

United States District Court,
D. New Jersey.

MARS, INCORPORATED, et als,
Plaintiffs and Counterclaim Defendants.

v.

COIN ACCEPTORS, INC,
Defendant and Counterclaim Plaintiff.

Civil Action No. 90-49 (JCL)

March 21, 2007.

Background: Suit was filed alleging infringement of patent for four-price four-vend relay coin changers used within Type 1 or Type 2 vending machines. Defendant filed counterclaim alleging plaintiff's contributory and induced infringement of claims of defendant's patent describing a vending machine control circuit.

Holdings: In making its findings of fact and conclusions of law on the counterclaim, the District Court, Lifland, J., held that:

- (1) four-price four-vend relay coin changers, when used within Type 1 or Type 2 vending machines, did not infringe any of the asserted claims of defendant's patent as construed by the court;
- (2) patent describing a vending machine control circuit was not invalid for failure to disclose the best mode; and
- (3) even if court had adopted patentee's proposed claim construction for all terms, numerous claims of patent describing a vending machine control circuit would be invalid for anticipation or obviousness.

Order in accordance with opinion.

3,828,903. Invalid and Not Infringed.

Lanny Steven Kurzweil, McCarter & English, LLP, Newark, NJ, for Plaintiffs and Counterclaim Defendants.

Elizabeth J. Sher, Pitney, Hardin, Kipp & Szuch, LLP, Florham Park, NJ, Clyde A. Szuch, Pitney, Hardin, Kipp & Szuch, Morristown, NJ, for Defendant and Counterclaim Plaintiff.

FINDINGS OF FACT AND CONCLUSIONS OF LAW RE: COINCO '903 PATENT

LIFLAND, District Judge.

I. Introduction

This matter comes before the Court upon the counterclaim of Defendant Coin Acceptors, Inc. ("Coinco" or "Defendant") against Plaintiff Mars, Incorporated ("Mars" or "Plaintiff") regarding Mars' alleged contributory and induced infringement of claims 1, 2, 3, 4, 6, 11, and 12 of Coinco's U.S. Patent No. 3,828,903 (filed Feb. 12, 1973) (issued Aug. 13, 1974). For the reasons set forth below, the Court finds that Mars' 5900-series four-price four-vend relay coin changers, when used within Type 1 or Type 2 vending machines, do not infringe any of the asserted claims of the '903 Patent as construed by the Court. Alternatively, if the Court had accepted all of Coinco's arguments regarding claim construction, all of the asserted claims of the '903 Patent would be invalid for lack of enablement, claims 1, 2, 3, 4, and 11 would be invalid for anticipation, and claim 6 would be invalid for obviousness. The Court does not find the '903 Patent invalid for failure to disclose the best mode, and does not find claim 12 invalid for either anticipation or obviousness.

II. Background

A. The '903 Patent

1. Description of the '903 Patent

The '903 Patent, entitled "Vend Control With Escrow Until Available Product Selection," describes a vending machine control circuit. The patent was originally issued to H.R. Electronics Company, a subsidiary of Coinco, as assignee of the inventor Joseph L. Levasseur. Subsequently, the '903 Patent was assigned to Coinco. (Joint Ex. 6, Stipulated Fact No. 127.)

According to the patent, "[t]he present invention resides to a large extent in the construction and operation of the selection monitor circuit 58 and in the way it is connected into the circuit." '903 Patent col. 5, lines 33-35. The patent describes a vending machine control circuit which uses the same electrical line both to detect the selection of a product and to provide electrical power to the vending device. FN1 In order to permit this dual use of a line, the configuration of the circuit elements along that line must ensure that the vending device does not vend a product immediately upon a user's selection of that product; instead, the vending device should wait for confirmation that the user has deposited enough money in exchange for the product attached to that vending device. The '903 Patent accomplishes this via an element called the "selection monitor," which is "particularly important to the present invention." '903 Patent col. 3, lines 40-41. The '903 Patent provides four separate embodiments of the selection monitor.

FN1. According to Mr. Levasseur, one major advantage of the '903 Patent over the prior art was that the '903 patent allowed for the use of an eight-pin Jones plug within a four-price vending machine. (Trial Tr. vol. 28, 51.) Each pin in a plug provides for a line of communication between the units on either end of the plug. In the case of a vending machine, a plug permits communication between a coin changer unit and a vending machine unit. The communication that occurs within a vending machine control circuit that includes both a coin changer unit and a vending machine unit allows the control circuit to determine whether a user has selected a product to be vended, whether the user has deposited sufficient money, and whether the machine has successfully delivered a product to the user.

Mr. Levasseur claims that prior to his invention, use of the eight-pin Jones plug was limited to single-price vending machines with single-price coin changers, and that no four-price coin changers existed that could use an eight-pin Jones plug. (Tr. vol. 28, 48-49.) A vending machine control circuit must provide for lines of communication that allow the control circuit to sense that a user has actuated a product selection switch along a particular price line and then provide power to the mechanical vending device which delivers the product matching that price to the user. Each separate price line within a vending control circuit requires separate lines of communication. Although many examples of the prior art used separate pins of a plug for detecting the actuation of a selection switch and providing power to the vending device, the '903 Patent allows a single pin to be used for both purposes. (Tr. vol. 28, 52). Because use of a single pin for dual purposes allows the use of a plug with less pins, Mr. Levasseur claims that the teachings of the '903 patent improve upon the prior art by permitting the use of an eight-pin Jones plug in a vending machine control circuit with four price lines. The plug must also allow for other lines of communication beyond the price lines. *See, e.g.*, Def.'s Ex. 483, A000781 (showing pins used for AC Hot, AC Neutral, Exact Change, and Blocker, in addition to the four price lines).

Although Mr. Levasseur explained that one goal of the '903 invention was to allow a four-price coin changer to work with an eight-pin Jones plug, the patent itself never discusses an eight-pin plug. Figure 1 of the patent, which shows a single-price embodiment, does have points for seven connections which "can easily be included in a relatively simple multi-prong plug," but at no point does the patent directly mention eight pins or the Jones plug. '903 Patent col. 7, line 67-col. 8, line 6. (Tr. vol. 28, 95; Trial Tr. vol. 32, 29.) Therefore, while the use of the '903 Patent with a Jones plug may provide some interesting background information about one potential use of the invention, the Court does not consider this information relevant to claim construction, infringement, or validity.

The simplest embodiment, in Figure 2, describes a selection monitor built as a relay. A relay is an electromechanical device, composed of an electromagnetic coil and an associated switch. The switch is composed of ferro-magnetic material, which causes the switch to pivot in response to the magnetic field created whenever sufficient current passes through the coil. (Trial Tr. vol. 29, 53.) The relay embodiment in Figure 2 is not at issue in this infringement suit, but an analysis of its operation provides the simplest explanation for how the invention works.

When a user actuates a product selection switch in a control circuit built with the Figure 2 relay embodiment, electrical power flows between the electromagnetic coil within the relay and the vending device chosen by the product selection switch. FN2 *See* '903 Patent fig. 1, fig. 2. Although current flows through the vending device at this point in time, "[t]he [relay's electromagnetic] coil 80 is constructed to have a relatively high impedance and is energized at a relatively small current level that is substantially below the current level required to energize the vending devices...." FN3 '903 Patent col. 5, lines 52-56. However, the current flowing through the relay's coil is sufficient to energize the coil itself and create a magnetic field with enough power to cause the relay's switch to pivot and close. '903 Patent col. 5, lines 57-60. In the Figure 1 embodiment of the control circuit, built with a selection monitor based on the Figure 2 embodiment, the closing of the relay's switch within the selection monitor causes one of the inputs to AND gate 63 to go high.FN4 The other input to AND gate 63 comes from "change maker or accumulator means." '903 Patent col. 3, lines 14-17. The input to the AND gate from the accumulator goes high after the user has deposited money within the coin changer that is equal to or greater than the amount required to buy an item associated with the selection switch actuated by the user. *Id.* Therefore, when both inputs to the AND gate go high-indicating that the selection monitor has sensed that the user has actuated a product selection switch and that the user has deposited enough money for the product associated with that selection switch-the AND

gate's output will apply current, causing movement in elements 40, 42, 44, 45, and 46 which bypasses the high impedance coil in the selection monitor, allowing a stronger current to flow along the same wire that includes the product selection switch and the vending device. With a full current applied, the vending device may now operate to vend the selected product to the user. Thus, the vending control circuit may use the same line to both communicate a product selection by a user via a low current and transmit power to the vending device via a high current.

FN2. The parties disagree regarding whether language in the first claim of the patent requires that energization may only occur "at a time when the amount accumulated in the accumulator means at least equals the vend price." The Court will resolve this issue in the claim construction section of this Opinion.

FN3. The impedance of an element is inversely proportional to the amount of current that may flow through the element. Therefore, an element with a high impedance only permits a small amount of electrical power to flow through the element, while an element with a low impedance permits a large amount of electrical power to flow through. (Tr. vol. 28, 122.)

FN4. An AND gate usually accepts two inputs. The AND gate's output will go high (i.e. output an electrical current) if and only if both of its inputs are high. (Tr. vol. 29, 27.)

The selection monitor embodiment at issue in this infringement case is the optical isolator shown in Figure 3. An optical isolator has a light emitting diode (LED) on one side and a photo-transistor on the other side. When sufficient current passes through the LED, the LED transmits light to the photo-transistor. (Tr. vol. 29, 17.) Upon sensing light, the photo-transistor allows current to pass through its side of the optical isolator. The LED side of the optical isolator in the Figure 3 embodiment includes a current-limiting resistor so that only a low-power electrical current may pass through the LED, which is connected to the vending device via the product selection switches. In this way, the LED behaves in a manner similar to the electromagnetic coil of the relay in Figure 2, while the photo-transistor behaves like the relay's associated switch in Figure 2. Thus, in a case where the selection monitor in Figure 1 is built using the embodiment of the optical isolator in Figure 3, a user actuating a product selection switch will cause a low-power electrical current to pass through both the vending device and the LED. The LED, in turn, transmits light to the photo-transistor, which causes a current to go high on one of the inputs to AND gate 63, just as with a selection monitor based on the relay of Figure 2. '903 Patent col. 5, line 65-col. 6 line 24.

The '903 Patent contains two other embodiments of the selection monitor in Figures 4 and 5. Neither of these embodiments is relevant to this case.

The '903 Patent does not describe a four-price embodiment, (Tr. vol. 28, 95.), but the patent does contain a dual-price embodiment, described in Figure 6. Unlike Figure 1, Figure 6 is only a partial diagram which does not show most details of the circuit's construction.

2. *Claims of the '903 Patent*

The patent claims at issue in this litigation are:

Claim 1:

A control circuit for vending or other similar devices which have coin units capable of accepting coins of selected denominations, said coin unit including means for producing output signals corresponding to the value of each coin deposited,

[a]FN5 accumulator means having an input connected to receive the output signals of the coin unit and including means to accumulate the amount of credit entered in the coin unit during each vending operation,

FN5. The Court uses Coinco's breakdown of claim elements.

[b] means under control of the accumulator whenever an amount accumulated at least equals the amount of a selected vend price for establishing a condition to enable a vend operation to take place, said last named means including operator actuatable vend selection means including switch means and associated vend producing means under control thereof,

[c] a vend enabling circuit having a first portion operatively associated with the operator actuatable switch means and a second portion under control of the first portion, said first portion being connected in circuit with the vend producing means when the vend switch means are actuated,

[d] said second portion and said accumulator each having an output where output signals are produced,

[e] means responsive to the simultaneous occurrence of output signals at the outputs of both said second portion and said accumulator to enable a vend operation,

[f] actuation of said switch means at a time when the amount accumulated in the accumulator means at least equals the vend price associated therewith energizing the said first portion of the vend enabling circuit to thereby change the condition of and enable the second portion thereof so that said second portion produces an output signal which in association with an output signal from the accumulator means establishes a circuit condition that initiates a vend operation.

Claim 2 is dependent on claim 1 and states:

The control circuit of claim 1 including means to enable full escrow of an amount accumulated in the accumulator means until a vend operation is initiated.

Claim 3 is dependent on claim 1 and states:

The control circuit of claim 1 wherein said first portion of said vend enabling circuit includes relatively high impedance circuit means connected in series with the vend producing means, the impedance of said first portion being selected to be too high to enable sufficient current flow through the associated vend producing means in series therewith for the vend producing means to be able to initiate a vend operation.

Claim 4 is dependent on claim 1 and states:

The control circuit of claim 1 wherein said operator actuatable switch means include a plurality of switches, one of which is associated with each different product to be vended.

Claim 6 is dependent on claim 1 and states:

The control circuit defined in claim 1 wherein said first portion of said vend enabling circuit includes a photo-diode, and said second portion includes means responsive to the light produced when said photo-diode is energized by operation of the switch means in the vend selection means at a time when the accumulator has an amount accumulated therein at least equal to the vend price.

Claim 11:

Improvements in a vend circuit

[p.1]FN6 for a vending machine having a coin unit for receiving coins of at least one denomination,

FN6. Coinco's breakdown of the elements of claim 11 referred to those elements known in the prior art as p. 1, p. 2, p. 3, and p. 4.

[p.2] said vending machine having an accumulator operatively connected to the coin unit and responsive to outputs produced thereby when coins are deposited to accumulate the value thereof,

[p.3] said accumulator including means to control the refunding of amounts deposited in excess of the vend price of a selected product and means for producing an accumulator output signal whenever the amount accumulated therein at least equals the price of a selected vend,

[p.4] means including at least one price selection switch actuable by a customer to initiate a vend cycle whenever the amount accumulated in the accumulator at least equals the vend price, the improvement comprising

[a] means to inhibit the accumulator from initiating a vend or refund operation until after the customer has actuated one of the product selection switches at a time when the amount accumulated in the accumulator at least equals the selected vend price,

[b] said accumulator inhibit means including a control monitor circuit having an input control portion connected in circuit with the product selection switch and energized by actuating said product selection switch at a time when the amount accumulated at least equals the selected vend price, energization of the input control portion of the monitor circuit by itself being insufficient to cause a vend operation to take place, an output portion of said control monitor circuit including means for generating a control output signal whenever the input control portion is energized, and

[c] means including a gate circuit and vend control means, said vend control means being energized whenever the gate circuit simultaneously receives input signals from the output of the accumulator and from the output portion of the control monitor, said vend control means including means in circuit with the vend producing means operable to enable vend and refund operations to take place.

Claim 12:

The improvements in a vend control circuit defined in claim 11 including

[a] separate escrow means operatively connected to the accumulator, said escrow means including an escrow

switch operable by a customer, and means under control of said escrow switch to cause total refund of an amount deposited up to the capacity of the accumulator, and

[b] means to disable the escrow means when said price selection switch is operated at a time when the accumulator has an amount accumulated therein at least equal to the vend price.

3. *Lawsuit Against UMC Industries, Inc.*

On January 24, 1977, HR Electronics Company, a subsidiary of Coinco, filed suit against UMC Industries, Inc. for infringement of various U.S. patents, including the '903 Patent. On May 21, 1981, a consent decree was entered in the case in which the '903 Patent was found valid and infringed. During the course of the litigation, UMC identified various prior art references. After examining all of the evidence presented regarding the UMC lawsuit, the Court finds that Coinco has not convinced the Court that the UMC lawsuit has any relevance to this case.

B. *Mars' 5900-series four-price Coin Changers*

1. *Relationship Between Coin Changers and Vending Machines*

Since well prior to 1984, many vending machines have been designed to operate with a separate coin changer, such as Mars' 5900-series coin changers. These coin changers are capable of providing change to a customer during a vend operation. (Joint Ex. 6, Stipulated Fact No. 13.) A coin changer typically consists of two main components: (1) a coin acceptor and (2) a changer control portion that includes, among other things, change making features, coin storage tubes, and accounting and control circuits. (Joint Ex. 6, Stipulated Fact No. 15.) Mated coin acceptor portions and changer control portions are routinely and typically offered and sold as coin changers. (Joint Ex. 6, Stipulated Fact No. 19.) Mars' 5900-series coin changers employ mated coin acceptor and changer control portions. (Joint Ex. 6, Stipulated Fact No. 20.) The coin changers at issue in this case have both an acceptor board and a control board. The acceptor board handles the validation of coins deposited by a user, and informs the control board that a particular coin has been validated. The control board is in charge of running the vending machine, keeping track of the total value of money deposited, and dispensing change. (Tr. vol. 29, 11-12.)

Mars' 5900-series four-price coin changers with four-vend relays have been advertised and promoted for use in either "Type 1" or "Type 2" vending machines. (Joint Ex. 6, Stipulated Fact No. 132.) Both Type 1 and Type 2 vending machines use an eight-pin plug as an interface with Mars' coin changers. (Tr. vol. 28, 111; Def.'s Ex. 483, A000777.) On the vending machine side, pin 1 connects to AC Hot. Pin 2 connects to AC Neutral. Pins 3, 4, 7, and 8 connect to price lines 1, 2, 3, and 4. Pin 6 connects to a "blocker." (Def.'s Ex. 483, A000777, A000780, A000781.)

In Type 1 vending machines, each of the four price lines may connect to one or more vending motors. (Tr. vol. 28, 126-27; Def.'s Ex. 483, A000780.) If more than one vending motor is connected to a particular price line, all products dispensed by those motors sell for the same price. The schematic diagram of a Type 1 vending machine in Mars' *MC5 Coin Changers Installation, Operation & Service Manual* shows the motors directly connected to the price lines, and a set of "select switches" directly connected to the motors. A user actuates one of these select switches to select a product.

