COIN-OPERATED ELECTRIC POWER SUPPLY STATION

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ABSTRACT

A coin-operated electric power supply station especially adapted for use in remote unsupervised locations. The station includes a substantially vandalproof metal box having one or more removable walls which are positively locked in place by a key-operated lock. The control elements of the station are mounted on the interior side of the removable wall so as to be readily accessible for repair. When the box is closed, only an actuating handle, a coin slot and an electric power outlet are accessible from the exterior of the box.

4 Claims, 8 Drawing Figures
COIN-OPERATED ELECTRIC POWER SUPPLY STATION

BACKGROUND OF THE INVENTION

The present invention is especially designed for use in dispensing electric power at remote, unsupervised locations, such as public campgrounds. Installations of this type are subject, at best, to only periodic supervision, and thus in addition to its function of supplying electricity in a convenient and foolproof manner, the station must be made secure against tampering and vandalism.

BRIEF SUMMARY OF THE INVENTION

The power supply station of the present invention takes the form of a substantially vandalproof metal box which is fixedly mounted on the top of a hollow metal post. Electric power is supplied by an underground supply cable which is led upwardly through the post into the interior of the box. The operating mechanism of the station is mounted on the inner side of a removable panel or wall of the box which is normally positively locked in position in the box by a key-operated lock. Within the box, a motor-driven timer controls the period of time during which electrical power is supplied from the supply cable to an electric outlet accessible from the exterior of the box. The timer motor may be set to operate for a selected period of time determined by the insertion of one or more coins into a coin slot. To complete the insertion of a coin into the box, it is necessary to depress an actuating handle, accessible at the exterior of the box, depression of the handle mechanically setting an escapement mechanism which shuts off the timer motor and opens the power circuit after the elapse of a predetermined time interval. The escapement mechanism is so constructed as to permit the user to select any desired multiple of time periods, up to a certain limit, by inserting the appropriate number of coins. The power supply circuit includes a circuit breaker which will open the circuit if it is overloaded. The circuit breaker is of the manually resettable type and is so located in the interior of the box as to permit resetting by operation of the actuating handle. A total elapsed time recorder is also electrically connected in the circuit so that coin collections from the station can be verified.

Other objects and features of the invention will become apparent by reference to the following specification and to the drawings.

In the drawings:

FIG. 1 is an exploded perspective view, with certain parts broken away, showing a supply station embodying the present invention;

FIG. 2 is a cross-sectional view of the station of FIG. 1 taken on a horizontal plane at approximately the location of section line 2—2;

FIG. 3 is a detail view of the coin-actuated escapement mechanism, taken approximately on line 3—3 of FIG. 1, and with certain parts broken away, showing the mechanism just prior to actuation;

FIG. 3a is a view similar to FIG. 3, again with certain parts broken away and others omitted showing the mechanism being actuated;

FIG. 3b is a view similar to FIGS. 3 and 3a showing the mechanism in its actuated or timing condition;

FIG. 3c is a view similar to FIG. 3b, with certain parts omitted, showing the mechanism as it is timing out or concluding the time period of operation;

FIG. 4 is a detail view of the mechanism of FIG. 3, taken approximately on line 4—4 of FIG. 3; and

FIG. 5 is a schematic diagram of the electrical control circuit.

Referring first to FIG. 1, a supply station embodying the present invention is disclosed as including a hollow metal box designated generally 10 having removable front and rear walls 12F and 12R respectively. The top 14, side 16a, 16b and bottom 18 walls of box 10 are preferably formed from a single strip of fairly heavy gauge metal joined into a boxlike tubular configuration as by a weldment 20 along one corner. Front and rear walls 12F and 12R are slightly recessed into the front and rear sides of the box 10 and are mounted in position within the box by having one edge located between a pair of spaced flanges 22 welded to the sidewalls of the box. As best seen in FIG. 2, one pair of flanges 22 are located at diagonally opposite corners of the box, and at the remaining corners a single flange 24 is formed integrally with or welded to the box sidewalls. A key-operated lock 26 is mounted in each of walls 12F and 12R. The striker 28 of each lock 26 is adapted to be engaged along the inner side of flange 24 to positively lock walls 12F or 12R in assembled position in the box.

