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[54] **PROPERTY SECURITY SYSTEM**
9 Claims, 4 Drawing Figs.

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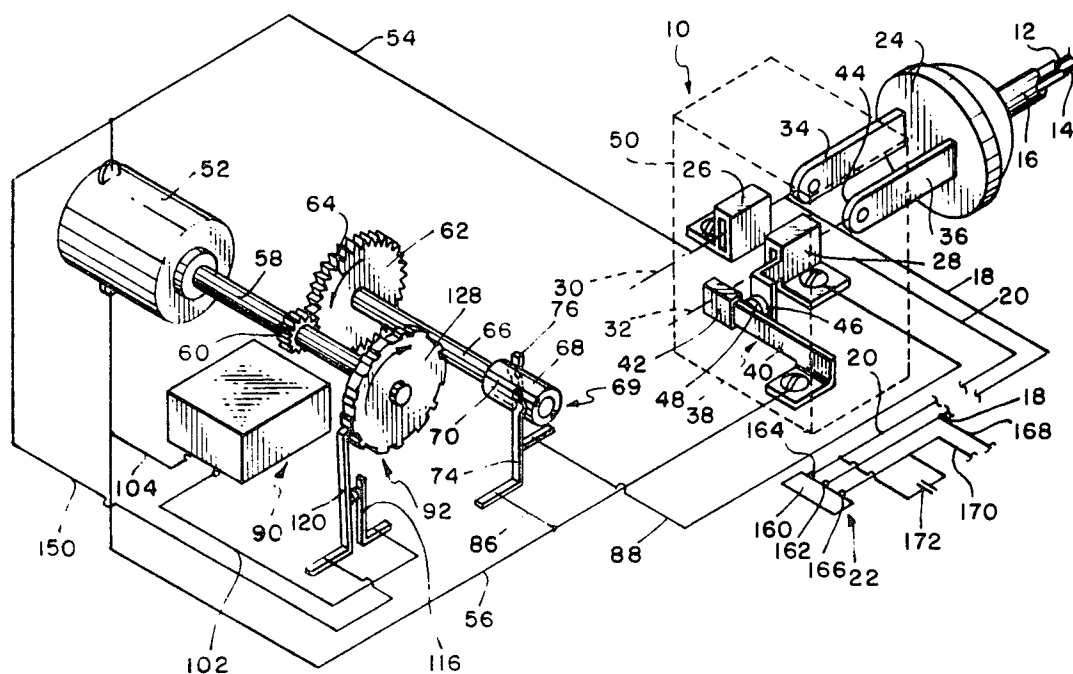
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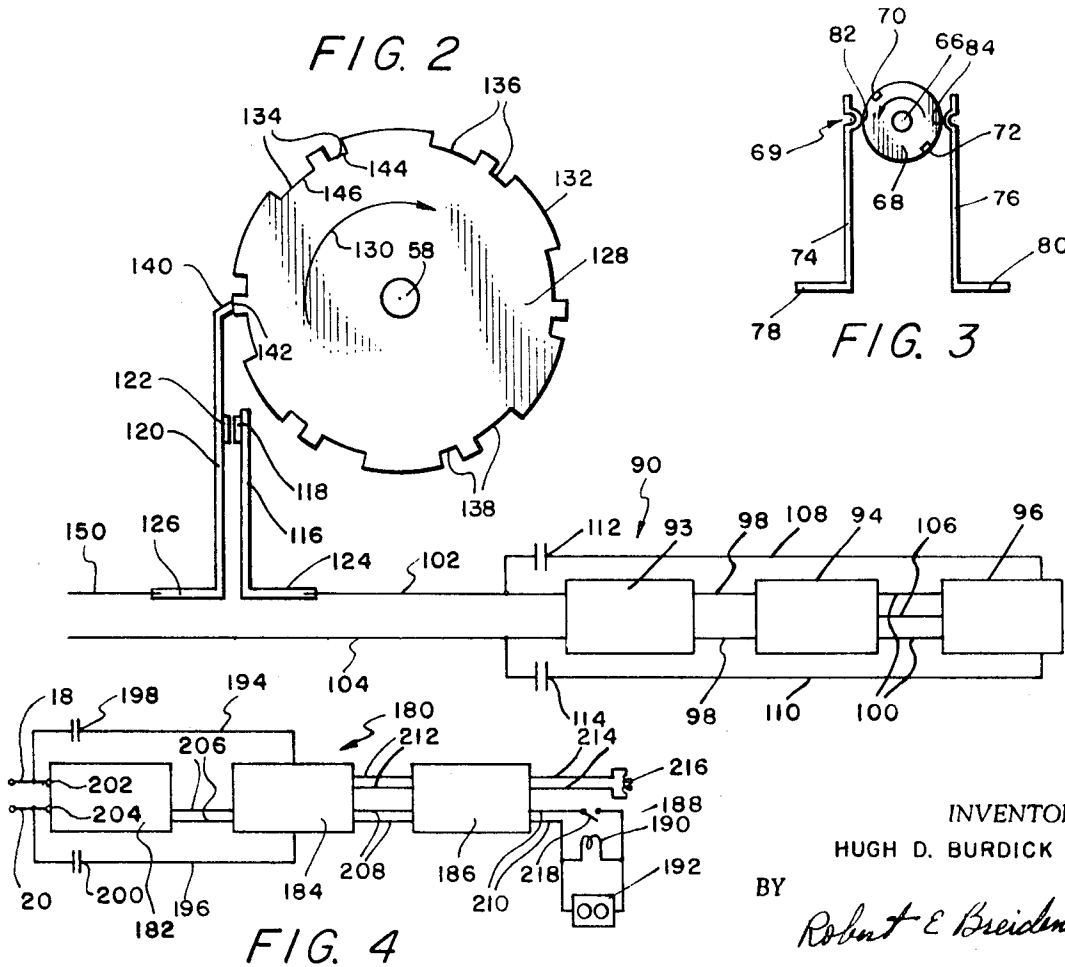
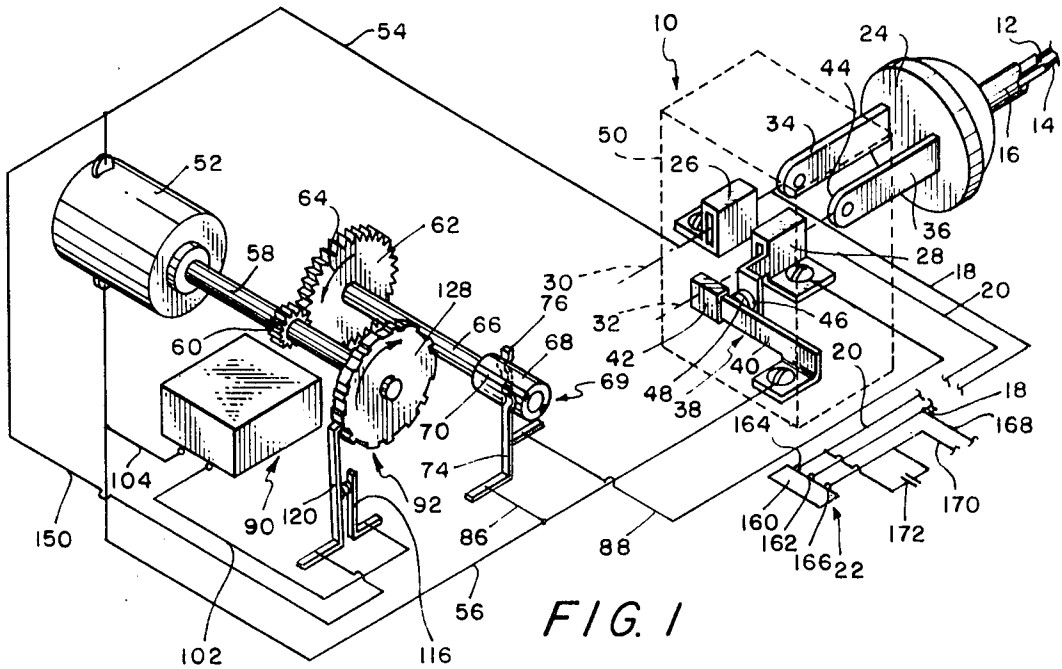
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ABSTRACT: Property security apparatus for producing a pulsed perceptible signal, audible and/or visual, at a detection location whenever electrical apparatus, such as a television set, is disconnected from a convenience outlet socket at a remote location. A sensing switch at the outlet socket closes in response to withdrawal of an electric power cord plug therefrom, and such closure initiates the production of a coded sequence of pulses of a radiofrequency signal that is coupled to the electric power circuit with the latter serving as a transmission line for the pulsed radiofrequency signal to the detection location. Means is provided at the detection location for pulsing a perceptible signal generator in synchronism with the detection of radiofrequency pulses. The sequence of radiofrequency pulses are uniquely coded whereby identification of the particular sensing switch can be made, when a plurality of combined sensing switch and radiofrequency signaling units are employed at a plurality of different locations.