Type 2 vending machines operate in a similar manner to Type 1 machines. However, Type 2 machines have vend solenoids FN7 in place of vend motors. (Tr. vol. 29, 78-80; Def.'s Ex. 483, A000781.) The Type 2

machines have a single vend motor. In order to vend a selected product, the vend solenoid, connected to a select switch actuated by a user, must act in conjunction with the vend motor. (Tr. vol. 29, 81.) Although Type 1 and Type 2 machines have some mechanical differences, these differences are not generally relevant to the way in which these machines interact with Mars' coin changers via the eight-pin Jones plug.

FN7. A vend solenoid is similar to a relay. However, in a solenoid, the electromagnetic coil causes a plunger to move, rather than causing a switch to move. The plunger may cause other mechanical actions, such as moving a switch. (Tr. vol. 29, 79.)

2. Control Circuit of Mars' 5900-series Coin Changers

In order to complete a circuit that energizes a wire or an element along that wire (such as a motor), a path must exist for the current to flow between AC Hot and AC Neutral. (Tr. vol. 28, 131.) In its idle state (i.e. before a user selects a product by actuating a product selection switch), both Type 1 and Type 2 vending machines, used together with Mars' coin changers, sit in a holding state with a path from AC Hot on pin 1 to AC Neutral on pin 2. The path of the current in this idle state avoids energizing the vend motors and solenoids. (Tr. vol. 29, 4, 77-83; Def.'s Ex. 818A, 818C.) During this time, blocker pin 6 on the vending machine forms a connection between AC Hot on the vending machine and microprocessor U1 on the control board of Mars' coin changers. Through this connection, the control board monitors the state of the blocker switch on the vending machine in order to guide the microprocessor in its deliberations as it controls the vending operation. (Tr. vol. 29, 8; Def.'s Ex. 818B.)

When a user actuates a product selection switch on the vending machine, the switch connects the motor or solenoid associated with that switch, and a price line connected to that motor or solenoid, to AC Neutral on pin 2. (Tr. vol. 29, 12-16, 83-85; Def.'s Ex. 819A, 819C.) The vending machine's four price lines connect to Mars' control board via the Jones plug. On the control board, each price line connects through the LED portion of an optical isolator in control board units U11 and U12, through resistors, and finally to AC Hot. Thus, when a user actuates a product selection switch on the vending machine, the vending motor or solenoid associated with that product selection switch becomes energized via a connection between AC Hot and AC Neutral. However, the resistors on the control board create a high impedance circuit without sufficient current to operate the connected motor or solenoid. (Tr. vol. 29, 18.)

Upon energization of an optical isolator's LED in U11 or U12, the transistor side of the optical isolator applies current to one input of AND gate U9. (Tr. vol. 29, 27, 85-86; Def.'s Ex. 820A.) The other input to AND gate U9 comes from counter U10. Counter U10 has a clock which increments about 5,000 times per second. U10 counts from states zero to nine in sequential order, and then resets back to state zero in a circular fashion. On four of these states, U10 produces an output to one of the U9 AND gates associated with a particular price line. Because U10 counts through ten different states using a clock that pulses 5,000 times per second, U10 runs through a full cycle of possible outputs-including the four U9 AND gates-500 times per second. This action by U10 is known as "polling," since only one AND gate may receive an output from U10 at any given time. If an AND gate receives an input from one of the price line's photo-transistors and from U10's polling activity at the same time, that AND gate produces an output. That output provides feedback which causes U10 to stop polling and hold its output on the same AND gate, thus locking U9's output so long as the photo-transistor side of U10 or U11 continues to supply current to the other input of U9. Through this polling mechanism, the control board prevents a user from causing a high-power electrical current to pass through more than one vend motor or solenoid at a time.

The output current from the selected U9 gate also passes through a price setting switch. Each price line has associated price setting switches which control the selling price of that price line. When current is applied from the output of U9 to the price setting switches, that current becomes an input to various pins of the control board microprocessor U1, which allows the microprocessor to learn (1) that a user has actuated a product selection switch, and (2) the selling price of the item that the user has selected via the product selection switch. (Tr. vol. 29, 33-37, 85-86, 104; Def.'s Ex. 820A, 820B.)

The third purpose of the U9 AND gate output is as one of the two inputs to NAND gates U6 and U7.FN8 (Tr. vol. 29, 38; Def.'s Ex. 820B.) The other input to NAND gates U6 and U7 originates in the control board's microprocessor as a line labeled VEND NOT. Generally, the microprocessor produces a high signal on VEND NOT, which prevents a vending operation from taking place. (Tr. vol. 29, 42.) Before the microprocessor asserts the VEND NOT line as low, which would allow a vending operation to take place, the microprocessor must make the following determinations based on all of its inputs: (1) a user has actuated a product selection switch with an associated price value, (2) the value of money received from the acceptor board either equals or exceeds that price value, and (3) the blocker signal from pin 6 of the vending machine is asserted as high. (Tr. vol. 29, 44, 113-18, 148; Def.'s Ex. 820A, 820B.) Each of the four NAND gates is associated with a particular product selection switch and its price line via its input from one of the four U9 gates. (Tr. vol. 29, 51.) Thus, when a NAND gate receives appropriate input from both the VEND NOT line and one of the U9 AND gates, the NAND gate's output causes one of four mechanical relays K1-K4 to actuate. (Tr. vol. 29, 49-52, 85-86; Def.'s Ex. 820A.) Because the VEND NOT output passes through a capacitor FN9 on its path to the U6 or U7 NAND gates, VEND NOT appears as a pulse that lasts for 2.2 seconds rather than lasting for just an instant in time. (Trial Tr. vol. 30, 14-17.) This pulse, in turn, may continue to supply power to the LEDs at U10 and U11 via the K1-K4 relays even when the user has removed his or her hand from the product selection switch. (Tr. vol. 30, 20-21.)

FN8. A NAND gate (also known as a "not AND" function) is the mirror image of an AND gate. Whereas an AND gate asserts its output as high when both of its inputs are high, the NAND gate asserts its output as low when both of its inputs are high. (Tr. vol. 29, 49-50.)

FN9. A capacitor works like a small battery which stores electricity. (Tr. vol. 30, 7-14.)

Each of these mechanical relays are in turn associated with a particular price line. Therefore, when a relay actuates as a result of the output of its NAND gate, that relay connects AC Hot to its associated price line. (Tr. vol. 29, 58-59; Def.'s Ex. 821A.) The price line connected to AC Hot via the relay had previously been connected to AC Hot via a high impedance resistor network through optical isolators U10 and U11. However, the actuation of one of the K1-K4 relays bypasses the resistors and directly applies a high-power AC Hot to the connected price line. (Tr. vol. 29, 60-62.)

Thus, a high-power current passes from AC Hot on the Mars control board, through one of relays K1-K4 to a price line, through the pin of the Jones plug associated with that price line to the vending machine (Def.'s Ex. 821A), through the vend motor or solenoid associated with the selected product, through the product selection switch actuated by the user, and to AC Neutral. (Def.'s Ex. 821B; 821C.) On the vending machine side, this high-power current provides sufficient power to activate the vend motor or solenoid associated with the selected price line. (Tr. vol. 29, 61, 64, 86-88.) As a result of these operations, the pin of the Jones

plug associated with a particular price line is used for two purposes: (1) to signal the control board that a user has actuated a product selection switch on the vending machine, and (2) to signal the vending machine that the control board has approved the vending of a product. (Tr. vol. 29, 62.)

In a Type 1 machine, sufficient current to the motor causes the motor to turn and move a hold contact that bypasses the user actuated select switch as a path to AC Neutral on pin 2. (Tr. vol. 29, 66-69; Trial Tr. vol. 33, 101-03; Def.'s Ex. 822AA.) In a Type 2 machine, the solenoid's mechanical action causes a hold contact to bypass the select switch so that AC Neutral is applied to the solenoid through pin 2 of the vending machine, just as in a Type 1 machine. However, in a Type 2 machine, the movement of the hold contact also results in a full circuit path through the vending machine's vend motor, which causes the vend motor to begin to move. (Tr. vol. 29, 89-91; Def.'s Ex. 821C, 821D.) In both Type 1 and Type 2 machines, the closing of the hold contact by the motion of the vend motor or solenoid bypasses the user actuated select switch; thus, once mechanical motion has closed the hold contact, the user may remove his or her finger from the product selection switch without affecting the vending process. In addition, the mechanical motion in both types of machines causes the blocker on pin 6 to disconnect from AC Hot, signaling to the control board's U1 microprocessor that mechanical vending activity has begun. (Tr. vol. 29, 69-74, 93-94; Tr. vol. 33, 103-05; Def.'s Ex. 822AA, 822B, 823AA, 823B.) Eventually, the mechanical action progresses to the point where the machine vends the selected product, and the machine and its electronic logic revert back to their neutral positions, with the blocker again connected to AC Hot. (Tr. vol. 29, 74-75, 95-96.)

Between the time that a user actuates a product selection switch and the time that one of relays K1-K4 applies a high-power current to the vend motor or solenoid, a short period of time passes. If the user were to remove his or her hand from the selection switch during this time, the relay would not be able to complete a full circuit through the vend motor or solenoid. However, because the activity of the control board takes place within tens of milliseconds, it would be difficult for a user to place a finger on the product selection switch and remove that finger fast enough to interrupt the vending machine's operation. FN10 (Tr. vol. 29, 66-68, 72, 91.)

FN10. There was extensive trial testimony regarding the fact that the VEND NOT signal initiates a pulse which continues to power U11 and U12 for about two seconds after the user releases the select switch. (Tr. vol. 29, 151-vol. 30, 23.) Neither party explained the relevance of this pulse to claim construction and infringement.

3. Communication Between Acceptor Board and Control Board

The coin changer handles the accepting and refunding of money via communication between the acceptor board, the control board, and the blocker signal. The acceptor board is responsible for waiting for coins to be deposited by the user, validating those coins, and watching to see if the user has requested a refund of all money deposited by pressing the escrow return button. (Tr. vol. 29, 106, 113; Def.'s Ex. 483, A000770, A000790.) In contrast, the control board interfaces with the vending machine to control the vending operation, accepts communications from the acceptor board regarding the deposit of coins, and instructs the acceptor board to give money to the user. (Tr. vol. 29, 107, 114.)

When a user deposits a coin, the acceptor board determines whether the coin is valid, in which case the coin changer routes the coin into either a cash box or coin tube, or whether the coin is invalid, in which case the coin changer routes the coin back to the user via the coin return slot. (Tr. vol. 30, 41-44; Def.'s Ex. 483,

A000770, A000771.) During the period of time that the acceptor board attempts to validate an inserted coin, the control board sits in an idle loop FN11 waiting for some input that will cause it to wake up and perform an action.FN12 (Tr. vol. 30, 41.) The acceptor board and the control board communicate via the four pins ACCEPT ENABLE NOT, FN13 SEND NOT, INT NOT, and DATA NOT. (Tr. vol. 30, 51-53; Def.'s Ex. 496, A000910, A000913, A000919, A000947.) The control board uses the ACCEPT ENABLE NOT line to inform the acceptor board that the coin acceptor should reject all coins. The control board asserts the ACCEPT ENABLE NOT line during periods when the control board is processing a vending operation initiated by a user. (Tr. vol. 30, 52.) If the acceptor board accepts a valid coin, it asserts the INT NOT line, which indicates to the control board that the acceptor board wishes to send a message. (Tr. vol. 30, 51, 54.) The control board then asserts the SEND NOT line, which informs the acceptor board that the control board is ready to receive information over the DATA NOT line. The information sent allows the control board to know the value of money deposited. (Tr. vol. 30, 55.) The acceptor board does not keep a running total of all money deposited; this information is stored in a memory location on the control board's microprocessor. (Tr. vol. 29, 114; Tr. vol. 30, 38, 58.)

FN11. When a program is in an idle loop, that program repeats instructions continuously until the program receives some input that causes the loop to break. (*See generally* Tr. vol. 29, 114-15.)

FN12. Although the acceptor board may inform the control board that a user has inserted an invalid coin, the control board probably does not take any action for invalid coins. (Tr. vol. 30, 42.)

FN13. Lines labeled "NOT" are asserted when low, i.e. when current does not flow through the line, and are not asserted when high, i.e. when current does flow through the line.

When the control board determines that a customer has actuated a product selection switch, the control board also asserts ACCEPT ENABLE NOT to the acceptor board, which causes the coin changer to temporarily reject all further deposited coins. (Tr. vol. 29, 119; Tr. vol. 30, 34-35.) At that point, if the control board also determines that the customer has inserted enough money for the product selected and that the blocker is connected to AC Hot, the control board will continue instructing the acceptor board to reject deposited coins while asserting VEND NOT, which should result in a high-power current applied to the vend motor or solenoid. (Tr. vol. 29, 119.) If the control board determines that not enough money has been deposited, the vending machine will return to its idle state and permit the deposit of further coins. This logic prevents the coin changer from accepting more money in the middle of a vending operation. During this period and until the blocker reconnects to AC HOT after completion of the vending operation, the acceptor board will not process a user's request for a refund of all money placed into the machine. (Tr. vol. 29, 121-22.) When the acceptor board is not enabled by the control board, the acceptor board does not transmit any messages. (Tr. vol. 29, 120.)

Generally, when a user presses a product selection switch after depositing enough money for the selection, the user's decision is irrevocable, and the user may no longer request a return of all money deposited. (Tr. vol. 30, 30.) However, in the rare case where the vending mechanism begins to operate but fails-due to mechanical or electrical problems-prior to the time when the blocker disconnects from AC Hot, the control board and its microprocessor would return to an idle mode, and the machine would honor the user's subsequent request for a full refund of deposited money. (Tr. vol. 30, 30-33; 48-50.) Thus, some unusual

circumstances do exist where the machine will permit the user to request a full refund up until the moment that the blocker disconnects from AC Hot, even after the user has deposited the appropriate amount of money for a selected item. (Tr. vol. 30, 40.)

If the control board determines that a user has deposited money in excess of the price of the selected item, the control board calculates the "over price" prior to asserting the VEND NOT line. (Tr. vol. 29, 115-16.) Once the vending operation proceeds to the point where the blocker is no longer connected to AC Hot, the coin tubes return money in excess of the price for the vended item to the user. (Tr. vol. 29, 123-24.) If the user presses the coin return button at a time when the control board is accepting messages, the control board will instruct the coin tubes to return coins equivalent to the value of all coins deposited. (Tr. vol. 29, 127-29; Tr. vol. 27-29.)

4. Parties Do Not Dispute Operation of 5900-series Coin Changers

There appears to be no dispute among the parties regarding the circuitry and operation of Mars' coin changers when placed within a Type 1 or Type 2 vending machine. (See Tr. vol. 29, 26, 79-80, 108-13; Tr. vol. 30, 3-4, 65, 84.) The question of infringement revolves around the parties' different interpretations of claim language in the '903 Patent.

III. Infringement of the '903 Patent

A. Coinco's Allegations of Infringement

Coinco believes that Mars' 5900-series coin changers infringe claims 1, 2, 3, 4, 6, 11, and 12 of the '903 Patent when placed within Type 1 and Type 2 vending machines.

B. Claim Construction and Infringement of the '903 Patent

A patent infringement analysis is a two-step process. *Cybor Corp. v. FAS Techs.*, 138 F.3d 1448, 1454 (Fed.Cir.1998). First, the Court must construe the claims of the '903 Patent. Claim construction is a matter of law to be decided by the court. *Markman v. Westview Instruments*, 52 F.3d 967 (Fed.Cir.1995) (en banc), *aff'd*, 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996). Claim construction must be performed without reference to the allegedly infringing device. *Pall Corp. v. Hemasure Inc.*, 181 F.3d 1305, 1308 (Fed.Cir.1999). After determining the scope of the claims, the court proceeds to the second step of comparing the properly construed claims to the allegedly infringing device. *Cybor Corp.*, 138 F.3d at 1454. As a result of this analysis, the Court finds that Mars' 5900-series coin changers in combination with Type 1 and Type 2 vending machines do not infringe any of the claims of the '903 Patent. The Court also agrees with Mars that Coinco made little effort to show infringement by the doctrine of equivalents.

1. "means under control of the accumulator ... including ... vend selection means" (1[b])

(i) Claim Construction

[1] Mars has asked the Court to construe the claim term "accumulator" as a term in means-plus-function format, which would require looking to the specification for a description of the accumulator's structure. According to 35 U.S.C. s. 112, paragraph 6, a claim element "may be expressed as a means ... for performing a specified function without the recital of structure." Where a claim describes a means for a function without stating the structure associated with the means, "such claim shall be construed to cover the

corresponding structure ... in the specification...." *Id.* This allows a patentee to draft a claim using generic language describing the means to perform a particular function, "provided that [the patentee] discloses specific structure(s) corresponding to that means in the patent specification." *Kemco Sales, Inc. v. Control Papers Co., Inc.*, 208 F.3d 1352, 1360 (Fed.Cir.2000); *Mass. Inst. of Tech. & Elecs. for Imaging, Inc. v. Abacus Software*, 462 F.3d 1344, 1361 (Fed.Cir.2006); *Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc.*, 145 F.3d 1303, 1307-08 (Fed.Cir.1998) ("the 'means' term in a means-plus-function limitation is essentially a generic reference for the corresponding structure disclosed in the specification."). Without a disclosure of adequate structure in the specification, the claim must be rendered invalid as indefinite. *Mass. Inst.*, 462 F.3d at 1361; *Kemco*, 208 F.3d at 1360-61.

(a) Use of the word "means" triggers the presumption of a means-plus-function analysis of the term "accumulator" in claim 1

[2] Generally, "[t]he use of the word 'means' triggers a presumption that the inventor used this term advisedly to invoke the statutory mandate for means-plus-function clauses." *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1347 (Fed.Cir.2002) (citation omitted); *see also* *Kemco*, 208 F.3d at 1361 ("Use of the term 'means' in a claim limitation creates a presumption that 35 U.S.C. section 112, paragraph 6 has been invoked...."). A party may rebut this presumption either by (1) showing that the claim element describing "means" does not recite a function corresponding to the means, or (2) by finding sufficient structure within the claim for performing the function. *Allen*, 299 F.3d at 1347; *Kemco*, 208 F.3d at 1361.

