

[54] ELECTRONIC SHOPLIFTING PREVENTION SYSTEM

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[52] U.S. Cl. **340/280, 340/258 C, 340/224, 328/5**

[51] Int. Cl. **G08b 21/00**

[58] Field of Search **340/280, 258 R, 258 A, 258 B, 340/258 C, 258 D, 307, 276, 283, 224; 328/5; 325/361**

[56] References Cited

UNITED STATES PATENTS

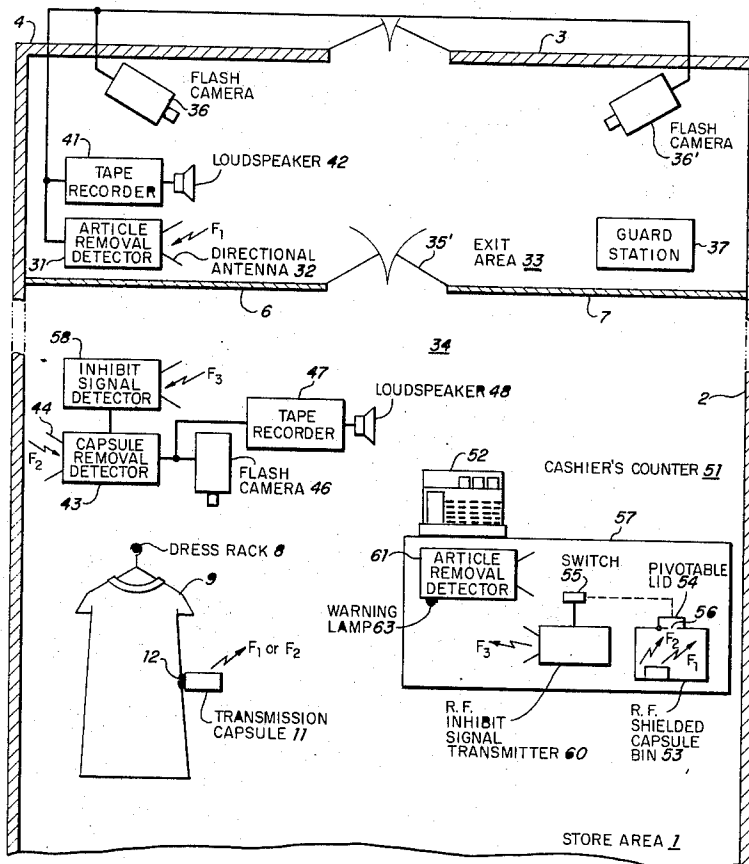
2,774,060	12/1956	Thompson	340/258 C
3,500,373	3/1970	Minasy.....	340/280 X
3,508,235	4/1970	Baisden.....	340/224 X
3,391,623	7/1968	Tabankin.....	340/224 UX
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[57] ABSTRACT

A system for preventing shoplifting of articles through a first exit area having an article removal detector positioned therein. A small capsule bearing the designation DON'T REMOVE ELECTRONIC ALARM is attached to an article to be protected, such as a dress, by means of a safety pin. The capsule includes a wristwatch battery which powers a single-stage, solid state oscillator which generates an RF signal having a frequency F_1 when the safety pin is closed. A shoplifter who passes through the exit area with the dress having the capsule fastened thereto will actuate an article removal detector which will in turn actuate a pair of flash cameras which are positioned to effectively photograph the entire exit area. If the shoplifter unfastens the safety pin in the process of discarding the radiating capsule within the store in an attempt to thwart the system, a capsule removal detector will immediately actuate a flash camera or annunciator to indicate unauthorized removal of the capsule. Upon payment of the dress, the cashier removes the capsule and very briefly causes an inhibit signal to be transmitted to the capsule removal detector to prevent activation of the capsule removal alarm devices during authorized removal of the capsule. Another detector may be utilized at the cashier's counter to detect secreted items bearing the capsule.

