

Nov. 20, 1962

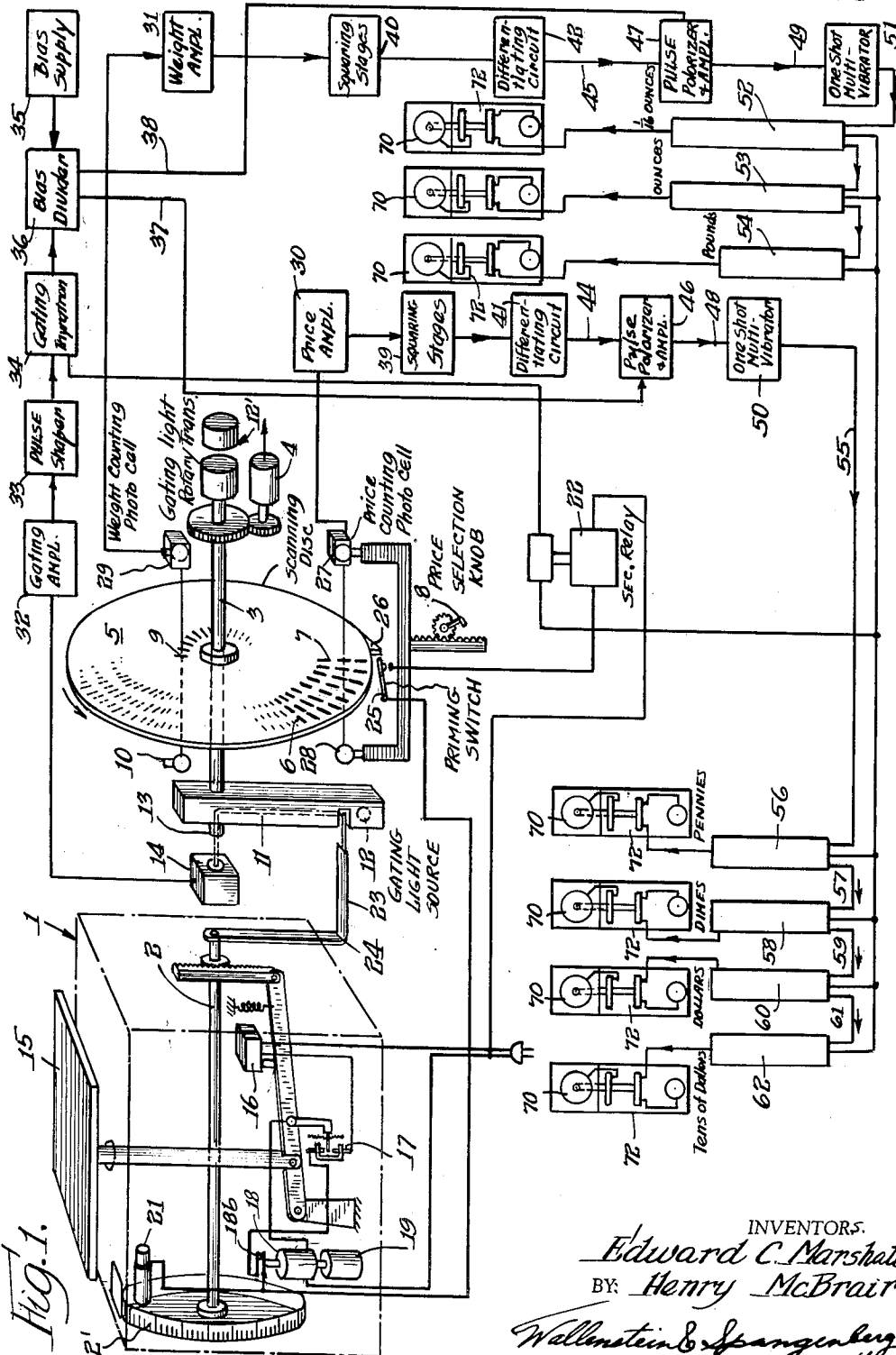
E. C. MARSHALL ETAL

3,064,743

PRICE MARKING MACHINE

Filed Feb. 4, 1957

7 Sheets-Sheet 1