(1) The claim term "accumulator" in claim 1 does recite a function

[3] Determination of function for a means-plus-function element is a claim construction issue decided as a matter of law. *Chiuminatta*, 145 F.3d at 1308. In this case, the "accumulator means" and "means to accumulate" of claim 1 recite the function of accumulating "the amount of credit entered in the coin unit during each vending operation," and then producing an output "whenever an amount accumulated at least equals the amount of a selected vend price." '903 Patent col. 8, lines 26-30.FN14

FN14. The specification supports this interpretation of the accumulator's function of price comparison, explaining that "the output of the accumulator 56 on lead 65" is one of the inputs required to create a vend condition. '903 Patent col. 3, lines 60-63. *See generally* *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed.Cir.2005).

(2) The language of claim 1 does not give a structure for the claim term "accumulator"

[4] Because the function of the accumulator means is well expressed within the claim language, the remaining issue for a determination of whether or not the accumulator means should be construed according to section 112, paragraph 6, is whether these means also recite sufficient definite structure within the language of the claims themselves for producing these functions. Determination of this structure is also a matter of claim construction. *Id.*

Coinco points to *Cole v. Kimberly-Clark Corp.*, 102 F.3d 524 (Fed.Cir.1996), as one example of a case where a court held that a claim element describing a "means" itself recited sufficient structure for performing the stated function. *Cole* discussed a patent with a claim employing "perforation means ... for tearing." *Id.* at 531. Because the accused infringing product did not possess true perforations but instead used bonded seams capable of tearing, the plaintiff in *Cole* desired to have "perforation means" construed

by the court as a means-plus-function element in order to claim infringement via additional embodiments described in the patent's specification. *Id.* The Federal Circuit rejected the plaintiff's arguments because the claim element recited the structure of perforations to perform the tearing function. *Id.* at 531. In addition, the claim detailed the location and extent of these perforations. *Id.* Thus, *Cole* held that the defendant had shown sufficient definite structure to rebut the presumption of applying 35 U.S.C. s. 112, paragraph 6 to "perforation means." FN15

FN15. *Cole* also held that the "perforation means" could not apply to stitched seams because of estoppel arising from the prosecution history of the patent. *Cole*, 102 F.3d at 531-32.

Just as *Cole* held that a claim with "perforation means" recites sufficient structure so as to avoid the means-plus-function presumption, Coinco asks the Court to also hold that "accumulator means" and "means to accumulate" within the claims of the '903 Patent recite sufficient definite structure to avoid the presumption. Besides the word "accumulator" itself, the only structural descriptions of an accumulator within claim 1 of the patent are that the accumulator has an input and an output, both of which fit within the invention's general structure. The claim language gives no guidance for how the accumulator should keep a record of total money deposited, and how it should compare that total to the "selected vend price." '903 Patent col. 8, lines 20-54. This contrasts with *Cole*, where the claim language specified the means to perform the tearing function with a detailed structure which included perforations extending from the leg band to the waist band and through an outer impermeable layer. *Cole*, 102 F.3d at 531. Unlike the "perforations" in *Cole*, the word "accumulator" by itself describes a function with no associated structure.FN16

FN16. As in *Allen* and *Cole*, the drafter of the '903 patent "was clearly enamored of the word 'means.'" *Cole*, 102 F.3d at 531; *Allen*, 299 F.3d at 1348. Although this drafting style may provide some evidence to rebut the presumption created by the presence or absence of the word "means," the most important evidence for or against a finding of a means-plus-function limitation comes from the presence or absence of sufficient definite structure in the claim language.

Where Mars has specifically alleged—as with the term "accumulator means"—that a particular use of the word "means" requires an examination into whether function and structure exist, the Court has engaged in a full claim construction analysis. However, in light of *Allen* and *Cole*'s holding regarding patent drafters enamored of the word "means," the Court declines Mars' invitation to do a full means-plus-function analysis of every other use of the word "means" within the '903 Patent, and gives Coinco the benefit of the doubt regarding those "means" terms not specifically discussed in this Opinion. Without more specific allegations relating to claim construction or invalidity as to all other "means" terms within the '903 Patent, the Court cannot appropriately engage in this analysis.

Further evidence that claim 1(b) does not recite a definite structure for the accumulator comes from the trial testimony of Mr. Upchurch regarding infringement. During his testimony, Mr. Upchurch attempted to use the language of claim 1 to show structural similarity with the inputs and outputs of the U1 microprocessor on Mars' control board. (Tr. vol. 30, 97-99.) However, when he compared the accumulation activity described in claim 1 with the U1 microprocessor, Mr. Upchurch's testimony referred only to the function of accumulation within the patent, and did not discuss any supporting structure within the claim language itself which allowed the accumulation to take place. (Tr. vol. 30, 99-100.) The Court would have expected Mr. Upchurch to make some comparison to the structure of the accumulator using the language of claim 1, if such a structure existed within the language of the claim. Because Mr. Upchurch, Coinco's expert witness on infringement, did not even attempt to reference the language of claim 1 to find a structure for the

accumulator, the Court is further persuaded that no such structure exists within the language of the claim itself.

"What is important is not simply that a [term] is defined in terms of what it does, but that the term, as the name for structure, has a reasonably well understood meaning in the art." *Greenberg v. Ethicon Endo-Surgery*, 91 F.3d 1580, 1583 (Fed.Cir.1996); *see also* *Watts v. XL Sys.*, 232 F.3d 877, 880 (Fed.Cir.2000). Coinco has not convinced the Court that the general term "accumulator" on its own describes sufficient structure for an individual skilled in the art to understand the claim. There was no testimony from Coinco relating the level of ordinary skill to the knowledge required to understand the structure of an accumulator. During his testimony, Mr. Upchurch discussed U.S. Patent No. 3,687,255, which the '903 Patent's specification described as containing an accumulator that could be used in one embodiment of the '903 Patent. (Tr. vol. 34, 138-41.) In the '255 patent, element 14 is labeled "Forward Back Accumulator." '255 Patent Fig. 1. Although the '255 Patent appears to refer to this element alone as the accumulator, Mr. Upchurch testified that the accumulator means in claim 1 of the '903 Patent included more than just the Forward Back Accumulator element. (Tr. vol. 34, 138-39.) Because the '903 Patent and the '255 Patent use the word "accumulator" to refer to different types of structures with different purposes, the court must conclude that individuals with ordinary skill in the art at the time of the invention would differ in their understanding of the structure that an "accumulator" requires.FN17

FN17. Reference to other patents does more harm than good to Coinco's case because there is little consistency between the structures of the elements marked as accumulators within the various patents submitted as evidence to the Court. For example, the Court notes that the Forward Back Accumulator element 14 in the '255 patent does not perform price comparison, and that any individual skilled in the art would likely realize the necessity of additional elements. Price comparison in the '255 Patent is performed by Price Control elements 28 and 30, which operate based upon outputs from the Forward Back Accumulator. However, the claim language of the '903 Patent uses only the word "accumulator." Many of the patents described as containing accumulators within the '903 Patent's specification appear to separate accumulation and price comparison into different elements. In light of this distinction and the testimony of both Mr. Upchurch and Dr. Morley that the element labeled "Forward Back Accumulator" in the '255 Patent would not satisfy the accumulator described in the '903 Patent, the court cannot find that the word "accumulator" on its own recites sufficient structure so that a person of ordinary skill in the art would understand the structure without further description. (*See* Tr. vol. 34, 51-58, 104, 115.) There is no basis in the evidence for Coinco's broad assertion that "to someone skilled in the art an 'accumulator means' represents any electromechanical device or electronic circuit...." (Coin Acceptors, Inc.'s Supplemental Memorandum of Law Regarding Coinco Patent Issues ("Coinco's Supp."), at 10.)

The Court reaches this conclusion-that the word "accumulator" does not have a well defined structure-in contrast to a recent case which construed the word "scanner" as containing limitations even though "the specification [did] not define the term 'scanner' either explicitly or implicitly." *Mass. Inst.*, 462 F.3d at 1351. The *Mass. Inst.* court did not construe "scanner" as a means-plus-function term, as the Court does for the word "accumulator." Additionally, Coinco has not convinced the Court that an individual of ordinary skill in the art would have understood the meaning of "accumulator" in light of the claims and the specification of the '903 Patent.

(b) The term "accumulator" in claim 11 is also a means-plus-function term despite lack of the word "means"

[5] [6] The accumulator described in claim 11 also satisfies the requirements for a means-plus-function element. Although the language of claim 11 does not use the word "means" in reference to the accumulator, the requirements of 35 U.S.C. s. 112, paragraph 6 still apply. "[A]bsence of the word 'means' creates a presumption that 35 U.S.C. section 112, paragraph 6 has not been invoked," but this presumption may "be rebutted if the claim limitation is determined not to recite sufficiently definite structure to perform the claimed function." *Kemco*, 208 F.3d at 1361. Generally, "the same terms appearing in different portions of the claims should be given the same meaning unless it is clear from the specification and prosecution history that the terms have different meanings at different portions of the claims." *Fin Control Sys. Pty, Ltd. v. OAM, Inc.*, 265 F.3d 1311, 1318 (Fed.Cir.2001). The accumulator described in claim 11 is quite similar to the accumulator described in claim 1.FN18 Just as in claim 1, the accumulator must have an input "responsive to outputs produced ... when coins are deposited to accumulate the value thereof," and must also be capable of "producing an accumulator output signal whenever the amount accumulated therein at least equals the price of a selected vend." '903 Patent col. 9, line 44-col. 10, line 14. Because claim 11 also does not recite any structure to perform these functions, the term "accumulator" in claim 11 must also be construed as a means-plus-function element.FN19

FN18. There is no suggestion made that the '903 Patent intended to use the word "accumulator" differently in claims 1 and 11.

FN19. The accumulator in claim 11 must also include "means to control the refunding of amounts deposited in excess of the vend price of a selected product." This requirement adds another function to the accumulator without a defined structure within the claim. The specification gives a limited structural description of how this should take place. '903 Patent Fig. 1; col. 4, lines 51-54; col. 5, lines 17-22; col. 7, lines 44-53.

(C) The specification of the '903 Patent provides a structure for the term "accumulator"

"After a court establishes that a means-plus-function limitation is at issue, it must then construe the function recited in that claim and determine what structures have been disclosed in the specification that correspond to the means for performing that function." *Kemco*, 208 F.3d at 1361; *Chiuminatta*, 145 F.3d at 1308. The "accumulator means" limitation must be "defined by the corresponding structure, material, or acts described in the patent specification, or their equivalents...." *WMS Gaming*, 184 F.3d at 1348. Figure 1 of the patent describes a single-price embodiment where all products to be vended share the same price. The specification describes the accumulator's structure in the single-price embodiment as follows:

The accumulator 56 can have many different forms including any of those forms shown in Shirley U.S. Pat. Nos. 3,307,671, 3,521,733, 3,508,636, 3,589,492, Johnson U.S. Pat. No. 3,687,255, Levasseur U.S. patent application Ser. No. 267,558, filed June 29, 1972 and Douglass U.S. patent application Ser. No. 204,988, filed Dec. 6, 1971

....

'903 Patent col. 3, lines 17-23. In addition, the specification states that

[t]he accumulator-change maker circuit 56 can have many different forms as stated and should be able to

accumulate amounts deposited or otherwise entered and should be able to make change for deposits in excess of a selected vend price. The form of circuit selected for the circuit 56 is not part of this invention.FN20

FN20. Although the text of the specification indicates that the accumulator element itself adds nothing new to the art of vending machine circuits, the accumulator element is a required portion of any circuit based upon claims 1 and 11.

'903 Patent col. 4, lines 22-27.

Figure 6 describes a dual-price embodiment where each product in the vending machine may have one of two prices. The accumulator in this embodiment is a "dual changer or accumulator circuit" which "may be similar to that shown in Johnson U.S. Pat. No. 3,687,255 and which has one of its inputs connected to a cash or credit acceptor circuit 152." '903 Patent col. 6, lines 59-62. The two different price lines in this dual-price embodiment each have their own selection monitor, and each of those selection monitors has a separate connection to the dual changer or accumulator element. Figure 6 also shows two separate outputs from the dual changer or accumulator, each of which connects to an OR gate connected to the escrow element and also back to the product selection switches, which appear intended to provide the high-power current. '903 Patent col. 6, line 59-col. 7, line 39.

[7] An examination of the accumulator means requires the Court to decide how broadly to interpret the structures and patents given as examples for an "accumulator" within the specification. "When multiple embodiments in the specification correspond to the claimed function, proper application of s. 112, paragraph 6 generally reads the claim element to embrace each of those embodiments." *Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1258 (Fed.Cir.1999); *see also* *Versa Corp. v. Ag-Bag Int'l Ltd.*, 392 F.3d 1325, 1329 (Fed.Cir.2004). For the single-price embodiment, the specification reveals certain patents as providing the structure for the accumulator means. The specification also advises that the accumulator "is not part of this invention," and that it "can have many different forms." Similarly, the specification broadens the structure of the dual-price (or multi-price) embodiment beyond the '255 Patent by including language that the structure "may be similar" to the accumulator in the '255 Patent. However, "[w]hile the use of means-plus-function language in a claim is clearly permissible by reason of section 112(6), a means clause does not cover *every means* for performing the specified function." *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1536 (Fed.Cir.1991) (emphasis in original); *see also* *Nomos Corp. v. Brainlab USA, Inc.*, 357 F.3d 1364, 1368 (Fed.Cir.2004). A court should not define the structure to include any possible means for performing the designated function, even where the specification lacks disclosure of the structure. *WMS Gaming Inc. v. Int'l Game Tech.*, 184 F.3d at 1348 (refusing to apply a broad definition of structure to "means for assigning" even where the patent was "almost completely devoid of any structure to support this limitation of the claim"); *see also* *Source Search Techs., LLC v. Lending Tree, LLC*, 2006 WL 2990363, at *9-*13, 2006 U.S. Dist. LEXIS 79651, at *27-*35 (D.N.J.2006) (unpublished opinion) (quoting *WMS Gaming*). Thus, regardless of the language in the specification that the accumulator "can have many different forms," the Court construes "accumulator" to include only the structures in those patents disclosed within the specification and equivalents of those structures. *Nomos*, 357 F.3d at 1369.

Coinco argues that the court should apply a broad interpretation to the structure of the accumulator. Although the Court believes that it would have been possible to draft the claims to encompass a broader definition of the term "accumulator," the actual language used by the '903 Patent prevents the Court from

accepting the broad interpretation urged by Coinco. Instead, the language of the '903 Patent requires the Court to adopt a much narrower construction; therefore, the word "accumulator" includes only the structures in those patents disclosed within the specification and equivalents of those structures.

[8] With the term "accumulator" thus construed, one final issue remains regarding the interpretation of the term. The "structure disclosed in the specification must be clearly linked to and capable of performing the function claimed by the means-plus-function limitation." *Default Proof Credit Card Sys. v. Home Depot U.S.A., Inc.*, 412 F.3d 1291, 1299 (Fed.Cir.2005); *B. Braun Medical, Inc. v. Abbott Laboratories*, 124 F.3d 1419, 1424-25 (Fed.Cir.1997). The specification does link the stated patents to single-price and dual-price embodiments of the invention by specifically naming the patents as examples of the types of forms that the accumulator could take. The named accumulator patents describe various structures for the functions of accumulating the value of money deposited into a coin unit and comparing the value of money received with a set price before sending an output indicating that the set price had been met.

(ii) *Infringement*

[9] [10] "Literal infringement of a means-plus-function claim limitation requires that the relevant structure in the accused device perform the identical function recited in the claim and be identical or equivalent to the corresponding structure in the specification." *Applied Med. Res. Corp. v. United States Surgical Corp.*, 448 F.3d 1324, 1333 (Fed.Cir.2006). "Once the relevant structure in the accused device has been identified, a party may prove it is equivalent to the disclosed structure by showing that the two perform the identical function in substantially the same way, with substantially the same result." *Id.* At trial, Mr. Upchurch testified that Mars' U1 microprocessor performs the same function as the '903 Patent's accumulator. However, other evidence regarding the workings of the U1 microprocessor shows that this is not the case. Mars' U1 microprocessor does accumulate money, based on input from a coin unit, but does not necessarily assert an output on VEND NOT "*whenever* an amount accumulated at least equals the amount of a selected vend price." VEND NOT will only be asserted as low if *both* the blocker is hot *and* the amount accumulated at least equals the amount of a selected vend price. Thus, U1 does not perform the same function as the '903 Patent's accumulator.

With regards to structural comparison, the U1 microprocessor does not have an identical or equivalent structure to the single-price accumulator structures described in the '903 Patent. Based on the construction of "accumulator" outlined above, Mars' coin changers cannot literally infringe the patents disclosed for the single-price embodiment. Coinco did not show identical or equivalent structure between any of these single-price accumulators and Mars' accused products, and did not show how the structure of any of these single-price accumulators compared to the multi-price structure of Mars' U1 microprocessor.FN21 Therefore, Mars' coin changers do not include the structure of any of the patents which describe a single-price accumulator.

FN21. Although Dr. Morley, who obtained a Ph.D. in 1977, testified that the single-price accumulator patents "were readily adaptable to use in the '903 multi, or dual-price embodiment," and that his current students could easily perform this adaptation, there was no testimony that an individual of ordinary skill in the art at the time of the invention would have known how to do this. (Tr. vol. 34, 19, 58-60.) In addition, the '903 Patent only links these single-price accumulators to the single-price embodiment in Figure 1, and does not link them to a multi-price embodiment. *See* Default Proof, 412 F.3d at 1299.