30 Claims, 4 Drawing Figures



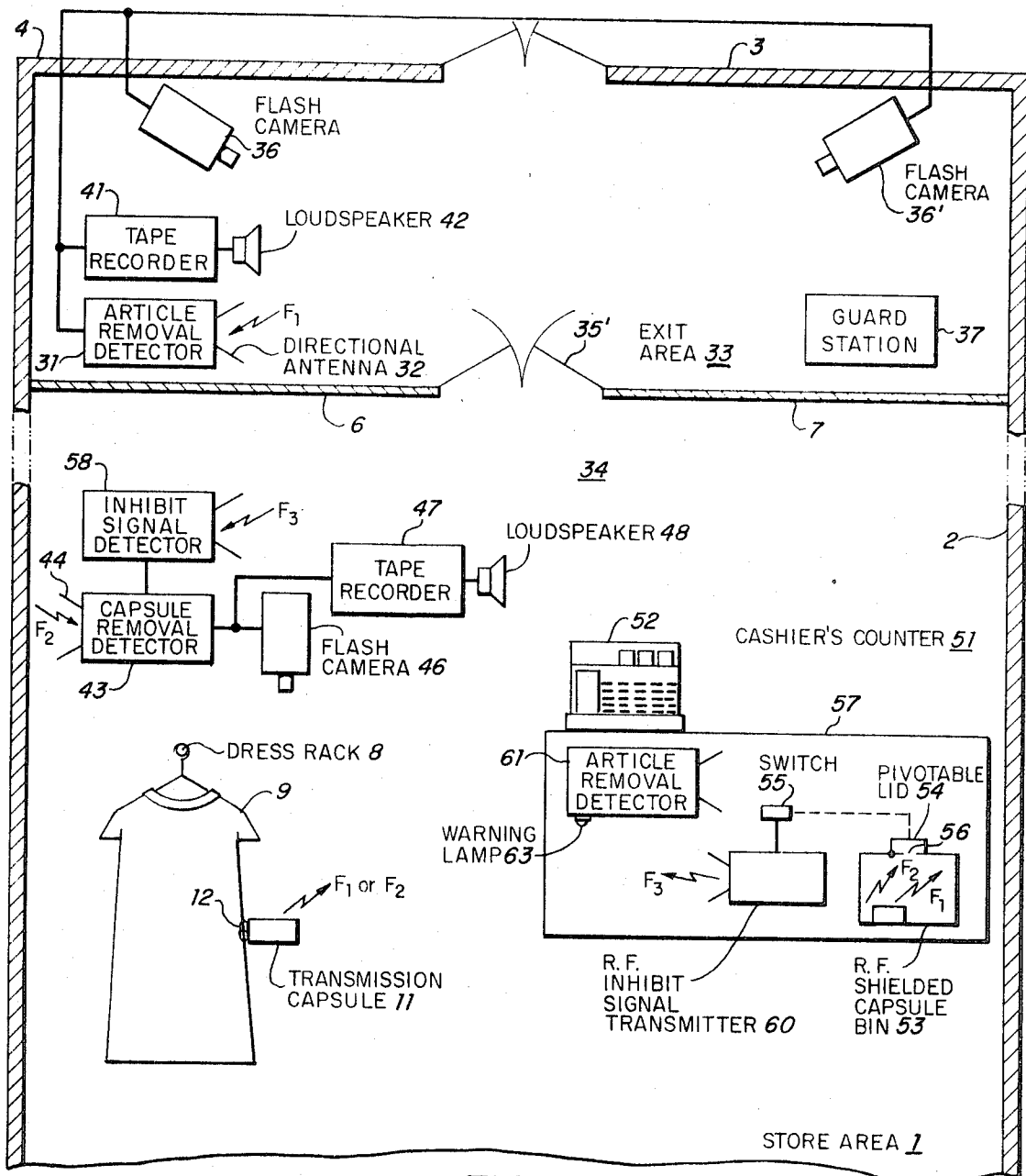


FIG. 1.

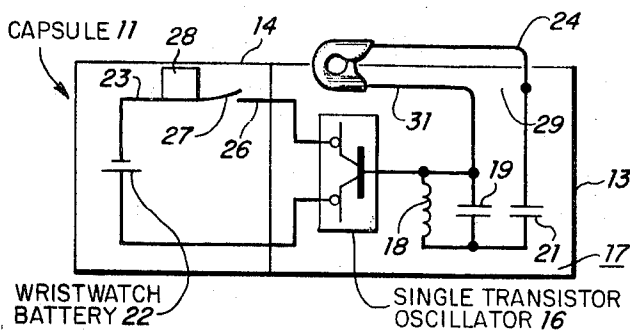


FIG. 2.

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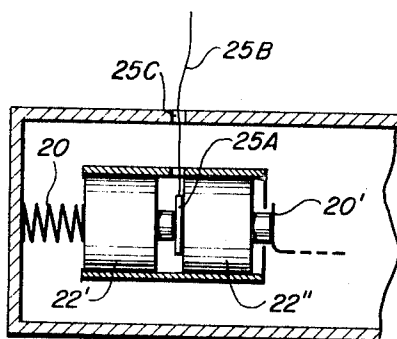


FIG. 2A.

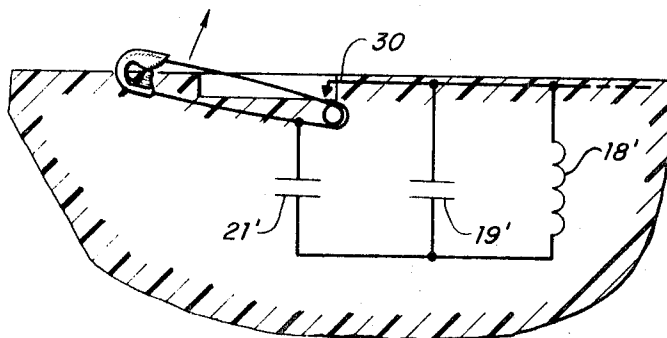


FIG. 2B.

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ELECTRONIC SHOPLIFTING PREVENTION SYSTEM

BACKGROUND OF THE INVENTION

This invention relates to the field of theft alarms and more particularly to systems which inhibit the unauthorized carrying away of articles from a given article storage area, such as the interior of a store, museum or industrial warehouse.

