

[54] METHOD AND APPARATUS FOR
ENCOURAGING RETURN OF SHOPPING
CARTS

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; a part interest
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221/13, 2; 194/4; 250/221, 222, 219 ID, 219
DC

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[57] ABSTRACT

A method and apparatus for encouraging return of shopping carts to the store including a detector and dispenser triggered by the return of a shopping cart belonging to the store, the device having a first photocell and light source detector which is sensitive to reflective indicia mounted on shopping carts belonging to the store. The first photocell is coupled to an ejector mechanism which ejects a reward medium, such as a game contest piece, to a pickup station. The piece at the pickup station interrupts the beam of light trained on a second photocell to thereby disable the dispenser until the piece is manually removed from the pickup station. The reflective indicia may be colored and a filter interposed before the second photocell.

8 Claims, 2 Drawing Figures

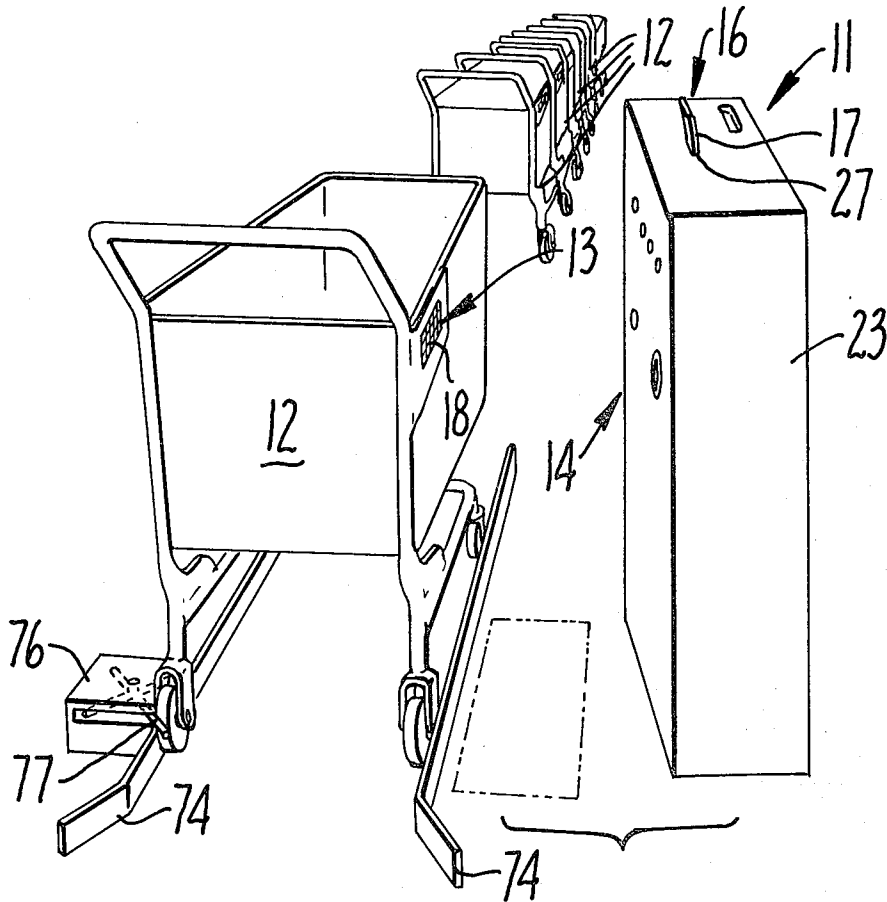


FIG. 1.