For a dual- or multi-price embodiment, the '903 Patent states a structure for the accumulator which "may be similar to that shown in Johnson U.S. Pat. No. 3,687,255." By defining the structure as the '255 Patent and those "similar," the description of a multi-price accumulator appears to exclude other types of structures. The '255 Patent does have the capability to accumulate money and compare prices for differently priced products. However, Coinco has not shown identical or equivalent structure between the U1 microprocessor and the accumulator discussed in the '255 Patent. Indeed, the output of the Forward Back Accumulator (and the Price Control elements) in the '255 Patent does not depend upon whether or not a user has actuated a product selection switch. In contrast, the U1 microprocessor cannot make a comparison between a vend price and the amount accumulated until a user has actuated a product selection switch.FN22 (Tr. vol. 33, 52-53.) The '255 Patent's accumulator and the U1 microprocessor do not perform identical or substantially the same functions in substantially the same way, with substantially the same result.FN23

FN22. Figure 6 of the '903 Patent shows a connection between the selection monitor and the dual changer or accumulator. Although Figure 6 on its own may imply that user actuated product selection is required prior to the accumulator's determination that the amount accumulated equals or exceeds a selected vend price, the description of this activity in the specification clarifies that this is not the case. The specification states that "the credit switch 44 must not have its contacts transfer under control of the change maker and accumulator circuit 150 alone even when the amount of the vend price has been deposited, until it is enabled by operation of the associated selection monitor circuit 154 or 156." '903 Patent col. 7, lines 19-24. This language indicates that the accumulator may signal that "the amount of the vend price has been deposited" even without the actuation of a product selection switch, and that this signal and a signal from the selection monitor must both exist prior to the vend operation.

FN23. Jonas Hodges, *Infringement of Means-Plus-Function Claims*, 87 J. Pat. & Trademark Off Soc'y 175, 196 (2005) is an article which provides a useful breakdown of all possible permutations of infringement and the doctrine of equivalents for means plus function claims. The Court has considered all of the legal standards for infringement described in the article for each claim asserted by Coinco.

2. "whenever" (1[b], 11[p.3])

(i) Claim Construction

[11] Two issues arise regarding interpretation of the word "whenever" in claim 1 and claim 11 of the '903 Patent: (1) whether claim 1 includes the situation where a condition to enable a vend will not be established, even if there is sufficient credit for the selected product, until the selection switch has been actuated for a sufficient time, and (2) whether claim 1 and claim 11 include the situation where the means under control of the accumulator will not establish a condition to enable a vend operation to take place until a product selection switch has been actuated and additional logic is satisfied. Coinco argues that the word "whenever" should be construed to allow for a determination that the selection switch has been actuated for a sufficient time and that the accumulator's logic to establish the condition may also include actuation of the product selection switch and any additional logic. Mars argues that "whenever" must exclude the situation where a determination must be made that the product selection switch has been actuated for a sufficient time and that the accumulator's logic to establish a vend condition may not include a test for the actuation of a product selection switch and additional logic.

(a) "whenever" does not require the selection switch to be actuated for sufficient time

The Court finds that the language of the claim itself and of the claim in light of the specification does not state any limitation on the length of time that the select switch must be held prior to the establishment of a condition enabling a vend operation. Claim 1 of the '903 Patent describes "means under control of the accumulator whenever an amount accumulated at least equals the amount of a selected vend price for establishing a condition to enable a vend operation to take place." '903 Patent col. 8, lines 28-32.

(b) "whenever" does not permit the output signal to depend upon other logical requirements

The Court also construes the "whenever" language in both claim 1 and claim 11 as a limitation that requires the accumulator to produce an output signal at every time when the amount accumulated exceeds a set price; the output signal may not depend upon any other logical requirements.FN24 The claim language does not suggest that any other logic may play a part in determining whether to assert the accumulator's output; in fact, "whenever" appears to exclude other logical requirements. The specification confirms this view:

FN24. Claim 11 has similar language to claim 1: "means for producing an accumulator output signal whenever the amount accumulated therein at least equals the price of a selected vend." '903 Patent col. 9, lines 52-54.

The selection monitor circuit 58 is constructed so as to be able to establish a circuit condition which has a control effect on the operation of the relay 45. This control effect causes the AND gate 63, when the change maker 56 has sufficient accumulation, to be able to energize the vend relay 45.... '903 Patent col. 4, line 65-col. 5, line 3. Again, the only requirement prior to an accumulator output signal is that the accumulator "has sufficient accumulation," which is not related-in either the claim language or the specification-to the actuation of a product selection switch and other logic. FN25 The '903 Patent's language prohibits any other logical test prior to asserting the accumulator's output.

FN25. Indeed, the structure of every patent listed as a potential accumulator, including the '255 Patent, has a hard-coded value for what constitutes "sufficient accumulation." Therefore, these accumulators may assert an output indicating sufficient accumulation regardless of the actuation of a product selection switch. Mars' U1 microprocessor does not use a hard-coded value, but only learns that value upon actuation of a product selection switch.

(ii) Infringement

(a) Mars' coin changers require the selection switch to be actuated for a sufficient time

Mars' product requires the selection switch to be actuated for a sufficient time even if there is sufficient credit for the selected product.FN26 Therefore, Mars' product satisfies the first part of the limitation imposed by the word "whenever."

FN26. The parties have not explained to the Court precisely how and why Mars' products require the selection switch to be actuated for sufficient time. However, the parties appear to agree that this limitation does occur within Mars' coin changers when placed within Type 1 and Type 2 vending machines.

(b) Mars' coin changers have additional logic prohibited by the '903 Patent

[12] Because Mars' U1 microprocessor cannot make a price comparison and cannot assert VEND NOT until after the actuation of a product selection switch and a determination that the blocker is connected to AC Hot, the Mars coin changers do not produce an accumulator output signal *whenever* the amount accumulated at least equals the price of a selected vend, and they do not allow means under control of the accumulator to establish a condition to enable a vend condition to take place *whenever* an amount accumulated at least equals the amount of a selected vend price. Thus, Mars' products do not satisfy the "whenever" limitation of the '903 Patent either literally or under the doctrine of equivalents.

3. "*in circuit*" (1[c], 11[b])

(i) *Claim Construction*

The Court has considered all of the testimony regarding interpretation of the term "in circuit." More so than with the interpretation of other claim terms heretofore addressed, the parties' discussion of the claim term "in circuit" requires application of *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed.Cir.2005) (en banc).FN27 "It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.' " *Id.* at 1312 (citation omitted). "The words of a claim 'are generally given their ordinary and customary meaning' " where "the ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention...." *Id.* Intrinsic evidence, such as the specification and the prosecution history, is key to an interpretation of claim terms, with the specification playing a slightly more important role than the prosecution history. *Id.* at 1315-17. However, a court should avoid reading limitations from the specification into the claim. *Id.* at 1323. In particular, the Federal Circuit has "expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment." *Id.* at 1323.

FN27. *Phillips* was decided after the trial in this case concluded and after the parties submitted their briefs.

Extrinsic evidence, such as dictionaries, treatises, and expert testimony has a more limited role than intrinsic evidence in claim interpretation. *Id.* at 1317-18. The parties submitted more extrinsic evidence regarding the interpretation of the term "in circuit" than with regard to any other claim term at issue in this case. Although

extrinsic evidence in the form of expert testimony can be useful ... to provide background on the technology at issue, to explain how an invention works, to ensure that the court's understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field ... conclusory, unsupported assertions by experts as to the definition of a claim term are not useful to a court. Similarly, *a court should discount any expert testimony "that is clearly at odds with the claim construction mandated by the claims themselves, the written description, and the prosecution history...."*

Id. at 1318 (citation omitted) (emphasis added).

[13] Claim 1 of the '903 Patent describes the first portion of the selection monitor "being connected in circuit with the vend producing means when the vend switch means are actuated." '903 Patent col. 8, lines 35-40. At trial, Mr. Kesner, Mars' expert witness, suggested that for two elements to be in circuit, a direct connection must exist between those elements. Therefore, Mars argues that this claim language requires that

the product selection switch be located between the selection monitor and the vend producing means, as drawn in Figure 1, so that the first portion and vend producing means are not in circuit when the switch is not actuated. Dr. Morley, Coinco's expert witness, expressed his belief that elements in circuit shared a common completed current, and that the definition of "in circuit" had nothing to do with a direct connection between those elements. Consistent with this definition, Coinco argues that the claim language includes the situation where the vend producing means is between the selection monitor and the product selection switch.

The Court applies *Phillips* to determine the weight of the various sources submitted by the parties for interpretation of the term "in circuit." Therefore, the Court first considers the ordinary meaning of the language within the claims at issue. Claim 1 refers to an output signal which "establishes a circuit condition that initiates a vend operation." '903 Patent col. 8, lines 52-54. This provides evidence that the word "circuit," as used in the '903 Patent's description of the relationship between the selection monitor, selection switch, and vend producing means, refers to the flow of current.

Phillips also places strong weight on intrinsic evidence, such as the specification and prosecution history. The specification refers to "selection switches 12, 14, 16, and 18 which are connected in series, and when one of them is actuated it *completes a circuit* through an associated vending device 20, 22, 24, and 26." '903 Patent col. 2, lines 40-44 (emphasis added); *see also* '903 Patent col. 3, lines 40-46. Additionally, the specification explains that "line 62 determines that one of the vend selection switches 12, 14, 16, and 18 has been actuated ... *when a circuit has been completed* through an associated one of the vend control devices 20, 22, 24, and 26...." '903 Patent col. 3, lines 29-36 (emphasis added). The specification thus provides further evidence that the requirement for an "in circuit" connection between elements refers to the ability for current to flow through all those elements.

The prosecution history contains further evidence that "in circuit" refers to the completion of a possible electrical circuit via a group of named structures through which electricity may flow. The examiner's remarks explain that

Claim 1 also requires that the first portion be connected in circuit with the vend producing means when the vend switch means are actuated. This refers to the first portion of the circuit 58 which is the portion connected in circuit with the vend producing solenoid means when the operator actuates the associated vend switch. *This establishes a circuit through the said first portion of the circuit 58 so that the second portion is actuated to operate....*

(Def.'s Ex. 471, at 47. (emphasis added)) In this case, the examiner clearly interpreted the term "in circuit" of claim 1 to refer to an action which permits the second portion to become actuated. This cannot occur unless current flows through the first portion.

Thus, following *Phillips*' holding regarding the importance of evidence intrinsic to the patent, the language of claim 1 itself, the specification, and the prosecution history all speak of the selection monitor and the vend producing means as "in circuit" only when current may flow between them.

Some of the trial testimony regarding the meaning of "in circuit" appeared to revolve around a discussion of "in circuit" as a defined term within the field of electrical engineering. (*See, e.g.*, Tr. vol. 29, 151; Tr. vol. 33, 14-15.) The Court has considered this testimony and, in light of *Phillips*, rejects this extrinsic evidence. Although extrinsic evidence has value, *Phillips* holds that courts must look primarily to the intrinsic evidence to interpret claim terms. Therefore, a court need not look for supporting documentation outside of

the '903 Patent if the patent itself and its prosecution history provide information necessary to properly construe a term. Additionally, *Phillips* also explains that single embodiments, like Figure 1, do not cause additional limitations to be read into the claim terms. *Phillips*, 415 F.3d at 1323. As a result, the words "in circuit" in claim 1 of the '903 Patent have not acquired the meaning that Mars urges.

Claim 11 describes "a control monitor circuit having an input control portion connected in circuit with the product selection switch and energized by actuating said product selection switch." '903 Patent col. 9, lines 64-67. Generally, the same terms in a patent should have the same meaning. *Phillips*, 415 F.3d at 1314. The language of claim 1, the specification, and the prosecution history all make clear that "in circuit" within claim 1 refers to the fact that current must be able to pass through all of the three named elements: the first portion, FN28 the selection switch, and the vend producing means. However, in claim 11, the term "in circuit" only refers to the selection monitor's input control portion and the product selection switch, without describing the vend producing means. Claim 11 also specifically requires that the unactuated selection switch be "in circuit" with the selection monitor at a time when current cannot flow. Because of the language used to describe these elements in claim 11, the Court agrees with Coinco, and finds no requirement that the use of "in circuit" within claim 11 places any limitation on the location of the vend producing means. The product selection switch and the selection monitor are "in circuit" here because electrical current could flow between the two of them if one chose to apply electrical current to the switch itself.

FN28. As used in the patent, the "first portion" and the "input control portion" both appear to refer to the same element.

(ii) Infringement

With regard to claim 1, when one of Mars' coin changers is placed within a Type 1 or Type 2 vending machine, actuation of the vend switch means does allow current to flow through the first portion FN29 and the vend producing means, thus placing the first portion in circuit with the vend producing means. In a Type 1 vending machine, the vend producing means is the vend motor. In a Type 2 vending machine, the vend producing means is the vend solenoid being connected in circuit with the vend producing means when the vend switch means is actuated.

FN29. For the purposes of the infringement analysis of the claim term "in circuit," the Court assumes that Mars' coin changers have a "first portion." As shall be seen below, the Court does not find that Mars' coin changers have a first portion as described by the '903 Patent.

With regard to claim 11, if one were to apply current to the product selection switch of a Type 1 or Type 2 vending machine with Mars' coin changer, that current would be able to pass through the input control portion of the control monitor circuit. Therefore, these two elements are in circuit with each other.

4. "at a time when" (1[f], 6, 11[b])

(i) Claim Construction

[14] Claim 1 explains that "actuation of said [vend selection] switch means *at a time when the amount accumulated in the accumulator means at least equals the vend price*" will energize the first portion of the

selection monitor. '903 Patent col. 8, lines 45-47 (emphasis added). In a similar vein, claim 6 describes how a selection monitor designed with an optical isolator "includes means responsive to the light produced when said photo-diode is energized by operation of the switch means in the vend selection means *at a time when the accumulator has an amount accumulated therein at least equal to the vend price.*" '903 Patent col. 8, lines 14-19 (emphasis added). Claim 11 also uses this language, describing a means to inhibit the accumulator "until after the customer has actuated one of the product selection switches *at a time when the amount accumulated in the accumulator at least equals the selected vend price.*" '903 Patent col. 9, lines 59-63 (emphasis added). Mars urges the Court to interpret these phrases so that the patent does not cover the situation where actuation of the switch means energizes the first portion regardless of whether or not the amount accumulated at least equals the vend price. Coinco urges the opposite interpretation, and suggests that the patent covers the situation where the closing of the selection switch may enable the first portion regardless of whether or not the amount accumulated at least equals the selected vend price.

[15] Words in a patent must have meaning. *Ethicon Endo-Surgery v. United States Surgical Corp.*, 93 F.3d 1572, 1582 (Fed.Cir.1996); *see also* *Chef Am. v. Lamb-Weston, Inc.*, 358 F.3d 1371, 1373 (Fed.Cir.2004) (explaining that words "mean exactly what they say."). Coinco's position, as demonstrated by Mr. Upchurch, is that the "at a time when" language only requires that the selection monitor be capable of working at a time when the amount accumulated at least equals the selected vend price; according to this interpretation, it is irrelevant, according to the claim language, whether or not the selection monitor also operates at a time when sufficient money has not been accumulated in the accumulator. (Tr. vol. 30, 112 (Mr. Upchurch explained that the statement regarding when actuation should occur "is true whether the amount accumulated in the accumulator equals the vend price or not."); Tr. vol. 30, 134 (disclosing the same testimony for claim 11.)) If the Court were to accept Coinco's argument, then claims 1, 6, and 11 would have exactly the same meaning even if the language specifying "at a time when" were removed from the text of those claims. The Court rejects Coinco's argument for three reasons.

First, construing the claims in the manner requested by Coinco would have the result of effectively excising these words from the claims. Second, the specification does not support Coinco's argument because the specification contains no indication that the selection monitor's operation does not depend upon sufficient accumulation. Third, figures that are part of a patent cannot be used to directly contradict the language of the claims. Coinco argues that Figures 1-5 of the '903 Patent do not show any direct connection between the selection monitor and the accumulator, and that without this connection the selection monitor cannot be dependent upon the accumulator. Although Coinco is correct that the figures do not show any direct connection between the selection monitor and the accumulator, requiring the selection monitor to be dependent on the accumulator-as urged by Mars-would result in a working vending machine that used the teachings of the '903 Patent's claims. The interpretation requested by Mars would certainly not result in a nonsensical patent. Because "[e]ven 'a nonsensical result does not require the court to redraft the claims of the ... patent,' " and the specification does not show any indication that the drafter intended anything other than what the words say, the law is clear that the words "at a time when" must be given meaning. *See* *Chef Am.*, 358 F.3d at 1373-74 (citation omitted). Therefore, the Court accepts Mars' interpretation, and the patent does not cover the situation where actuation of the switch means energizes the first portion regardless of whether or not the amount accumulated at least equals the vend price.

(ii) Infringement

The parties agree that the optical isolator on Mars' products depends only upon the actuation of a product selection switch and does not depend upon the amount accumulated. As a result, Mars' products do not

satisfy the claim limitations that the selection monitor should only operate after a user has both actuated a product selection switch and deposited sufficient money, under either literal infringement or the doctrine of equivalents.

5. "*means to enable full escrow*" (2)

Mars argues that every use of the word "means" within the claims of the '903 Patent indicates a means-plus-function term. Coinco argues that not every use of the word "means" within the claims of the '903 Patent indicates a means-plus-function term.

[16] Claim 2 is dependent upon claim 1 and describes "means to enable full escrow of an amount accumulated in the accumulator until a vend operation is initiated." '903 Patent col. 8, lines 55-57. Because of the use of the word "means," this element is presumed to be in means-plus-function format, with the function defined as providing full escrow. Coinco did not provide sufficient evidence to overcome this presumption. As explained above, when a patent is drafted with a term in means-plus-function format, the patent must also specify the structure within the specification. Without a disclosure of adequate structure in the specification, the claim must be rendered invalid as indefinite. Mass. Inst., 462 F.3d at 1361. The specification does not detail a structure capable of fulfilling the function of enabling full escrow of an amount accumulated in the accumulator. Therefore, claim 2 is invalid as indefinite.