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PROPERTY SECURITY SYSTEM

The present invention pertains to new and useful improvements in property security systems, and relates more particularly to apparatus for signaling at a surveillance location the closure of any one of a plurality of remotely located sensing switches, with the signaling being coded to enable unique identification of whichever sensing switch may be closed.

The present invention involves means at each of a plurality of convenience outlet sockets of an alternating current electric power distribution system for producing at least one occurrence of a coded sequence of pulses of radiofrequency signal upon removal of a power cord plug from the socket associated with such means. The various means provided at the various sockets differ from each other as to character of the coded sequence produced thereby, that is, the coded sequence produced by each of the means is unique and distinguished from all the others, whereby the production of a coded sequence enables identification of the particular means producing the same, and therefore also the identification of the particular socket associated with such particular means.

The invention also involves all of the means being connected for energization to the electric power distribution circuit or system having the convenience outlet sockets. Furthermore, each of the means for producing a pulsed radiofrequency signal is coupled to the power circuit (common to all the sockets and all of such means) for introducing the pulsed radiofrequency signal into the power circuit whereby the power circuit constitutes in effect a transmission line to a means coupled to such power circuit, at a surveillance location, for producing a pulsed perceptible signal in response to pulsed radiofrequency signals. The last mentioned means is connected to the power circuit for energization thereof and the same can produce an audio and/or visual signal that in addition to being perceptible can be decoded by a person perceiving the same.