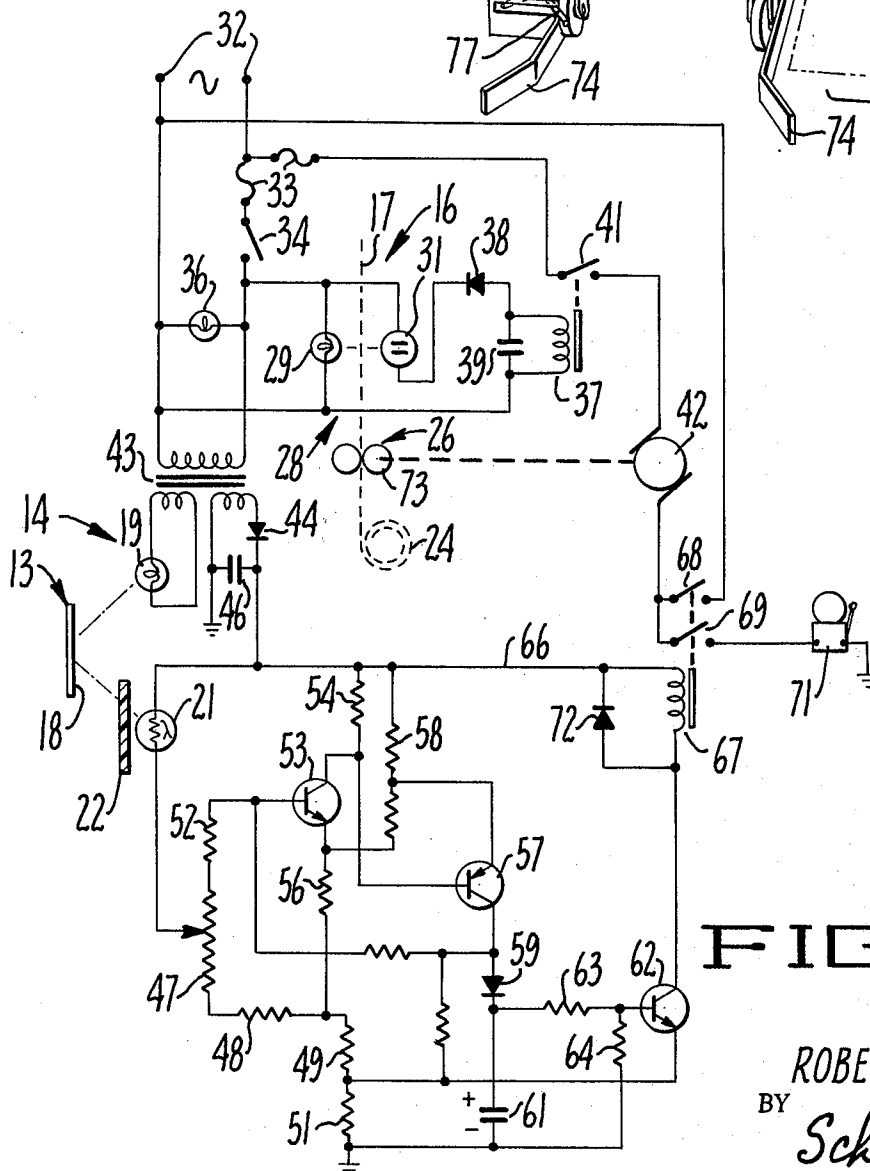
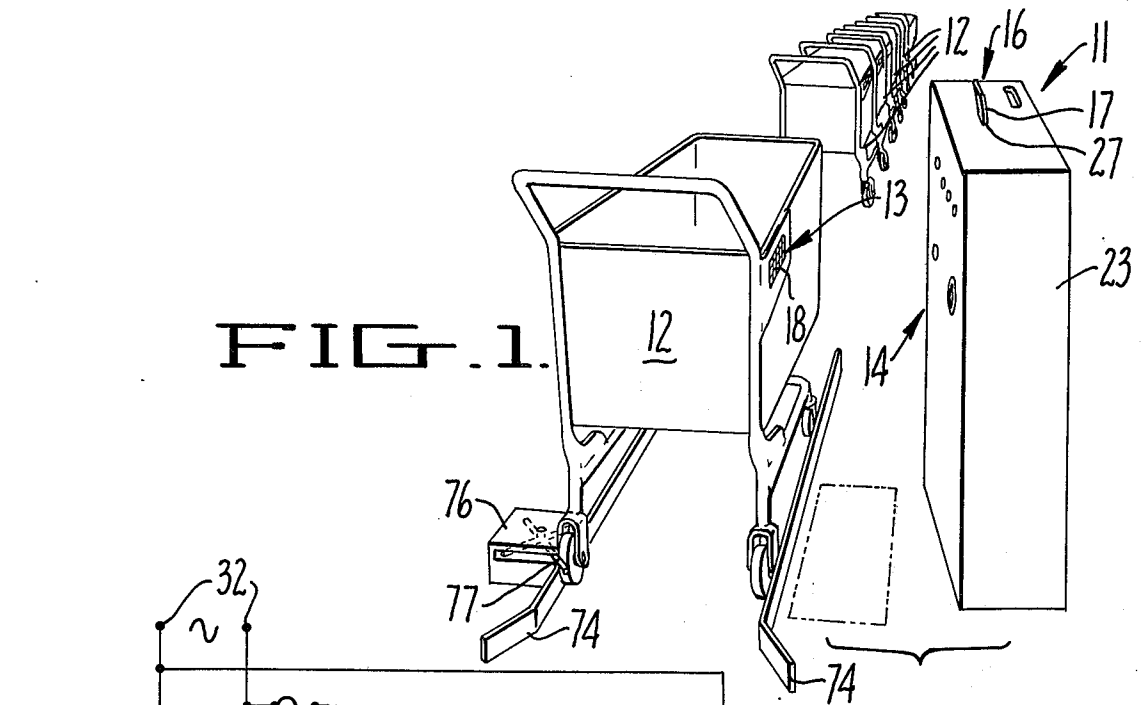