However, even if the Court had found structure within the specification which performed the function of enabling full escrow, Mars' coin changers would not infringe claim 2 of the '903 Patent because Mars' coin changers permit full escrow even after a vend operation is initiated.

(i) *Claim Construction*

[17] The specification explains that "[a]s soon as the vend operation ... is initiated, the vend signal automatically cancels the possibility for producing an escrow operation out of the escrow means 67 thus preventing the simultaneous occurrence of a vend and an escrow." '903 Patent col. 5, lines 17-22 (emphasis added). Thus, the vend signal must immediately cancel full escrow capability, with no delay permitted for other components.FN30 Although Coinco urges the Court to construe the language of claim 2 to include the possibility that the vend operation has progressed somewhat prior to the cancellation of full escrow capability, the clear language of the '903 Patent requires adoption of Mars' position that full escrow must be cancelled immediately upon initiation of the vend signal.

FN30. The specification adds that "if for some reason, no vend takes place such as because of an open circuit or a defective component, then the customer still has the possibility of getting his money back...." '903 Patent col. 5, lines 23-26. However, this language appears to indicate what would occur if the vend signal does not issue due to a defective component, and does not refer to any possibility of escrow after "the vend signal automatically cancels the possibility for producing an escrow operation."

(ii) *Infringement*

The Mars' coin changers do provide the function of full escrow generally, but do not cancel escrow as soon as the VEND NOT signal issues from the U1 microprocessor. Instead, escrow cancellation depends upon the blocker signal, which is tied to the vending motor and not the accumulator. The blocker is asserted as high until the motor in the vending machine moves sufficiently to disconnect the blocker from AC Hot.

Although the length of time between the moment that AC Hot is applied to the vend motor or solenoid and the moment that the blocker breaks is relatively short, the operation of escrow for Mars' coin changers when placed in Type 1 or Type 2 vending machines is quite different from the operation that the court has defined for the '903 Patent. (Tr. vol. 29, 71-72.) In Mars' products, the money is only collected by the vending machine after the motor has already begun to run. (Tr. vol. 30, 35-40.) Because Mars' products do not cancel escrow when a vend operation has initiated, but wait until the vend operation has progressed somewhat, Mars' products do not infringe claim 2 of the '903 Patent either literally or under the doctrine of equivalents.

6. "*means to inhibit*" (11[a])

(i) *Claim Construction*

[18] Claim 11 includes "means to inhibit the accumulator from initiating a vend," and that "said accumulator inhibit means includ[es] a control monitor circuit...." '903 Patent col. 9, lines 59-65. Because of the use of the word "means," this element is presumed to be in means-plus-function format, with the function defined as inhibiting the accumulator from initiating the vend operation. Coinco did not provide sufficient evidence to overcome this presumption. The specification describes the structure for this element, explaining that

The subject circuit also includes a selection monitor circuit 58 which operates to prevent or inhibit the change maker or accumulator 56 from energizing the relay 45 and the contacts 44 from transferring and energizing the credit relay 42 until a monitoring line shown as line 62 determines that one of the vend selection switches 12, 14, 16, or 18 has been actuated by the customer....

'903 Patent col. 3, lines 25-32; *see also* '903 Patent Fig. 1 (showing a pictorial representation of the above description).

Much of the disagreement regarding the "means to inhibit" at trial involved a discussion of whether this language in the patent describes the patented invention as shutting off the accumulator itself-and thus inhibiting the accumulator-or as inhibiting the accumulator from initiating a vend. The Court accepts Coinco's construction in light of the claim language and the specification, both of which refer to inhibiting a function of the accumulator; neither the claim language nor the specification provide any evidence for Mars' position that the accumulator should be shut down or disabled by the means to inhibit.

(ii) *Infringement*

[19] Although the Court has accepted Coinco's view of the function of the "means to inhibit," Mars' coin changers do not possess the structure of the "means to inhibit" in the '903 Patent. In the '903 Patent, the accumulator will signal that sufficient money has been deposited regardless of whether or not a user has actuated a product selection switch. As described in the patent, the "means to inhibit" prevents this signal from powering a vending device until the selection monitor detects that a user has actuated a product selection switch.

Mars' U1 microprocessor has no capability to assert any output solely based on accumulation. The U1 microprocessor must first detect that a product selection switch has been actuated before making any decision about whether sufficient accumulation has been received. The structure of Mars' U1 microprocessor therefore behaves in the exact opposite manner to the mechanism described in the '903 Patent. Mars' U1

microprocessor inhibits the selection circuitry from initiating a vending operation; the selection circuitry does not inhibit the microprocessor accumulator as required by the '903 Patent. Mr. Kesner's testimony explained this difference:

In figure 1 of the '903 Patent, output line 65 from the accumulator will be energized at a time when the amount of deposited money equals or exceeds the vend price, and possibly if that alone were used to initiate a vend, then a vend cycle would begin. But it is inhibited from initiating a vend by the fact that signal 64 out of the selection monitor isn't active until a selection switch is actuated. In the Mars apparatus, conversely, no matter how much money is deposited, the accumulator cannot initiate the vend. So there is no need to inhibit.

(Tr. vol. 32, 51.) Clearly, the portions of Mars' products identified by Coinco as a selection monitor perform a different function in a different way to achieve a different result than that achieved by the "means to inhibit" within the '903 Patent.FN31 Thus, the claim element of "means to inhibit" is not satisfied either literally or under the doctrine of equivalents.

FN31. Claim 11 describes the "accumulator inhibit means" as "including a control monitor circuit having an input control portion connected in circuit with the product selection switch and energized by actuating said product selection switch ... energization of the input control portion of the monitor circuit by itself being insufficient to cause a vend operation to take place...." '903 Patent col. 9, line 64-col. 10, line 14. Even if the Court determined that this language recited sufficient structure to overcome the means-plus-function presumption, Mars' coin changers would still not infringe this element of the '903 Patent either literally or under the doctrine of equivalents because of the differences between what the claims describe and how Mars' vending machines operate.

7. "refund operation[s]" (11[a])

(i) Claim Construction

Claim 11 also describes "means to inhibit the accumulator from initiating a ... refund operation...." '903 Patent col. 9, lines 59-60. Mars has asked the Court to construe "refund" as including both the refund of amounts deposited in excess of a vend price and the full refund of all money deposited. As far as the Court can tell, Coinco has asked the Court to construe "refund" in claim 11 as limited to the refunding of amounts deposited in excess of a vend price.

As stated above, generally, the same terms in a patent should have the same meaning. Phillips, 415 F.3d at 1314. In this case, the claims and specification of the patent make it difficult to determine exactly which meaning of the word "refund" is intended for any given use. This is because in some cases the word is qualified so that it only applies to either full refund or the return of excess deposit, whereas in other cases the word is unqualified. *See, e.g.*, '903 Patent col. 1, line 45; col. 4, line 37; col. 5, line 18; col. 7, line 48. Claim 11 itself first refers to "accumulator means including means to control the refunding of amounts deposited in excess of the vend price of a selected product." This text contains a qualified use of the word "refunding" and therefore defines the word. Accordingly, the Court construes all other uses in claim 11 of the word "refund" in the same way, to mean "refunding amounts deposited in excess of the vend price of a selected product."

However, as with the "means to inhibit the accumulator from initiating a vend," described above, this means

to inhibit a refund is also stated in means-plus-function format. As with the discussion regarding inhibiting a vend operation, the function here is inhibiting the accumulator from initiating a refund operation. The Court had difficulty finding a structure within the specification which enables this function. *See, e.g.*, '903 Patent col. 5, lines 13-32. Without a disclosure of structure in the specification, the claim must be rendered invalid as indefinite. *Mass. Inst.*, 462 F.3d at 1361.

(ii) Infringement

[20] Even if the Court had found a structure to enable the function of inhibiting the accumulator from initiating a refund operation, the Court would not have found infringement. Although Coinco's testimony attempted to show that Mars' coin changers contained an element which provided the function of inhibiting the accumulator from initiating a refund operation, there was little testimony attempting to show literal or equivalent infringement. Comparison to function alone is insufficient to sustain an infringement claim without a corresponding comparison to structure. *Applied Med.*, 448 F.3d at 1333. Therefore, there can be no infringement of this element by the Mars' coin changers.

Claim 11 also refers to "vend control means including means in circuit with the vend producing means operable to enable vend and refund operations to take place." '903 Patent col. 10, lines 12-14. The evidence shows that the refund operation in Mars' products is completely separate from the vend producing means. *Tr. vol. 32*, 66-67. Therefore, Mars' products cannot infringe this element of the claims when placed within a Type 1 or Type 2 vending machine either literally or under the doctrine of equivalents.

8. "separate escrow means" and "means to disable the escrow means" (12[a], 12 [b]) FN32

FN32. The "means to inhibit the accumulator from initiating a ... refund operation" of claim 11 and the "means to disable the escrow means" of claim 12 are different and separate. Unlike the means to inhibit the accumulator from initiating a refund operation, which has no structure defined in the specification, the means to disable the escrow means of claim 12 properly includes a structure within the specification.

(i) Claim Construction

[21] Claim 12 is dependent on claim 11 and includes:

separate escrow means operatively connected to the accumulator, said escrow means including an escrow switch operable by a customer and means under control of said escrow switch to cause total refund of an amount deposited ... and means to disable the escrow means when said price selection switch is operated at a time when the accumulator has an amount accumulated therein at least equal to the vend price.

'903 Patent col. 10, lines 17-25. Again, the Court presumes that any element which uses the word means is in means-plus-function format unless the claim language states sufficient structure to perform the stated function. The only structure stated for the escrow means in the claim language is the escrow switch itself. In response to actuation of this switch, the escrow means has the functions of providing a total refund at certain times and of disabling the ability to provide a total refund at other times. FN33 The specification describes the structure for this as follows:

FN33. The claim language embeds the "means under control of said escrow switch" within the "escrow means." Although this language is confusing, to say the least, the Court construes this language as requiring

that the escrow means have the function of providing a total refund when the escrow switch is actuated. This interpretation is supported by language in the specification which states that the "escrow means 67 are under control of an operator actuatable escrow switch 68...." '903 Patent col. 4, lines 17-18. Similarly, the Court construes the escrow means to include the embedded "means to disable the escrow means when said price selection switch is operated at a time when the accumulator has an amount accumulated therein at least equal to the vend price." '903 Patent col. 10, lines 22-25.

The accumulator means 56 also have [sic] an output that is connected to escrow means 67 which return the full amount of a deposit to a customer under circumstances where a vend credit condition has not been established. The escrow means 67 are under control of an operator actuatable escrow switch 68 and are also under control of the accumulator and also the AND gate 63 which automatically cancels any escrow possibility whenever a vend credit condition is established.

'903 Patent col. 4, lines 13-22. The specification further explains that:

As soon as the vend operation, and when necessary a refund also is initiated, the vend signal automatically cancels the possibility for producing an escrow operation out of the escrow means 67 thus preventing the simultaneous occurrence of a vend and an escrow.

'903 Patent col. 5, lines 17-22. The specification details some differences between the structure of the escrow means necessary for a single-price vending machine and a multi-price vending machine:

The circuit of FIG. 6 may also be provided with escrow means 162 similar to the escrow means 67 and operated similarly except for the fact that with the dual price selection feature of FIG. 6, an OR gate circuit 164 is also provided and is connected between the separate accumulator output leads 158 and 160 and the escrow circuit 162. This means that the escrow circuit will be operated selectively in so far as the changer circuit 150 is concerned depending upon the price of the article that has been selected by the customer. An operator actuatable escrow switch 166 is also provided as in the other cases.

'903 Patent col. 7, lines 27-39. Figures 1 and 6 of the '903 Patent provide pictorial representations of these structures. The Court had difficulty understanding what, if any, arguments Coinco made regarding the structure of the escrow means. Therefore, the Court rejects Coinco's arguments regarding the meaning of "escrow means" and construes "escrow means" in claim 12 of the '903 Patent to include the structures defined above for the single-price and multi-price embodiments, which have separate escrow means connected by specific logic circuitry to the accumulator and an escrow switch.

(ii) Infringement

Coinco attempts to argue infringement solely by comparing the function of structures in Mars' products to the function of the escrow means within the '903 Patent. Coinco does not make any attempt to compare to structures within the '903 Patent that perform this function. Comparison to function alone cannot prove infringement. Because the evidence does not show why Mars' products infringe apart from a comparison of product function, the Court does not find infringement of the "separate escrow means" or "means to disable the escrow means."

[22] A means-plus-function element does not include every possible structure that performs the given function. *See, e.g., WMS Gaming Inc. v. Int'l Game Tech.*, 184 F.3d at 1348. In his testimony on infringement of the escrow means, Mr. Upchurch compared the structure of Mars' coin changers to the functions described in claim 12. (Tr. vol. 30, 139-40.) Neither Dr. Morley's nor Mr. Upchurch's reports on infringement made any reference to a comparison of Mars' coin changers to the limitations of claim 12 or

the structure of the escrow means in the '903 Patent. (Def.'s ex. 481; Def.'s ex. 482A.) Other than the escrow switch, the testimony did not refer to any particular structure described in the claim or the specification, and therefore did not show any comparison between the structure of the escrow means in the patent and the structure of the escrow means in Mars' products. Without a reference to the structure that the '903 Patent describes for the escrow means, the Court cannot find infringement.

Coinco also failed to show literal or equivalent infringement for the "means to disable the escrow means" for several reasons. Firstly, the means which provide a total refund in the Mars' units are separate from the accumulator. Additionally, as also explained above, Mars' coin changers do not cancel escrow "[a]s soon as the vend operation ... is initiated," but only do so after the vend operation has progressed to the point that the blocker is disconnected from AC Hot. Thirdly, Coinco also failed to show any comparison to the logic circuitry defined in the patent for the escrow means. (See Tr. vol. 32, 39-46.) Finally, the "means to disable the escrow means" is limited to the "time when the accumulator has an amount accumulated therein at least equal to the vend price." As the Court has explained above in connection with claim construction for the term "at a time," the words "at a time" create a limitation. Coinco has not shown that Mars' products include this limitation. Because these requirements are not met and because Coinco's testimony focused on the function of the escrow means rather than its structure, the Court finds neither literal infringement nor infringement under the doctrine of equivalents.

9. "escrow switch" (12[a])

(i) Claim Construction

The word "switch" is a term understood by those of ordinary skill in the art, which Mr. Kesner defined as "means which provides a contact or provides an in circuit connection ... between two components." (Tr. Vol. 33, 20-22.) FN34

FN34. Mr. Kesner used Mars' definition of "in circuit"-which the Court has rejected-to describe the meaning of the word "switch." However, this does not change the fact that "switch" appears to be a common engineering term which would be understood by anybody of ordinary skill in the art. For this same reason, the Court does not construe "switch" as a means-plus-function element.

(ii) Infringement

Mars argues that there is no infringement because the escrow lever in its coin changer units is not technically a switch. Mr. Kesner explained that Mars' escrow works by

operat[ing] a lever on the front of the machine which then is mechanically coupled into the coin mechanism and produces a change in the coin detection. And then a signal is generated that says the customer wants an escrow and then that message is passed on from one microprocessor to another.

(Tr. vol. 32, 40-41.)

[23] For an element not in means-plus-function form, "[l]iteral infringement of a claim exists when each of the claim limitations 'reads on,' or in other words is found in, the accused device." *Allen Eng'g Corp. v. Bartell Indus.*, 299 F.3d 1336, 1345 (Fed.Cir.2002). Because Mars' products do not have an actual physical switch to provide escrow, this limitation is not literally infringed. However, '[e]ven if one or more of the

claim limitations are not literally present in the accused device, thus precluding a finding of literal infringement, the claim may still be held infringed if equivalents of those limitations are present.... Equivalence may be established by a showing by preponderant evidence that an element of an accused device 'does substantially the same thing in substantially the same way to get substantially the same result' as the claim limitation.' " *Id.* The function of this lever in Mars' apparatus is to signal the escrow means to process a full refund. It works by sending a signal to the microprocessor, which processes the refund, and the result is that the customer receives a refund of the total money placed in escrow. Although the lever may not literally be a switch, it is the equivalent of a switch.FN35

FN35. The Court's finding that Mars' escrow lever is the equivalent of an escrow switch is limited to the lever itself. As explained elsewhere in this opinion, Mars' apparatus does not infringe on other elements of claim 12, including the escrow means.

10. "means under control of the accumulator ... said last named means including ... vend selection means" (1[b]) FN36

FN36. The Court notes that the issues discussed in this section also apply to claim construction and infringement of the term "in association with" in claim 1.

(i) Claim Construction

The parties agree that the phrase "said last named means" refers to the means under control of the accumulator. (Mars' Proposed Conclusions of Law para. 174; Coinco's Proposed Conclusions of Law para. 182.)

[24] Claim 1 describes "means under control of the accumulator whenever an amount accumulated at least equals the amount of a selected vend price for establishing a condition to enable a vend operation to take place, said last named means including operator actuatable vend selection means including switch means and associated vend producing means under control thereof." '903 Patent col. 8, lines 28-35. The use of the word "means" triggers a presumption that the "means under control of the accumulator" is stated in means-plus-function format. However, the Court finds sufficient structure in the claim language to overcome this presumption. The claim language clearly specifies that the "means under control of the accumulator" must include "operator actuatable vend selection means" and a variety of other structural elements. The Court construes this claim language to limit this particular element to those vending machine control circuits in which the accumulator can independently assert a signal to control the result of actuating a vend selection switch. The Court reaches this conclusion because the accumulator is designed to control something which it does by asserting a signal as disclosed in Figure 1 of the '903 Patent. This output of the accumulator is independent of the output of the vend selection means, and the vend selection means requires an accumulator output in order for the actuation of the vend selection means to have any effect. *See* '903 Patent col. 3, lines 60-63.