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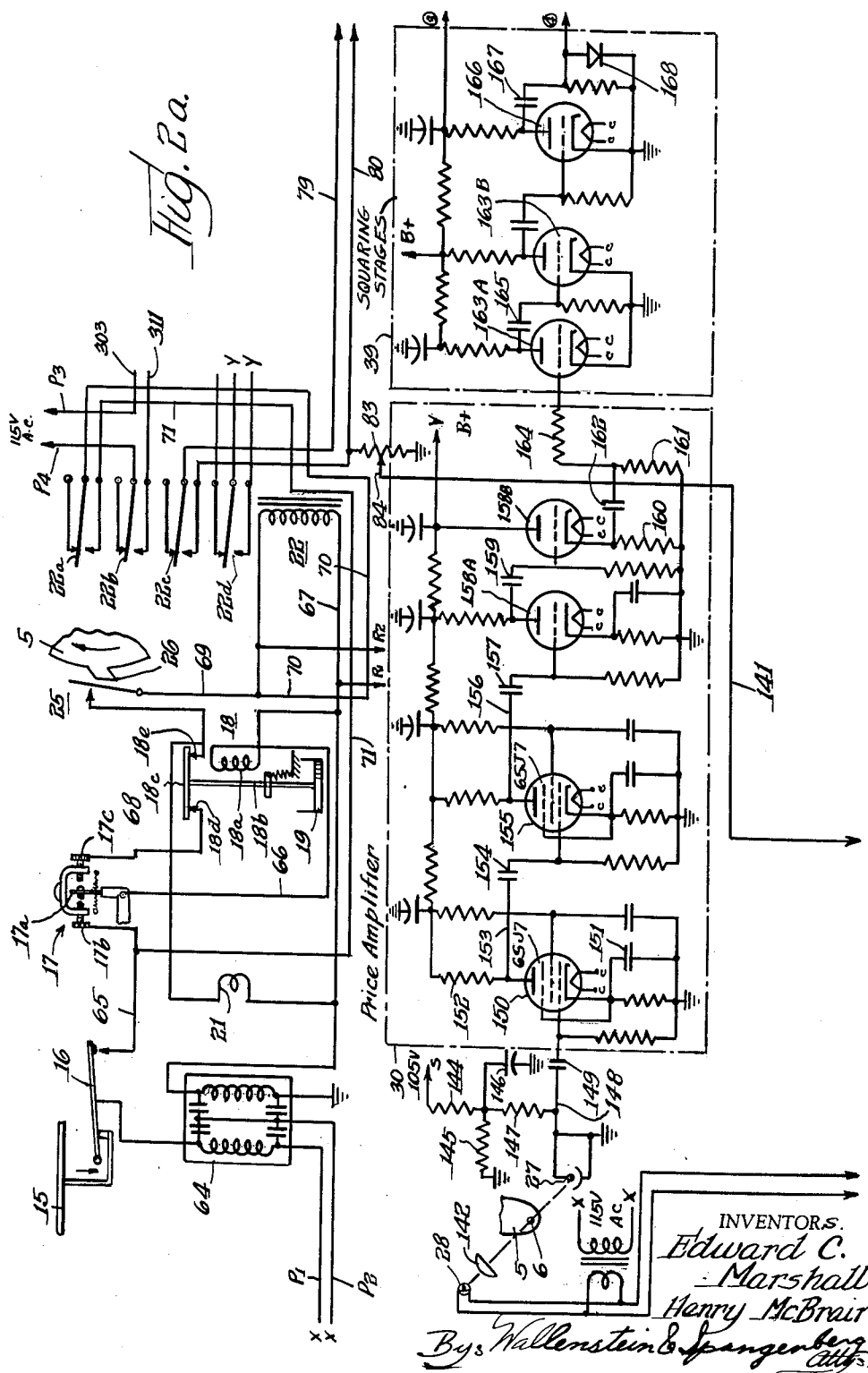
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PRICE MARKING MACHINE

