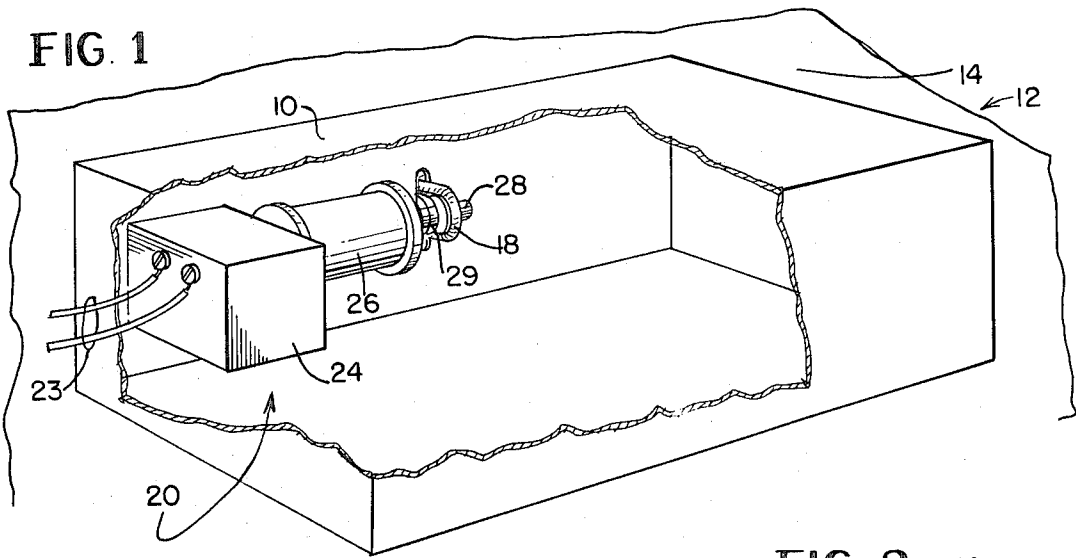


FIG. 2

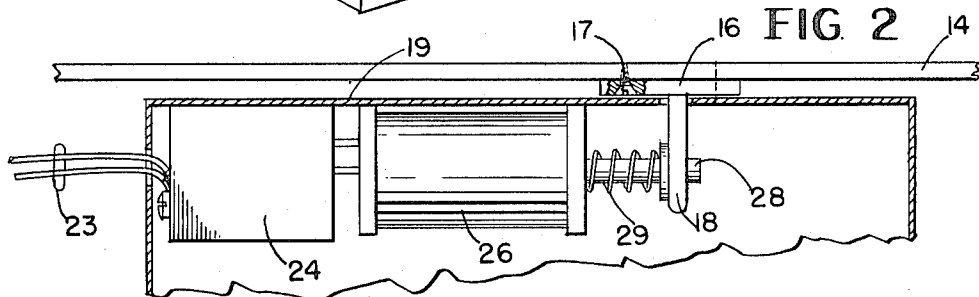


FIG. 3

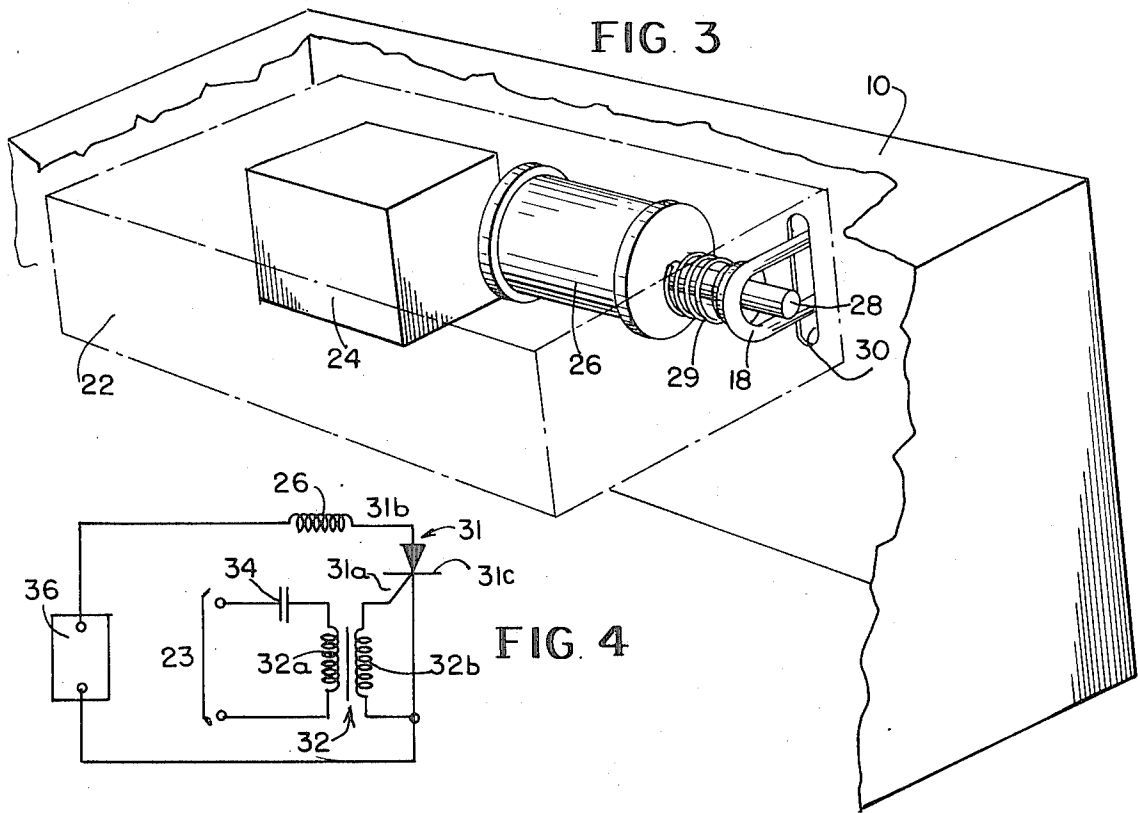
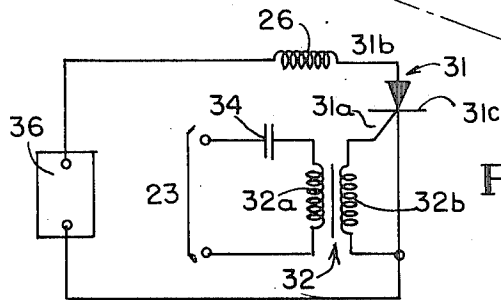


FIG. 4



ELECTRICALLY OPERATED COIN BOX LOCK**BACKGROUND OF INVENTION**

This invention relates to an improved coin box locking apparatus for vending machines and the like, and in particular to an electrically actuated locking apparatus.

Millions of dollars are lost each year by vending machine companies as a result of coins being pilfered from coin boxes positioned in vending machines. Generally, the coin boxes are not locked in place making it convenient for anyone having access to the interior of such machines to remove a handful or two of coins therefrom. There are some coin boxes that use either surface or flush mounted locks. However, these locks require master keys which are easily lost and/or duplicated thereby making such locking device virtually ineffective.

Today, because of the unions, it is not always possible to have the same man fill the vending machine and collect the proceeds from the coin box. The more people having access to the machines, the greater the probability of pilferage from the coin boxes and the less chance for detecting who is causing the loss. Further, to complicate the problem, personnel of the business where the machines are installed might have access to the interior of the machine.

Today, to the best of my knowledge, there are no electric locking devices for coin boxes in vending machines. The majority of existing coin box locking devices are key controlled; therefore, by its very nature accessible to many persons.

It is very desirable both from a security and profit standpoint to provide a coin box locking device that is accessible to only one person and not to everyone having access to the interior of the vending machine.

The existing coin box locking devices do not provide a fool proof system for inhibiting pilferage from the coin boxes, in that keys are easily duplicated.