FIG. 2.

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METHOD AND APPARATUS FOR ENCOURAGING RETURN OF SHOPPING CARTS

BACKGROUND OF THE INVENTION

This invention relates to a METHOD AND APPARATUS FOR ENCOURAGING RETURN OF SHOPPING CARTS, and more particularly to an acceptor mechanism for detecting shopping carts belonging to a particular store and rewarding their return to the store.

Retail stores have experienced mounting problems with removal of shopping carts from the store premises. Measures for combating this outflow have ranged from prominent warnings of criminal sanctions to sending crews out with trucks to retrieve the carts from their points of abandonment in the neighborhood. Devices for unpoliced return of the carts have been proposed, such as radio receiver range alarms, but have generally proven to be bulky, expensive and unreliable. If store personnel attention is required to dispense a reward for cart return, the solution is too expensive to be attractive or feasible.

SUMMARY OF THE INVENTION

The present invention provides an automatic detector and dispenser responsive to inexpensive and unobtrusive indicia borne by the shopping carts to reward their return. Customers will be advised of the reward, which may be money or a contest game piece, or any other suitable reward medium. They are thus encouraged to return their cart to the store, and even to return any carts abandoned by others.

On return, the customer rolls the cart through a designated confined lane adjacent to the acceptor. Carts belonging to the store have a reflective indicia, such as a piece of reflective adhesive tape, affixed at a selected level above the floor. The acceptor projects a beam of light positioned to strike the reflective indicia at its selected level, and a photosensitive cell in the acceptor receives the reflection from the indicia.

The photosensitive cell triggers the dispenser to eject a piece of the reward medium from inside the acceptor to an exposed pickup station, where the person returning the cart may grasp and remove the piece. To prevent multiple actuation of the dispenser by one cart, the piece of reward medium, on arrival at the pickup station, interrupts a beam of light from a second light source to a second photosensitive cell. Interruption of this second beam triggers a disabling circuit which prevents further actuation of the dispenser until the piece of reward medium is removed.