(ii) Infringement

[25] Mars' coin changers, when placed in Type 1 or Type 2 vending machines, do not infringe this element literally or under the doctrine of equivalents.FN37 Because Mars' U1 microprocessor cannot make a price comparison and assert VEND NOT as low without first receiving a signal from the selection switch, the

signal is not under control of the accumulator, but instead the reverse is true-the signal is under control of the selection switch and its operator.FN38 (Tr. vol. 31, 137-39.)

FN37. Even if the Court were to interpret the "means under control of the accumulator" as a means-plus-function element, the same analysis of non-infringement would still hold true based on language in the specification clearly requiring the accumulator to be able to assert its own output independent of the selection switch.

FN38. The Court acknowledges the agreement of the parties that the accumulator and selection monitor may be designed as a single unit. (Mars' Reply to Coinco's Memorandum on Pertinent Evidence Regarding U.S. Patent No. 3,828,903, at 3.) However, the Court believes that regardless of whether the selection monitor and accumulator are constructed as a single unit, the '903 Patent places limitations upon the logic of the components.

11. "first portion" / "second portion"

(i) Claim Construction

[26] Claim 1 describes the actions which begin with "energizing the said first portion of the vend enabling circuit to thereby change the condition of and enable the second portion thereof so that said second portion produces an output signal...." '903 Patent col. 8, lines 48-51. The analogous description of this in claim 11 describes "an output portion of said control monitor circuit including means for generating a control output signal whenever the input control portion is energized." '903 Patent col. 10, lines 4-7. Mars argues that these claims exclude the situation where energization of the input control portion (first portion) does not always energize the output control portion (second portion). Coinco argues that the claims include this situation.

Claim 11 uses the word "whenever" to describe the situation under which energization of the input control portion should energize the output control portion. In addition, Figures 2 through 5 and their associated descriptions in the specification all involve embodiments where the energization of the input control portion always energizes the output control portion. Ordinarily, claims should not be limited to the embodiments in the specification. However, the combination of the claim's use of the word "whenever" together with these embodiments and the associated description of the selection monitor makes clear that the claim is limited to vending machine control circuits in which the energization of the input control portion should always energize the output control portion. The language used in claim 1 is less clear on this point since the word "whenever" is not used, but the Court concludes that "energizing the said first portion ... to thereby change the condition of and enable the second portion" requires the second portion to always be energized if the first portion is energized.

The Court construes the "first portion of the vend enabling circuit" in claim 1 to be the same element as the "input control portion" in claim 11, and construes the "second portion" in claim 1 to be the same element as the "output portion" in claim 11.

(ii) Infringement

The Mars coin changers use a polling function originating with counter U10, which polls each of the U9 gates to see if an output has occurred from optical isolators U11 and U12 on any of the U9 gates associated

with a price line. Mr. Upchurch identified the first portion as "the photo-diode side of the optical isolation circuits and the associated high impedance resistor network," and identified the second portion as "the photo-transistor side of the optical isolation circuits and chips U9 and U10." (Def.'s Ex. 482A, at 6-7.) It is theoretically possible-though highly unlikely-for a customer to briefly actuate and release a product selection switch and apply current to one of the U9 inputs at a precise moment in time when U10 is polling the other U9 gates. In this admittedly rare situation, the portions of Mars' control board identified by Coinco as the first portion would energize without the corresponding energization of the second portion. Although this situation is highly unlikely, the fact that this set of actions could occur in Mars' coin changers makes literal infringement impossible for this element.

Mars' coin changers also do not infringe this element under the doctrine of equivalents. The purpose of the polling function is to prevent a user from selecting more than one product at the same time. This function works because the polling function only applies power to a single U9 gate at any one time, and a corresponding output from the optical isolator associated with that U9 gate causes feedback to U10 which "locks" U10's output on a particular gate. Although this circuitry also partially sets up the high-power current which powers the vend motor, the main function of U9 and U10 is to ensure that only a single product is vended by the machine. (Plaintiff's Ex. 108, at 13.) The circuitry achieves this through preventing all optical isolator outputs from setting up a low-power current. Therefore, Mars' products do not perform substantially the same function in substantially the same way with substantially the same result.

12. Claim Construction of "price selection switch" (11[p.4])

The parties disagree over the meaning of the term "price selection switch" in claim 11. Mars contends that claim 11 of the '903 Patent is directed to and limited to a vend control system capable of vending at multiple prices. As evidence, Mars points to the prosecution history of claim 11. This prosecution history reveals that the initial version of claim 11 of the '903 Patent submitted to the United States Patent and Trademark Office (USPTO) made multiple references to a "price selection switch." (Def.'s Ex. 471, at 37-38.) After the rejection of the initial version, Mr. Levasseur resubmitted the patent with changes to claim 11 that included replacing three occurrences of "price selection switch" with "product selection switch." (*Id.*) However, even after this amendment, one occurrence of the phrase "price selection switch" remained within claim 11. (*Id.*) Thus, the evidence shows that the drafter of the '903 Patent deliberately allowed a single reference to a "price selection switch" to remain within claim 11 of the '903 Patent despite a clear intention to replace other references to "price selection switch" with "product selection switch." The prosecution history makes clear that the drafter of the '903 Patent intentionally chose to use the different words "price" and "product" to refer to two separate concepts. This raises the question of to what extent the Court should construe the term "price selection switch" differently from a "product selection switch."

[27] [28] Mars is correct that "the use of [two] terms in close proximity in the same claim gives rise to an inference that a different meaning should be assigned to each." *Bancorp Servs., L.L.C. v. Hartford Life Ins. Co.*, 359 F.3d 1367, 1373 (Fed.Cir.2004); *see also* *Ethicon Endo-Surgery, Inc.*, 93 F.3d at 1579. Although "it is not unknown for different words to be used to express similar concepts, even though it may be poor drafting practice," *Bancorp Servs.*, 359 F.3d at 1373, the specification of the '903 Patent provides ample evidence that "price selection switch" and "product selection switch" refer to two different capabilities. The description of the single-price embodiment of Figure 1 refers to elements 12, 14, 16, and 18 as "product selection switches." '903 Patent col. 3, lines 48-49. In contrast, the description of the multi-price embodiment of Figure 6 refers to "price selection switches." '903 Patent col. 6, line 65-col. 7, line 11. FN39 Because the prosecution history shows an intent to differentiate between price and product selection

switches, and the specification places the words within different contexts, the Court construes "price selection switch" and "product selection switch" to have different meanings.

FN39. The reference to "price selection switches" at column 3, lines 66-67 appears to be a generic reference to elements that come later in the specification.

Therefore, a "price selection switch" actuatable by a customer must mean that the customer is choosing one price from among more than one price. This is separate from a "product selection switch" which differentiates between different products. Because choosing one price from among more than one price requires a vending machine with a multi-price construction, claim 11 must refer to a vending machine that operates at multiple prices.FN40

FN40. Because the words of claim 11 later refer to a "product selection switch," one reasonable interpretation is that a "product selection switch" includes a "price selection switch." However, the context of claim 11 and the specification also indicates that a "price selection switch" does not necessarily include a "product selection switch."

Just as Mars contends that claim 11 is limited to a multi-price construction, Mars also contends that claim 1 is directed to and limited to a vend control system capable of vending at multiple prices. The Court disagrees. Because the language of claim 1 does not contain the same reference to "price selection switch," the Court construes claim 1 as not limited solely to a multi-price construction.FN41

FN41. It is not clear to the Court how either party wishes to apply this claim construction to infringement.

C. Claims of the '903 Patent, as Construed by the Court

When properly construed by the Court, the claims read:

Claim 1:

A control circuit for vending or other similar devices which have coin units capable of accepting coins of selected denominations, said coin unit including means for producing output signals corresponding to the value of each coin deposited,

[a] accumulator means, consisting of the structures of those patents disclosed within the specification and equivalents of those structures, having an input connected to receive the output signals of the coin unit and including means to accumulate the amount of credit entered in the coin unit during each vending operation,

[b] means under control of the accumulator, which can independently assert a signal, whenever an amount accumulated at least equals the amount of a selected vend price (regardless of how long the selection switch is held) for establishing a condition to enable a vend operation to take place (and without any other additional logic), said last named means including operator actuatable vend selection means including switch means and associated vend producing means under control thereof,

[c] a vend enabling circuit having a first portion operatively associated with the operator actuatable switch

means and a second portion under control of the first portion, said first portion being connected in circuit with the vend producing means, so that a circuit is completed and current may flow, when the vend switch means are actuated,

[d] said second portion and said accumulator each having an output where output signals are produced,

[e] means responsive to the simultaneous occurrence of output signals at the outputs of both said second portion and said accumulator to enable a vend operation,

[f] actuation of said switch means at a time when-and only at a time when-the amount accumulated in the accumulator means at least equals the vend price associated therewith energizing the said first portion of the vend enabling circuit to thereby always change the condition of and enable the second portion thereof so that said second portion produces an output signal which in association with an output signal from the accumulator means establishes a circuit condition that initiates a vend operation.

Claim 2 is dependent on claim 1 and states:

The control circuit of claim 1 including means to enable full escrow of an amount accumulated in the accumulator means until a vend operation is initiated, with full escrow being cancelled immediately after the vend operation is initiated.

Claim 3 is dependent on claim 1 and states:

The control circuit of claim 1 wherein said first portion of said vend enabling circuit includes relatively high impedance circuit means connected in series with the vend producing means, the impedance of said first portion being selected to be too high to enable sufficient current flow through the associated vend producing means in series therewith for the vend producing means to be able to initiate a vend operation.

Claim 4 is dependent on claim 1 and states:

The control circuit of claim 1 wherein said operator actuatable switch means include a plurality of switches, one of which is associated with each different product to be vended.

Claim 6 is dependent on claim 1 and states:

The control circuit defined in claim 1 wherein said first portion of said vend enabling circuit includes a photo-diode, and said second portion includes means responsive to the light produced when said photo-diode is energized by operation of the switch means in the vend selection means at a time when-and only at a time when-the accumulator has an amount accumulated therein at least equal to the vend price.

Claim 11:

Improvements in a vend circuit

[p.1] for a vending machine having a coin unit for receiving coins of at least one denomination,

[p.2] said vending machine having an accumulator, consisting of the structures of those patents disclosed within the specification and equivalents of those structures, operatively connected to the coin unit and

responsive to outputs produced thereby when coins are deposited to accumulate the value thereof,

[p.3] said accumulator including means to control the refunding of amounts deposited in excess of the vend price of a selected product and means for producing an accumulator output signal whenever the amount accumulated therein at least equals the price of a selected vend (and without any other additional logic),

[p.4] means including at least one price selection switch, to choose between products of different prices, actuable by a customer to initiate a vend cycle whenever the amount accumulated in the accumulator at least equals the vend price,

the improvement comprising

[a] means to inhibit the function of the accumulator from initiating a vend or refund (of amounts deposited in excess of the vend price of a selected product) operation until after the customer has actuated one of the product selection switches at a time when-and only at a time when-the amount accumulated in the accumulator at least equals the selected vend price,

[b] said accumulator inhibit means including a control monitor circuit having an input control portion connected in circuit with the product selection switch, so that a circuit would be completed and current could flow through the switch and input control portion if one side was connected to AC Hot and the other side was connected to AC Neutral, and energized by actuating said product selection switch at a time when the amount accumulated at least equals the selected vend price, energization of the input control portion of the monitor circuit by itself being insufficient to cause a vend operation to take place, an output portion of said control monitor circuit including means for generating a control output signal at every time when the input control portion is energized, and

[c] means including a gate circuit and vend control means, said vend control means being energized whenever the gate circuit simultaneously receives input signals from the output of the accumulator and from the output portion of the control monitor, said vend control means including means in circuit with the vend producing means operable to enable vend and refund (of amounts deposited in excess of the vend price of a selected product) operations to take place.

Claim 12:

The improvements in a vend control circuit defined in claim 11 including

[a] separate escrow means, with structure as described in the specification, operatively connected to the accumulator, said escrow means including an escrow switch operable by a customer, and means under control of said escrow switch to cause total refund of an amount deposited up to the capacity of the accumulator, and

[b] means to disable the escrow means, with structure as described in the specification, when said price selection switch is operated at a time when the accumulator has an amount accumulated therein at least equal to the vend price.

IV. Validity of the '903 Patent

"Patent claims are presumed to be valid ... and the party seeking to show invalidity must prove facts

supporting invalidity by clear and convincing evidence." 35 U.S.C. s. 282; *Abbott Labs. v. Baxter Pharm. Prods.*, 471 F.3d 1363 (Fed.Cir.2006). Mars argues that the '903 Patent is invalid due to lack of a disclosure of the best mode, lack of an enabling disclosure, and anticipation and obviousness in light of prior art. Mars has met its obligation to prove invalidity of all asserted claims due to lack of an enabling disclosure. Additionally, Mars has proven that claims 1, 2, 3, 4, and 11 are invalid for anticipation, and that claim 6 is invalid for obviousness. Mars has not met its obligation to prove lack of disclosure of the best mode for any of the asserted claims, and has not shown that claim 12 is invalid for either anticipation or obviousness. For the purposes of this validity analysis, the Court will assume that the claims of the '903 Patent had been construed in a manner necessary for a finding of infringement.

A. Best Mode

[29] A patent must "set forth the best mode contemplated by the inventor of carrying out his invention." 35 U.S.C. s. 112 paragraph 1. "Compliance with the best mode requirement ... is a question of fact." *Zygo Corp. v. Wyko Corp.*, 79 F.3d 1563, 1566-67 (Fed.Cir.1996). An analysis of whether a party has satisfied the best mode requirement depends upon a two-pronged inquiry. *Eli Lilly and Co. v. Barr Labs., Inc.*, 251 F.3d 955, 963 (Fed.Cir.2001). Firstly, the fact finder must make a subjective inquiry into whether, at the time of filing the application, the inventor knew of a best mode for practicing the invention. *Id.* Secondly, a court must conduct an objective inquiry into "whether the written description disclosed the best mode such that one reasonably skilled in the art could practice it." *Id.* The purpose of this inquiry is to ensure the *quid pro quo* of patent law: an inventor may only receive intellectual property protection for an invention after providing sufficient public disclosure that another individual skilled in the art might replicate that invention. The law seeks to discourage inventors from hiding the details of a protected invention.

[30] With regard to the first prong of the best mode test, Mars claims that Mr. Levasseur withheld information about the best mode for building a multi-price vending unit which would allow it to use the same eight-pin Jones plug that Mr. Levasseur envisioned for use with the single-price version. Mars points to a brochure disclosing a more detailed schematic drawing of a vending circuit to support its claim. (Mars' Post-Trial Memorandum on U.S. Patent No. 3,828,903 ("Mars' Post-Trial"), at 16-17). The subject of this drawing, the DEK-9400 coin changer, was sold by Coinco months before the filing of the '903 Patent, and the drawing itself was published by Coinco around the time of the patent's filing. (Tr. vol. 28, 96-98.)

The '903 Patent does not directly discuss use of the eight-pin Jones plug for either a single-price or multi-price embodiment. Figure 1 of the patent does show seven connection points labeled A-G, which the specification explains "can easily be included in a relatively simple multi-prong plug..." '903 Patent col. 7, line 67-col. 8, line 5. The claims themselves do not refer to a plug of any kind.

"[T]he parameters of a section 112 inquiry *are set by the claims.*" *Zygo*, 79 F.3d at 1567 (emphasis added) The claims must be read in light of the specification, but a court should not read limitations into the claims from the specification. *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115-16 (2004); *see also Phillips*, 415 F.3d, at 1312. Neither the claims nor the specification of the '903 Patent make any reference to an eight-pin plug. The specification refers to a "multi-prong" plug with connections, but this description cannot be read as a claim limitation. The main purpose of the invention described by the patent is to allow a vending machine to use the same line for both sensing that a user has selected a vend and for enabling the mechanical operation of a vend. Although the invention may allow for the use of plugs with less pins as a result of its teachings, the use of any kind of plug is not a limitation required by the claims, and thus is not a part of the invention.

[31] "The focus of a section 112 inquiry is not what a particular user decides to make and sell." Zygo, 79 F.3d at 1567. Therefore, courts should avoid consideration of commercial uses when engaging in a best mode analysis. *See, e.g., SDS USA Inc. v. Ken Specialties Inc.*, 122 F.Supp.2d 533, 549 (D.N.J.2000). Mr. Levasseur and Coinco may have desired to use the invention within a vending machine like the DEK-9400 that used an eight-pin Jones plug, but this commercial use of the invention cannot impact a best mode analysis. Despite the intention of Mr. Levasseur to use the '903 invention within the DEK-9400, the Court does not find that the DEK-9400 or its documentation reveals an intention to use a better mode than that disclosed within the '903 Patent itself.

The second prong of the best mode test requires the Court to examine whether one reasonably skilled in the art could practice the best mode of the invention given the written description. With regard to the type of plug used to connect the coin changer to the vending machine, the '903 Patent discloses sufficient information for an individual of ordinary skill in the art at the time of the invention to understand the appropriate connections in either a single- or multi-price embodiment.FN42 Mars has not carried its burden to prove otherwise.

FN42. Although the Court also finds lack of enablement regarding other issues in the '903 Patent, there is sufficient disclosure within the patent for an individual of ordinary skill in the art to understand how to connect the plug which enables communication between the various parts.

B. Lack of Enabling Disclosure

[32] Mars claims lack of an enabling disclosure for asserted claims 1, 2, 3, 4, 6, 11, and 12 of the '903 Patent for a multi-price vending control circuit. According to 35 U.S.C. s. 112 paragraph 1:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same....