It has been estimated that losses due to shoplifting in the United States alone have exceeded 2 billion dollars per year, and it is widely appreciated that the problem of shoplifting is an extremely serious one. At present, floor-walkers are utilized to observe the behavior of customers together with, in some cases, hidden video cameras which are coupled to a display console which simultaneously displays a number of scenes throughout the store, which scenes are monitored by an observer. These procedures are quite expensive and in the case of closed circuit television systems, a considerable time lag occurs between the observation of suspicious behavior on the tv receiver screen and action taken by a floor walker to apprehend the shoplifter. In smaller stores TV systems and floor-walkers are not utilized at all.

In the past, systems have been proposed for automatically detecting the carrying out of shoplifted articles through an exit area. One of the earliest approaches is to insert magnets or highly permeable metallic members in articles to be protected and to provide a magnetic flux change detector at an exit area which produces an alarm as the article containing the magnetic material passes therethrough. One problem with this approach is that an honest customer triggers the alarm if a metallic object is being carried on his person which, in manner similar to the magnetic material, affects the flux detector. Another serious drawback to this approach is that the shoplifter can remove the magnetic material before passing through the exit area. Likewise with radioactive tags which also might be dangerous to use in any quantity.

In U.S. Pat. No. 2,774,060 No. of Thompson, issued Dec. 11, 1956, an oscillator is provided at the exit area and tags are fixed to the articles to be protected, which tags include tuned circuits having a resonant frequency which is equal to the radiating frequency of the oscillator. If a tag which has not been removed by the cashier is present in the vicinity of the oscillator, the oscillator is loaded and such loading is detected by a threshold device to sound an alarm. One disadvantage of this system is that metallic objects carried by an honest customer could have a similar effect on the oscillator, and, thus, the alarm would be sounded erroneously. However, again as in the case of a magnetic detector, a shoplifter may thwart the system by merely removing the tag before secreting the article.

In U.S. Pat. No. 3,493,955 of Minasy, issued Feb. 3, 1970, a transmitter is positioned in the exit area together with a receiver which senses the presence of an RF signal having a different frequency than the frequency of the signal produced by the transmitter. An electronic circuit is attached to the article to be protected, and, in the case of a shoplifter, is carried by him through the exit area. This circuit includes a tuned detector which activates an RF transmitter coupled thereto, so that the exit area transmitter having a first frequency causes the energization of the transmitter attached to the article which in turn produces an RF signal having a second frequency which in turn is detected by the receiver at the exit area to sound the alarm. One disadvantage of this system is that the circuit attached to the article includes both a receiver and a transmitter which increases the cost of the units attached to each article. This factor is significant since the store owner often has to purchase thousands of these units to protect his merchandise. However, what is perhaps the most important disadvantage of this arrangement, is that, again, the shoplifter can merely thwart the system by removing the electronic receiver-broadcaster unit attached to the article being protected before stealing the article.

Thus, it is desirable to provide numerous capsules, which may be attached to the articles being protected, which capsules include a minimum of components so that mass production of such capsules may be carried out economically. It is also important to provide capsules which may be transported about within the store while being attached to the articles and which cooperate with an exit detector having a carefully controlled threshold sensitivity so that radiating capsules transported within the store will not inadvertently trigger the exit alarm. What is perhaps most important is that the capsules be designed to be quickly and easily removable from the articles to be protected by the cashier and in the event that they are removed by a shoplifter, a capsule removal alarm indication is immediately produced upon such removal, to trigger a "Land" flash camera and/or actuate a tape recorder which could broadcast a message such as "Security Problem in Dress Department." However, it is also important to provide a system which inhibits the aforementioned capsule removal alarm indication during the brief period when a cashier removes the capsule from the article. It is also advantageous to provide capsules which can be rapidly and conspicuously affixed to dresses, for example, by means of a safety pin and which bear a designation such as DON'T REMOVE ELECTRONIC ALARM. Such an arrangement is necessary to cause an honest customer not to remove the capsule and also serves as a powerful deterrent to keep shoplifters who are often perplexed about electronics, from shoplifting the article.

SUMMARY OF THE PREFERRED EMBODIMENT

In accordance with a preferred embodiment of the invention, an article removal detector triggers an alarm indication within the exit area if a capsule, having an RF oscillator, which continuously produces a first RF signal, is positioned within the exit area but which will not trigger the alarm if such a capsule is positioned anywhere within the article storage area. This alarm indication actuates a pair of "Land" flash cameras which photograph the exit area. The radiating capsule is affixed to an article to be protected and is designed to immediately produce a second RF signal upon being removed from the article by an unauthorized individual, which second RF signal immediately triggers an unauthorized capsule removal alarm. When an honest customer pays for the article, the cashier momentarily generates an inhibit signal before removing the radiating capsule from the article to be protected, which inhibit signal briefly blocks the production of the capsule removal alarm indication which would otherwise be produced by an unauthorized removal of the capsule.

Other objects, features, and advantages of the present invention will become apparent upon perusal of the following detailed description taken in conjunction with the drawings in which:

FIG. 1 illustrates an overall schematic of the system; and
FIG. 2 schematically illustrates one of the capsules which is attached to an article to be protected;
FIGS. 2a and 2b illustrate alternative detailed structure for FIG. 2.