It is desirable to provide an electrically operated coin box locking device that does not rely upon keys.

The present invention not only provides for an electrically operated coin box locking device but provides for a locking device that can be operated by special electronic control circuits. These control circuits are responsive to a selective series of electrical signals. The electrical signals are transmitted by appropriate means; one of such means being an encoded data card that is inserted into an associated card reader by a person authorized to have access to the vending machine.

SUMMARY OF INVENTION

The present invention incorporates an electrically actuated locking device for vending machine coin boxes. The particular electrical signal required to actuate the locking device can be generated by a special signal source, which is only possessed by authorized personnel. If additional security is required, the signal source can be actuated by introducing thereto a series of electrical signals that correspond to a predetermined digital card.

A further advantage in using a combination of digitally encoded electrical signals is that the combination does not even have to be known by the authorized coin collector if he carries an encoded data card with him, the card having the required combination placed therein. The card transmits the digital combination to

an associated card reader, which, in turn transmits the required series of electrical signals to the locking device actuating circuits. If the card has the correct code therein, the series of signals derived therefrom enable the actuating circuits to energize the locking device and the mechanical locking mechanism holding the coin box in place will be released. Each vending machine route has a different combination and therefore requires use of a different encoded data card.

The principal object of this invention is to provide an electrically actuated locking mechanism for vending machine coin boxes.

It is a further object of this invention to eliminate the use of key locks for vending machine coin boxes.