Id. Enablement involves consideration of whether the specification "provide [s] sufficient teaching such that one skilled in the art could make and use the full scope of the invention without undue experimentation." *Warner-Lambert Co. v. Teva Pharms. USA, Inc.*, 418 F.3d 1326, 1337 (Fed.Cir.2005). The ability of one skilled in the art is measured as of the filing date of the patent application. *Chiron Corp. v. Genentech, Inc.*, 363 F.3d 1247, 1254 (Fed.Cir.2004). Mars has provided abundant evidence that an individual skilled in the art in 1973 could not have used the disclosure of the '903 Patent to create a multi-price vending control circuit.

[33] The disclosure of a multi-price system in the '903 Patent is limited to Figure 6 and its associated description in the specification. '903 Patent col. 6, line 59-col. 7, line 39. Although Figure 1 shows a mostly complete schematic of a single-price vending machine. Figure 6 is only a partial schematic of a multi-price system, with many elements missing. For the disclosure of a multi-price system to be sufficiently enabling, the individual skilled in the art must have been able to combine Figure 6 with other portions of the description.

The schematic of Figure 6 does not appear to be a simple one-for-one replacement for a portion of Figure 1.

AND gate 63, which in Figure 1 tests for the occurrence of both sufficient accumulation and a valid selection, and apparently inhibits the accumulator from initiating a vend operation, does not exist in Figure 6. The selection monitors of Figure 6 connect directly into the "Dual Changer or Accum," whereas Figure 1 has no such connection. Figure 6 uses an OR gate which listens for outputs from the accumulator before sending a signal to the escrow element. In contrast, the escrow element of Figure 1 has inputs from both the accumulator and AND gate 63. Figure 6 does not have the vend credit relay 45, credit relay 42, or credit switch 44, all of which enable a high-power current in Figure 1. The specification does permit the "selection monitor circuit 58 ... [to] be constructed to be a part of the change maker or accumulator circuit 56, and the same is true of the escrow circuit 67 (and 162) and the relay means 45." '903 Patent col. 7, lines 54-57. Although the patent may allow for a construction that combines these elements, the schematics of Figure 1 and Figure 6 are not consistent in the way they present the invention to the individual of ordinary skill in the art. Indeed, Mr. Levasseur testified that the multi-price embodiment of Figure 6 "doesn't function the same way that it has to in the single-price." (Tr. vol. 28, 100-01.)

The specification's explanation for how to tie together many of these inconsistent schematics is that

[w]henver one of the price selection switches is actuated and closed by the customer it signals an appropriate means in the dual price changer circuit 150 by way of the associated selection monitor circuit 154 or 156 and through the actuated switch, and *thereafter the circuit operates in the manner substantially similar to that described above.*

'903 Patent col. 7, lines 7-13 (emphasis added). Although the credit switch 44 is not described in Figure 6, "*it is important* that the credit switch 44 be transferred by the change maker or accumulator circuit 56 (or 150) only after the vend price has been deposited and not until after it is enabled by operation of the selection monitor circuit 58." '903 Patent col. 7, lines 40-44 (emphasis added). Thus, Figure 1 and its associated description contain elements important to the operation of the multi-price vending machine shown in Figure 6, but the limited Figure 6 schematic and its associated description require an individual reading the patent to infer how these elements should be combined by reference to the single-price description.

Mr. Kesner testified about many of these differences and the limited disclosure of the multi-price system. (See Tr. vol. 31, 139-41; Tr. vol. 32, 21-27, 36.) Mr. Kesner, who in 1973 had held a master's degree for three years and had been "actively designing" for seven years, also testified that the level of ordinary skill in the art in 1973 was "more along the lines of electricians than electronic engineers." (Tr. vol. 33, 75-76.) Therefore, in 1973, Mr. Kesner was well above the level of one of ordinary skill in the art. Although Mr. Kesner admitted that he could probably have built a multi-price construction based on the '903 Patent in 1974, he emphasized that he believed parts of Figure 6 to be "unworkable" and that the designer would need "to wing it a lot." (Tr. vol. 32, 101; Tr. vol. 31, 140.)

Dr. Morley attempted to refute Mr. Kesner's testimony with a showing that it would be relatively easy to combine the '255 Patent with the teachings of the '903 Patent. In 1973, Dr. Morley was finishing his senior year at an undergraduate electrical engineering program. He obtained his Ph.D. in 1977, and at the time that he wrote his expert report had taught electrical engineering for eleven years. When asked how easily one of ordinary skill in the art in 1973 could have combined the multi-price disclosure of Figure 6 in the '903 Patent with the accumulator in the '255 Patent, Dr. Morley responded:

A. It would be total speculation on my part as to what somebody unidentified back then would have done. I

can only say that when I put these two together, it was based solely on my knowledge of reading the '903 patent, and my knowledge of reading the '255 Johnson patent that I saw what the functions were in the one and what the functions were in the other, and merged them without any other suggestions from outside. It was pretty straightforward and clear.

Q. Did you hear Mr. Kesner's testimony that the level of skill of the art in around 1973 in the vending business was that of an ordinary electrician, and not that of an electrical engineer?

A. I-

Q. Would that affect your view, if you have any view? Perhaps you don't have a view.

A. Well, my view is that somebody wrote these two patents that directed me on how to put them together, and would assume that person was somebody that was of ordinary skill in the art. They are the ones that are out there doing the work. So their words on these two patents were plenty for me to put the two together with no other outside information.

(Tr. vol. 34, 59-60 (emphasis added).) The level of ordinary skill in the art is not measured by the skills of an inventor who was capable of writing the '903 Patent and is not measured by the skill of Dr. Morley himself. The Court finds Dr. Morley's testimony about the level of ordinary skill in the art in 1973 unconvincing. Comparing the testimony of Dr. Morley and Mr. Kesner regarding the level of skill in the art in 1973, Mr. Kesner showed much more substantial knowledge about the capabilities of an average vending machine designer in 1973. Additionally, the standard for enablement requires the Court to examine how one of ordinary skill in the art would apply the patent. In contrast, much of Dr. Morley's testimony regarding enablement appears to discuss how Dr. Morley himself—a very capable individual of great skill—would interpret the patent at the time that he wrote his expert report. Thus, the Court accepts Mr. Kesner's testimony and finds that the level of skill in the art in 1973 was low and was more like that of an electrician rather than that of a highly skilled engineer.

Dr. Morley agreed that Figure 6 showed a somewhat different form of the invention than Figure 1, but also attempted to show that these differences would not prevent an individual skilled in the art from combining the '255 Patent accumulator with the other teachings of the '903 Patent. (Tr. vol. 34, 45-55, 70-87.) Dr. Morley did, in fact, produce a modification of Figure 5 of the '255 Patent using a selection monitor to bypass the selection switch, and showing connections to elements in Figure 6 of the '903 Patent. (Def.'s ex. 879.) However, on cross examination, Dr. Morley acknowledged that he had made a minor—though correctable—error in his work which would have prevented his original diagram from working properly. (Tr. vol. 34, 104-13.) In addition, the element described as the "accumulator" in the '255 Patent does not even appear in Figure 5 of the '255 Patent. (Tr. vol. 34, 104.) To combine the teachings of the '903 Patent with the '255 Patent, an individual skilled in the art would need to have understood that an "accumulator" could mean something very different than an element labeled "accumulator" in another vending machine patent. Because the level of skill in the art in 1973 was low, and the disclosure of a multi-price system in the '903 Patent is confusing at best, the Court finds that the '903 Patent lacks an enabling disclosure for a multi-price vending machine.

C. Anticipation & Obviousness

[34] Earlier in this opinion, the Court rejected many of Coinco's claim construction arguments. Claim

construction of a patent directly impacts whether a finding of infringement is even possible. In this case, the Court's rejection of Coinco's proposed claim construction has resulted in a finding that Mars' coin changers could not infringe on the claims of the '903 Patent as construed by the Court. However, even if the Court had adopted Coinco's proposed claim construction for all terms, Mars would still not be liable for infringement because the '903 Patent would then be largely invalid for anticipation or obviousness. The following analysis assumes that the Court had adopted an alternate claim construction for the '903 Patent with all terms construed as urged by Coinco.

[35] Mars asserts that the '903 Patent, if construed according to the interpretation urged by Coinco, is largely anticipated by U.S. Patent No. 3,250,363 by Hooker. "A single prior art reference that discloses, either expressly or inherently, each limitation of a claim invalidates that claim by anticipation." *Perricone v. Medicis Pharmaceutical Corp.*, 432 F.3d 1368, 1375 (2005).

The Hooker patent has a set of vend solenoids, which initiate the mechanical action that causes an item to be vended, connected in series with a set of user actuatable product selection switches. '363 Patent col. 3, lines 18-30. Each of the selection switches, in turn, is connected to a price line, that associates the vend solenoid and selection switch for an item with a particular price. '363 Patent col. 3, lines 12-18. The price lines are all connected to a single rotary "stepper" which includes commutator strips associated with each price line. '363 Patent col. 2, lines 45-55. Each commutator strip is connected to a mechanical wiper that moves in response to the addition and subtraction of credit within the vending machine. '363 Patent col. 6, lines 9-35. As the wipers move, they connect to contacts within element 40, which connect to denomination conductors 101, 111, and 131. '363 Patent col. 12, lines 12-18. Each denomination conductor is associated with a particular coin value (in this case, nickel, dime, and quarter), with conductor 101 connected to denomination relay 100, conductor 111 connected to denomination relay 110, and conductor 131 connected to denomination relay 130. '363 Patent col. 4, line 37-col. 5, line 17. These denomination relays are high impedance so that when a user actuates a product selection switch, the connected vend solenoid and relay coil are energized as part of the circuit, but the vend solenoid cannot actually initiate a vend cycle. '363 Patent col. 12, lines 62-64; (Tr. vol. 31, 49). Upon energization through the high impedance circuit, each relay coil 101, 111, or 131 respectively causes contacts 104, 114, or 135 to close, which in combination with various other components moves contact set 72, which bypasses the high impedance relays, and allows a high-power current to pass through the vend solenoid, resulting in a vending operation. (Tr. vol. 31, 49-60.)

[36] Hooker was not disclosed to the patent examiner during prosecution of the '903 Patent, and there is no evidence that the patent examiner was aware of Hooker. (Def.'s Ex. 471.) The patent examiner originally rejected all claims of the '903 Patent as anticipated or obvious. (Def.'s Ex. 471, at 29-32.) To overcome these objections, Mr. Levasseur amended the '903 Patent, including independent claims 1 and 11. (Def.'s Ex. 471, at 36-38.) These amendments added claim language requiring that the first portion be in circuit with the vend producing means, and also requiring that energization of the first portion would not be sufficient to cause a vend operation to take place. After amendment, the patent examiner allowed all claims asserted by Coinco in this case. (Def.'s Ex. 471, at 41-48.) In particular, the examiner stated that the claims, as amended, contained a

unique selection monitoring and vend control means. The selection monitoring means in the present construction includes the provision of means which connect a high impedance sensing means ... in circuit with the product selection means selected by the customer, which high impedance means when energized establish a circuit when the amount deposited at least equals the selected vend price which enables other operations, but is not sufficient unto itself to pass sufficient current for the selected vend to take place.... No

known prior art device including the devices shown in the cited references has anything similar structurally or operationally to the selection monitoring means of the present device.

(Def.'s Ex. 471, at 41-42.) Thus, the patent examiner of the '903 Patent appears to have been unaware of the Hooker patent, and did not consider whether Hooker disclosed a similar type of vending control circuit. When a challenger, such as Mars, produces prior art not considered by the patent examiner, a court need not defer to the patent examiner's finding of validity so far as that newly discovered prior art is concerned. *See American Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1359-60 (Fed.Cir.1984). The fact that Hooker was not before the patent examiner does not alter the burden of proof regarding validity; Mars must still prove the invalidity of the '903 Patent's claims by clear and convincing evidence. *See Gillette Co. v. S.C. Johnson & Son, Inc.*, 919 F.2d 720, 722-23 (Fed.Cir.1990)

1. Analysis of Claim 1

Claim 1 of the '903 Patent is anticipated by Hooker.

(i) "A control circuit for vending or other similar devices which have coin units capable of accepting coins of selected denominations."

Hooker shares this limitation because it discloses a control circuit for vending which has a coin unit capable of accepting coins of selected denominations. '363 Patent col. 7, line 52-col. 8 line 10; col. 1, lines 8-23; col. 5, lines 66-73; Figs. 1, 2; (Tr. vol. 31, 62).

(ii) "said coin unit including means for producing output signals corresponding to the value of each coin deposited"

During claim construction, the Court rejected Coinco's arguments urging a broad definition of an accumulator, and instead adopted a narrower definition that included the accumulators within patents referred to by the '903 Patent. For the purposes of this anticipation analysis only, the Court will assume that the term "accumulator" had been construed as a well-known term to one of ordinary skill in the art, and that such an accumulator included any structure capable of adding numbers and indicating when a particular value had been achieved.

In Hooker, the passing of a coin through a photo-electric cell results in solenoid coil 42 causing wipers 22, 24, and 26 to increment the stored amount of credit. Solenoid coil 44 causes the wipers to subtract credit. '363 Patent col. 2, lines 35-63; (Tr. vol. 31, 35; *see also* Tr. vol. 32, 81-83.). Much of Coinco's expert report denying Mars' allegation of anticipation by Hooker centers around the interpretation of the term "output signals," and disputes whether Hooker contains such output signals. If the Court had construed "accumulator" to mean any device capable of adding numbers and indicating when a particular value had been achieved, there is no indication that the limitation of an output signal in the '903 Patent refers to anything other than a manner for indicating to the accumulator that a particular value has been deposited. '903 Patent col. 4, lines 5-11. Therefore, the mechanical action of solenoids 42 and 44 in Hooker, which signal the wipers to change positions, shares the '903 Patent's limitation on "means for producing output signals corresponding to the value of each coin deposited."

(iii) "accumulator means having an input connected to receive the output signals of the coin unit and including means to accumulate the amount of credit entered in the coin unit during each vending operation"

If the Court had accepted the broad interpretation of accumulator urged by Coinco, the court would have construed an accumulator to include mechanical totalizers, such as the one present within Hooker. The Court notes that the '903 Patent references Schuller U.S. Patent No. 3,335,838, which describes a mechanical totalizer similar to the one within Hooker. (Tr. vol. 31, 30-35.) The motion of the wipers described within Hooker does "accumulate the amount of credit entered in the coin unit during each vending operation."

As described above, the wipers in Hooker "hav[e] an input connected to receive the output signals of the coin unit." (Tr. vol. 31, 63.)

(iv) "means under control of the accumulator whenever an amount accumulated at least equals the amount of a selected vend price for establishing a condition to enable a vend operation to take place"

During claim construction, the Court construed the "means under control of the accumulator ... including operator actuatable vend selection means" to limit this particular element to those vending machines in which the accumulator can independently assert a signal to control the result of actuating a vend selection switch. For the purposes of this anticipation analysis only, the Court will assume that this element does not limit the '903 Patent to those vending control circuits in which the accumulator can independently assert a signal to control the result of actuating a vend selection switch; this element may include an accumulator that depends upon a selection switch in order to assert an output signal.

In Hooker, the stepper motor moves wipers 22, 24, and 26 into the appropriate position to enable a vend operation to take place when the amount accumulated at least equals the vend price of a selected item. '363 Patent Figs. 1, 2, col. 6, lines 18-35. In their normal position, the wipers 22, 24, 26 rest one, two, and three steps back, respectively from the first contact 'a' of the contact set 40 a-j. '363 Patent col. 6, lines 21-29. The wipers all move one step to the right as credit is registered. The wipers 22, 24, and 26 correspond to 5, 10, and 15 cent products. If, for example, the wiper 22 has been moved at least one step to the right, then the accumulator establishes a circuit condition that enables a vend operation to take place for a 5 cent product via the contacts a-j of set 40. '363 Patent Figs. 1, 2, col. 10, line 37-col. 11, line 9.

(v) "said last named means including operator actuatable vend selection means including switch means and associated vend producing means under control thereof"

In Hooker, product selection switches A-L in the set 48 are actuatable by a user and control an associated vend solenoid A-L of the set 58, which produce a vend. '363 Patent col. 3, lines 13-34. (See also Tr. vol. 31, 63-64.)

(vi) "a vend enabling circuit having a first portion operatively associated with the operator actuatable switch means and a second portion under control of the first portion"

The vend enabling circuit in Hooker uses relays 100, 110, and 130 as a first portion, which are operatively associated with the switch means of set 48. Hooker uses contacts 104, 114, and 135 as the second portion elements which are under control of the first portion relays. (Tr. vol. 31, 64-65, 71-72.)

(vii) "said first portion being connected in circuit with the vend producing means when the vend switch means are actuated"

Mars claims that one of the first portions in Hooker (relay 100, 110, or 130) is connected in circuit with the

vend producing means (one of the solenoids of set 58) when one of the vend switches of set 48 is actuated *if there is sufficient credit for the selected product*. The '903 Patent requires the first portion and vend producing means to be in circuit "when the vend switch means are actuated," but does not discuss any additional logic, such as a requirement for sufficient credit. Above, the Court construed the word "whenever" as imposing limitations that the stated function was required to occur whenever a situation occurred, regardless of other intervening logic. Because the Court accepted Mars' arguments regarding claim construction of "whenever," the Court also found that Mars' products did not infringe the '903 Patent.