DETAILED DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

In FIG. 1, a store area 1 is illustrated, and is defined by wall members 2, 3, 4, 6, and 7. The store area contains article storage subareas, one of which is illustrated by dress rack 8, having a dress 9 hanging thereon. A radiating transmission unit or capsule 11 is affixed to the dress preferably by means of safety pin 12. Details of the capsule are illustrated in FIG. 2. The capsule would typically have a unitary, plastic housing portion 13 with a flexible wall portion 14. The housing would contain a solid state oscillator 16 which preferably would be of the simplest type and would have a single stage and typically would radiate within the Citizens Band, (e.g., 5.1 - 5.9 Mc. and at a power level of a few milliwatts). Attached to the oscillator would be a frequency determination circuit 17 which

comprises inductor 18 and capacitors 19 and 21. A tiny battery 22, such as those utilized in wristwatches, would be connected to oscillator 16 through a "one-way" switch 23. Plastic housing 13 has a safety pin 24 embedded therein so that the capsule may be readily attached and removed from the article to be protected. Upon receipt of the dress at the store, a clerk would attach the capsule to the dress and would thereafter squeeze the capsule to deflect flexible wall portion 14 which would in turn close "one-way" switch 23 which could not thereafter be opened without destroying the capsule. While obviously numerous types of "one-way" switches may be employed, an inexpensive switch would comprise a stiff metallic strip 26 and a flexible metallic strip 27 having an end portion which slightly overlays the terminal portion of the stiff strip 26. A small block 28 would be affixed to the flexible strip 27 so that when the capsule is squeezed, the flexible wall portion 14 deflects flexible strip 27 against the stiff strip 26 and passes under the stiff strip and is thereafter spring biased against the lower terminal portion of strip 26. A segment of the lower right hand portion of the safety pin is cut out at 29 and capacitor 21 is soldered to the right hand portion of the safety pin, while the lower left hand portion of the safety pin at 31 is electrically coupled to a second capacitor 19 so that when the pin is closed, the frequency determining circuit 17 comprises inductor 18 and capacitors 19 and 21, and thus, the oscillator oscillates at a first frequency F_1 . Details of the oscillator have not been included since numerous types of solid state circuits could be utilized which employ transistors, tunnel diodes, etc.

It is conceivable that on occasion a shoplifter would attempt to destroy the capsule while it is still on the dress so that it might not be able to trigger the various alarms within the system. Although it is dubious that this could be done effectively, it might be desirable to provide a capsule having a housing made of rigid, virtually unbreakable material. A high impact plastic may be considered. However, the store clerks must still close the "one-way" switch in order to activate the capsule, and thus, a variation in the previously discussed "one-way" switch may be considered. In FIG. 2a batteries 22' and 22'' are coupled in series and are spring biased by spring 20 against contact member 20'. An insulating member or tab 25a may be positioned between the positive terminal of battery 22' and the negative side portion of battery 22''. Obviously, other locations may be considered so long as the tab initially breaks the power supply circuit. A wire or highly tensile strength string 25b is attached to tab 25a and passes through a bore hole 25c. This variant of the previously discussed "one-way" switch is closed by pulling string 25c away from the wall of the capsule, which in turn removes insulating tab 25a from the interface of the battery terminals, thereby to complete the power supply circuit.

In the aforementioned oscillator configuration the opening of the safety pin removes capacitor 21 from the tank circuit. It is conceivable that a clever shoplifter could place an additional shunt wire between the left hand portion 31 of the safety pin and the right hand portion 24 and thereafter open the pin. In this instance, capacitor 21 would still be in shunt with capacitor 19 and thus the capsule removal detector might not be actuated. FIG. 2b illustrates a variant in the arrangement of FIG. 2 which would thwart the possible effect of the shunting of the safety pin by a clever shoplifter. In this arrangement, the upper wire portion of the safety pin would be slanted as shown in FIG. 2b and would pass through a narrow elongated slot formed in the housing of the capsule. Capacitor 21' which corresponds to capacitor 21 of FIG. 2 would be disconnected from the tank circuit when the pin is closed, because contact member 30 is positioned away from the heel or right hand portion of the upper wire safety pin member as illustrated. In contrast with the arrangement of FIG. 2, the lower left hand portion of the safety pin is not coupled to the oscillator tank circuit. Upon the unauthorized unclasp of the safety pin, the aforementioned heel portion of the safety pin presses against flexible contact member 30 so that capacitor 21' is now coupled in parallel with capacitor 19' of the

tank circuit. In this instance, frequency F_2 is lower than frequency F_1 rather than the reverse as explained in connection with the operation of FIG. 2. With this variation in the tank circuit arrangement, the shunting of the safety pin by a jumper wire would have no effect and the capsule removal detector would be actuated upon unauthorized unclasp of the pin.

