

Dec. 10, 1968

E. C. WAHLBERG
PACKAGE HANDLING APPARATUS TRANSPORTATION
COST DETERMINING MEANS

3,415,348

Original Filed May 6, 1965

8 Sheets-Sheet 1

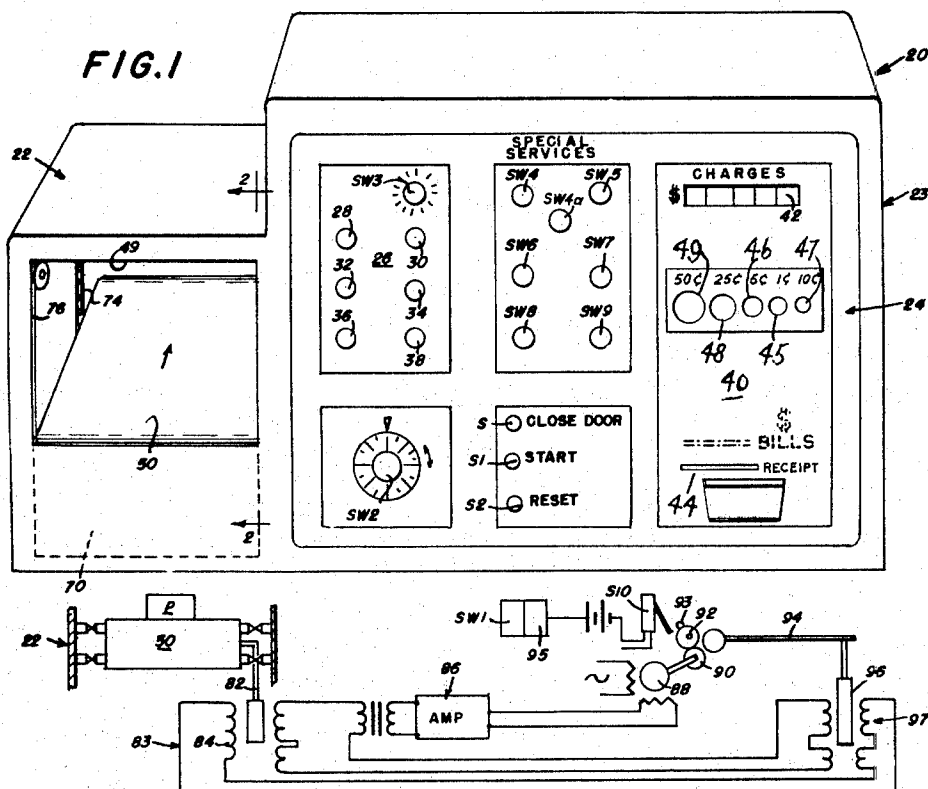


FIG. 4

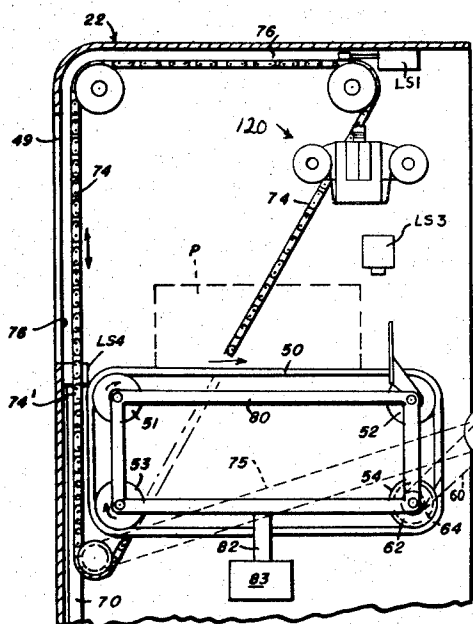


FIG. 2

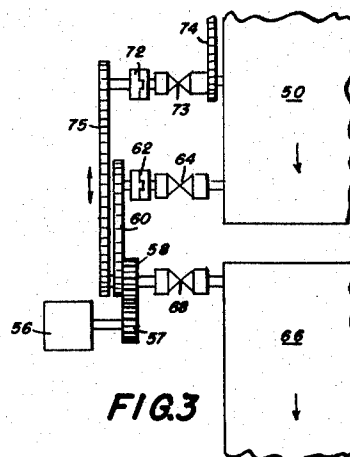


FIG. 3

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FIG. 6

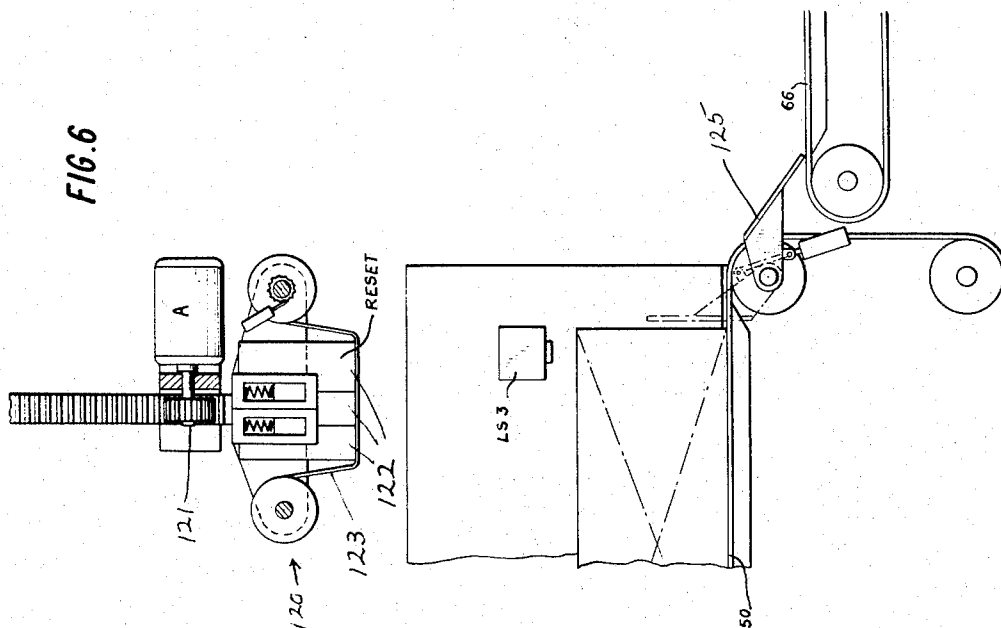
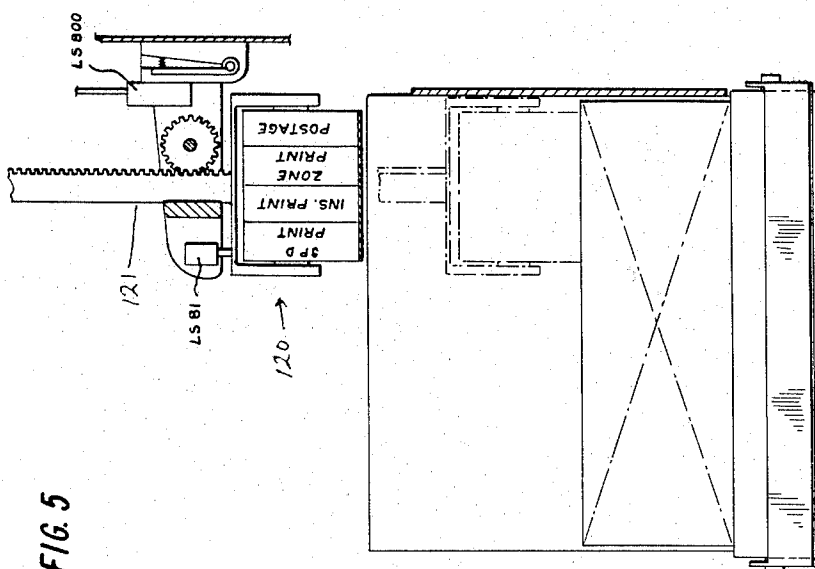