If the pickup station is located slightly forward on the acceptor, the customer will have to roll the cart forward to reach the reward piece, and the reflective indicia will thus be carried out of range of the first light beam and photocell. If necessary, a one-way turnstile mechanism may be installed in the return lane to prevent the cart from being backed up to retrigger the acceptor. Further protection against multiple actuation may be secured by coupling an audible alarm, such as a gong, to the detector for sounding each time the reflective indicia is detected. Too frequent sounding of the gong would then indicate to store personnel the occurrence of tampering with the acceptor by multiple actuation.

Accordingly, it is a principal object of the present invention to provide a shopping cart acceptor of the

character described which will automatically reward the return of shopping carts to the store.

Another principal object of the present invention is to provide a reliable foolproof method of automatically rewarding the return of shopping carts.

It is a further principal object of the present invention to provide a shopping cart acceptor of the character described which will detect and respond only to those carts belonging to the particular store.

Another object of the present invention is to provide a shopping cart acceptor of the character described which will prevent issuance of multiple rewards for the same cart on one return.

A still further object of the present invention is to provide a shopping cart acceptor of the character described which will fail to respond to sham stimuli.

Further objects and advantages of the present invention will appear as the specification proceeds, and the new and useful features of the shopping cart acceptor will be fully described in the claims attached hereto.

BRIEF DESCRIPTION OF THE DRAWINGS

The preferred form of the present invention is illustrated in the accompanying drawings, in which:

FIG. 1 is a perspective view of the shopping cart acceptor of the present invention, with a shopping cart shown in position to activate the acceptor; and

FIG. 2 is a schematic diagram of the electronic circuit of the acceptor, with certain mechanical parts shown schematically.

While only the preferred forms of the present invention have been shown, it should be understood that various changes or modifications may be made within the spirit of the claims attached hereto without departing from the spirit of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in detail it will be seen that the apparatus for encouraging return of shopping carts of the present invention includes a detecting and registration device or acceptor 11 for rewarding the return of a shopping cart 12 bearing an identifying indicia 13. The acceptor 11 comprises a detector 14 adapted and mounted for scanning predetermined areas of the shopping cart 12 for the presence of the indicia 13 and a dispenser 16 connected to the detector 14 for dispensing a reward medium 17 in response to detection of the indicia 13.

The indicia 13 provides a surface 18 having a light reflection characteristic differing from that of the remainder of the portion of the cart 12 scanned by the detector 14. As here shown, the indicia 13 is a piece of material having a reflective surface, the indicia being affixed to the cart 12 in a position to pass by the detector 14 as the cart 12 is rolled along near the acceptor 11. The indicia preferably is made of reflective tape 18, the surface of which is a highly reflective medium so that it reflects more light back to the detector 14 than do the remaining portions of the cart 12 scanned by the detector 14. An example of such a reflective tape would be the material Scotchlite, manufactured by the Minnesota Mining and Manufacturing Corporation, which has a reflective coating on a flexible plastic tape provided with pressure-sensitive backing.

The detector 14 includes a light source 19 for emitting a beam of light aimed at a station occupied by the

indicia 13 as the shopping cart 12 moves past the detector 14, and a photosensitive cell 21 aimed at the same station to receive the light reflected back by the shopping cart 12 and its indicia 13. The reflective tape 18 may if desired include a filter medium which imparts a characteristic color to the light reflected by the tape 18. In that event, filter 22 which preferentially transmits the characteristic color created by the tape 18 is interposed in the detector 14 to filter the light reflected back to the photosensitive cell 21 before the light impinges on the cell. The use of colored tape 18 and a filter 22 greatly increases the resistance of the detector to being triggered by sham stimuli such as pocket mirrors or stray light sources such as flashlights.

The dispenser 16 is contained within an enclosure 23 and holds a stock of reward medium schematically indicated at 24 in FIG. 2. The dispenser 16 includes an ejector mechanism generally schematically indicated at 26 in FIG. 2 for moving a portion of the reward medium 17 from the interior of the enclosure 23 to a pickup station 27 adjacent to the exterior of the enclosure 23 for removal by the person returning the shopping cart, and a disabling device 28 generally indicated in FIG. 2 which is operative to disable the dispenser 16 during the time the portion of the reward medium 17 remains at the pickup station 27. The disabling device 28 includes a light source 29 for projecting a light beam in a position to be intercepted by the portion of the reward medium 17 at the pickup station 27, and a photosensitive cell 31 disposed in a beam of light from the light source 29 so that the reward medium 17 at the pickup station 27 intercepts the light passing from the light source 29 to the photosensitive cell 31 to cause the dispenser 16 to be disabled.