Box 10 is fixedly secured to the top of a hollow metal post 30 which is driven into the ground to support box 10 at a convenient height. An opening 32 in bottom wall 18 of box 10 places the interior of the box in communication with the interior of post 30, and an underground electric supply cable 34 is led upwardly through the interior of post 30 and opening 32 into the interior of box 10.

Walls 12F and 12R are identical in construction and each of the two walls has the same elements mounted on its exterior and interior sides. In FIG. 1, the exterior side of front wall 12F is shown, while the interior side of rear wall 12R is visible. The exterior of rear wall 12R is identical to that of wall 12F, while the interior side of wall 12F has the same structure mounted upon it as does the interior of wall 12R. Thus, while the following description may make reference to either front wall 12F or rear wall 12R, the description is equally applicable to both.

On the interior of each wall 12F and 12R, there is mounted a coin-actuated interval timer designated generally 36 which includes a coin chute 38 having a coin-receiving opening 40 at the exterior side of the wall. An actuating shaft 42 is rotatably mounted on the top of device 36 and projects through the wall. An actuating handle 44 is fixedly secured to shaft 42 on the exterior side of the wall to actuate device 36 in a manner to be described in more detail below.

Also mounted on the interior of walls 12F and 12R is an electric power output box 46 of well-known construction having a socket capable of accepting a conventional electric plug. In view of the fact that the power supply station is exposed to weather, the box and plug 46 is of the weatherproof type, having a conventional sealing cap 48 at the exterior of the box.

An indicator light 50 is also mounted on the box wall to indicate when power is available at outlet 46, and an elapsed time indicator or recorder 52 is also mounted on the interior side of each wall 12F or 12R to verify coin collections.

As best seen in FIG. 2, coin-actuated timers 36 are the most bulky of the components mounted on the interior of walls 12F and 12R. The timers 36 are preferably mounted near one end of each wall so that they can overlap each other when the two walls are in position, thus minimizing the overall size of the box.

Details of the coin-actuated timer are best shown in FIGS. 3, 3a-c and 4. Referring first to FIG. 3, each timer 36 includes a casing 60 which is fixedly secured to the interior side of wall 12F or 12R as by welding. Shaft 42 is rotatably journaled in a bore 62 in wall 12F and in a plain bearing 64 fixedly mounted on the top wall of casing 60. A main actuating arm 66 is fixedly mounted on shaft 42 at an axial position in alignment with actuating plunger 68 slidably guided in a slot 70 in the upper wall of casing 60. A second actuating arm 72 is likewise fixedly mounted upon shaft 42 in alignment with the reset button 74 of an electric circuit breaker 76 mounted on casing 60. Actuating shaft 42 is rotatably biased in a clockwise direction as viewed from the exterior of wall 12F by a torsion spring 78 to a position such that arms 66 and 72 do not engage plunger 68 or button 74.

Coin chute 38 is extended downwardly through casing 60 as at 80. In FIG. 3, a coin C is shown near the lower end of chute extension 80 at the position to which it would fall upon being inserted into the chute. Coin C is retained in the position shown in FIG. 3 by a lug 82 on an escavation actuating lever 84 forming part of an escapement mechanism which deter-
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3 mines the period of time within which electric power will be available at outlet box 46.

The actual timing function of the device 36 is performed by a constant speed electric motor 86 (FIG. 4) which is energized whenever two fixed contacts 88 and 90 are electrically connected with each other by contact bridge 92. Motor 86 includes a drive shaft 94 carrying a driving pin 96 which is meshed with an idler gear 98 mounted for free rotation upon a fixed shaft 100. Gear 98 in turn is meshed with a gear 102 freely rotatable upon a stub shaft 104 which is carried on a latch arm 106 which is in turn rotatably supported upon shaft 100. A second gear 108 is fixedly secured to and rotates with gear 102 upon shaft 104. Gear 108 is in turn engaged with a gear 110 which is likewise rotatably supported upon shaft 100. As best seen in FIG. 4, gear 110 is formed with an axially projecting lug 112 which is located to lie at the same radial distance from the axis of shaft 100 as is a corresponding lug 114 formed on a ratchet wheel 116. Legs 112 and 114 axially overlap one another and their engagement is employed to initiate the cutting off of the timer.