Filed Feb. 4, 1957

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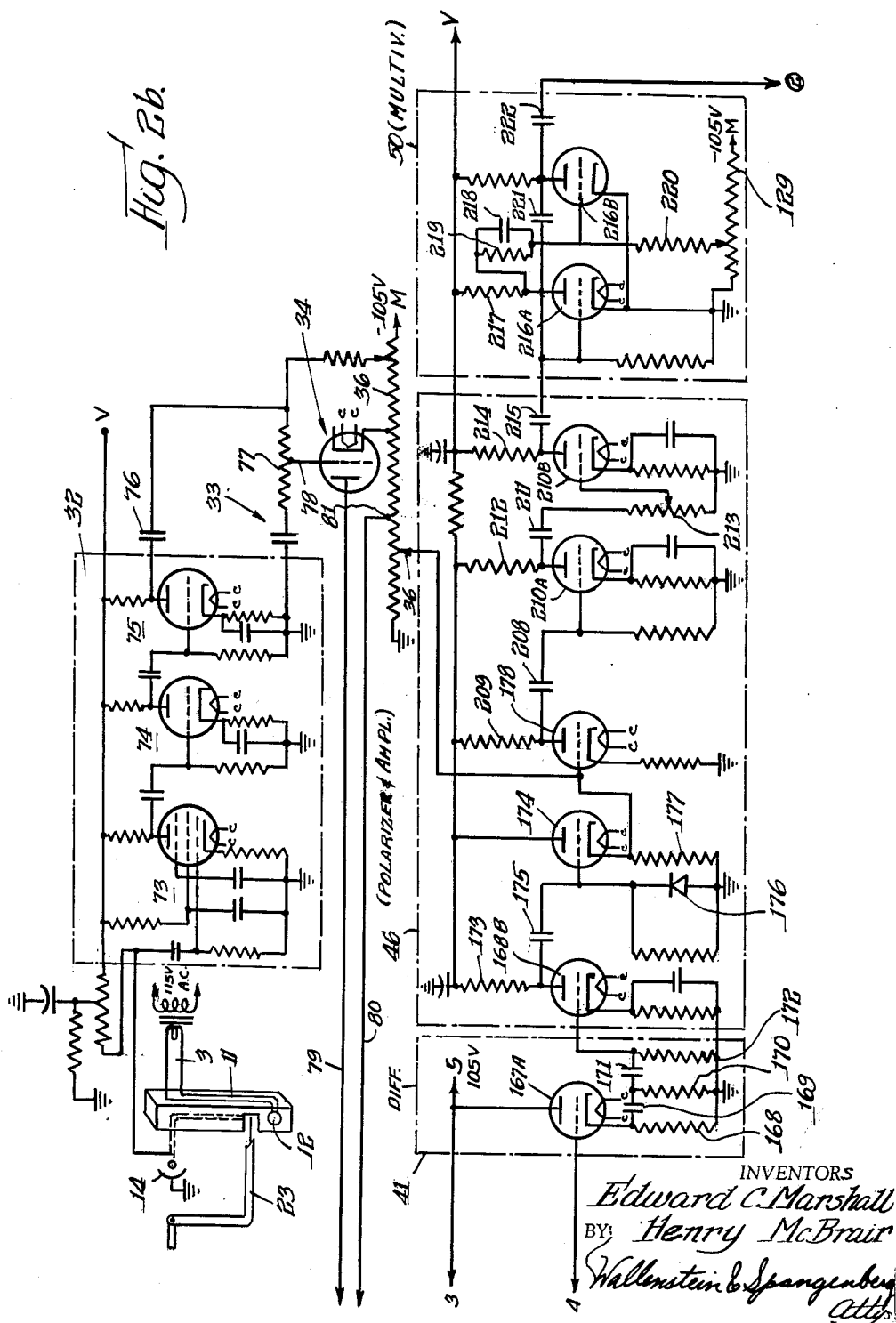
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PRICE MARKING MACHINE