Line AC power is supplied to the circuit of FIG. 2 through a pair of AC supply lines 32 fused by the appropriate fuses 33 and controlled by an SPST on-off switch 34. A pilot light 36 indicates that the acceptor circuits are supplied with power. The light source 29 is a small low wattage lamp connected in parallel with the AC supply lines 32. The photosensitive cell 31 is placed in series with the AC supply lines 32 to control the flow of current to the actuating coil of a relay 37. A diode 38 rectifies the power supplied to the relay 37 and a capacitor 39 is connected in parallel across the coil of the relay 37 to damp out transient current and to provide a slight delay function. The contacts 41 of the relay 37 switch one leg of the power supply line to the electric motor 42 which drives the ejector mechanism 26. The contacts 41 are "normally open," but they remain closed most of the time, as the relay 37 is actuated at most times. Whenever no piece of reward medium 17 is at the pickup station 27, the light from the light source 29 falls on the photo cell 31, causing it to conduct and pass current to the relay 37.

Turning now to the circuit of the detector 14, a transformer 43 provides power through one of its secondary windings for the light source 19, and through another of its windings provides a low voltage which is rectified by diode 44 and filtered by a capacitor 46 to provide the appropriate DC voltage for the transistor circuit below. This low voltage DC is supplied to the photosensitive cell 21, which is preferably a cadmium sulfide photoresistive cell. Such cells exhibit a lowered resistance when light impinges on them, so that when light is reflected back from the indicia 13 to the photosensitive cell 21 through the filter 22 a positive potential is ap-

plied to the base of the NPN type transistor 53 through a variable resistance 47 and a fixed resistance 52.

The variable resistance 47 operates as a sensitivity control to adjust the response of the circuit to discriminate between the amount of light reflected by the indicia 13 and the amount of light reflected by other portions of the cart as they pass by the photosensitive cell 21. The remaining resistors, 48, 49 and 51 constitute a voltage divider network leading to ground. The positive potential on the base of the transistor 53 causes it to begin conduction through its collector resistor 54 and its emitter resistor 56, thereby lowering the potential on the base of a PNP type transistor 57.

The negative potential on the base of the PNP type transistor 57 causes that transistor to begin conduction, with the current flowing through a load resistor 58, the transistor 57, and on through a diode 59 to charge a capacitor 61. The conduction of the transistor 57 also places a positive potential on the base of an NPN type transistor 62 through a bias network consisting of the resistors 63 and 64, to cause the transistor 62 to begin conduction. The conduction by the transistor 62 allows current flow from the DC supply line 66 through the actuating coil of relay 67, through the transistor 62, and to ground through the resistor 51.

The relay 67 has a pair of normally open contacts 68 and 69, with one pair of contacts 68 placed in series with the AC supply line to the dispenser motor 42. The other pair of contacts 69 may be utilized to supply power either as shown here from the DC supply line 66 or from an appropriate AC supply line for any other desired purpose coincident with the detection of the reflective indicia 13. One such use for the contact 69 is shown here as an electric gong 71 which rings to indicate the reception of a proper cart. Tampering with the mechanism and operation, such as by pulling the cart back and forth in front of the detector 14 will then be signalled by repetitive sounding of the gong 71 to alert store personnel to the tampering.