An article removal detector 31 having a directional antenna 32 is positioned within exit area 33. The article removal detector typically comprises a resonant circuit tuned to frequency F_1 which is generated by the capsule when the safety pin is closed. The tank circuit is coupled to an electronic control device such as a transistor through a detecting diode and an integrating capacitor. The output circuit of the electronic control device is in turn coupled to a threshold device which may be readily controlled to close an alarm actuation circuit only upon the production of a predetermined voltage drop across a resistor coupled to the control device or the production of a given current passed through a relay. Details of the article removal detector have not been disclosed since numerous types are available in the prior art. For example, U.S. Pat. No. 2,844,762 to Duryee, issued July 22 1958, discloses an RF detection circuit which will turn on electric lights upon the receipt of a particular RF signal having a frequency to which the detector is tuned. The threshold sensitivity of the detector may be readily controlled by potentiometer R_2 so that only received RF signals of the required frequency and of a predetermined strength will fire the threshold devices T_1 and T_2 controlling the power actuation circuit which turns on the lights. Another example of an RF detector is disclosed on page 535 of the Radio Amateur Handbook, published by the American Radio Relay League, 1960 Edition. This circuit is designated as a field strength meter and as in the case of the Duryee patent, includes a resonant circuit coupled to an electronic switching device through a detector diode and a capacitor which is in shunt with the control circuit of the electronic switching device. In both of these references an RF signal having the requisite frequency causes the input tank circuit to resonate. Each half cycle causes the detector diode to conduct which causes the capacitor coupled thereto to commence to charge. In these arrangements the capacitor is in parallel with a discharge path so that if very weak RF signals are detected, the voltage across the capacitor will never charge up to the point where the threshold device, such as thyatron T_1 in the Duryee patent, is triggered. However, if a relatively strong RF signal is detected, the voltage will continue to rise across the shunt capacitor C_3 since during each half cycle the capacitor is being charged to a greater degree than it is being discharged and a voltage will be reached across capacitor C_3 to fire the threshold device T_1 , which in turn indirectly energizes relay CR to close the controlled lighting circuit. Fine adjustment of the threshold level is provided in the reference patent by potentiometer R_2 . This circuit also provides a $1\frac{1}{2}$ minute holding period by virtue of R_4 , C_5 , C_6 , and T_2 because the discharge path of C_3 is a high impedance. This holding period may be controlled by varying the value of R_4 . In a similar manner the field strength meter disclosed in the Radio Amateur's Handbook could be utilized by employing a potentiometer in series with a threshold relay in the collector circuit of the transistor. In this example the collector current will be a function of the strength of the RF signal being received and the relay will be actuated only after a predetermined amplitude of current passes through the collector. The threshold or actuation level of the relay may be varied by merely increasing or decreasing the current flowing through the relay for any given level of collector current such being typically performed by adjusting a potentiometer coupled to the relay.

The system is first calibrated by carrying the radiating capsule within exit area 33. The threshold level of article removal detector 31 is first adjusted so that an alarm indication is produced. The capsule is thereafter carried back through doors 33 and is positioned within the store area at position 34. If the alarm indication is still produced, the article removal de-

tor is too sensitive and the potentiometer is adjusted until the threshold level is increased to the point where the alarm indication is no longer produced. Obviously, this potentiometer control should be positioned so that access is not readily available thereto except by means of a key, for example. The directional antenna aids in preventing actuation of the exit alarm by a capsule positioned just inside the store area at point 34. Now let it be assumed that a shoplifter, notwithstanding the warning on the capsule which reads DON'T REMOVE ELECTRONIC ALARM, secretes the dress carrying the capsule on her person and enters the exit area 33. Article removal detector 31 will receive via its directional antenna an RF signal F_1 , to which its tank circuit is tuned, which has a sufficient strength to actuate the aforementioned threshold device. This action will in turn immediately actuate a pair of "Land" flash cameras 36 and 36' which take pictures of the exit area from diverse positions so that it is highly probable that at least one good photo of the shoplifter's face is recorded since she is heading out of the doors. Also, if a guard is present at guard station 37, the shoplifter would be immediately detained. Additionally, if desired, a tape recorder 41 could also be actuated to cause loudspeaker 42 to make an announcement, such as "Security Problem within exit area A". For certain configurations such as may be found in industrial applications, museums and even in stores, such an announcement could thwart the theft. If desired, the message could be broadcast at a remote intercept point. In fact, "exit area" is intended to include, for example, an area surrounding a showcase in a museum, which is not the exit from a room. For example, the aforesaid exit area could be the exit of a room in a museum or factory rather than the museum exit itself. The threshold control is an important feature of our system since obviously articles being carried about within store area 1 bearing radiating capsules must not trigger article removal detector 31. On the other hand, an object carried a few feet from a rifed showcase in a museum should sound an alarm. Ease of control of the threshold level results in easy adaptation of the system for different applications.