FIG. 5



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FIG. 7

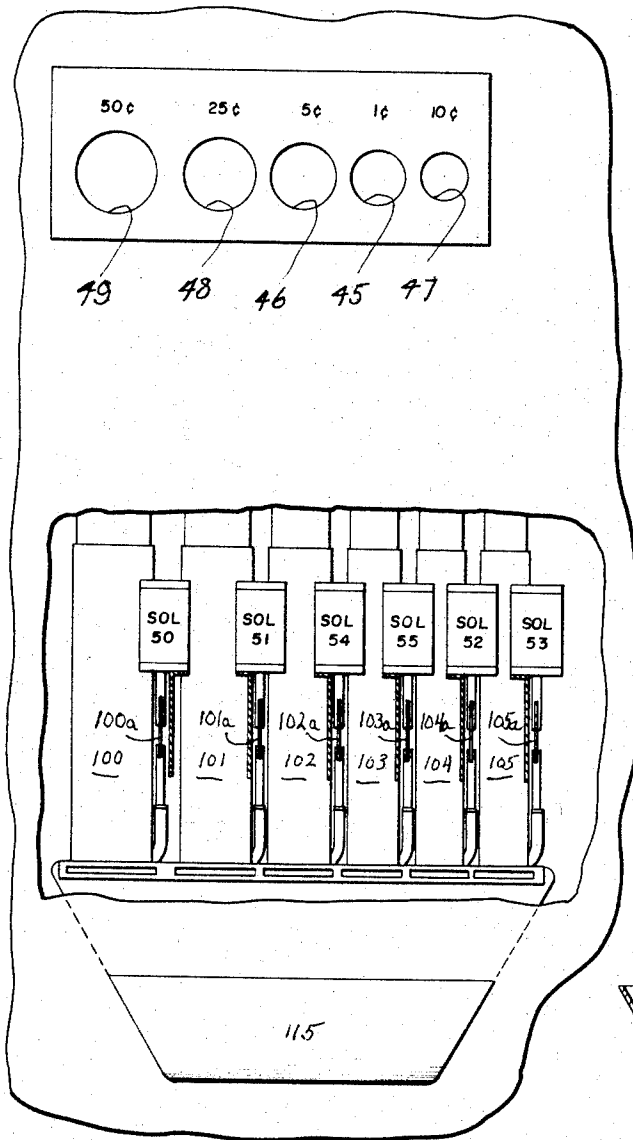
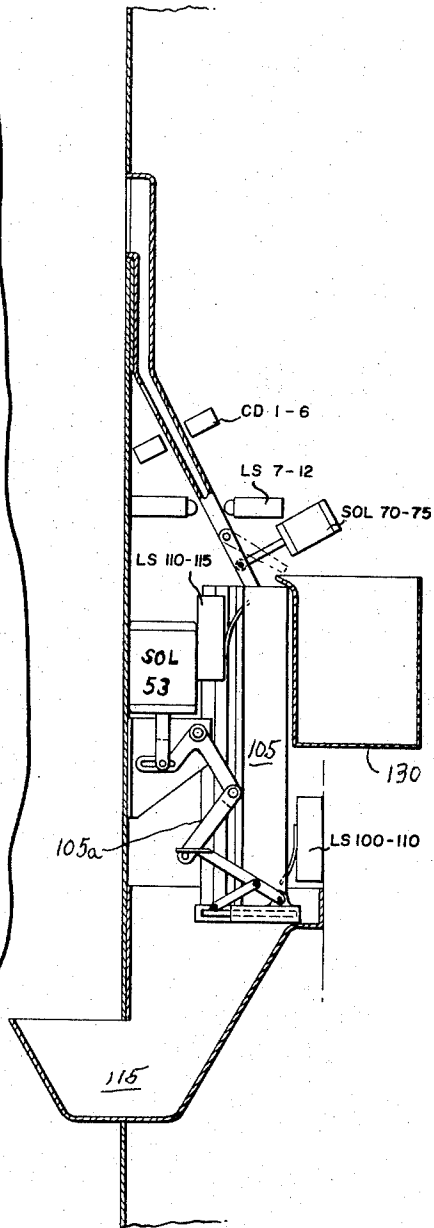


FIG. 8



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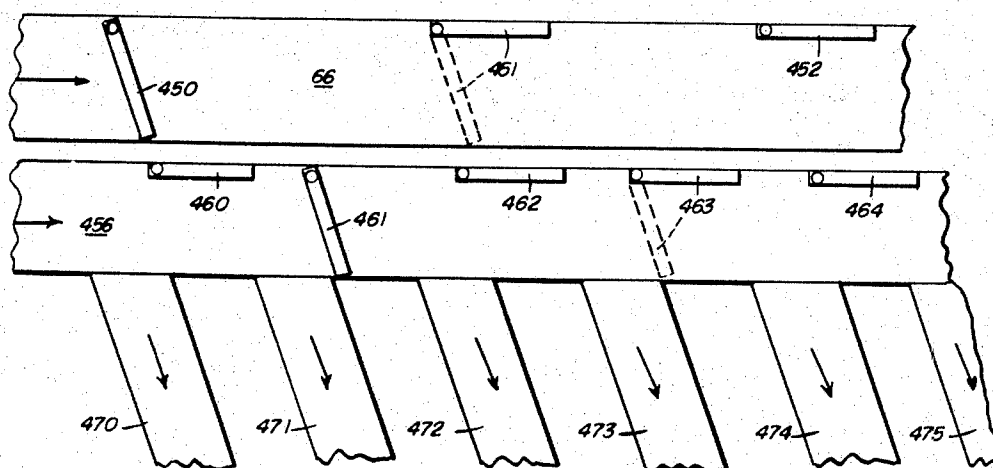


FIG. 9

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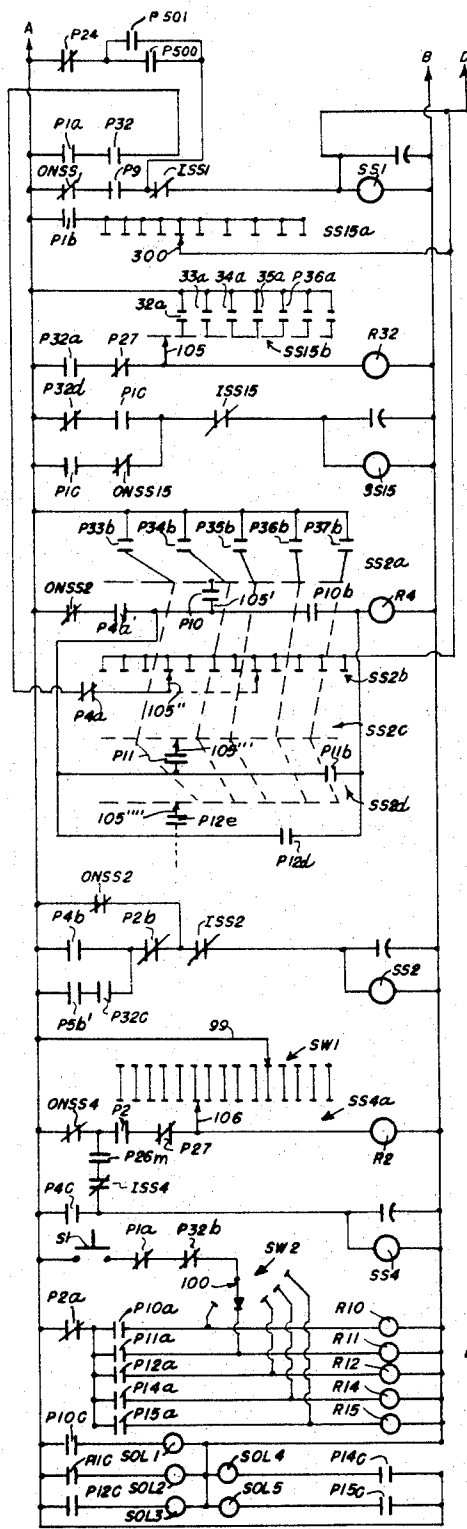
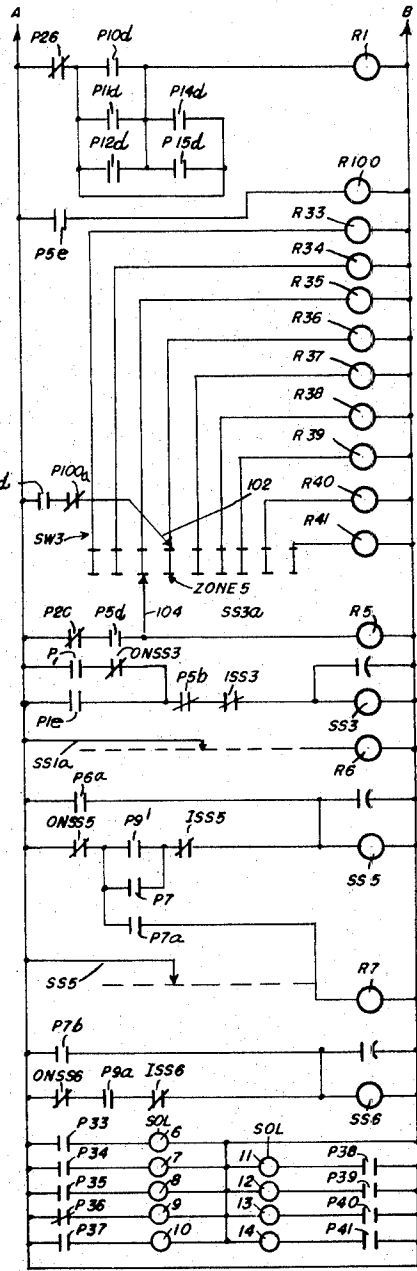