If no portion of the reward medium 17 is presently at the pickup station 27 to interrupt the light beam from the light source 29 to photosensitive cell 31, then the relay 37 will have closed the contacts 41 and the closure of the contact 68 upon actuation of the relay 67 will complete the circuit of AC power supply to the dispenser motor 42. That motor will then operate through drive rollers schematically indicated as 73 in FIG. 2 to supply a portion of the reward medium 17 to the pickup station 27. The arrival of the portion of the reward medium 17 at the pickup station 27 will block the path of the light from the light source 29 to the photosensitive cell 31, interrupting the actuation of the dispenser drive motor 42.

The capacitor 61 which was charged by the conduction of the transistor 57 is blocked from discharge by the diode 59 and forced to discharge through the resistor 63 and 64. It therefore operates to hold the base of the transistor 62 positive for a period after the transistors 53 and 57 again become non-conductive due to the reflective indicia 13 having moved out of range of the photosensitive cell 21. This delay is necessary to allow sufficient time for the dispenser motor 42 to drive the portion of the reward medium 17 to the pickup station in spite of the cart 12 and its indicia 13 having moved on slightly forward and out of range of the photosensitive cell 21. A diode 72 is placed in parallel with the actuating coil of the relay 67 to prevent the transient cur-

rent upon actuation and deactuation of the relay 67 from feeding back and influencing the behavior of the transistor circuit.

When the light falling on the photosensitive cell 21 falls below a selected threshold level determined by the setting of the variable resistance 47, the base of transistor 53 is biased negative through the resistors 47, 48, 49, 51, 52 and 56 causing the transistor 53 to cease conduction. The non-conduction of the transistor 53 renders the base of the transistor 57 more positive and causes that transistor to cease conduction. The non-conduction of the transistor 57 in turn removes the positive potential supplied to the base of the transistor 62, leaving a positive potential supplied the charge on the capacitor 61, until the capacitor 61 has discharged through the bias network of the resistor 63 and 64. On discharge of the capacitor 61, the base of the transistor 62 is again biased negative to cut off its conduction and terminate actuation of the relay 67, opening the contacts 68 and 69.

While a cascaded three-transistor amplifier for the photosensitive cell 21 has been shown here, it must be appreciated that many other amplifier circuits would be appropriate depending on the characteristics of the particular photosensitive cell 21 selected for use in the circuit. Also, either instead of or in addition to the gong 71, the contact 69 of the relay 67 may be used to switch other desirable devices such as a tape loop player which might bear an advertising message or an instruction message instructing the person returning the cart to remove the piece of reward medium 17 from the pickup station 27 and instructing the person what to do with the piece of reward medium 17. Although the circuit of the dispenser 16 possesses certain advantages of simplicity, it should be appreciated that other photosensitive cells could be used in place of the photosensitive cell 31 with appropriate amplifying circuits to drive the relay 37 as necessary.

To bring the carts into the correct degree of proximity to the acceptor mechanism 11 a pair of channeling guides 74 may be affixed to the floor adjacent the acceptor 11 to provide a confining lane for directing the shopping carts past the acceptor. If desired, a turnstile mechanism 76 may be installed in the lane provided by the channeling guide 74 to require one way passage of the cart 12 in that portion of the lane in which the indicia 13 is detected by the detector 14, so that reactivation of the detector 14 by means of backing up the cart and pushing it forward again past the detector is prevented. Any of a number of appropriate mechanisms, such as a ratchet (not shown) may be used in conjunction with a rotating multi-armed structure 77 adapted to be moved by the wheel of the cart 12 in a counter-clockwise direction as here shown, with the ratchet mechanism preventing clockwise motion of the multi-armed wheel 77. It is to be noted that the pickup station 27 is located slightly forward on the acceptor mechanism 11, so that for maximum convenience the returner of the cart will usually have to push the cart forward some distance beyond the point at which the indicia 13 is detected by the detector 14 in order to conveniently remove the piece of reward medium 17 from the pickup station 27. This forward location of the pickup station 27 thus encourages the returner to push the cart on forward so that he may pickup his piece of reward mediums 17 and move the cart out of range of actuation of the detector 14 by the indicia 13.