Ratchet wheel 116 is freely rotatable upon shaft 100 and is provided with a suitable scale which cooperates with a pointer 118 to indicate the remaining time before shutoff. Pointer 118 is mechanically linked to and rotates with gear 100, the pointer and gear being coupled to each other as by a sleeve 120, while ratchet wheel 116 is formed with a hub 122 (FIG. 4) which rotates freely upon the sleeve 120.

Ratchet wheel 116 is positioned in rotation about the axis of shaft 100 by a double-toothed pawl 124 mounted for rotation about a stub shaft 126 fixedly mounted upon casing 60. In FIG. 3, pawl 124 is shown in its normal position, in which a holding tooth 128 on the pawl is engaged between two teeth of ratchet wheel 116 to hold wheel 116 against rotation about shaft 100. Pawl 124 is normally maintained in this position by the engagement between a projecting lip 130 formed on an actuating lever 84 which overlies an arm 132 integrally formed on pawl 124. Lip 130 and arm 132 are resiliently biased against each other by a spring 134 seated between lip 130 on lever 84 and another lip 136 formed on pawl 124. In addition to holding tooth 128, pawl 124 is formed with a driving tooth 138.

Returning now to latch arm 106, a tension spring 140 is connected between arm 106 and a lug 142 on casing 60 to normally resiliently maintain arm 106 in the rotatable position shown in FIG. 3 in which the right-hand tip of the arm is engaged with a stop pin 144 on casing 60. When arm 106 is engaged with pin 104, a latch tooth 146 on arm 106 is located in the position shown in FIG. 3.

With the parts in the position shown in FIG. 3, the bridging contacts 92 are in their open position. Bridging contacts 92 are carried at the end of a contact arm 148 which is mounted for rotation upon casing 60 by a shaft 150. A crank 152 formed with a latch tooth 154 at its distal end is also pivotally mounted on shaft 150. A torsion spring 156 is engaged between casing 60 and a flange 158 integrally formed on crank 152. Flange 158 forms a platform which bears against a substantial length of contact arm 150, and normally the arm 148 and platform 158 are held in face-to-face engagement with each other by a compression spring 160 engaged between arm 148 and a headed stud 162 fixedly secured to platform 158 and passing through a bore in arm 148.

In FIG. 3, the mechanism is shown with the contacts open and with a coin C inserted in the chute to the position at which the timer is ready to be activated. It will be noted that at this time moving arm 106 is in engagement with lug 114 on ratchet wheel 116 and that the ratchet wheel is locked against rotation by the engagement of holding tooth 128 between two adjacent teeth on ratchet wheel 116.

To activate the timer, the actuating handle 44 at the exterior of the box is pressed downwardly to rotate shaft 42 in a direction moving arm 106 downwardly against the top of actuating plunger 68. Plunger 68 is pivotally connected at its lower end as at 164 to drive crank 166 pivotally mounted on casing 60 at 168. A torsion spring 170 normally biases drive crank 166 to the position shown in FIG. 3 at which a drive lug 172 is located clear of the path of coin C through chute 80, but at a position overlaying the coin as the coin is held by lug 82 on the actuating lever 84. Drive crank 166 actually is located behind chute 80 as viewed in FIG. 3, lug 172 projects forwardly into the chute when the coin is at slot 174 (see FIG. 4).