FIG. 10



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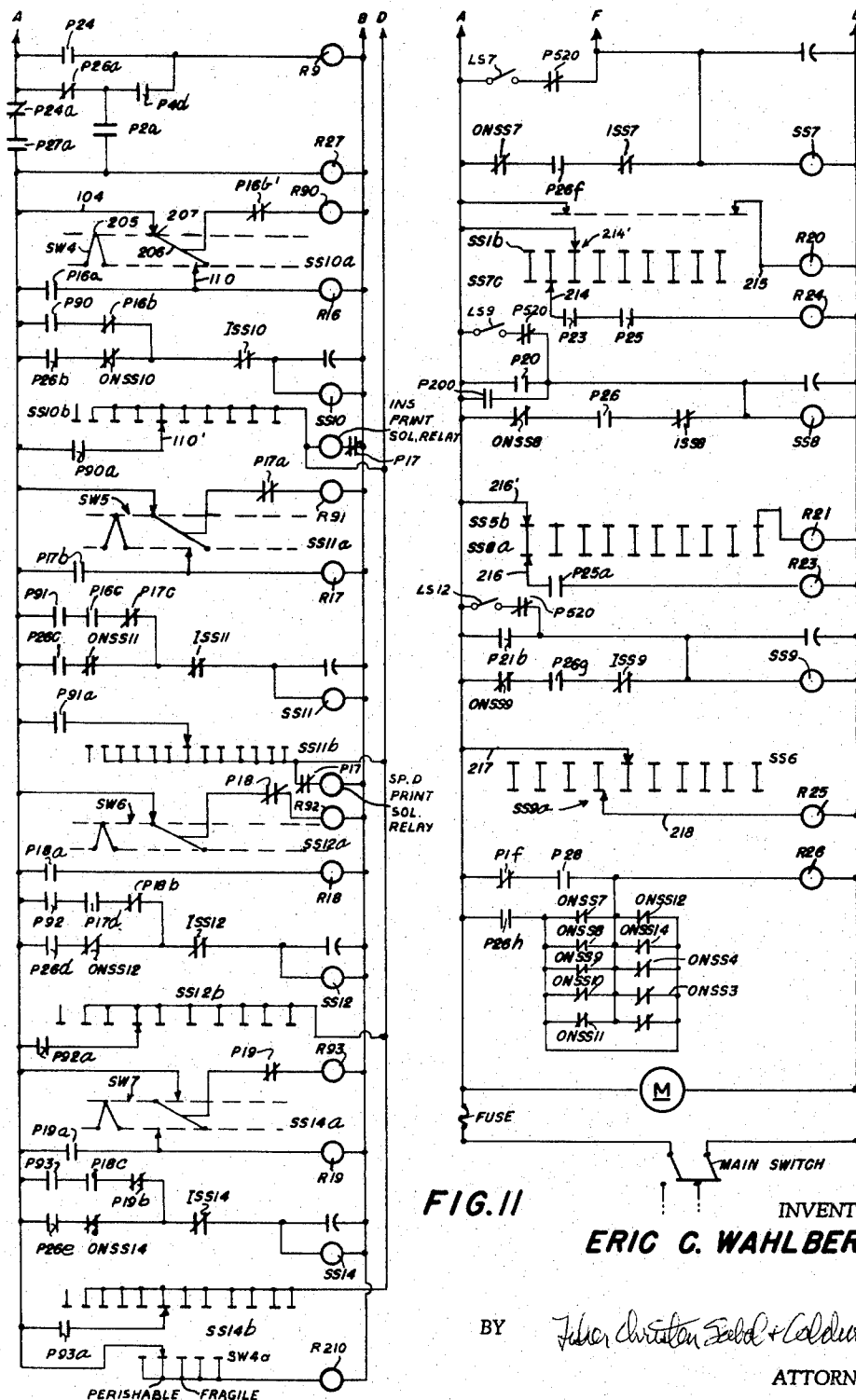
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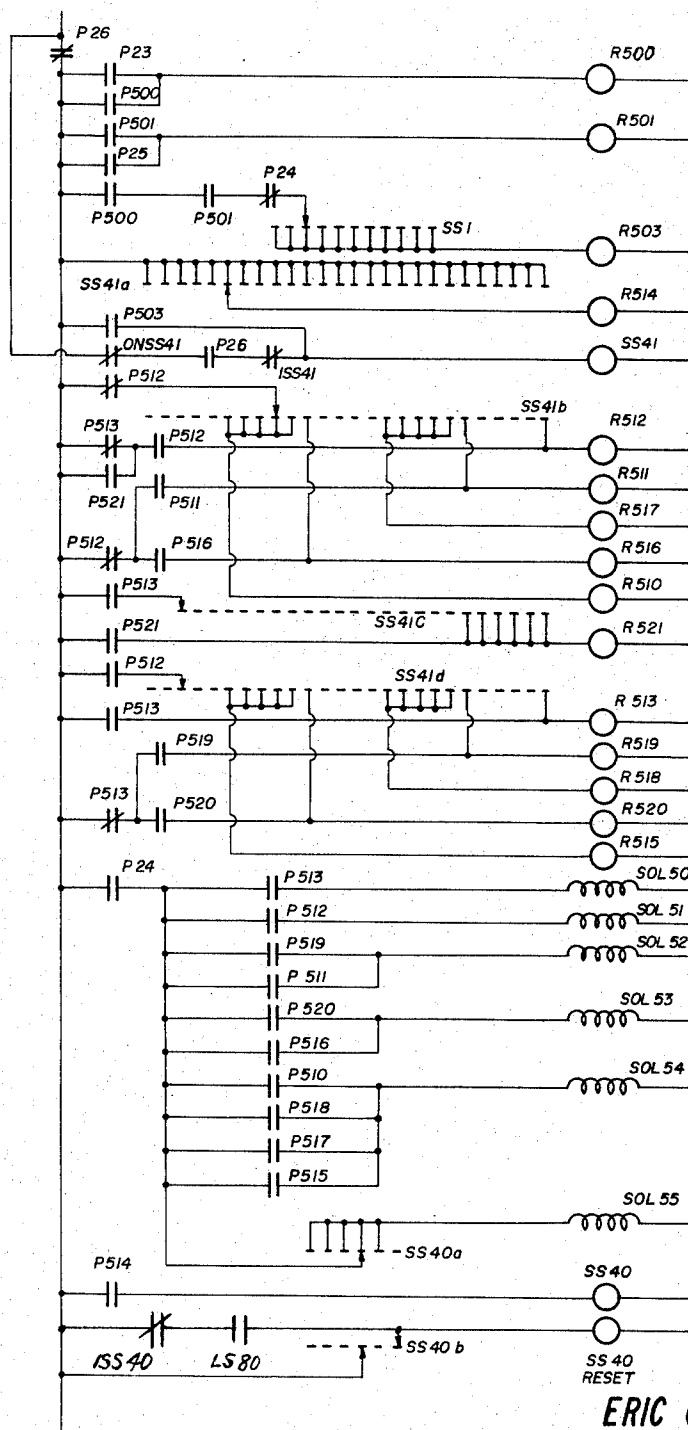
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FIG. 12