Owners of public accommodations for guests, especially such as motels and the like, are often subject to losses due to the theft of various furnishings of the accommodations by the guests. Stolen items commonly include less valuable articles such as towels, linen, and so forth; however, theft extends to quite valuable articles such as electrical equipment including radios and television sets. It appears that it is altogether too convenient for motel guests (whether habitual criminals or not) to remove large articles from their rooms and to abscond with the same in their automobiles.

It is difficult and usually impossible from the practical standpoint for a motel operator to maintain a continuous vigil over all guests and to observe all movements of guests intermediate their rooms and their nearby automobiles.

The present invention while not limited to such usage is particularly well suited and has for its paramount purpose the curtailment or abatement of losses sustained by motel operators as a consequence of the theft of electrical equipment of the type energized from alternating current electric power mains, and normally connected to the latter by means of the male plug of the power cord of the equipment being plugged into a convenience outlet socket.

Broadly, the invention involves in a system for signaling the occurrence of a predetermined condition evidenced by closure of a sensing switch, an improved apparatus comprising means for producing a radiofrequency signal output, a first electric switch means operatively coupled to the signal producing means for selectively preventing signal output, an electric circuit adapted to be connected to a source of alternating current electric power, a second electric switch means in said electric circuit, switch actuating means operable during electrical energization thereof cyclically to open and close said second electric switch means and also operable during electrical energization thereof cyclically to cause a predetermined sequence of opening and closing of said first electric switch means with at least one such sequence occurring during each closure of the second electric switch means, said switch actuating means being in said electric circuit for energization therefrom, and said sensing switch being in the said electric

circuit in electrical parallel and electrical series with the second electric switch means and said switch actuating means respectively.

Other objects, aspects, features and advantages of the invention will become evident during the following description of the preferred embodiment of the invention, such description to be taken in conjunction with the accompanying drawings illustrative thereof, wherein:

FIG. 1 is an isometric view of the transmitter portion of the signaling system including associated electric circuitry, wherein the convenience outlet housing is shown in dashed outline, and wherein the power cord of the male plug is fragmentarily shown;

FIG. 2 is an enlarged side view of the keying switch shown in its relationship to a schematic representation of the transmitter;

FIG. 3 is an enlarged side view of the rotary switch; and,

FIG. 4 is a schematic diagram of the receiving and perceptible alarm portion of the signaling system.

Referring now to the drawings wherein like numerals designate like parts throughout the various views, the reference numeral 10 designates generally a convenience electrical outlet or socket device for enabling the detachable coupling of the insulated conductors 12 and 14 of an electrical power cord 16 to the conductors 18 and 20 constituting a branch circuit of a single phase alternating current power distribution system 22 by means of a conventional male power plug 24 connected to the cord 16.

The socket device 10 includes a pair of apertured terminals or contactors 26 and 28 that are electrically insulated from each other, and which are adapted to receive guidingly therethrough along the paths indicated by the dashed lines 30 and 32 the prongs 34 and 36 of the plug 24.

The conductors 18 and 20 are respectively connected to the contactors 26 and 28, and the arrangement is such that when the plug 24 is inserted into the socket device 10, the conductors 18 and 20 are electrically coupled to the conductors 12 and 14 by virtue of the metallic prongs 34 and 36 extending through and engaging the contactors 26 and 28 respectively.

As thus far described, the socket device 10 is substantially the same as or equivalent to numerous extant socket devices that are well known in the art in that the same serves to receive guidingly therein the prongs of conventional male plugs in a manner such that the guidingly received prongs engage terminals or contactors therein that are in turn connected to the alternating current supply distribution system.

The socket device 10 is distinguished from conventional convenience socket devices in that the same is provided with a normally closed electric switch means 38 arranged to be actuated to and held in an open condition when the plug 24 is inserted into the socket device 10. The switch means 38 comprises the provision of a resilient metallic switch arm 40 electrically insulated from the contactors 26 and 28 and having one end 42 rigidly mounted in fixed relation to such contactors 26 and 28. The other end of the arm 40 is embraced by a sleeve 42 of electrically insulative material and is disposed in the travel path 32 of the free end 44 of the plug prong 36 when the plug 24 is inserted in the socket device 10.

The contactor 28 is provided with a fixed contact 46, and the arm 40 is provided with a contact 48 movable therewith. The arm 40 is biased so as to yieldingly urge the contacts 46 and 48 into engagement with each other. Thus, the switch means 38 is normally closed, but is caused to be opened when the plug 24 is inserted into the socket device 10 by virtue of the end of the prong 36 engaging the sleeve 42 and forcing flexure of the arm 40 sufficient to separate the contacts 46 and 48 during insertion of the plug 24. Conversely, the switch means 38 is closed upon removal of the plug 24 as the resiliency of the arm 40 moves the contact 48 into engagement with the contact 46.

It is to be understood that the electric power cord 16 is connected to or forms a part of an electrical appliance or electrical equipment, not shown, that requires electrical energy from

the alternating current power distribution system 22, such as a radio, television, record player, etc. Since such electrical appliance or equipment does not in itself constitute the subject matter of this invention, the same has not been illustrated in the drawings.

The socket device 10, as is conventional, is provided with a protective housing, such as indicated in dashed outline at 50, and also, as is conventional, it is to be understood that the socket device 10 within its housing 50 is flush mounted within a wall or partition, not shown, for reception of the plug 24 therein.