It is a further object of the invention to eliminate the use of any exposed locking means for vending machine coin boxes.

It is still a further object of the invention to provide a positive locking device which is electrically actuated by means of a specified electrical signal or signals, possessing a preselected characteristic.

It is still a further object of the invention to provide an electrically actuated positive locking device for vending machines that is adaptable to existing vending machines.

IN THE DRAWINGS

FIG. 1 is a perspective view of the coin box positioned in a vending machine.

FIG. 2 is a top sectional cut-away cross-section of a coin box.

FIG. 3 is a perspective view of the electromechanical locking assembly embodied by this invention.

FIG. 4 is an electrical circuit diagram for an amplifier.

DESCRIPTION OF PREFERRED EMBODIMENT

FIG. 1 illustrates, in perspective, a coin box 10 of a vending machine 12 having a wall 14. The relationship between the coin box 10 and the vending machine 12 is for illustrative purposes only and will vary between each type of vending machine. The locking assembly hereinafter described is adaptable to any type of coin box 10 in any type of vending machine 12.

FIG. 2 is a top sectional cut-away cross-section of FIG. 1 of the coin box 10 adjacent the wall 14, of the vending machine 12.

A plate 16 is affixed to the wall 14 of the vending machine 12 opposite a surface of the coin box 10 by means well known in the art: one of such means being screws 17, and another such means being welding. A staple 18 is coupled to the plate 16 and wall 14 by means well known in the art.

An exterior surface 19 of the coin box 10 is positioned in an abutting relationship with and opposite the plate 16.

FIG. 3 is a perspective view of an electro-mechanical locking assembly 20. The electro-mechanical locking assembly 20 is mounted within a container 22, and the top of the container being shown removed for illustrative purposes only. The container 22 is coupled to the coin box by means well known in the art.

A preferred embodiment of the locking assembly 20 is comprised of a pair of signal wires 23 coupled to an amplifier 24; the amplifier being located in the container 22. A solenoid coil 26 is electrically coupled directly to the amplifier 24 for receiving electrical actuat-

ing signals therefrom. The solenoid coil 26 operates a plunger 28 which is magnetically coupled directly thereto and responsive to electrical signals from the amplifier 24. The plunger 28 may be set to be in a retracted or extended position upon the respective presence or lack of an electrical actuating signal from the amplifier 24.

In the preferred embodiment, a spring 29, enables the plunger 28 to remain in an extended position until an application of an actuating signal from the amplifier 24. When this signal is transmitted to the solenoid 26, the plunger 28 is retracted against the spring.

A slot 30 is positioned in the coin box 10 to enable the staple 18 to be inserted therethrough. The container 22 for the locking assembly 20 is positioned within and coupled to a wall of the coin box to enable the plunger 28 of the solenoid coil 26 to be inserted through the staple 18, thereby inhibiting access to the coin box 10 until the plunger 28 of the solenoid coil 26 is retracted by a remote control signal transmitted to the amplifier 24 by means of wires 23.

To prevent unauthorized excitation of the solenoid coil 26, it is electrically coupled to the amplifier 24 which is coupled to the mounting case 22. The amplifier 24 is responsive only to a particular signal possessing a preselected characteristic. FIG. 4 illustrates the circuit for such amplifier. The amplifier 24 is comprised of a thyristor (SCR) 31, which is an electronic amplifier switching means having a control gate 31a, an anode 31b and cathode 31c; a transformer 32 having a primary winding 32a, a secondary winding 32b; and, a capacitor 34 in series with the transformer primary 32a. The primary winding 32a receives its signal via the pair of wires 23. The solenoid coil 26 is connected to the anode 31b of the thyristor 31. The secondary winding 32b, of the transformer 32 is coupled to the control gate 31a and the cathode 31c of the thyristor 31.

The value of the capacitor 34 is such that only audio-frequency signals on the wires 23 will be coupled to the primary winding 32a to the secondary winding 32b of the transformer 32. When the audio signal is coupled through the transformer 32, the thyristor control gate 31a is forward biased resulting in a current passing from one output line of a power supply 36 through the solenoid coil, thyristor anode 31b and then returning to the other output line of power supply 36.

An appropriate audio-frequency signal across the lines 23 will therefore enable the solenoid coil 26 to become energized retracting the plunger 28. Any attempt to either open or short circuit any of the lines to the locking assembly or to apply a DC or 60HZ AC signal across lines 23 will not result in the solenoid being energized in that the gate 31a of the thyristor 31 will not receive sufficient forward bias from the secondary winding 32b.