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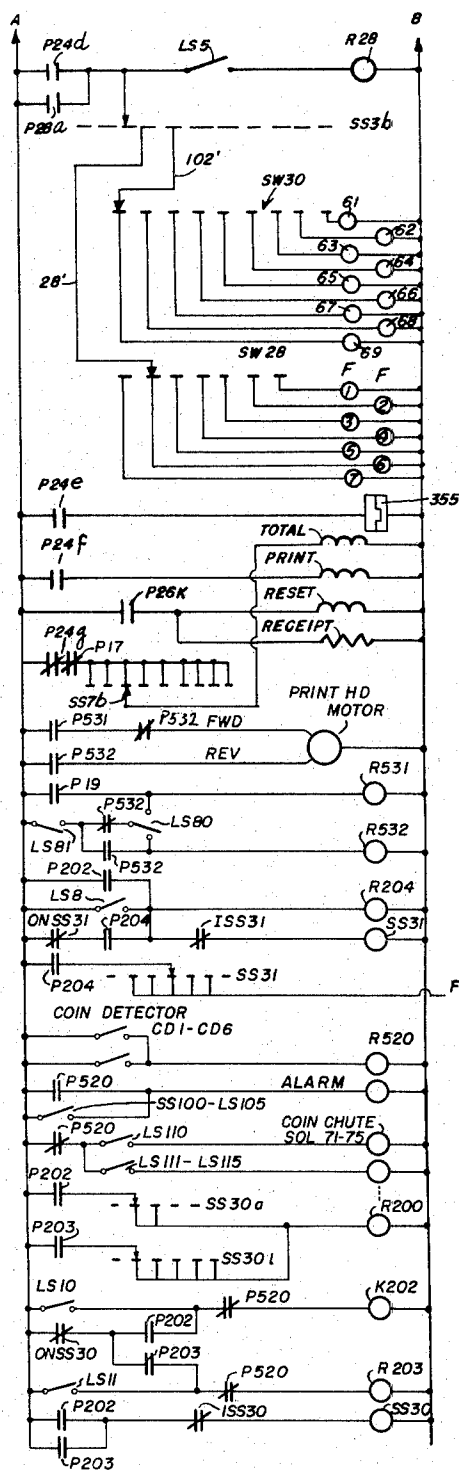
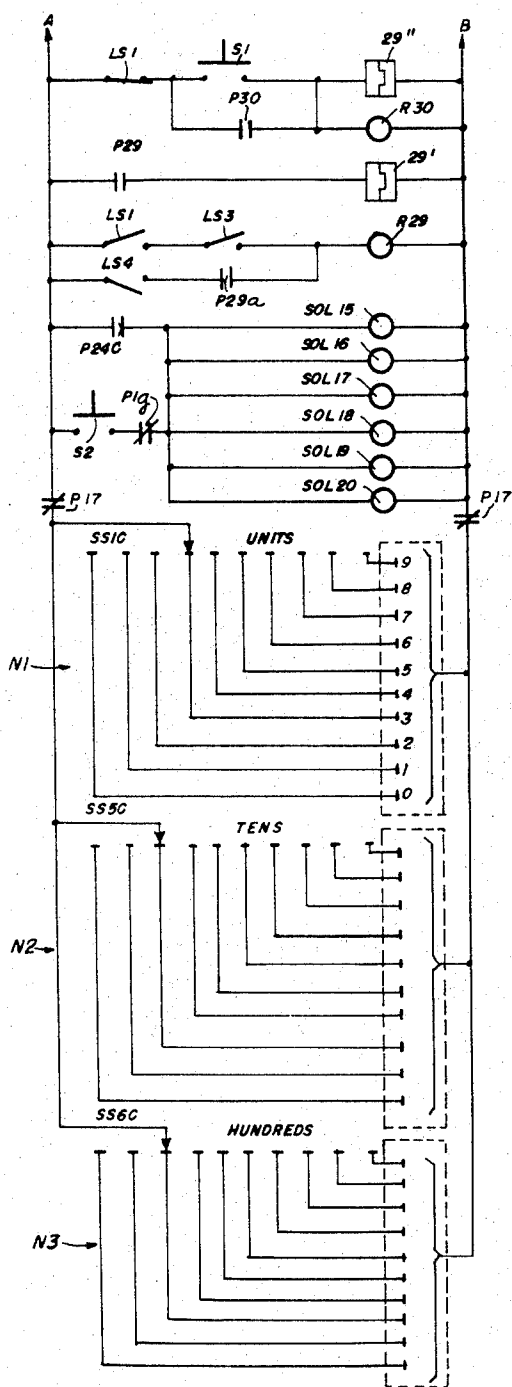
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COST DETERMINING MEANS

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3,415,348

PACKAGE HANDLING APPARATUS HAVING TRANSPORTATION COST DETERMINING MEANS

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Continuation of application Ser. No. 453,802, May 6,
1965. This application Jan. 8, 1968, Ser. No. 696,482
11 Claims. (Cl. 194-4)

ABSTRACT OF THE DISCLOSURE

Package handling apparatus comprising a mechanism for weighing the package and providing an output indicative thereof, circuitry for selecting the destination of the package, circuitry for selecting the classification of the package, means for combining the output from the weighing mechanism with the selected destination and classification of the package to provide an indication of the cost of transporting the package, a mechanism for receiving money and totaling the amount received and a mechanism for issuing a receipt, routing the package and dispensing change when the money received is equal to or greater than the transportation cost.

This application is a continuation of Ser. No. 453,802, filed May 6, 1965, now abandoned.

This invention is an improvement on the apparatus disclosed in my co-pending application, Ser. No. 117,980 and filed June 19, 1961, now Patent No. 3,290,491, which, in turn, is a continuation-in-part of my application Ser. No. 740,484, filed June 6, 1958, now abandoned.

In the invention disclosed and claimed in the prior application, means is provided for accepting a package, sensing the physical characteristics thereof, such as weight and also for accepting other information manually supplied by the operator of the apparatus and combining this information to indicate a value to the user. Following the receipt of this information, the user may then deposit currency equal to the value so indicated to cause the apparatus to dispatch the package to any one of a plurality of locations.

In the prior application the apparatus was shown as having particular utility in the postal service to provide an automated parcel post office. Such a system makes it possible for a customer to deposit a package, indicate its destination and whether the package is to be insured, specially handled or to receive the benefit of any other available service. However, the invention is capable of being adapted for use in related fields as in the case of manufacturing or merchandising organizations engaged in a type of business involving the handling of large quantities of diverse articles each having separate qualities and requiring individual treatment.

In the present invention the capabilities of this system have been increased to include means whereby the customer may not only initiate the dispatch of articles upon presentation of the correct amount of currency but may also accomplish the desired result upon the presentation of an excess of currency, the excess amount of currency being returned to the customer.

An additional improvement over the previously disclosed apparatus is the provision of means for imparting indicia to the package, such as by printing information indicating the time and place of deposit of the package and the value of the postage accepted by the machine. This may be done by providing a printing machine which includes automatically changeable dials for the value of the postage, these dials being operated in response to the mechanism for sensing the weight of the package and the information supplied manually by the customer. It will be understood that while the present invention relates to

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weighing a package and to values of postage the apparatus can be modified to sense other physical characteristics and to accept different types of intangible information relating to the package and that the information calculated from these factors could refer to values other than those of currency and postage. It will also be understood that indicia, such as magnetic ink, etc. may be imparted to the package.

Other objects and advantages of this invention will be apparent to those skilled in the art after reading the following specification in connection with the annexed drawings, in which:

FIG. 1 is a front perspective of a preferred form of the invention;

FIG. 2 is a diagrammatic sectional view along the line 2-2 of FIG. 1;

FIG. 3 is a partial plan view showing portions of the conveyors and drive structure shown in FIG. 2;

FIG. 4 is a diagrammatic view showing one type of weight measuring assembly;

FIG. 5 is an enlarged end view of the printer mechanism shown diagrammatically in FIG. 2;

FIG. 6 is a side view of the printer mechanism;

FIG. 7 is an enlarged front view of the coin changing mechanism shown in FIG. 1 with a portion of the front wall cut away;

FIG. 8 is a side view of the coin changing mechanism;

FIG. 9 is a diagrammatic plan view of the conveyor gate assembly, and;

FIGS. 10, 11, 12 and 13 are circuit diagrams of the calculating, balancing and coin changing mechanisms.

In general, the embodiment described below is for installation at a local post office. Assuming a person with a parcel or letter approaches the machine (FIG. 1), he would first note a package receptacle of a size determined by current post office regulations, and a control panel alongside the receptacle. Suitably situated on the machine would be an instruction panel explaining the steps necessary to operate the machine.

The instruction panel information discloses that the user should place his package in the receptacle. (Although not readily discernible to the operator, the bottom of the receptacle is a conveyor with an associated weighing means. The weight of the package activates a switch which closes a receptacle door, or as an alternative a manual door closing switch may be provided.) As will be described, the weight of the parcel is automatically transformed into useable data for the computations which are to be performed.