Depression of actuating handle 44 and the consequent depression of plunger 68 by its engagement by the downwardly moving actuating arm 66 pivots drive arm 166 in a clockwise direction about its pivot 168, and drive lug 172 moves downwardly into engagement with coin to force the coin downwardly from the position shown in FIG. 3 to the position shown in FIG. 3a. This downward movement of the coin forces lug 82 to the left from the FIG. 3 position, thus swinging actuating lever 84 in clockwise movement about its pivot 126 to the position shown in FIG. 3a. This clockwise pivotal movement of actuating element 84 drives a toe 176 integrally formed on element 84 upwardly against crank arm 152, forcing arm 152 in counterclockwise movement about its pivot 150 and eventually shifting to catch tooth 154 upwardly past tooth 146 on arm 106. The movement of tooth 154 past tooth 146 is accommodated by pivoting of arm 106 in a counterclockwise direction about shaft 100 against the action of spring 106. As soon as tooth 154 has passed about 146, spring 140 swings arm 106 back in a clockwise direction to pivot tooth 146 under tooth 154, thereby latching arm 152 in the FIG. 3a position.

During the foregoing interaction between actuating lever 84 and arm 152, bridging contacts 92 are mechanically held against completing the circuit between fixed contacts 88 and 90 by a lever 178 freely pivotable upon lever 184 as at pivot 180. Lever 178 is slidably guided between two contacts 88 and 90 and projects through between the contacts to engage bridge 92 to hold at least one side of the bridge away from contact.

As crank arm 152 is elevated by the clockwise pivoting movement of lever 84 about its pivot 126, the pivoting action of element 84 about pivot 126 likewise causes a pivoting movement of pawl 124, the movement of lever 84 about pivot 126 being transmitted to the pawl by spring 134. The pivoting action of pawl 124 disengages holding tooth 128 from ratchet wheel 116, and at the same time swings drive tooth 138 of the pawl into engagement with a tooth of ratchet wheel 116 to drive the ratchet wheel in a clockwise direction about shaft 100.

After the actuating handle has been swung to its downwardmost position, coin C has passed beyond lug 82 and drops freely downward the chute into the collection box 184. With the coin disengaged from lug 82, a return spring 186 connected between actuating lever 84 and casing 60 returns the lever to its original FIG. 3 position, as shown in FIG. 3b, thus restoring holding tooth 128 into engagement with ratchet wheel 116 and at the same time withdrawing lever 178 to the right to permit bridge 92 to make across contacts 88 and 90.

The action described above in essence mechanically rotates ratchet wheel 116 one notch or tooth in a clockwise direction from its original FIG. 3 position. This increment of displacement will permit the circuit to operate to supply electric current for one unit time period, as for example, one-half hour. If the user wishes to have electricity supplied for a longer time period, he simply inserts another coin and repeats the foregoing process, thereby moving ratchet wheel 116 one more notch away from its original position. In FIGS. 3a and 3b, the relationship between lugs 112 and 114 is that which would exist if the coin shown in FIGS. 3a and were the fourth successive coin inserted in the chute.

Referring briefly now to the electrical diagram of FIG. 5, it will be seen that when contact 92 bridges contacts 88 and 90, an electrical circuit is completed to the timer motor 86 and through circuitry top 76 to outlet box 46 to supply current. Indicator light 50 will be energized and illuminated as soon as the circuit is completed.
Returning now to FIG. 4, with timer motor 86 in operation, pinion 96 is driven in a counterclockwise direction and through gear train 96, 98, 102, 108 gear 110 is driven in a clockwise direction. Because ratchet wheel 116 is held stationary by holding tooth 128 of pawl 124, counterclockwise rotation of gear 110 carries its lug 112 in a clockwise direction toward lug 114 on ratchet wheel 116. After elapse of a predetermined time, or more correctly, a given number of revolutions of constant speed motor 86, lug 112 is driven into engagement with lug 114. Lug 114 is integral with wheel 116 which is latched by pawl 124, and thus gear 110 cannot rotate any further, once lug 112 is engaged with lug 114. Timer motor 86 continues to drive, but since it can no longer rotatively advance gear 110, it causes gear 108 to become a planetary gear which climbs up the teeth of gear 110. This action carries with it arm 106, lifting arm 106 up off its stop pin 144, as shown in FIG. 3c until the tooth 146 on arm 106 is retracted from beneath tooth 154 on arm 152. As soon as teeth 146 and 154 are disengaged, torsion spring 156 swings arm 152 in counterclockwise movement about its pivot 150, thereby swinging arm 148 in clockwise movement about pivot 150 to disengage contacts 92 from contacts 88 and 90, thereby breaking the circuit to the timer motor and opening the circuit between the supply cable 34 and outlet box 46.