Filed Feb. 4, 1957

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Nov. 20, 1962

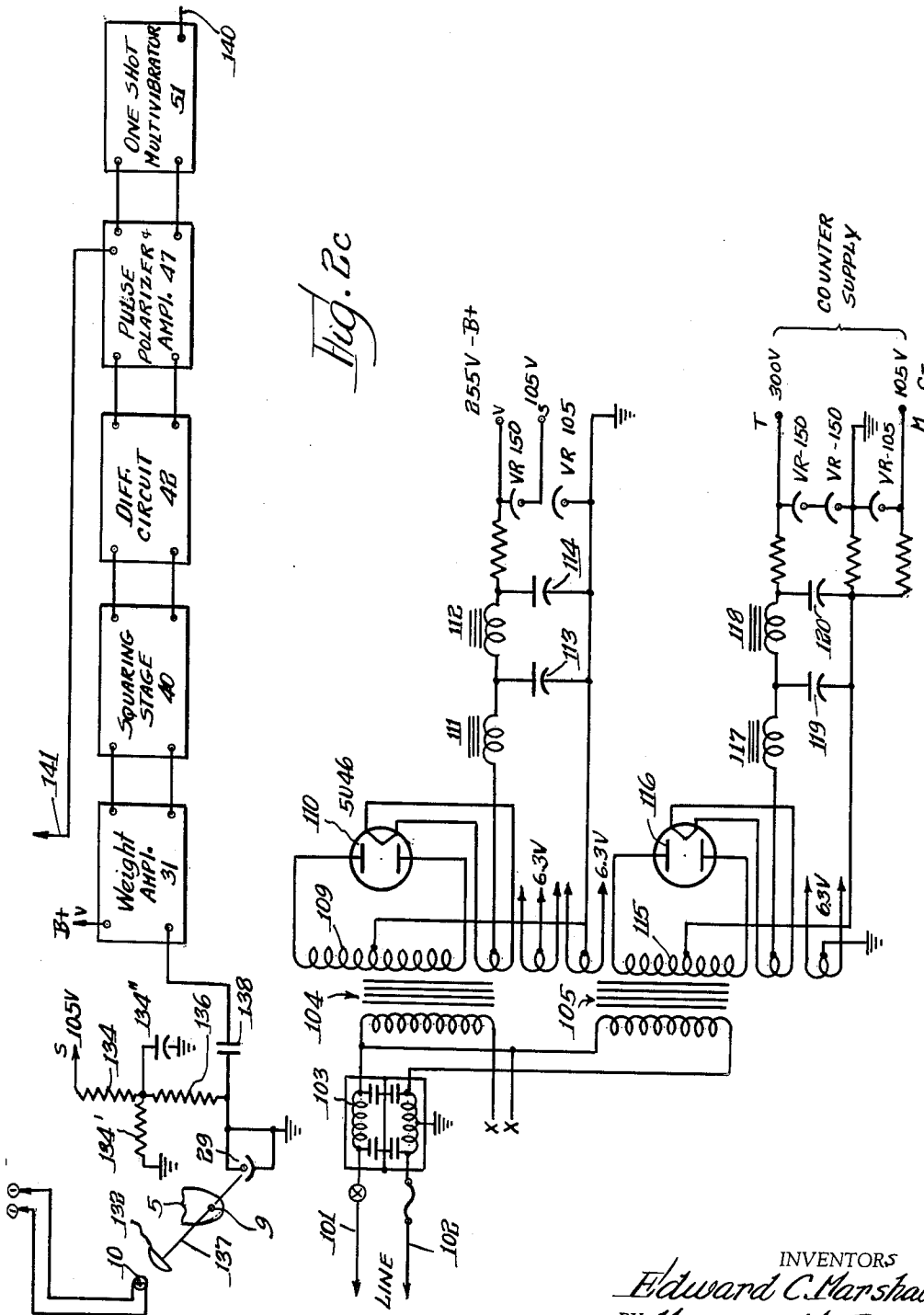
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Filed Feb. 4, 1957