The remaining transmitting intelligence is then given to the machine by the operator via a series of control switches on the panel. A first control indicates the classification type of the item; that is, first class, second class, library book, film, catalogue, etc. A second set of controls permits the user to select the zone and city the particular parcel is to be sent. Another set of controls permits the user to select the special services desired such as special delivery and the like.

After all the necessary intelligence has been set in the machine, a start button is pushed and the machine calculates the amount of money necessary to send the package. The amount calculated is then posted in full view of the user.

Below the charge indicator, there are a series of coin-receiving slots. After the user deposits the amount of money posted on the indicator, the package in stamped with such information that is required—amount of postage, date insurance, etc. The receptacle conveyor is then actuated and the package started on its journey to its selected destination. In addition a package may be taken of the individual sending the package and of the package and the stamp information, if desired.

The various data in the machine may be forwarded to a data processing center for incorporation into that received from other machines. Such data could consist of the amounts of the various items contracted for.

It can be seen that the machine must digest and compare various physical data and intangible data through a wide range of values, calculate the results with precision, and activate various structures to perform their assigned functions.

Current post office basic charges are based, in part, on the weight of the package and the geographic zone to which the package is to be sent. The basic charge will also be dependent on the classification of the item. Whether the item is sealed against inspection, whether it is film, library material and the like will all influence the basic charge. Auxiliary special service charges for instance, special delivery, registered, air mail, and the like (which are normally fixed regardless of distance) must also be accounted for to give a total mailing charge.

The machine of this invention automatically correlates the variables such as weight, classification, and zone segments of the mailing charges, and transfers these charges to a totalizing means. The individual special services requested are also sent to the same totalizing means, and the totalizing means computes and posts a sum which is equal to the mailing charges. After coins equaling the mailing charges have been deposited in the machine, the totalizing means is balanced, the item is routed and all the information switches are returned to their neutral position.

Another object of the invention is to provide coin-operated apparatus wherein a coin, or coins having a value in excess of the amount required to actuate the apparatus may be inserted, and the requisite coin, or coins, to make up the difference will be dispensed.

Referring to FIG. 1, there is shown a mailing machine embodiment 20, comprised generally of a package receptacle 22 and a calculating console 23. The console along its front surface has a control panel 24.

The control panel has a classification switch SW-2 with its associated indicia, such that the type item to be mailed may be set into the machine. These indicia will indicate classification of the parcel. Above SW-2 is the zone and city panel 26. This panel has a zone switch SW-3 and a plurality of city switches 28, 30, 32, 34, 36, and 38. Each of the contacts of SW-3 and the city switches is connected to a solenoid-activated gate for routing the packages as will be described below. The zone switch, in addition to its routing function, will give computation intelligence which will be correlated with the weight of the parcel.

Also on panel 24 are a plurality of special service switches SW-4, SW-5, SW-6, SW-7, SW-8, and SW-9. These switches will give further intelligence to the console to enable it to calculate the charges necessary to mail the item. Each of these switches will be calibrated with the necessary information to perform its function. In the described embodiment, the switches SW-4, SW-5, and SW-6 respectively indicate the following services:

Insurance (calibrated in dollars)
Special Delivery (Yes and neutral positions)
Registered (Yes and neutral positions)

The remaining switches could be included as new services become available.

A door closing button S is located on the panel to close the door after a package is inserted. A start button S-1 and a reset button S-2 are arranged with the door closing button below the special services panel of switches. In the event an incorrect setting is placed on any of the dials prior to depositing money, S-2 provides means to remove the previous incorrect settings.

A coin-reception panel 40 has a charge-indicating dial 42, a receipt-issuing slot 44, and a plurality of coin slots 45, 46, 47, 48, and 49, corresponding respectively to pen-

nies, nickels, dimes, quarters and halves of dollars. Auxiliary equipment such as bill-recognizing devices may be used with this machine if desired.

WEIGHT MEASURING APPARATUS

The first intelligence received by the console is the weight of the package. Referring to FIGS. 2 and 3, it is shown that the bottom of receptacle 22 is a scale platform comprised of an endless conveyor belt 50 riding on 4 resiliently hung roller guides 51, 52, 53 and drive roller 54. The belt is driven by a motor 56 which is connected to drive roller 54 via gears 57 (FIG. 3) and 58, chain 60, clutch 62, and the flexible coupling 64. The motor 56 also drives a routing conveyor 66 via gears 57, 58 and a flexible coupling 68. An overhead type flexible door 70 is operated by motor 56 via gears 57, 58, chain 75, clutch 72, flexible coupling 73, and chain 74. Door 70 is connected to chain 74 at a point 74'. The door 70, which may be segments of heavy neoprene or the like, rides in a recess 76 along the receptacle opening 49 of receptacle 22. For purposes of clarity some of the above structure is shown diagrammatically.

The outer ends of each of the rollers 51, 52, 53, and 54 are supported to the receptacle frame by flexible coupling units similar to 64 and 68. A rectangular rigid framing member 80 is attached to the rollers in a manner which will not interfere with their rotation, but which will reflect the vertical deflection in the conveyor caused by the weight of a package on the conveyor assembly.

Attached to the bottom of frame 80 is an armature 82 movable within a weight-determining device 83. The assembly and its operation are diagrammatically shown in FIG. 4. The weight of a parcel P placed on conveyor 50 causes armature 82 to assume an unbalanced position within a differential transformer 84. The signal caused by this unbalanced condition is amplified by the amplifier system 86. The amplified signal is transferred to a servo 88 which rotates a gear 90. The gear 90 in turn is geared to both a cam gear 92 and to an armature linkage 94. Cam bearing 92 has a boss 93 thereon which will contact a leaf contact of switch S-10 upon each rotation thereof. Each contact of the boss 93 on the leaf contact activates a rotary solenoid 95. The solenoid 95 has an associated ratchet (not shown) such that the solenoid will assume and retain a particular position, depending on the number of activations received from S-10.

The solenoid 95 physically positions arm 99 (FIG. 10) of weight switch SW-1. The contact end of arm 99 lies along a bank of contacts of SW-1. Although the physical connection between solenoid 95 and arm 99 is not shown, they may be connected in any convenient or conventional fashion. A stepping switch SS-4, associated with SW-1, has a corresponding bank of contacts whose operation will be described herein below.

Referring back to FIG. 4, the linkage 94 (also operated by gear 90) moves an armature 96 within a transformer assembly 97 to develop a feedback signal to balance the signal in transformer assembly 84. This will inactivate the servo 88, stopping rotation of gear 92, when conveyor 50 has fully sensed the weight of the package. The rotation of gear 92 is calibrated so that each rotation will indicate a workable unit of postage weight. For instance, if each rotation indicates one ounce, this also would indicate a particular charge which may be represented along the contacts of SS-4.

CALCULATING MECHANISM

The machine at this point has its first item of intelligence represented by the position of arm 99 on SW-1. Each contact represents a unit of weight along the contact bank of its associated stepping switch SS-4. This weight item must be correlated with the classification of the item to be mailed, the post office zone of the packages' destination and the special services to be selected before any usable data is obtained. For this purpose, there is provided

the various switches on the console panel. The operator, after placing his parcel on the receptacle and closing door 70, begins making the proper setting on the other dials. The switch SW-2 is turned such that its indicator arrow indicates the items' classification. SW-3 is turned to the desired mailing zone, and likewise one of the switches 28 through 38 to the selected city.

Insurance switch SW4 has a dual dial (SW4 and SW4a). One dial relates to the nature of the contents of the package, perishable, fragile, non breakable, etc. The other dial relates to amount of insurance and is calibrated in values of money. SW5, the special delivery switch, merely has a neutral and a "Yes" position. Succeeding switches for registration, special handling, air mail, etc. may be added as the circumstances call for them.

The switch SS-1 (FIG. 11) is the totaling switch of the circuit. Pulses sent to this switch will represent the cost to the sender or operator. The weight and zone information must be correlated prior to pulsing SS-1, because the cost of sending a parcel of a certain weight will vary from zone to zone. The cost of the special services are the same regardless of weight, classification and zone and, therefore, can pulse SS-1 directly.

After each switch is set with its selected information and the item is on the conveyor, the start button S-1 (FIG. 10) is depressed.

When button S-1 is depressed, the circuit is closed through the selected contact on SW₂. This occurs through the normally closed contacts P_{1a} and P_{32b} and the associated relay in series with the selected contact, which in this case is R₁₁. The arm 100 of SW₂ working directly in response to the knob on the console closes the particular contact representing the classification of the package to select the relay R₁₁. R₁₀ and R₁₂ through R₁₅ each represent other non-selected classification relays.