Referring now to FIGS. 1 and 5, the overall operation of the station is as follows. By inserting a coin in coin slot 40 and depressing actuator handle 44, the user then has available at outlet 46 electric power for a preset time period, typically one-half hour. If a longer period of use is desired the user can repeat the process to obtain any desired multiple of the unit time period up to the capacity of wheel 116, say 20 hours. Referring to the electrical schematic of FIG. 5, the insertion of the coin and subsequent depression of the actuating handle engages contact bridge 92 with contacts 88 and 90, as explained in detail above, thus completing the circuit through supply line L2, from the main supply line 34 to outlet 46. Upon closing of the contacts, an electrical circuit is completed through the timer motor, thus starting the motor in operation, and also energizing time recorder 52. Indicator light 50 is also energized, giving an external indication at box 10 that power is available at outlet 46. After the prepaid period of time runs out, contacts 92, 88, 90 open, thereby deenergizing timer motor 86, elapsed time recorder 52 and indicator light 50 and breaking the circuit to outlet 46.

If, during operation, an electric overload occurs, circuit breaker 76 will open, thus opening the supply circuit to indicator light 50 and to outlet 46, but not affecting the electrical circuit to timer motor 86 and time recorder 52. Upon correcting the overload, the user can reset the circuit breaker without inserting another coin only if some unused time still remains in the device. Depression of actuating handle 44 without inserting a coin will cause arm 72 on actuating shaft 42 to depress the circuit breaker reset button 74 to reset the circuit breaker.

It will be noted that the circuit breaker 76 is automatically reset each time actuating handle 44 is depressed, and thus the overloading of a circuit and opening of circuit breaker 76 by a previous user does not pose any problem to the subsequent user.

The construction of the box is such as to minimize the effects of attempted vandalism. As explained above, the top, sides and bottom walls are constructed from a single strip of relatively heavy gauge metal and welded along one corner as at 20 to present no external jamb or attachment for anyone to pry the walls apart. The recessing of front and rear walls 12F and 12R makes it difficult to do any effective prying along the edge of the wall of which lock 26 is mounted, since any prying force developed here is exerted parallel to the surface of the wall and not outwardly. The recessing of the walls places actuating handle 44 within the recess, thereby partially shielding handle 44 from hammering.

The mounting of all of the operating mechanism on the interior of the wall makes these parts readily accessible for repair or replacement when the wall is removed. Time recorder 52 is a factory sealed unit so that it provides an accurate record to verify coin collections even though this unit is accessible to the collector.

1 claim:

1. A coin-actuated electric power supply station comprising a locked tamper-resistant boxlike casing having a first wall recessed into one side of said casing, an electric power outlet mounted on the inner side of said wall and accessible from the exterior of said casing, electric power supply means for supplying electric power supply means for supplying electric power to the interior of said casing, circuit means in said casing including a coin-actuated time escappement mechanism for electrically connecting said supply means to said outlet for a predetermined time interval in response to the insertion of a coin, an actuating handle at the exterior of said wall having a shaft rotatably journaled in said wall and manually actuable to complete the insertion of a coin into said escappement mechanism, first and second actuating arms on said shaft on the inner side of said wall, an actuating plunger on said escappement means located to be engaged and depressed by said first actuating arm upon rotation of said shaft in one direction, electric circuit breaker means in said circuit means for disconnecting said outlet from said supply means in the event of an electric overload, and a reset button on said breaker means located to be depressed by said second arm when said first arm depresses said plunger.

2. A supply station as defined in claim 1 wherein said escappement means comprises a constant speed electric motor, contact means operable when closed to energize said motor and to connect said supply means to said outlet, and means operable to open said contact means after a predetermined number of revolutions of said motor.

3. A supply station as defined in claim 2 wherein said circuit breaker means is electrically connected in said circuit means between said contact means and said outlet whereby said motor is energized independently of said circuit breaker.

4. A supply station as defined in claim 3 further comprising time recording means for indicating the total elapsed time of operation of said motor.