7 Sheets-Sheet 4



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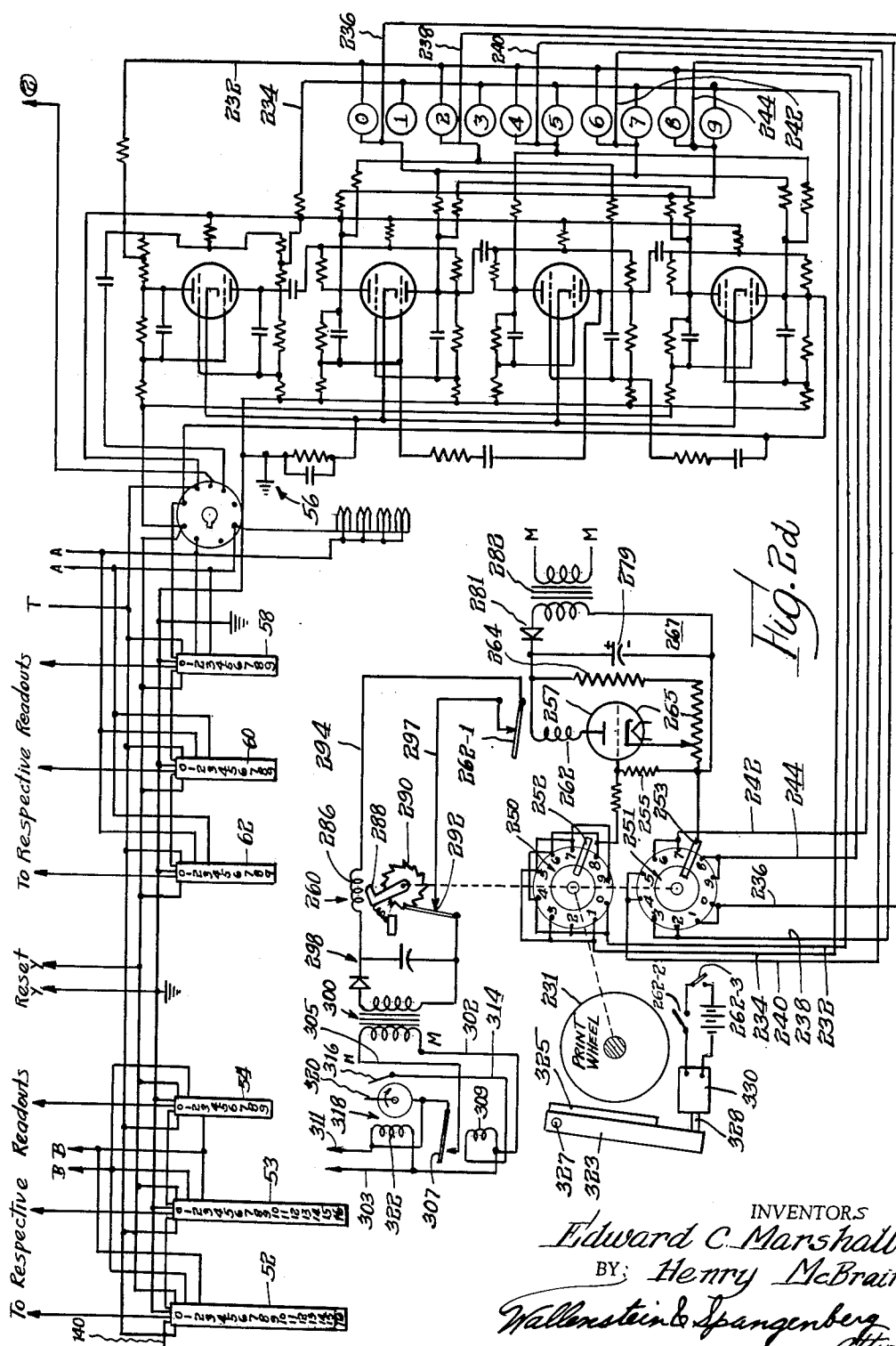
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PRICE MARKING MACHINE