R₁₁ is energized which in turn closes the normally open contact P_{11a}, locking the relay R₁₁ into the circuit with normally closed contact P_{2a}. R₁₁ selects a particular bank of contacts of SS-2, each bank of which in most instances have a different scale of values for different classification of the parcel. There can be only one classification of package in the receptacle at one particular mailing. The relays R₁₀ and R₁₅ are chosen by turning switch SW-2 to the classification of the package. For instance, if the switch stops on the first contact, R₁₀ will be energized or if on the last contact, R₁₅ will be energized. These relays will close their corresponding contacts such as P_{10b}, P_{11b} to select for the circuit a corresponding bank of contacts such as SS2a, SS2b, etc. At no time are two of these in the circuit at the same time. The banks shown are SS2a, SS2b, SS2c and SS2d, of course continue for as many classifications as the machine is adapted to handle. The relay R₁₁ causes contact P_{11d} to close, which brings into the circuit and energizes relay R₁. Relay R₁ opens the normally closed contact P_{1a}, which then positively removes SW₂ from the circuit.

For reasons of clarity the banks of controls SS2a, SS2b, SS2c and SS2d are shown quite diagrammatically. For purposes of this invention, however, it need only be understood that banks representing different values with circuitry identical to SS2a, may be selected.

In the example being described, let it be assumed that arm 102 (FIG. 10, right side) of zone switch SW-3 is at zone 5, which would be opposite a selected relay R₃₆. R₃₆ is energized because contact P_{1d} has been closed by the energizing of relay R₁. SW-3's corresponding stepping switch shown diagrammatically as SS3, by means of interrupted contact switch Iss3, steps its arm 104 along the bank of contacts until its position is on the same contact as arm 102. Relay R₅ is thus energized and held in the circuit by the closing of the normally open contact P_{5a}. Normally closed contact P_{5b} is opened causing SS3 to stop stepping. Further, the energizing of R₅, closes contact P_{5e}, causing relay R₁₀₀ to energize and open the

normally closed contact P_{100a}, the operation of which removes SW-3 from the circuit.

In the circuitry being described, the cost of sending a parcel of unit weight and having a particular classification is represented on the particular bank of SS2 selected. This cost multiplied by the zone number to which the parcel is to be sent will give the cost of sending a unit weight of a particular classification to a selected zone. This combined cost multiplied by the number of unit-weights in the parcel will give the basic mailing cost to send the parcel, exclusive of special services.

A stepping switch SS_{2b} is used to correlate the data from SW-2 and SW-3 and represent it to the totalizing switch SS1. There is normally a different charge for the first unit of weight for each zone. SS₁₅ takes this normally different charge and presents it to SS₁ before the remainder of the units are processed. An arm 105 responsive to stepping switch SS₁₅ will move until it reaches the closed contact P_{36a}. R₃₂ is then energized and SS₁₅ is stopped and deenergized. All the while SS₁₅ has been stepping, SS₁ has been pulsed through arm 300 and P_{1b}. When arm 105 of SS₁₅ has completed its cycle (arm 105 at P_{36a}), R₃₂ is energized and the classification of package circuit is placed in circuit through the closing of contacts P₃₂ and P₁ via line 301. Relay 36 when locked in, closes contact P_{36b} as well as P_{36a}. Since contact P_{1c} is also closed by relay R₁, stepping switch SS₁₅ will be stepped by interrupter switch ISS15 until the connection from contacts P_{36b} is matched by arm 105. At that instant, the relay R₃₂ is energized causing the normally open contact P_{32a} to close, locking R₃₂ in. The contact P_{32d} is opened, stopping the stepping of SS₁₅ and completing the circuit to the selected bank of contacts of SS2 by the closed contact P32. Also the stepping circuit to SS2 is energized through closed contacts P_{32c} and P_{5b}.

The selection of the bank of contacts of SS₂ to be used is accomplished through the setting of SW₂. This energizes a relay (in this case) R₁₁. R₁₁ closes contact P_{11a} and locks R₁₁ into the circuit. Also R₁₁ closes contacts P₁₁ and P_{11b} of the SS_{2a} bank of contacts of the SS₂ stepping switch. Thus the bank of contacts of SS₂ is established and arm 105''' is connected into the pulsing circuit.

The selected arm 105 (105''' in this instance) of the selected bank of SS2 will step and send pulses to SS1 until 105''' matches the contact P_{36b}. At that instant, R₄ is energized and locks itself in through ON SS2 and P_{4a}. When R₄ is energized, the continuing pulsing of SS2 (beyond contact 36_b) does not step SS1 since the P_{4a} contact has opened the pulse transmitting circuit of SS_{2b}. When arm 105' has stepped to its home position (not shown but to the right of P_{37b} as viewed in FIG. 10) it connects with off normal contacts of ONSS2 and opens the R₄ relay and the pulse transmitting circuit from SS2 to SS1 is re-established and arm 105' begins stepping again and transmits pulses to SS1 until it reaches P_{36b} when R₄ is energized again.

Each time R₄ is energized SS4 is stepped one as a result of P_{4a} closing the SS4 circuit. In effect, the circuit is multiplying the weight times the selected classification and the pulse equivalent of the zone chosen. In other words, SS4 represents the weight, R₃₆ is the selected zone equivalent, and R₁₁ is the classification of the package, in this case SS2c.

The stepping of SS2 and SS4 is automatically continued until arm 106 matches the weight switch as represented by arm 99. At this point, the number of pulses which have been sent to SS1 represent the cost to mail the parcel as far as weight, zone, and classification are concerned.

When arm 106 matches arm 99, the relay R₂ is energized which drops out Relay R₁₁ by opening P_{2a} and sequentially relay R₁ by opening P_{11d}. Any further stepping of SS15, SS4, or SS2 will not pulse SS1.

Stated another way, a particular level or bank of values on SS2 was selected for classification of the SW-2-R₁₁ circuitry. Through SW-3-R₃₆ circuitry, the classification value and zone were combined to determine the number of pulses SS1 should receive per unit of weight. The weight determined by the SW-1 conveyor arrangement determines the number of times the value computed by the classification-zone circuitry should be multiplied and sent to SS1. The stepping procedures of SS2 and SS4 continues until SS4 matches the weight switch SW1. When this occurs, relay R₂ is energized. When SS4 matches arm 99 of SW1, the energization of relay R₂ drops out R₁₁ and R₁.

All circuits mentioned above are now opened excepting the homing circuits. Homing circuits are those circuits which operate after R₂ is energized and merely return the stepping switches to their start position. Now any further stepping of the aforementioned steppers does not step the SS1 stepping switch. SS2, SS4, and SS15 are independently homed by means of their associated interrupter and off normal contacts, and such stepping does not pulse SS1 as far as the transaction being described is concerned. The homing of stepping switches is well within the understanding of those skilled in the art.

The charges, as represented by steps or units along SS1, must be represented in a more usable form. This is accomplished through stepping switches SS5 and SS6, representing tenths and hundreds while SS1 is used to represent units. This can best be observed by referring to the right hand portion of FIG. 10.

In the process of stepping SS1 in the foregoing procedure, after every ten steps, R₆ is energized and SS5 is pulsed one step. Likewise, when SS5 has reached its tenth step, relay R₇ pulses SS6 one step. As can be seen, the number of steps along SS1 are now represented in hundredths, tenths, and units along SS6, SS5, and SS1, respectively. The basic charge to mail the parcel is now represented on these switches. The total charge will depend on whether any special services are selected.

SPECIAL SERVICES

As seen in FIGS. 10 and 11, relay R2, having been energized in the foregoing procedure, has energized R27, by closing the normally open contact P2a. R27 locks itself in by closing R27a. This establishes the necessary connections so that the special service switches SW4, SW5, SW6, etc. may be scanned. The services are scanned successively beginning with SW4. The insurance switch is in two parts; contents and amount. The contents switch is in several steps and may include condition of fragile, perishable etc. and not damageable. Those packages which are dialed any thing but not damageable are routed to place where it is examined for packing and OK'd or returned to the sender for compliance. Those dialed as having nondamageable are sent to the proper routing by information in the machine. Although the switch is represented as the multi-contact type, it has a two position switch arm 104 for the instant purposes. The multi-contact arrangement is preferable in the event in the future, special services of varying degree and cost become available. Point 205 represents the neutral or "No" position and Point 207 represents the "Yes" position. The shunt 206 can be varied by a mechanic as the particular charge for a service might vary according to changing Post Office regulations.