Though only one assembly is shown in the housing 50, a pair of such assemblies can be disposed therein so that the structure exposed to view has substantially the appearance of the structure shown in FIG. 4 of U.S. Pat. No. 3,192,518 which issued to Sliman June 29, 1965.

The switch means 38 is also disposed within the housing 50. Therefore, the socket device 10 essentially has the appearance of a conventional convenience outlet or wall mounted socket device to a person seeking to insert or remove the plug 24.

In other words, when applied for use, no structure is exposed to view or is readily exposed to view that would alert anyone having a larcenous intent with respect to any electrical equipment connected to the power cord 16 to the fact that the outlet device 10 and its associated switch means 38 form a part of a property security system that will, as will be seen presently, signal the removal the plug 24 in acting upon the larcenous intent.

The manner of mounting of the contactors 26 and 28 and the arm 40 is in accordance with customary mounting techniques well known in the art, does not of itself constitute inventive subject matter, and is therefore not shown as illustration would only tend to obscure the actual invention.

In essence, the structure thus far described is a conventionally mounted convenience electrical outlet provided with a normally closed switch means that is opened in response to insertion of a male power cord plug. The illustrated and described structure constitutes a simplification over that disclosed in U.S. Pat. No. 3,090,948 which issued to Cremer May 21, 1963, in that the latter requires a third pin on the plug to open the switch whereas, in the present case, a prong which is electrically connected to a power cord conductor actuates the switch open. If desired, the plug and combined socket and switch assembly disclosed in the last mentioned patent can be substituted for or employed in lieu of the structure thus far described in the signaling system of the present invention; this being deemed well within the ordinary skill of the art.

A small constant speed, electrically powered prime mover or motor 52 of the type inclusive of reduction gearing, such as is conventionally employed in electric timers, is connected to the contactor or terminal 26 and to the switch arm 40 as shown by electric leads 54 and 56, respectively. The arrangement is such that the motor 52 is energized and drives an output shaft 58 for rotation whenever the switch means 38 is closed. The output shaft 58 has fixed thereon a small spur gear 60 arranged to drive a larger spur gear 62 for rotation in the direction indicated by the arrow 64. The gear 62 is fixed on a rotatable shaft 66. Means, not shown, of conventional character are provided for mounting the motor 52, and rotatably mounting the shafts 58 and 66.

Rotary switch means 69 are provided which comprises a metallic and hence electrically conductive cylinder 68 fixed on the shaft 66. The cylinder 68 has recessed therein a pair of diametrically positioned bars 70 and 72 of electrically insulative material. The cylinder 68 is disposed between the upper end portions of a pair of upstanding resilient wiper arms 74 and 76. The lower ends 78 and 80 of the arms 74 and 76 are fixedly mounted by conventional means, not shown, and the upper end portions of the arms 74 and 76 are bent as shown to present convex extents 82 and 84 toward the cylinder 68. The arms are biased to cause the convex extents to bear against the cylinder 68. The arrangement is such that during minor angular intervals of rotation of the cylinder 68, the convex extent

82 will be in contact with the recessed insulation bars 70 and 72. Each of such angular extents is preferably such as to exceed only minutely the amount of rotation of the cylinder 68 that will occur due to inertial effects after the motor 52 is deenergized. With such arrangement, if it is assumed that the motor 52 is deenergized at the instant that the convex extent 82 engages one of the bars 70 and 72 and disengages the metallic portion of the cylinder 68, the convex extent 82 will again contact the metallic portion of the cylinder 68 after a very brief interval of reenergization of the motor 52. The convex extent 84 is arranged to contact each one of the bars 70 and 72 for the same angular intervals that the convex extent 82 contacts the other of such insulative bars. As shown, the arms 74 and 76 are preferably staggered along the length of the cylinder 68 to prolong switch life and reliability.

In view of the foregoing the rotary electric switch means 69 is closed (that is, electrical connection being made through the cylinder 68 between the arms 74 and 76) at all times except when the convex extents 82 and 84 engage the insulation bars 70 and 72.

The rotary switch means 69 is arranged to be in electrical parallel with the previously described sensing switch means 38 by virtue of the wiper arms 74 and 76 being selectively connected to the lead 56 and the contactor or terminal 28 by leads 86 and 88. Accordingly, the motor 52 is energized from the power conductors 18 and 20 whenever either one or both the rotary switch means 96 and the sensing switch means 38 are closed.

The switch means 38 is termed as sensing switch means for the reason that the same serves to sense a particular condition, namely, the condition of the plug 24 being absent from the socket device 10. In other words, the switch means 38 senses a predetermined condition, with such switch means closing on sensing the predetermined condition.

As thus far described, it will be seen that upon withdrawal or partial withdrawal of the plug 24 sufficient to close the switch means 38 (assuming the switch means 69 to be open), the motor 52 is energized at the instant of closure of the sensing switch means 38 and will remain energized as long as such switch means 38 remains closed. Energization of the motor 52 initiates rotation of the cylinder 68 and results in closure of the switch means 69 as soon as the wiper arms 74 and 76 are in contact with the metallic cylinder 68. In view of the preceding comments concerning the small angular extent (preferably less than 10°) of the insulator bars or strips 70 and 72, the closure of the switch means 69 occurs very shortly after closure of the switch means 38, especially if the angular extents of the bars 70 and 72 only slightly exceed the angular rotation of the cylinder 68 occurring after the motor 52 is deenergized.