The proper audio-frequency signal can be impressed upon lines 23 by several means. One of such means is from a signal generator (not shown). For additional security, this signal generator can be controlled by various devices. A device for controlling the signal generator may be an encoded switch not shown, which closes only when a correct combination of associated push-buttons are depressed. Another device for controlling the signal generator is by means of an encoded card and its associated reader; when the reader receives the properly encoded card it will enable the generator to

transmit the audio-frequency signal to the transformer 32 via lines 23.

It should be noted that the amplifier could be deleted without affecting the operation of the locking apparatus. In this case the signal lines 23 are coupled directly to the solenoid coil 26; the solenoid being responsive to the proper electrical stimulation.

In operation the coin box 10 is locked into the vending machine when the plunger 28 of the solenoid 26 passes through the staple 18. The staple 18 being inserted into the coin box via slot 30. The slot 30 and the electro-mechanical assembly 20 are positioned relative one another on the coin box 10 to enable the plunger 28 to either engage or pass through the staple 18, locking the coin box in position.

The coin box 10 is readily removed and inserted into machine 12 by providing a proper electrical signal to the solenoid coil 26 which enables the plunger 28 to be retracted from the staple 18. As stated aforesaid a proper electrical signal could be supplied by means of an encoded data card, not shown, which is inserted into an associated reader. If the code was correct, the electrical signal to retract the plunger 28 would be transmitted to the solenoid 26.

It is believed that the invention has been described in such detail as to enable those skilled in the art to understand the same, and it will be appreciated that variations or modifications may be made without departing from the spirit and scope of the invention.

What is desired to be secured by letters patent in the United States:

1. An electrically actuated coin box locking device for locking a coin box in a vending machine, said locking device comprising:

- a solenoid coil positioned in the coin box;
- a plunger slidably coupled to the solenoid and positioned to extend therefrom and retract thereto;
- a staple coupled to the machine adjacent the coin box and positioned to enable the plunger to pass therethrough;

means for actuating the solenoid enabling the plunger to retract thereto and extend therefrom; and

- an amplifier coupled between the solenoid and the means for actuating the solenoid, said amplifier being responsive only to a particular signal possessing a preselected characteristic.

2. An electrically actuated coin box locking device as defined in claim 1 whenever said amplifier comprises: switch means having at its input a control electrode and at its output two electrodes;

- a power supply coupled to the solenoid and the switch means;

wherein the means for actuating the solenoid is coupled to the control electrode causing conduction between the output electrodes, enabling power to flow from the power supply to the solenoid.

3. An electrically actuated coin box locking device as defined in claim 2 wherein said amplifier further comprises:

- a capacitor coupled between the control electrode of the switch means and the means for actuating the solenoid, said capacitor having a value to enable the means for actuating the solenoid to pass there-through.

4. An electrically actuated coin box locking device as defined in claim 3 wherein said amplifier further comprising:

A transformer having a primary winding and a secondary winding, wherein the secondary winding of the transformer is coupled to the control electrode of the switch means and the means for actuating the solenoid is coupled to the primary winding of the transformer.

5. An electrically actuated coin box locking device as defined in claim 4, said device further comprising: a spring positioned between the solenoid and the plunger enabling the plunger to remain in an extended position until retracted by the means for actuating the solenoid.

6. An electrically actuated coin box locking device as defined in claim 4 wherein said coin box has an aperture positioned thereon to enable the staple to pass therethrough, thereby enabling the coin box to be locked to the machine when the plunger is in the extended position.

7. An electrically actuated coin box locking device as defined in claim 6 wherein said means for actuating the solenoid coil comprises:

an audio-frequency signal.

8. An electrically actuated coin box locking device as defined in claim 7 wherein said switch means is a thyristor.

9. An electrically actuated coin box locking device for locking a coin box in a vending machine, said locking device comprising:

a solenoid coil positioned in the coin box, said coin

box having an aperture thereon:

a staple coupled to the machine adjacent the aperture of the coin box and suitable for passing therethrough;

a plunger slidably coupled to the solenoid and positioned to extend therefrom and retract thereto; means for actuating the solenoid; and

an amplifier coupled between the solenoid and the means for actuating the solenoid, said amplifier being responsive to a preselected signal; and wherein the plunger is extended through the staple locking the coin box to the machine, in the absence of said signal.

10. An electrically actuated coin box locking device for locking a coin box in a vending machine, said locking device comprising:

a solenoid coil positioned in the coin box having a pair of wires extending therefrom;

a plunger slidably coupled to the solenoid and positioned to extend therefrom and retract thereto;

a staple coupled to the machine adjacent the coin box and positioned to enable the plunger to pass therethrough;

a remote source of excitation for actuating the solenoid, wherein said wires of said solenoid extend from the coin box and are connected to the remote source of excitation, and

an amplifier coupled between the solenoid and the remote source of excitation for actuating the solenoid, said amplifier being responsive to a preselected signal.

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