Now let it be assumed that notwithstanding the warning on the capsule, DON'T REMOVE ELECTRONIC ALARM, a shoplifter unfastens the safety pin and discards the capsule within the store. As can be seen from FIG. 2, unfastening of the safety pin removes capacitor 21 from the oscillator frequency determining circuit, which action in turn reduces the product LC which in turn raises the oscillating frequency of oscillator 16 to F_2 , as is obvious to those skilled in the art. A capsule removal detector 43 preferably having an omnidirectional antenna 44 coupled thereto, is tuned to frequency F_2 . The capsule removal detectors may be similar in design to the article removal detectors positioned in the exit area previously discussed. Immediately upon unclasping of the safety pin, the threshold device coupled to capsule removal detector 43 triggers "Land" flash camera 46, which takes a picture of the area in which the shoplifter is operating, and a tape recorder 47 again causes a message such as "Security Problem in Dress Department" to be broadcast over loudspeaker 48. Thus, an unauthorized capsule removal alarm indication is produced immediately upon the removal of the capsule and preferably right in the area in which the shoplifter is operating. In the case of a large store, economical considerations might preclude having the arrangement shown at numerous article storage stations. A more centralized capsule removal detector could be utilized at a remote station to trigger an alarm which could alert a floorwalker via a portable paging device. With this arrangement, the Dress Department capsules could transmit an alarm signal of one frequency to the remote console and the Men's Clothing Department could transmit another frequency to the remote console so that a floorwalker is quickly advised as to the location of the unauthorized removal. The capsules could be color coded to indicate the goods to which they are to be attached. Color coding may also be used to indicate battery expiration dates.

Thus, when a shoplifter removes the transmission unit or capsule from the protected article, a flash camera immediately takes a picture of the shoplifter. The resulting flash alerts store personnel along with an annunciator which includes the aforementioned tape recorder 47 together with loudspeaker 48. The resulting photograph which is developed on the spot would often illustrate the shoplifter handling the goods suspiciously, and thus might be valuable as means to secure an on-the-spot confession. It is preferable that all of the cameras mentioned hereinbefore are "Land" cameras so that a photograph can be developed rapidly for "on-the-spot" use in the store. In the case of a museum application, the photograph is itself powerful evidence of theft. Likewise, if an employee is stealing a TV set from a warehouse.

Now let it be assumed that an honest customer carries the dress to the cashier's counter 51 which normally consists of a desk bearing a cash register 52. A problem is suggested with the aforementioned system since the cashier must unfasten safety pin 24 in order to remove the capsule from the dress. In the absence of further circuitry, the aforementioned shift in the radiated signal from frequency F_1 to frequency F_2 might trigger the capsule removal alarm indication if capsule removal detector 43 is positioned within range of the cashier's counter. Under certain circumstances this might not be a problem because the threshold level of capsule removal detector 33 might be set at a level which would render the detector 43 out of range with respect to the location of cashier's counter 51. However, often this would not be the case; and, therefore, it may be necessary to take steps to inhibit the production of a capsule removal alarm indication upon authorized removal of the capsule by the cashier. One method of performing this inhibiting step would be to provide a capsule storage bin 53 having a pivotable lid 54 overlaying an entrance slot 56. A cashier would be trained to raise pivotable lid 54 just before removing the radiating capsule from the dress. Upon raising lid 54 a limit switch 57 mechanically coupled to lid 54 would activate an RF signal of frequency F_3 immediately upon actuation of the switch. An inhibit signal detector 58 having a band pass filter or input circuit resonant to F_3 would open a switch somewhere within capsule removal detector 43 to prevent actuation of the aforesaid capsule removal alarm indication by detector 43. The inhibit signal detector, like the aforementioned detectors, could comprise a tank circuit, a diode detector, an integrating capacitor, and a control device such as a transistor which in turn would be coupled to a relay which breaks the circuit between the input circuit of capsule removal detector 43 and alarm devices 46 and 48. As soon as the capsule is dropped into capsule bin 53, lid 54 is closed, the RF signal F_3 is no longer generated and the inhibit condition is removed to thereby again enable the capsule removal alarm device. The system might utilize an RF shielded capsule bin to prevent a deposited capsule radiating at frequency F_2 from triggering the capsule removal detector 43. However, it is not necessary to utilize an RF shielded bin if the width of the bin slot 53 is narrow enough to preclude allowing the cashier to drop the capsule into the bin without closing the safety pin. Normally, in the absence of an RF shielded bin, she would close the safety pin to allow the capsule to be dropped through the relatively narrow slot 53. Since the capsule dropped into the bin is oscillating at frequency F_1 , and since the cashier's COUNTER 51 IS NOT LOCATED IN EXIT AREA 33, NO ALARM INDICATIONS WOULD BE PRODUCED.

However, optional use of another article removal detector 61 may be considered which is similar to the aforementioned article removal detector 31 positioned in the exit area. The threshold control discussed hereinbefore would be set so that an alarm indication is produced by article removal detector 61 only if a radiating capsule is situated in the immediate vicinity of the cashier's counter. Detector 61 would typically utilize warning lamp 63 rather than the aforementioned annunciators or flash cameras. It is commonplace for a shoplifter to pay for one article and secrete another article on her person. In the event that such a shoplifter should be present at the cashier's