From the foregoing it may be seen that a shopping cart acceptor has been provided which automatically rewards the return of the shopping carts to the store by detecting and responding to the carts belonging to that store. The acceptor is designed to prevent issuance of multiple rewards of the same cart on one return and is resistant to actuation by sham stimuli and to defeat of its purpose by tampering.

I claim:

1. A device for detecting movement of shopping carts through a location on a passageway and dispensing an article in response to said movement, comprising an indicia carried on each of the shopping carts to be detected,
- a detector for detecting movement of shopping carts carrying said indicia through said location, said detector comprising
 - a light source positioned to provide reflective light from said indicia in a form discriminating from ambient light emanating from said location,
 - a photosensitive cell located in position to receive said reflective light and be selectively responsive to the light reflected from said indicia, and
 - an electric circuit including said photosensitive cell and switch means operated by said cell, and
 - a dispenser operatively associated with said circuit and its switch means for dispensing an award medium in response to the operation of the detector caused by movement of a shopping cart carrying said indicia through said location,
- said dispenser being located a sufficient distance from the detector that a person pushing the shopping cart through the detector location cannot reach the article dispensed without continuing along the passageway beyond the operative location.
2. A device for shopping carts as described in claim 1, in which means are provided in the passageway to prevent reversal of movement of the shopping cart.
3. A device for shopping carts as described in claim 2, in which sound means are also provided, said sound means being responsive to the dispensing of a reward medium for signaling such operation to the store personnel.
4. A device for detecting movement of shopping carts through a location on a passageway and dispensing an article in response to said movement, comprising an indicia carried on each of the shopping carts to be detected,
- a detector for detecting movement of shopping carts carrying said indicia through said location, said detector comprising
 - a light source positioned to provide reflective light from said indicia in a form discriminating from ambient light emanating from said location,
 - a photosensitive cell located in position to receive said reflected light and be selectively responsive to the light reflected from said indicia, and
 - an electric circuit including said photosensitive cell and switch means operated by said cell, and
 - a dispenser operatively associated with said circuit and its switch means for dispensing a reward medium in response to the operation of the detector

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caused by movement of a shopping cart carrying said indicia through said location, said dispenser being contained within an enclosure and comprising

- an ejector mechanism for moving a portion of reward medium from the interior of said enclosure to a pickup station adjacent to the exterior of said enclosure for removal by the person returning the shopping cart, and
- a disabling device operative to disable said dispenser during the time said portion of reward medium remains at said pickup station.

5. A device for shopping carts as described in claim 4 and wherein said disabling device comprises a light source projected across the path of said reward medium adjacent said pickup station so as to be intercepted by said portion of said reward medium at said pickup station, and a photosensitive cell disposed in the beam of light from said light source which is interrupted by said portion of said reward medium.

6. An apparatus for encouraging return of shopping carts, comprising

- identifying indicia mounted on the shopping carts,
- a stationary detector positioned to scan shopping carts moved therepast to detect said indicia,
- a dispenser connected to said detector and operative upon activation of said detector by said indicia to

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dispense a reward medium, said dispenser being contained within an enclosure and comprising an ejector mechanism for moving a portion of reward medium from the interior of said enclosure to a pickup station adjacent to the exterior of said enclosure for removal by the person returning the shopping cart,

and a disabling device operative to disable said dispenser during the time said portion of said reward medium remains at said pickup station.

7. An apparatus for encouraging return of shopping carts as described in claim 6, and wherein said disabling device comprises a light source for projecting a light beam in position to be intercepted by said portion of said reward medium at said pickup station, and a photosensitive cell disposed in said light beam and effective during interception of the light beam by said reward medium to cause said disabling of said dispenser.

8. An apparatus for encouraging return of shopping carts as described in claim 7, and wherein said indicia is a reflective surface mounted on the shopping cart and said detector comprises a second light source for projecting a light beam in position to impinge upon said indicia, and a second photosensitive cell aimed to receive that portion of the light beam reflected from said indicia.

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