When arm 104 is at point 205 (neutral), R16 will be energized, thus transferring to the next service as represented by SW5. However, if arm 104 of SW4 indicates that the service is desired by making contact with point 207, R90 is energized thereby closing the circuit to stepping switch SS10a and the SS10b circuit by closing P90a and then to the SS1 counting circuit. In conventional fashion SS10 will step arm 110 and 110' until arm 110 is opposite the electrical point 207. Each step in the matching arm 110 is accompanied by a like step in the

pulse arm 110'. Each step, therefore, will pulse SS1 and add to charges represented on SS1, SS5, and SS6.

After point 207 is reached by arm 110, relay R16 is energized and locks itself in by closing P16a, and thereby transfers the circuit to SW5. Concurrently, R90 is de-energized by the opening of P16b'. This procedure continues until all the services SW6, SW7, etc. are scanned and passed or their counting pulses sent to SS1 in exactly the same fashion as that described for SW4.

COIN MATCHING CIRCUITRY

The machine provides the stepping circuitry to recognize the coins fed to the machine in response to the counting mechanism. The coin recognizing circuit includes coin switches LS7-12 corresponding to pennies, nickels, dimes, quarters, halves and dollars, respectively. In FIG. 11, LS7 pulses SS7 once for each penny inserted in the machine. LS12 pulses SS9 once for each quarter inserted. LS9 pulses SS8 one for each dime inserted.

In FIG. 13, LS8 energizes R204 for each nickel and locks itself in through P204 and ONSS31 causing SS31 to step until ONSS31 is reached. This causes five pulses to be transmitted to SS7. LS10 for each quarter energizes R202 which locks itself in through P202 and ONSS30 causing SS30 to step until ONSS30 is reached. This causes pulses to be generated in SS30a that cause R200 to pulse twice. This steps SS8 in FIG. 11 twice through contact P200. Also, SS31 is stepped as described above by means of P202 energizing R204. Thus five pulses are imparted to SS7. LS11 for each half dollar energizes R203 which locks itself in through ONSS30 and P203. SS30 is pulsed to ONSS30 during which time five pulses are generated to R200. In FIG. 11, R200 pulses SS8 five times in response to SS30.

Thus money values may be inserted in the machine and be added together to form a total which is compared with the cost calculations. When the value becomes equal to the cost calculations, relays R23, R24 and R25 will be energized. However, if the insertion is more than the cost calculation, then the procedure continues as described under coin dispensing. The coin matching circuitry operates in the same manner as described under calculating mechanism except as mentioned above.

COIN DISPENSING CIRCUITRY

When coins have been counted SS7, SS8, SS9 have stopped in one of two positions relative to corresponding SS1, SS5, SS6 positions.

Normally, it is hoped that the coins will match the calculated cost. If so, the stepping switch positions would match. The package would be stamped and routed and the machine reset for the next package.

It is quite possible that the correct change is not at hand. In that event the coin stepping switches would go beyond the position of the cost switches. The number of positions beyond would determine the amount of over payment. Since the coin switches have gone by the match point, R23, R25 have been energized and through them R500, R501. This allows SS1 to be self pulsed or timer pulsed.

As SS1 is stepped, R503 is pulsed and through P503, SS41 is pulsed. SS41 has four active levels, the first level SS41a is used to pulse R514 which in turn pulses SS40. The second level SS41b is divided into several portions. The first four contacts are open, the next five are tied together and connected to R510. The eleventh position is connected to R516 and the next four are open. The next five are connected together and to R517. The next contact is connected to R511. The next four are open. The next is connected to R512. Similarly, level SS41d has similar portions and each corresponding portion is connected to R515, R520, R518, R519, and R513. On level SS41c, two contacts before the last five are connected together and to R521. The contacts of these relays R510-R520 control coin ejector solenoids 50-55.

As the value of the money deposited is added into the computer section, it may pass the calculated cost. In that case R23 and R25 would have been energized. R500 and R501 are thereby energized and locked in. SS1 is pulsed through R500, P501 and ISS1. This causes R503 to be pulsed. P503 pulses SS41. As SS41 is pulsed, level SS41a-SS41b are scanned. Each step of SS41a causes pulsing of R514 which pulses SS40 through contact P514. The fifth contact of SS40 resets it through SS40 reset and SS40b. The sixth contact of SS41b energizes R510 which is held in through the tenth contact after which it is de-energized. Solenoid 50 is made ready by closing of P510, during energization of R510. On the eleventh contact, R516 is energized and locked in through P516 and P512. The stepping continues to the sixteenth contact, where R517 is energized and held in by SS41b through the twentieth contact when it is removed from the circuit. On the 21 contact R511 is energized and locked in through P512 and P511. On the 26 contact R512 is energized and locked in through P512, P513.

As a result, R516 and R511 are de-energized by contact P512 opening. As R512 is energized the circuit to SS41b is opened and circuit to SS41d is closed. Further pulsing produces the preceding effect on level SS41d utilizing R515, R520, R518, and R519, until the 26 contact when R513 is energized and locked in by P513. R513 switches circuit back to SS41b as R512 is de-energized. The above procedure may now be repeated on SS41b followed by SS41d. SS41c is utilized in the holding of R512 in the circuit in the second go around of the circuit through R521 and P521. Whenever the inserted money value is matched by SS1, SS5, SS6, the solenoids which are in the circuits of closed relay contacts may be energized by the closing of the "match contact" P24. The solenoids then eject the proper coins from the coin holder. The entire circuit is reset by opening contacts P26.

P513 controls SOL50 (50¢ actuator), P12 controls SOL51 (25¢ actuator), P19, P511 control SOL52 (10¢ actuator), P520, P516 controls SOL53 (10¢ actuator) and P510, P518, P517, and P515 controls SOL54 (5¢ actuator).

ROUTING ASSEMBLY

When the package is placed on the weighing platform, S1 is pushed to close the door by means of door clutch 29". When the door is closed LS1 is closed and clutch 29" is energized and conveyor 50 begins traveling.

As the item is transferred from conveyor 50 to conveyor 66, switch LS₂ is contacted which causes relay R₂₉ to be energized which in turn is connected to open door 70. When the door is open, the door will actuate LS4 and clutch 29 and R29 are deenergized, and the next item may be inserted.

When the item mentioned previously is passing out of the weighing chamber it contacts its selected routing gate along the conveyor 66, LS5 is actuated causing relay R28 to be deenergized.

Relay R₂₄ also energizes relay R₂₈ (via P_{24a}) which locks itself in via contact P_{28a} and LS5. This in turn energizes the gating solenoids selected by SW3 and the city selected switches 28 through 38. The conveyor clutch solenoid is for operation of conveyor 50 also energized by the energizing of Relay 24.

Referring now to FIG. 9, a plurality of gates such as 450, 451 and 452 are angularly spaced along conveyor 66. These gates are hinged to swing across the conveyor and push a parcel onto a traveling conveyor 456 which is parallel to 66 and slightly below. The gates are controlled by solenoids such as 61-69 shown in FIG. 13. The arm 105' which works concurrently with arm 102 of SW3 selects the particular gate to swing transverse of conveyor 66 and force the mailed parcel to conveyor 456.

Spaced along conveyor 456 are a plurality of city gates 460, 461, 462, 463, etc. A series of the city gates such as 461, 462, and 463 are present for each zone gate, in

this case zone gate 450. As seen in FIG. 13 these gates are controlled by a series of city solenoids F1-F6. The arm 28', for instance, is the contact arm of switch 28.

A plurality of transverse conveyors such as 470, 471, 472, 473, etc., are positioned opposite each of the city gates. These conveyors lead to assembly centers where the parcels may be further processed.

INDICATOR ASSEMBLY

In FIG. 13, indicator lights N1, N2, and N3 record the charges for the services. The unit light circuit is controlled by stepping switch SS1 and SS1c. The tens light N₂ circuit is controlled by stepping switch SS5 and SS5c. The hundreds light circuit N₃ is controlled by stepping switch SS6 and SS6c. The particular means for making this representation is not within the scope of this invention. The particular indicator used to transfer the data from SS1, SS5, and SS6 is not important and is not within the scope of this invention. Any indicator which will indicate the data gained from the position of the contact arms of the counting switches in dollars and cents will be sufficient.

MISCELLANEOUS CIRCUITRY

The following limit switches are included in the routing assembly:

LS1 is contacted and closed by door 70 when the door fully closes the receptacle.

LS3 is contacted and closed by package as it leaves the conveyor 50.