counter, and in the event that no other customers are in the immediate vicinity of the cashier's counter, such a secreted article bearing a capsule would produce an alarm indication by virtue of detector 61 after removal of the capsule by the cashier, associated with the article being paid for. The lighting of warning lamp 63 could be utilized by having the cashier phone a guard at guard station 37 or otherwise alert a floorwalker who could intercept the shoplifter in the exit area, even in the absence of a guard at guard station 37. If the optional article removal detector 61 is utilized at the cashier's counter, it would be necessary to shield the discarded capsules radiating at frequency F_1 from article removal detector 61. However, if the optional removal detector 61 is not utilized, an RF shield need not be employed. Another inexpensive arrangement which may be utilized to segregate the discarded capsules would be to provide a large wire loop or "key ring" instead of the aforementioned capsule storage bin. The "key ring" would be typically situated under the cashier's counter and would normally be supported by a detent mechanism which would normally position the "key ring" away from or under the cashier's counter. Before removal of the capsule the cashier would be trained to pull the "key ring" toward her which would snap the ring into a second detent position and which would render it accessible to the cashier. This action would trigger the aforementioned limit switch 55 which would generate the inhibit condition as before. The capsule is removed by the cashier from the protected article, and the pin is positioned to encompass the wire loop of the "key ring", and the safety pin is thereafter closed about the wire loop. This action ensures that the capsule will thereafter radiate at frequency F_1 just as in the case where the capsule is attached to a dress on the dress rack and no alarm indications are thereafter triggered by the capsules hanging from the "key ring". This arrangement is very economical and inherently ensures that the capsules do not thereafter radiate at frequency F_2 after removal of the inhibit condition. Additionally, unless the optional article removal detector 61 is utilized, no RF shielding is required. The "key ring" is thereafter pushed into the counter so that the inhibit condition is removed since the limit switch coupled to the "key ring" detent mechanism is again opened to remove the inhibit condition.

The inventor believes that this system is highly practical because of the powerful deterrent effect of the capsules bearing the designation DON'T REMOVE ELECTRONIC ALARM together with the flash cameras and annunciators which are made visible rather than hidden.

In summary, the present invention discloses a system which is highly economical and well within the state of the art and which, for the first time, should result in sharp reduction in thefts of articles to be protected. This system may be utilized to protect articles other than those being sold in stores although shoplifting losses in the United States alone have been estimated to exceed 2 billion dollars a year. Expensive inventory stored in industrial environments could also be protected since the carrying away of an item of inventory would trigger a pair of flash cameras at the exit area which would produce photographs of the thief. Likewise, the system could be utilized in museums for protecting paintings, etc., and such systems could greatly reduce payroll expenditures of museum guards, industrial guards, or floorwalkers.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described. For example, the term "alarm" encompasses virtually any indication which is useful in stopping a theft. Likewise, the term "exit area" includes any forbidden zone in which the radiating capsule should not pass through. The RF signal generated by the capsule over a prolonged time period may not necessarily be continuous but could be intermittent, e.g., one burst of radiated power every 3 seconds.

We claim:

1. A method of preventing the unauthorized removal through a first area of articles contained within a second area comprising the steps of:

providing within said first area an article removal detector having an alarm indicator coupled thereto for producing an alarm indication in response to the generation of RF signals within said first area;

attaching RF transmission units to at least some of said articles to be protected, which transmission units generate article removal RF signals within said second area containing said articles which are incapable of triggering said alarm indicator unless said transmission units are positioned within said first area associated with said detector to provide for containment of said articles within said second area without triggering said alarm indication;

producing a radiated transmission unit removal signal, in response to the unauthorized removal of said transmission units from said articles by an unauthorized individual; and

detecting said transmission unit removal signal and producing an alarm indication in response to the detection of said transmission unit removal signal to indicate unauthorized removal of said transmission unit from a protected article.

2. The method of claim 1 wherein the step of producing said alarm indication indicative of unauthorized removal of a transmission unit from a protected article includes taking a picture of the area containing the protected article.

3. The method of claim 1 wherein the step of producing said alarm indication indicative of unauthorized removal of a transmission unit from a protected article includes actuating an annunciator which broadcasts the unauthorized removal.

4. The method as set forth in claim 1 wherein the step of producing said transmission unit removal signal comprises altering a characteristic of said article removal RF signal.

5. The method as set forth in claim 4 wherein said transmission unit removal signal is produced by changing the frequency of said article removal signal.

6. The method as set forth in claim 1 including the step of detecting said transmission unit removal signal within said second area and in the vicinity of a storage area within which said articles to be protected are stored.

7. The method as set forth in claim 1 wherein said transmission unit removal signal has a particular characteristic indicative of the particular type of articles from which said transmission units were removed to facilitate the location of an unauthorized removal of a transmission unit from a protected article.

8. The method as set forth in claim 1 including the step of inhibiting the production of a transmission unit removal alarm indication, which would otherwise be produced by detecting said transmission unit removal signal, during a period within which an authorized individual removes a transmission unit from a protected article.

9. The method as set forth in claim 8 wherein said inhibiting step is performed by generating a radiating inhibit signal having an inhibit characteristic which blocks the generation of said alarm indication indicating unauthorized transmission unit removal which would otherwise be produced in the absence of the generation of said radiating inhibit signal.

10. The method of claim 1 further including the step of detecting radiant energy produced by a secreted transmission unit located only in the vicinity of a checkout station.