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7 Sheets-Sheet 5



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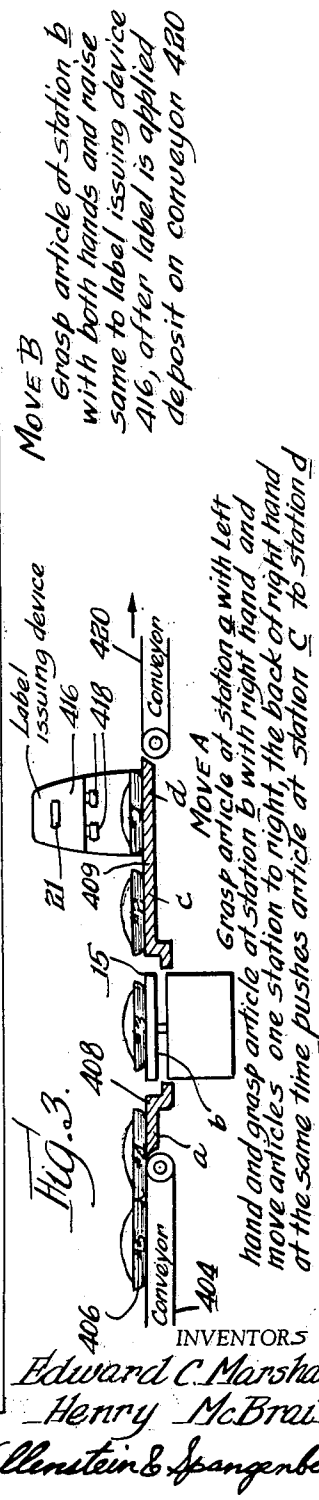
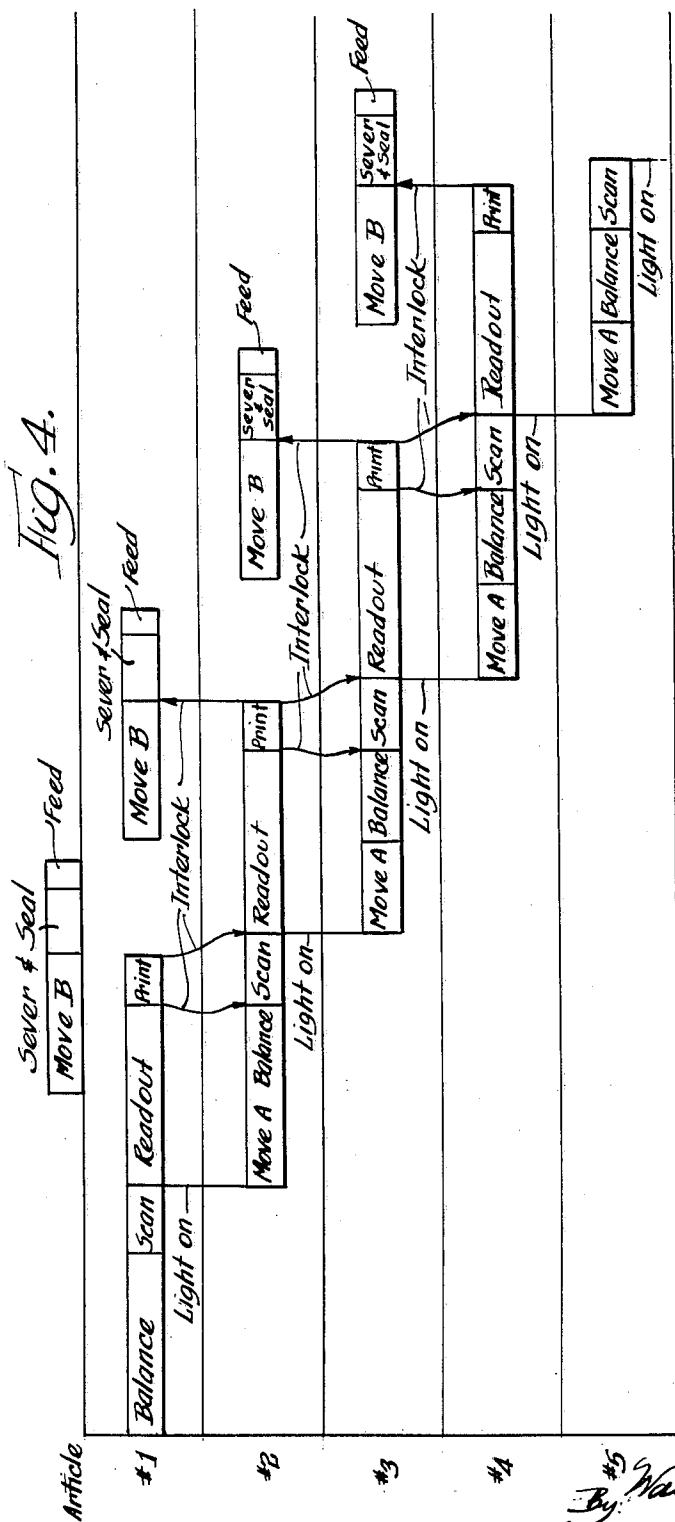
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3,064,743