Therefore, not only will the motor 52 be energized for so long as the plug 24 is removed, but if the switch means 38 is closed only sufficiently long to result in closure of the rotary switch means 69, the motor 52 will continue to remain energized for at least a predetermined interval, that is, until the switch means 69 is closed by rotation of the cylinder 68 through nearly 180°. Thus, closure of the sensing switch means 38 for a relatively very brief interval assures energization of the motor 52 and consequent rotation of the output shaft 58 for at least a relatively very long and predetermined interval.

It will be evident that the motor 52 is energized at all times that the switch means 69 is closed, and consequently, the total continuous interval of time during which the motor 52 can be energized must be an integral multiple of a unit time interval the duration of which is that required for the motor 52 to drive the cylinder 68 through 180° of rotation. As will be seen presently, such unit of time is sufficient to produce not only a perceptible signal at a remote location but such that the perceivable signal can be coded to enable identification of the particular sensing switch means 38 that may have been closed for a very brief interval.

Means is provided for producing a coded radiofrequency output signal whenever the motor 52 is energized, or more specifically, an integral number of complete code blocks of radiofrequency signal during each of said unit time intervals. Such means comprises a radiofrequency signal generator means or transmitter designated generally at 90 and a keying or coding means designated generally at 92. The transmitter 90 is a low-power transmitter and therefore can be and is preferably of conventional character employing transistors rather than tubes so as to require no warmup time.

The transmitter 90 is preferably such as not to require or to be dependent upon batteries, and is therefore such as to be energized from the conductors 18 and 20 of the power distribution system 22 in a manner to be presently set forth. Accordingly, as shown in FIG. 2, the transmitter 90 includes a conventional power supply 93 that serves on energization thereof from the alternating current distribution system 22 to provide direct current electric power at a suitable voltage to a radiofrequency oscillator 94 and a radiofrequency amplifier 96 by a circuit that includes pairs of leads 98 and 100. The power supply 93 employs solid-state rectifiers, not shown, in a conventional manner whereby an operative level of direct current output power is developed almost instantly upon the power supply 93 being energized from the alternating current power source 22. The means for energizing the power supply 92 and therefore the entire transmitter 90 from the alternating current power system 22 includes a pair of leads 102 and 104.

The output of the oscillator 94 is fed, by conventional means indicated at 106, to the amplifier 96 for amplification, and the amplified radiofrequency output of the amplifier 96 is capacitively coupled to the leads 102 and 104 by means of leads 108 and 110 having capacitors 112 and 114 therein. The arrangement is such that the radiofrequency output is delivered to the same leads 201 and 104 through which alternating current power is delivered to the direct current power supply 93 from the electric power source 22 (conventionally 60 cycles per second at about 117 v. AC).

The keying means 92 comprises a normally closed cam actuated electric switch constituted of an upstanding metallic arm 116 provided with a contact 118 and a second upstanding metallic arm 120 provided with a contact 122 at a position spaced below the upper end thereof. The arms 116 and 120 are bent as shown to define base portions 124 and 126, and such portions are rigidly mounted in insulated relationship to each other by conventional means, not shown. While the arm 116 may be relatively rigid, the arm 120 is flexible and resilient and is biased so that the contact 122 thereof is normally in engagement with the contact 118.

A cam wheel 128 of electrically insulative material such as nylon is fixed on the motor output shaft 58 for rotation therewith in the direction indicated by the arrow 130. The circular periphery 132 of the wheel 128 is provided with circumferentially spaced sets of notches, such as the sets of notches indicated at 134, 136 and 138. The sets of notches 134, 136 and 138 are identical to each other and are equiangularly spaced from each other. The upper end of the arm 120 terminates at about the height of the shaft 58 and the upper end portion 140 is upwardly inclined toward the wheel. The arrangement is such that when the extremity 142 of the arm 120 engages the periphery of the wheel 128 intermediate the sets of notches 134, 136 and 138 and intermediate the individual notches of such sets, the arm 120 is flexed or cammed to open the normally closed contacts 118 and 122 as shown in FIG. 2. However, when the extremity 142 moves into any of the notches under the influence of the bias of the arm 120, the contact 122 moves into engagement with the contact 118 closing the keying switch.

It will be evident on inspection of FIG. 2 that the keying switch will be cyclically closed for a short period, opened for about an equally short period, then closed for a relatively longer period and then opened for a relatively still longer period before repeating the cycle. This is because of the spacing of the sets of notches and because each set of notches,

such as the set 134 being composed of a short notch 144 preceding in travel a closely spaced longer notch 146. The wheel 128 is driven in rotation during energization of the motor 52. The sequence of closures of the keying switch means 92 is quite analogous to that made in repetitiously sending, by key, as in telegraphy, the letter "A" by International Morse Code.