11. A method of preventing unauthorized removal through a first area of articles retained with a second article containing area comprising the steps of:

providing an article removal detector at said first area having an alarm device coupled thereto for producing an alarm indication upon the receipt of a first radiating signal by said detector which exceeds a given threshold level;

attaching radiating transmission units to at least some of said articles to be protected, which transmission units

generate said first radiating signal which is insufficient to trigger said alarm indication produced by the alarm device coupled to said article removal detector unless said transmission units are positioned within said first area, so that the presence of said transmission units in areas other than said first area will not trigger the alarm device coupled to said article removal detector;

providing a transmission unit removal detector for detecting the presence of a second radiating signal;

providing an alarm indication in response to the receipt of said second radiating signal by said transmission unit removal detector;

generating a second radiating signal in response to unauthorized removal of a transmission unit from a protected article to trigger the alarm device coupled to said transmission unit removal detector;

generating a third inhibit signal during the period within which an authorized individual removes a transmission unit from an article to be protected; and

inhibiting the production of an alarm indication by the alarm device coupled to said transmission unit removal detector in response to the production of said third signal during the period when authorized removal of a transmission unit from an article occurs.

12. The combination set forth in claim 11 wherein the second radiating signal is produced by removing an electrical component from an oscillator positioned within the transmission unit.

13. The method set forth in claim 12 wherein said component is removed by unfastening a fastening device which couples the transmission unit to the article being protected.

14. An RF transmission unit for preventing the unauthorized removal of an article from a given area and which may be readily attached and removed from such an article to be protected comprising:

- an RF oscillator for generating an RF signal over a prolonged time period during which said RF transmission unit is attached to said protected article;
- a power source for operating said RF oscillator;
- a housing for supporting said oscillator and said power source;
- a fastening device coupled to said housing for fastening said transmission unit to said article to be protected; and
- control means for altering a characteristic of said RF signal radiated by said oscillator upon the actuation of said fastening device.

15. The combination set forth in claim 14 wherein a switch is provided for coupling said power source to said oscillator, together with means for preventing the opening of said switch once said switch is closed.

16. The combination set forth in claim 15 wherein said housing includes a flexible wall portion adjacent said switch to provide for the closure of said switch by applying pressure to said flexible wall portion.

17. The combination as set forth in claim 15 further including an insulating member coacting with said power source for preventing application of power to said oscillator; and

- an actuating member connected to said insulating member for enabling removal of said insulating member from said power source upon the actuation of said actuating member.

18. The combination set forth in claim 17 wherein said oscillator includes a frequency shifting component together with means coupled to said fastener for connecting said frequency shifting component to said oscillator when said fastening device assumes a first state and for decoupling said frequency shifting component from said oscillator when said fastener assumes a second state so that said oscillator shifts in frequency upon the unauthorized removal of said transmission unit from said article to be protected.

19. The combination set forth in claim 18 wherein said fastener is electrically conductive and means are provided for coupling said frequency shifting component to said oscillator

when said fastener is closed and for decoupling said frequency shifting component from said oscillator when said fastener is opened.

20. The combination set forth in claim 18 further including an electrical contact member positioned within said housing for coupling said frequency shifting component to said oscillator when said fastener is opened.

21. The combination set forth in claim 18 wherein said fastener is a safety pin.

22. A method of preventing unauthorized removal through a first exit area of articles contained within a second area comprising the steps of:

- attaching radiating transmission units to said articles to be protected;

- producing an article removal alarm indication in response to radiation produced by the presence of said transmission units in said first area but not in said second area;

- producing a transmission unit removal signal upon the unauthorized removal of a transmission unit from a protected article;

- detecting said transmission unit removal signal; and

- producing a transmission unit removal alarm indication in response to the receipt of said transmission unit removal signal.

23. The method as set forth in claim 22 further including the step of inhibiting the production of said transmission unit removal alarm indication upon the authorized removal of a transmission unit from a protected article.

24. The method of claim 23 wherein the step of inhibiting the production of said transmission unit removal alarm indication includes the transmission of an inhibit signal which inhibits the production of said removal alarm indication.

25. The method of claim 22 further including the additional step of detecting radiant energy produced by a secreted transmission unit located only in the vicinity of a checkout station; and

- producing a checkout station alarm indication in response to the detection of said secreted transmission unit.

26. The method of claim 22 further including the step of photographing said first area in response to the production of said article removal alarm indication.

27. The method of claim 22 further including the step of photographing said second area in response to the production of said transmission unit removal alarm indication.

28. A method for preventing unauthorized removal through a first exit area of a plurality of discrete articles contained within a second storage area distinct from said first exit area, which plurality of articles may be moved about within said storage area without producing an alarm indication, said method comprising the steps of:

- attaching protective capsules to each of said articles to be protected for enabling said protective capsules to move with said articles as said articles are moved about within said storage area;

- producing an article removal alarm indication in response to the presence of said protective capsules within said first exit area but not within said second storage area due to unauthorized removal of said articles from said second storage area;

- producing a protective capsule removal signal upon the unauthorized removal of a protective capsule from a protected article within said second storage area;

- detecting said protective capsule removal signal; and

- producing a protective capsule removal alarm indication in response to the receipt of said protective capsule removal signal.

29. The method as set forth in claim 28 wherein said article removal alarm indication is generated in response to the receipt of a predetermined minimum level of energy produced by the presence of said protective capsules within said exit area but not within said storage area.

30. The method of claim 28 wherein said protective capsule removal signal is produced in response to the opening of a

safety pin used to readily attach said capsules to said articles
to be protected.

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