However, if the Court had accepted Coinco's arguments regarding the claim construction of "whenever," then the phrase "said first portion being connected in circuit with the vend producing means *when* the vend switch means are actuated" would also not impose a limitation requiring the first portion and vend producing means to be in circuit regardless of other logic in the circuit's path. Neither party has suggested that "when" and "whenever" have different meanings, and if the word "whenever" must permit additional logic, then the word "when" must do so as well. Because Hooker's accumulator sits between the first portion relays 100, 110, and 130 and the vend producing means of set 58, these elements cannot share a common electrical current unless *both* the accumulator has sufficient accumulation *and* a vend switch has been actuated.FN43 (See Tr. vol. 31, 90-91.) If the word "when" includes the situation where additional logic—such as the accumulator in Hooker—may prevent the completion of a circuit between the first portion and the vend producing means, then Hooker anticipates the limitation requiring the first portion to be connected in circuit with the vend producing means when the vend switch means are actuated. (Tr. vol. 31, 72-79.)

FN43. Above, the Court construed "in circuit" to mean that electrical current could flow through the named elements along a completed circuit path.

(viii) "said second portion and said accumulator each having an output where output signals are produced"

The mechanical totalizer in Hooker has an output signal on lines 101, 111, and 131 via wipers 22, 24, and 26. Each of the second portions 104, 114, and 135 have output signals through circuitry which causes current to flow to various other elements within Hooker, including motor 60. (Tr. vol. 31, 101.)

(ix) "means responsive to the simultaneous occurrence of output signals at the outputs of both said second portion and said accumulator to enable a vend operation"

When output signals occur from both the second portion of Hooker and the accumulator/totalizer, vend motor 60, timing motor 70, and contact set 72 cause one of the relays 100, 110, or 130 to be shunted out of the path of one of the solenoids of set 58. This allows sufficient current to pass through one of the solenoids of set 58, which enables a vend operation. Therefore, motor 60, motor 70, and contact set 72 are responsive to the simultaneous occurrence of output signals from the totalizer and second portion in Hooker. '363 Patent col. 10, line 62-col. 11, line 9; (Tr. vol. 31, 79-85.)

(x) "actuation of said switch means at a time when the amount accumulated in the accumulator means at least equals the vend price associated therewith energizing the said first portion of the vend enabling circuit to thereby change the condition of and enable the second portion thereof so that said second portion produces an output signal which in association with an output signal from the accumulator means establishes a circuit condition that initiates a vend operation"

In Hooker, actuation of one of the switches A-L of set 48 at a time when the amount accumulated in the credit wheel at least equals the vend price associated with that switch will energize one of the first portion relays, which enables the respective second portion, so that the second portion produces an output signal which in association with an output from the totalizer establishes a circuit condition that initiates a vend operation. '363 Patent col. 10, line 71-col. 11, line 9; (Tr. vol. 31, 85-86.)

2. Analysis of Claim 2

"The control circuit of claim 1 including means to enable full escrow of an amount accumulated in the accumulator means until a vend operation is initiated."

Hooker discloses escrow contacts 92, 94, 96, and 98 which in the unoperated position lock out vending and control a full coin return payout. In the operated position, these contacts complete various vending circuits. '363 Patent col. 4, lines 26-36; col. 8, line 45-col. 9, line 20; (Tr. vol. 31, 109-10). Mr. Upchurch's initial report on validity did not challenge the anticipation analysis of Mr. Kesner regarding claim 2 other than to state that "[c]laim 2 depends from claim 1 and therefore the combination of the elements of claim 2 with those of claim 1 is also not shown or suggested by Hooker." (Def.'s Ex. 621A, at 8.) Because the Court finds claim 1 of the '903 Patent anticipated by Hooker, and also finds the limitations of claim 2 of the '903 Patent present within Hooker, the Court must conclude that claim 2 is also anticipated by Hooker.

3. Analysis of Claim 3

"The control circuit of claim 1 wherein said first portion of said vend enabling circuit includes relatively high impedance circuit means connected in series with the vend producing means, the impedance of said first portion being selected to be too high to enable sufficient current flow through the associated vend producing means in series therewith for the vend producing means to be able to initiate a vend operation." Relays 100, 110, and 130 have impedances which are too high to enable sufficient current flow through one of the associated vend producing means of set 58 to initiate a vend operation. '363 Patent col. 3, lines 23-35; col. 10, lines 47-50; col. 10, line 71-col. 11, line 9; (Tr. vol. 31, 110).

Coinco alleges that because current cannot flow through the vend producing means and the high impedance first portion unless there is sufficient credit, Hooker cannot anticipate claim 3 of the '903 Patent. Claim 3 itself does not state any limitations regarding whether other logic-such as an accumulator-may appear in the circuit described, and the Court will not read in a limitation from the embodiments of Figure 1 and Figure 6 of the '903 Patent. Claim 1, upon which claim 3 is dependent, could potentially have been read to include such a limitation, but if the Court accepts Coinco's claim construction of "when the vend switch means are actuated," then claim 1 of the '903 Patent permits additional logic within the described circuit. Even if the Court had not construed claim 1 to permit additional logic, passing the outputs of two elements through an AND gate, as described in the '903 Patent is an obvious modification to Hooker's description of two elements connected in series. The Court has considered and rejected Coinco's arguments, and finds that claim 3 of the '903 Patent is anticipated by Hooker.

4. Analysis of Claim 4

"The control circuit of claim 1 wherein said operator actuatable switch means include a plurality of switches, one of which is associated with each different product to be vended."

As with claim 2, Coinco does not appear to challenge Mr. Kesner's anticipation analysis of claim 4, other than to state that claim 4 depends upon claim 1. Hooker discloses a plurality of switches (set 48), each of

which is associated with a different vend solenoid (set 58). '363 Patent col. 3, lines 12-35. The Court finds that Hooker anticipates claim 4 of the '903 Patent.

5. Analysis of Claim 6

"The control circuit defined in claim 1 wherein said first portion of said vend enabling circuit includes a photo-diode, and said second portion includes means responsive to the light produced when said photo-diode is energized by operation of the switch means in the vend selection means at a time when the accumulator has an amount accumulated therein at least equal to the vend price."

The photo-diode and light-responsive means of claim 6 do not appear in Hooker, so Hooker cannot anticipate claim 6. Mars argues that the substitution of a relay with a photo-diode and light-responsive means would be obvious from Barrett U.S. Patent No. 3,486,029. "[T]he legal conclusion of obviousness requires that there be some suggestion, motivation, or teaching in the prior art whereby the person of ordinary skill would have selected the components that the inventor selected and used them to make the new device." *C.R. Bard, Inc. v. M3 Sys., Inc.*, 157 F.3d 1340, 1351 (Fed.Cir.1998). Motivation to combine may be found in the knowledge of one skilled in the art or in the nature of the problem to be solved. *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (Fed.Cir.2006).

Barrett, issued in 1969, discloses a light source at element 11 and a photo-detector at circuit 16. '029 Patent col. 3, lines 63-70; Figs. 1, 3. Mr. Kesner testified that the combination of a photo-diode with a light sensitive device would perform the same type of circuit function as a relay. (Tr. vol. 31, 111-13.) Although Barrett is not specific to vending, Barrett provides functions that a vending machine often requires, such as electrical isolation and power gain. (Id.) One of ordinary skill in the art would be motivated to use the combination described in Barrett because it provides the same isolation function and can be used to provide the high impedance and low impedance features that a relay offers in Hooker. (Id.) One of ordinary skill in the art in 1973 would have been aware of the necessity of these functions, and would therefore have found it obvious to add the photo-diode and light responsive means of Barrett to Hooker.

6. Analysis of Claim 11

Claim 11 of the '903 Patent is anticipated by Hooker.

(i) "Improvements in a vend control circuit for a vending machine having a coin unit for receiving coins of at least one denomination"

As with claim 1, Hooker discloses a vend control circuit for a vending machine which has a coin unit for receiving coins of at least one denomination. (Tr. vol. 31, 87-88.)

(ii) "said vending machine having an accumulator operatively connected to the coin unit and responsive to outputs produced thereby when coins are deposited to accumulate the value thereof"

As with Claim 1, Hooker discloses this limitation. (Tr. vol. 31, 88.)

(iii) "said accumulator including means to control the refunding^{FN44} of amounts deposited in excess of the vend price of a selected product"

FN44. As with other terms in this anticipation analysis, the Court assumes Coinco's claim construction of

the word "refund" which limits the term to the refunding of amounts deposited in excess of the vend price. (See Tr. vol. 31, 106.)

The Hooker control circuit and accumulator include means for refunding amounts deposited in excess of the vend price of a selected product. FN45 ' 363 Patent col. 2, lines 19-24; col. 13, line 72-col. 14, line 33; (Tr. vol. 31, 88-90).

FN45. Mr. Upchurch's testimony on validity does not appear to discuss this claim limitation.

(iv) "and means for producing an accumulator output signal whenever the amount accumulated therein at least equals the price of a selected vend"

As with claim 1, Hooker discloses this limitation.

(v) "means including at least one price selection switch actuatable by a customer to initiate a vend cycle whenever the amount accumulated in the accumulator at least equals the vend price"

As with claim 1, Hooker discloses this limitation. (Tr. vol. 31, 90.)

(vi) "the improvements comprising means to inhibit the accumulator from initiating a vend or refund operation until after the customer has actuated one of the product selection switches at a time when the amount accumulated in the accumulator at least equals the selected vend price"

In Hooker, switches of set 48 and relays 100, 110, and 130 are the means to inhibit the accumulator from starting a vend until after the customer has actuated one of the product selection switches. FN46 ' 363 Patent col. 10, line 17-col. 11, line 17; (Tr. vol. 31, 91-99).

FN46. Mr. Upchurch's testimony on validity does not appear to discuss this claim limitation.

(vii) "said accumulator inhibit means including a control monitor circuit having an input control portion connected in circuit with the product selection switch"

In Hooker, the accumulator inhibit means includes a control monitor circuit which has an input control portion, one of the relays 100, 110, or 130, which is connected in circuit with one of the product selection switches in set 48. FN47 ' 363 Patent col. 10, lines 37-50; (Tr. vol. 31, 100-01).

FN47. Mr. Upchurch's testimony on validity does not appear to discuss this claim limitation.

(viii) "and energized by actuating said product selection switch at a time when the amount accumulated at least equals the selected vend price"

In Hooker, one of relays 100, 110, or 130 is energized by actuating one of the product selection switches of set 48 at a time when the amount accumulated by the totalizer at least equals the selected vend price. '363 Patent col. 10, line 17-col. 11, line 17.

(ix) "energization of the input control portion of the monitor circuit by itself being insufficient to cause a vend operation to take place"

In Hooker, energization of the input control portion (one of relays 100, 110, or 130) is insufficient to cause a vend operation to take place. For example, relay 130 can be energized to pay back change instead of to vend and in such a situation the energization of relay 130 will be insufficient to cause a vend. '363 patent col. 9, line 57-col.10, line 15.

(x) "an output portion of said control monitor circuit including means for generating a control output signal whenever the input control portion is energized"

In Hooker, an output portion of the control monitor circuit (which includes one of the contacts 104, 114, or 135) generates a control output signal whenever the input control portion (which includes one of relays 100, 110, or 130) is energized. '363 Patent col. 10, line 17-col. 11, line 17.

(xi) "and means including a gate circuit" FN48

FN48. At trial, Coinco's attorney attempted to challenge Mr. Kesner's testimony regarding a gate circuit and other elements via Def.'s exs. 877 and 878, which were diagrams showing shortened versions of the Hooker patent. The Court does not find these exhibits particularly helpful in this anticipation analysis. (See Tr. vol. 32, 83-98.)

At trial, Mr. Kesner testified that an AND gate could be built by placing two elements that form inputs to the AND gate in series with each other. (Tr. vol. 31, 79-85.) Mr. Kesner showed the Court pages from a textbook entitled *Electrical Engineering* by A. Bruce Carlson and David G. Gisser which explains that "[t]o build an AND gate with mechanical switches, we just connect them in series so that all switches must be closed to complete the electrical circuit...." (Plaintiff's ex. 36, at 530.) Mr. Kesner also testified that although the copyright date of this textbook was 1981, the working of an AND gate "was well known" before the date that the '903 Patent application was filed. (Tr. vol. 31, 84-85.)

Mr. Upchurch's report argues that "Mr. Kesner does not suggest how Hooker might be modified to include such a gate circuit, or point to any teaching which would suggest making such a combination." (Def.'s ex. 621A, at 9.) In light of Mr. Kesner's testimony and the *Electrical Engineering* textbook, Mars has provided abundant evidence that an individual of ordinary skill in the art would know that an AND gate circuit is logically same as two switches in series. Therefore, the "gate circuit" described in the '903 Patent includes two switches-or even two elements-in series. Nothing in the '903 Patent suggests any other interpretation for the words "gate circuit." The use of an AND gate in Figure 1 of the '903 Patent is simply a shorthand abstraction which includes the well-known concept of placing two elements in series in order to achieve the logical AND function.

One of the contacts 72 and one of the wiper switches 22, 24, or 26 of the totalizer in Hooker must be in series for a product to be vended. Therefore, Hooker shows an AND gate function responsive to the closing of contacts 72 and the wiper switches. '363 Patent Figs. 1, 2. (Tr. vol. 33, 74-75.)

(xii) "and vend control means"

In Hooker, timing motor 70 and contacts 72 are part of a vend control means. '363 Patent col. 10, line 37-col. 11, line 8; (Tr. vol. 31, 102).

(xiii) "said vend control means being energized whenever the gate circuit simultaneously receives input signals from the output of the accumulator and from the output portion of the control monitor"

In Hooker, contacts 72 are energized when both a signal from the totalizer and a signal from the output portion (one of contacts 104, 114, or 135) are active and are simultaneously received by the gate circuit comprised of the two switches. '363 Patent col. 10, line 37-col. 11, line 8; Figs. 1, 2; (Tr. vol. 31, 102-03).

(xiv) "said vend control means including means in circuit with the vend producing means operable to enable vend and refund operations to take place"

In Hooker, the vend control means includes contacts 72 which are in circuit with the vend producing means and operable to enable vend and refund operations to take place. Contacts 72 enable refund by not shunting out relays 100, 110, and 130. '363 Patent col. 13, lines 1-5; col. 3, line 58-col. 4, line 12.

7. Analysis of Claim 12

"The improvements in a vend control circuit defined in claim 11 including separate escrow means operatively connected to the accumulator, said escrow means including an escrow switch operable by a customer, and means under control of said escrow switch to cause total refund of an amount deposited up to the capacity of the accumulator, and means to disable the escrow means when said price selection switch is operated at a time when the accumulator has an amount accumulated therein at least equal to the vend price."

According to Mr. Kesner, Hooker discloses escrow means which are operatively connected to the totalizer. These escrow means include an escrow switch operable by the customer and means under control of the escrow switch to cause a total refund of the amount deposited up to the capacity of the accumulator. '363 Patent col. 4, lines 26-36; col. 8, line 45-col. 9, line 20. However, neither Mr. Kesner's report nor his testimony at trial revealed a means within Hooker to disable escrow. (See Plaintiff's ex. 120, at 19; Tr. vol. 31, 114-18.)

Mars asserts that "[t]he accumulator 20 is stepped back until it stops at its normal (home) position and further payout of coins is prevented thereafter." Mars' Post-Trial Memorandum at 38. As far as the Court can tell, Mars appears to be arguing that the prevention of further payout by the backward motion of the wipers anticipates the "means to disable the escrow means." However, the Court was not convinced by Mr. Kesner's trial testimony regarding the anticipation of claim 12. He did not directly address the language of claim 12 regarding "means to disable the escrow means," and did not convincingly explain the link between the prevention of further payout within Hooker and the means to disable the escrow means in the '903 Patent. (Tr. vol. 31, 114-18.) Therefore, Mars has not carried its burden to show by clear and convincing evidence that Hooker describes each and every limitation of claim 12 of the '903 Patent.

Mars also argues that Bowring U.S. Patent No. 3,703,229 discloses a means to disable escrow, and that it would be obvious for one of ordinary skill in the art to add this limitation to Hooker. Although Bowring may disclose this limitation, neither Mr. Kesner's expert report nor his testimony discussed a motive that would suggest the addition of this feature of Bowring to Hooker. Failure to show a motivation, suggestion, or teaching to combine prior art is fatal to any argument of obviousness. *Golight, Inc. v. Wal-Mart Stores,*

Inc., 355 F.3d 1327, 1335-36 (2004). The only evidence of motivation in the record arises from the prosecution history of the '903 Patent, where the examiner originally rejected claim 12 on the grounds that "it would be obvious from [Bowring] to provide the control circuit of [Hendrickson] with refund and escrow means." (Def.'s ex. 471, at 30.) Mars' reliance on the original rejection of the '903 Patent in the prosecution history is insufficient to prove a motivation, suggestion, or teaching to combine prior art.FN49 *See, e.g., Golight*, 355 F.3d at 1336. Therefore, the Court must conclude that one of ordinary skill in the art would not find it obvious to combine Bowring and Hooker in this way.

FN49. The inventor in *Golight* argued successfully against the examiner's original rejection on the basis of obviousness. In contrast, Mr. Levasseur did not dispute the examiner's findings of obviousness as the claims were originally written, but instead resubmitted his application with additional limitations to the claims. Because the patent examiner of the '903 Patent did not find claim 12 obvious after the changes made by Mr. Levasseur, the Court will follow the holding of *Golight* and also not rely upon the examiner's original rejection of the '903 Patent as the sole basis for the finding of a motivation, suggestion, or teaching that must accompany a conclusion of obviousness.

V. Conclusion

The Court has construed the claims of the '903 Patent and finds that Mars' 5900-series coin changers, when placed within Type 1 and Type 2 vending machines do not infringe claims 1, 2, 3, 4, 6, 11, and 12 of the '903 Patent. Alternatively, if the Court had construed the claims in the manner urged by Coinco, all asserted claims would be invalid for lack of an enabling disclosure, claims 1, 2, 3, 4, and 11 would be invalid for anticipation, and claim 6 would be invalid for obviousness.

The forgoing shall constitute the Court's Findings of Fact and Conclusions of Law under Fed.R.Civ.P.52.

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