The lead 102 is connected to the switch arm 116 and a lead 150 is connected to the switch arm 120. The arrangement is such that the transmitter 90 and the keying switch means 92 are in electrical series, and such series arrangement is bridged across or in electrical parallel with the motor 52. Accordingly, during concurrent energization of the motor 52 and closure of the keying switch means 92, the transmitter 90 is energized to concurrently produce a radiofrequency signal output that is fed into the leads 102 and 104. Under the necessary and sufficient conditions for the injection of a radiofrequency signal output into the leads 102 and 104, namely, the switch means 92 being closed concurrently with the switch means 38 and/or the switch means 69 being closed, the lead 102 is connected to the conductor 18 of the alternating current power distribution system 22 via the switch means 92, lead 150, lead 54 and the contactor or socket terminal 26, while the lead 104 is directly connected to the power conductor 20 via lead 56, and either one or both of two parallel routes to the contactor 28 involving switch means 38 or lead 86, switch means 69 and lead 88.

Thus, whenever the motor 52 is energized from the conductors 18 and 20 of the alternating current power distribution system 22, pulses of radiofrequency energy are generated and introduced into the conductors 18 and 20, with a pulse being so generated and so introduced during the intervals of closure of the keying switch means 92. The keying switch means 92 serves two functions, namely, keying the transmitter on and off, and keying the introduction of radiofrequency energy into the conductors 18 and 20 of the power system 22.

The transmitter 90 is preferably such as to generate, when energized or keyed on, a sinusoidal waveform at a radio frequency in the interest of simplicity and low cost; however, it will be evident to those skilled in the art that the illustrated and described system is readily susceptible to embellishment in that the signal can be amplitude modulated by a tone or audiofrequency such that considering the operation of the keying switch means 92 to correspond to that of a telegrapher, the signal introduced into the conductors would be classified by the Regulations of the Federal Communications Commission as "Type A2" rather than "Type A1."

The radio frequency employed is preferably substantially higher than frequencies audible to the human ear and is substantially less than such as to radiate appreciably or readily from the power system 22. Of course, the frequency and power level must be such as not to interfere with the operation of electrical equipment connected to the power distribution system 22, or to cause any interference to any other services or to be contrary to law or the regulations of governmental bodies. A frequency selected to be in the lower half of the very low frequency range is preferred and can conveniently be about 100 kc.

It is to be understood, whatever frequency is selected, that such conventional precautions and remedial steps are to be taken as may be necessary to prevent the generation of and to bypass to ground any harmonics of the frequency that may be generated inadvertently; such precautionary and remedial measures being deemed to be well within the skill of the art.

The alternating current power distribution system 22 is conventional and as used herein includes all power wiring circuits or circuit branches coupled to a master switch or fuse panel 160, as well as the service line, not shown, connecting the panel 160 to the voltage stepdown transformer, not shown, of the electric utility. Conventionally, power is supplied to the master switch or fuse panel by a service line comprising three wires, one of which is a neutral or grounded wire and the other two wires which are "hot," being at approximately 234 v. AC with respect to each other and each being at approximately 117 v. AC with respect to the neutral or ground wire.

The conventional panel 160 includes three terminals 162, 164 and 166 connected respectively to the neutral and the "hot" wires of the service line, not shown. The conductors 18 and 20 constitute a 117 v. AC branch circuit connected to the terminals 162 and 164 in parallel with the leads 18 and 20 as is conventional. Clearly, any radiofrequency signal introduced into the branch circuit consisting of the conductors 18 and 20 will be transmitted throughout not only all of such branch circuit and outlet thereof, but also throughout all other branch circuits in parallel therewith and their outlets.

Other 117 v. AC branch circuits are connected to the terminals 162 and 166 such as, for example, the branch circuit comprised of the conductors 168 and 170. Though not shown, the conductors of all branch circuits connected to the terminals 164 and 166 are fused or provided with circuit breakers for reasons of safety, as is conventional.

The terminals 164 and 166 are bridged by a capacitor 172 whereby a radiofrequency signal introduced into the branch circuit consisting of the conductors 18 and 20 is communicated to all branch circuits connected to the panel terminals such as the branch circuit consisting to the conductors 168 and 170.

Accordingly, it will be seen that if the panel 160 is associated with the electric service entrance of a motel or the like, and all guest units and motel operator's Offices are supplied electrical power by the distribution system 22 through power branch circuits emanating or radiation from the panel 160, the introduction of a radiofrequency signal into any portion or branch of the system 22 results in the transmission of such signal throughout the entire system, with the conductors of the various branch circuits serving as signal transmission lines. Each guest unit can be provided with the special socket and signaling means shown in FIG. 1, whereby the removal of the power cord plug from any such means will result in a keyed or pulsed radiofrequency signal being transmitted throughout the power distribution system 22.

Whereas the cam wheel 128 is notched to key the letter "A" repetitiously, it is manifest the notching of the cam wheel 128 can be such as to key repetitiously, as by a telegrapher, any letter, number and the like as may be desired, such as the letter "Z" in which case each spaced set of notches would be two extended notches followed by two short notches all closely spaced. All socket and signaling means situated in a particular guest unit would include identical cam wheels; whereby the cam wheels employed in equipment in different guest units or rooms would differ from each other as to keying sequences produced on rotation thereof. For example, the withdrawal of a power plug in one guest unit would result in sequences or series of pulses of radiofrequency energy being introduced into the system 22 corresponding to the keying of the letter "A," while from other units the radiofrequency energy introduced would correspond in keying to the other distinctive letters or code groups, so to speak, such as "B," "Z" and the like.