LS4 contacted and closed by door 70 when the door is in the open position.

LS5 which is connected in series with the gating solenoids and controls energization of relay 28.

Solenoids 15-20 are used to reset all the switches on the panel when R₂₄ is energized. As can be seen, R_{24c} closes the circuitry to these solenoids when R₂₄ is energized. Solenoid 95 is provided to reposition the weight switch upon each cycle of operation.

The closing of reset switch S2 will accomplish this same function.

The representations made on FIG. 13 of "Total," "Print," "Reset," and "Receipt" are merely inserted to show the ease of inserting and adapting new circuitry to the invention.

It should be noted that for clarity of operation, similar components in similar banks of circuits have the same numerals with different letter designations.

COIN DISPENSING MECHANISM

The coin dispensing means comprises coin tubes 100; 101; 102; 103; 104 and 105, one for 50¢, one for 25¢, and one for 5¢, one for 1¢ and 2 for 10¢ fitted with single action coin dispensing blades together with cooperating solenoids SOL50; SOL51; SOL52; SOL53 and linkages 100a; 101a; 102a; 103a; 104a; and 105a for actuating the dispenser, coin detecting means; coin chute; coin receptacle 130; low coin storage switch; full coin storage limit switch; coin gate means operated by solenoids SOL70; SOL71; SOL72; SOL73; SOL74 and SOL75, and a coin receiving receptacle.

The coin receiving panel 40 has five openings, 45, 46, 47, 48 and 49 located on the front of the cabinet. Each opening has a chute attached to it leading to corresponding coin tubes. Each chute is fitted with a coin and slug discriminating means and a coin detecting means. The coin discriminating means determines whether it is genuine or not. If it is not genuine the counting circuitry is disconnected through R520 and the alarm is sounded. The bad coin can be ejected by corresponding gating solenoids 70-75. Also, a picture taking circuit can be actuated.

The coin detecting means is a photoelectric or limit switch for determining the coin and registering its value in the receiving circuit LS7; LS8; LS9; LS10; LS11 and LS12.

These limit switches actuate the proper circuits by energizing corresponding relays in the circuit as described under circuitry.

A limit switch is provided in each tube to determine when it is full, at which time the LS energizes solenoid to swing a coin gate to the receptacle 130 so that the coins will go to the receptacle rather than the full tube.

A limit switch is provided at the bottom of each tube to indicate an empty tube. These limit switches sound an alarm.

Each tube is provided with mechanism common to generally known manual change making equipment with a solenoid added to each tube mechanism. The solenoids are controlled (as described in the circuitry) by relays to cause the solenoids to actuate change making mechanism as directed by computer circuitry.

The change falls down into a cup 115 from where the sender retrieves the coins.

PRINTING MECHANISM

The printing mechanism (see FIGS. 5 and 6) consists of a vertical moving printing assembly 120 lowered by some such means as a rack and pinion 121 operated by a gear motor A energized on command of control circuitry. The unit is mounted by means of a spring biased hinge to the receptacle wall. A switch is mounted on the hinge to determine when the front print wheels have contacted the package on the conveyor. This switch is used to reverse the motor and raise the print mechanism.

Any standard print wheels 122 such as Pressin Co. MD5R may be used as an assembly to represent the desired date such as postage insurance amount, serial number etc. These units are mounted in a yoke in such a manner as to provide even pressure on an uneven surface and to align with the surface.

One method of providing print is to use ribbon 123 between print wheels and package similar to a typewriter being moved, as in a typewriter, by the print head.

The print heads are actuated by the circuitry to reproduce the values of the machine.

For simplicity, the package should be placed in a reference corner so that print head will always come down onto the package. To accomplish this, a combination front stop and transfer plate 125 is located to the rear of the receptacle and hinged on the conveyor shaft. In the upper position it serves as a stop for the package. In the down position it serves as a bridge from the weighing conveyor to the outside conveyor. The stop is lowered by means of a solenoid and spring biased toward the upper position.

A stop is located on the side of the conveyor as a side reference for the package. When the door is closed this stop should, but not necessarily, move away from the conveyor.

When the package is placed against both stops it will be in position for receiving proper printing of information relayed from circuitry.

The procedure would be as follows:

The sender would place the package in the receptacle. The door would be closed and stops could be removed from the package. Information such as weight, zone, etc. would be fed into the circuitry. As the computations are made the various printer wheels are positioned to satisfy the circuit-requirements through circuit connections. After all requirements of computation and payments have been made a signal is given for the motor to drive the print mechanism down to the package and through the ribbon print the information dictated by the circuitry are results of computations, etc. As soon as enough resistance has been met to compress the hinge spring to the point where the LS is actuated the motor is reversed and the print head brought to its original position where it has contacted a limit switch which stops the motor.

PRINT HEAD CIRCUITRY

When the last special services item is recorded a relay R19 is energized which closes the circuit to R531 through P19. P531 closes the circuit to print head motor A in FIG. 6. This causes the motor to run in a direction which lowers the print head to the package. As the print head contacts the package with a pressure determined by the hinge bias spring, LS 800 closes circuit through LS 81, P532 to R532. This causes the make before break contacts in the R532 circuit to lock R532 in through LS81. P532 also opens motor lowering circuit and closes motor raising circuit. As soon as the motor starts to raise print head, SL 800 opens. When print head reaches the position, LS 81 opens. Since R19 has dropped out by R24 energizing, the print head is ready for the next cycle.

Print wheels on print head are positioned by pulses generated from their corresponding steppers, i.e., SS10b is used to position the insurance print wheel as represented by in FIG. 11 by print sol and in FIG. 6 by print wheel 122.

Having disclosed one form in which the invention may be practiced, it will be evident to those skilled in the art that modifications and improvements may be made which would come within the scope of the annexed claims.

What is claimed is:

1. Package handling apparatus comprising first means for sensing a physical characteristic of the package and providing an output representative thereof;

second means for selecting the destination of the package and providing an output representative thereof; and

cost representation means including third means connected with said first means and said second means for combining the outputs thereof to determine a total transportation cost for the package in accordance with a physical characteristic and the destination of the package.

2. The invention as recited in claim 1 wherein said cost representation means further includes fourth means for selecting special services and providing an output representative thereof; and fifth means connecting said fourth means with said third means whereby said third means provides a total transportation cost for the package in accordance with special services selected for the package, a physical characteristic and the destination of the package.

3. The invention as recited in claim 1 wherein said first means senses the weight of the package.

4. Package handling apparatus comprising first means for sensing a physical characteristic of the package and providing an output representative thereof;

second means for selecting the destination of the package and providing an output representative thereof; third means connected with said first means and said second means for combining the outputs thereof to determine a total transportation cost in accordance with a physical characteristic and the destination of the package;

fourth means for receiving money and providing an output representative of the total amount of money received;

fifth means connected with said third means and said fourth means for comparing the outputs thereof; and sixth means connected with said fifth means and responsive thereto to dispense change equal to the difference in total money received and the total transportation cost.

5. The invention as recited in claim 4 wherein said sixth means includes seventh means for issuing a receipt when the total money received is equal to or greater than the total transportation cost.

6. The invention as recited in claim 4 wherein said

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sixth means includes seventh means for printing destination and transportation cost information on the package when the total money received is equal to or greater than the total transportation cost.

7. The invention as recited in claim 4 wherein said sixth means includes conveying means for routing the package when the total money received is equal to or greater than the total transportation cost.

8. The invention as recited in claim 4 wherein said first means senses the weight of the package.

9. The invention as recited in claim 8 wherein said first means provides an output in units of weight; said second means provides an output representing transportation cost per unit weight; and said third means includes means for determining the total transportation cost by multiplying the unit weight transportation cost from said second means by the output of said first means.

10. Automatic mailing apparatus comprising first means for sensing the weight of an item to be mailed and providing an output representative thereof in units of weight;

second means for classifying the item to be mailed;

third means connected with said first means and said second means and responsive to said second means to represent mailing cost per unit of weight;

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fourth means connected with said third means and responsive thereto to provide an output representative of the total mailing cost in accordance with weight and classification of the item to be mailed;

fifth means for receiving money and providing an output representative of the total amount of money received;

sixth means connected with said fourth means and said fifth means for comparing the outputs thereof; and seventh means connected with said sixth means and responsive thereto to dispense change equal to the difference between the total mailing cost and the total amount of money received.

11. The invention of claim 10 wherein said third means includes eighth means for multiplying the output of said first means in units of weight by the mailing cost per unit of weight.

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