In other words, the apparatus shown in FIG. 1 can be duplicated many times and coupled into the system 22 at many locations that are remote from each other, with each unit of apparatus shown in Fig. 1 associated with a particular area (such as a particular guest unit) having a distinctively notched cam wheel 128. Therefore, the occurrence of a radiofrequency signal in the system 22 indicates the removal of a power cord plug from the system 22, and the coded character of the signal enables identification of the location in the system 22 where the plug was removed. All units, of course, operate to transmit on the same radio frequency.

It will be manifest that such knowledge will be of great value in preventing theft of electrical apparatus such as a television set that may be associated with the removed power plug.

Means is provided to produce a perceptible signal, visual and audible, in synchronism with any pulses of radio frequency introduced into the system 22. Such means comprises a portable assembly 180 comprising a direct current power supply 182, a detector 184, a direct current amplifier 186, a control relay 188, an electric lamp 190, and a sounder (buzzer, bell or the like) 192.

The detector 184 is coupled by leads 194 and 196 through capacitors 198 and 200 to the alternating current input terminals 202 and 204 of the power supply 182, and the terminals 202 and 204 are in turn connected to the power leads 18 and 20. The showing of the connection of the terminals 202 and 204 to the conductors 18 and 20 is given by way of example only inasmuch as the assembly 180 can be powered from any of the branch circuits from the panel 160 and inasmuch as the radiofrequency signals to be detected will be present throughout the system 22. Indeed, the terminals 202 and 204 can be connected to a power cord and plug, not shown, so as to be connectable into the system 22 at any convenience outlet of the entire power distribution system 22, whereby the power supply 182 is energized and whereby any radio frequency in the system is fed to the radiofrequency detector 184.

The direct current output of the power supply 182 is conducted to the detector 184, the direct current amplifier 186 and the signaling elements 190 and 192 by pairs of conductors 206, 208 and 210.

The detector 184, which is tuned to the radio frequency, and includes means, not shown, for amplifying and rectifying radiofrequency signals fed thereto by the leads 194 and 196 with the rectified and preferably filtered output thereof being fed to the direct current amplifier 186 by a pair of leads 212.

It will be seen that when the detector 184 receives pulses of radiofrequency energy, the output of the detector will be in the nature of corresponding pulses of direct current in synchronism with the pulses of radio frequency energy. In other words, the output of the detector 184 is the same as a source of direct current that is normally open or off, which is closed or keyed on during reception of a pulse of radiofrequency energy. In the event that the transmitter 90 includes a tone modulator, the output pulses of the detector will have a ripple thereon corresponding in frequency to that of the tone, and accordingly, a loud speaker or ear phones, not shown, can be coupled to the conductors whereby an audible indication of the occurrence of radiofrequency energy pulses may be obtained.

It will be appreciated that the detector 184 does not respond to the frequency of the power system 22 by reason of the relatively high reactance of the capacitors 198 and 200 to such frequency and as the detector 184 is tuned to the radio frequency of the transmitter 90.

The direct current output of the detector 184 is amplified by the conventional direct current amplifier 186 and such output is connected by leads 214 to the solenoid 216 of the relay 188. The relay 188 includes a normally open switch 218 that is closed when the solenoid 216 is energized. Closure of the switch 218 completes a circuit through the parallelly arranged lamp 190 and sounding device 192, whereby the lamp 190 and the sounding device 192 are energized from the power supply 182 whenever the solenoid 216 is energized. Since the solenoid 216 is energized concurrently with and in synchronism with the reception of radiofrequency energy by the detector 182, the lamp 190 lights up and the sounding device (bell, buzzer, horn or the like) 192 produces sound concurrently with the transmitter 90 being keyed to introduce radiofrequency energy into the power system.

The rate of rotation of the shaft 58 and the number of notch-defined code groups about the periphery of the cam wheel 128 are so related that the keying rate is sufficiently slow that the pulses of light or of sound produced by the elements 190 and 192 can be readily "read," that is, deciphered by an observer.

Accordingly, a motel operator, for example, can couple the receiving and perceptible signaling means of Fig. 4 into any part of the power system that may be convenient, and should any power cord be removed from any convenience outlet equipped with a sensing switch and transmitting assembly such as shown in Fig. 1, he will not only be alerted to such occurrence by the devices 190 and 192, but by observing either one or both of them, the operator will be apprised of the location of the convenience outlet involved. The operator thus alerted

and informed can take timely and appropriate measures to prevent anyone absconding with equipment associated with the withdrawn male plug.

After having been actuated by closure of the switch means 38, the apparatus of Fig. 1 does not require any elaborate procedure of effort to restore the same to its initial conditions. Resetting of the apparatus of Fig. 1 entails nothing more than the reinsertion of the male plug 24 so as to open the sensing switch means 38. The motor 52 and the transmitter 90 will thereafter be deenergized as soon as the switch means 69 closes. Such restoration will, of course, occur only after the cylinder 68 has rotated at least one-half revolution.

It is deemed of importance that the security system of this invention does not operate in a fashion such as to cause any embarrassment to an innocent motel guest who may inadvertently dislodge the male plug 24. The guest will never be aware of the security apparatus or the fact that the same may have been actuated into alerting operation.

Ordinarily, the motel operator will content himself with maintaining a unit under surveillance after receiving an alerting and identifying signal therefrom, and take arresting action only on a guest committing an overt act such as removal of a television set. In many instances the motel operator may receive assistance from local law enforcement officers, and be relieved by them of the burden of maintaining surveillance of a suspect guest unit and the taking of any arresting action.

Inasmuch as the capacitors 112 and 118 are shown in lines connected to the panel neutral or ground terminal, they are not necessary to obtain isolation from alternating current supply voltages, but are preferred as a safety feature in the event the socket device 10 is improperly polarized by reversal of the leads 18 and 20 thereto, and in the event the terminals 202 and 204 are reversed with respect to the conductors 18 and 20. Also, the use of such capacitors 112 and 118 is preferred as such use is compatible with the invention being used in connection with 234 v. AC power distribution systems as by connection to conductors connected to the panel terminals 164 and 166, though in this use the capacitor 172 and its leads are preferably removed.

From the foregoing, those conversant with the art will readily be able to apply the principles of the present invention to the extant power distribution systems of motels and the like, and no further elaboration on the same and its operation is thought to be necessary.

I claim: radiofrequency

1. In a property security system for signaling the occurrence of a predetermined condition evidenced by closure of a sensing switch, an improved apparatus comprising means for producing a radiofrequency signal output, a first electric switch means operatively coupled to the signal producing means for selectively preventing signal output, an electric circuit adapted to be connected to a source of alternating current electric power, a second electric switch means in said electric circuit, switch actuating means operable during electrical energization thereof cyclically to open and close said second electric switch means with the closure interval being several times longer in duration than the open interval and said switch actuating means being also operable during electrical energization thereof cyclically to cause, during said closure interval, the repetitious occurrence of a predetermined sequence of opening and closing of said first electric switch means, said switch actuating means being in said electric circuit for energization therefrom, and said sensing switch being in the said electric circuit in electrical parallel and electrical series with the second electric switch means and said switch actuating means respectively.

2. The combination of claim 1, including an electric power distributing circuit means for delivering alternating current electric power to a pair of positions remote from each other, said first electric circuit being disposed adjacent one of such positions and being connected to said power circuit means whereby the latter constitutes a source of alternating current electric power therefor, and radiofrequency coupling means

at said one position for introducing the radiofrequency signal output into said power circuit means whereby radiofrequency signal output into said power circuit is transmitted by the power circuit means to the other of said positions, and radiofrequency signal detecting and signaling means coupled to the power circuit means at the other of said positions for concurrently producing, during radiofrequency signal detection, a perceptible signal.

3. The combination of claim 2, wherein the power circuit means includes a female power outlet socket adapted to receive thereinto the prongs of a male power plug, said sensing switch being normally closed, and means for opening said sensing switch in response to a male power plug being received in said socket, whereby the predetermined condition signaled by the system is the absence of a power cord plug from the socket.

4. The combination of claim 1, wherein said first electric switch means is a single pole, single throw electric switch, and wherein the second electric switch means is a rotary electric switch, and wherein said switch actuating means comprises an electric motor, means drivingly connecting the motor to the rotary electric switch for rotating the latter, rotary cam means provided with a circularly arranged array of cam lobes operative during rotation thereof to open and close the single pole, single throw electric switch, and means drivingly connecting the motor to the cam means for rotating the latter.

5. The combination of claim 4, including a second electric circuit adapted to be connected to a source of electrical power, and said second electric circuit including in electrical series said means for producing a radiofrequency output and said single pole, single throw electric switch, whereby a radiofrequency signal output can be produced only during closure of the last mentioned switch.

6. The combination of claim 5, wherein the second electric circuit is in electrical parallel with said motor, the arrangement being such that a radiofrequency signal output will be produced when and only when the single pole, single throw switch is closed and the motor is concurrently energized.

7. The combination of claim 1, including a female electric power outlet socket means, having a pair of electric terminals, for guidingly receiving the prongs of a power cord male plug thereinto and for electrically connecting said terminals to plug prongs received thereinto, said sensing switch being comprised of a fixed contact electrically and mechanically connected to one of said terminals, a second contact, a resilient member fixed to the socket means and carrying the second contact, said member being flexible and yieldingly urging the second contact into engagement with the fixed contact, and said resilient member being disposed in the travel path of a male plug prong received in the socket means, whereby said second contact is disengaged from the fixed contact when a male plug is received within the socket means, and said electric circuit being connected to the terminals of the socket means with the second electric switch means being connected to said one of the terminals.

8. The combination of claim 7, including an electric power distributing circuit means for delivering alternating current electric power to a pair of positions remote from each other, said socket means being at one of said positions with the terminals thereof being connected to the electric power distributing circuit means, radiofrequency coupling means at said one position for introducing the radiofrequency signal output into said power circuit means whereby radiofrequency signal output is transmitted by the power circuit means to the other of said positions, and radiofrequency signal detecting and signaling means coupled to the power circuit means at the other of said positions for concurrently producing, during radiofrequency detection, a perceptible signal.

9. The combination of claim 8, wherein the detecting and signaling means comprises a direct current power supply means connected to the power circuit means, a radiofrequency signal detecting means connected to the power supply means for energization and operative to produce a direct elec-

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tric current output in response to and concurrently with detection of a radiofrequency signal, a perceptible signal generating means connected to the detecting means for generating a per-

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ceptible signal in response to and concurrently with direct current output by the detecting means.

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