PRICE MARKING MACHINE

Filed Feb. 4, 1957

7 Sheets-Sheet 6



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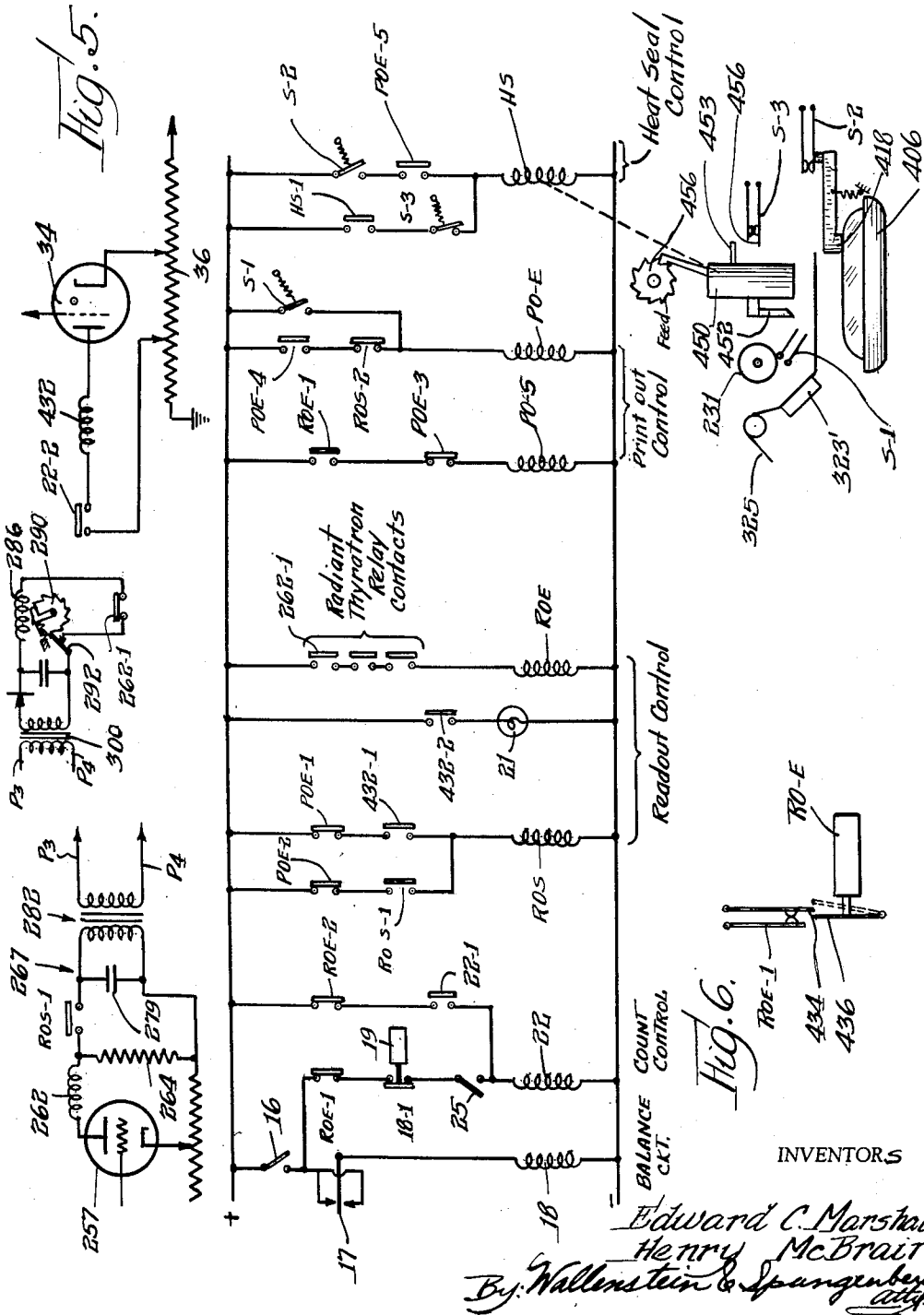
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PRICE MARKING MACHINE

Filed Feb. 4, 1957

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3,064,743

PRICE MARKING MACHINE

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Filed Feb. 4, 1957, Ser. No. 637,995
17 Claims. (Cl. 177-3)

This invention relates to automatic price computing and marking machines.

With the advent of modern supermarkets, there has been a need for efficient automatic price marking apparatus, particularly for price marking products of non-uniform size and hence weight, such as meat and the like.

It is, accordingly, one of the objects of this invention to provide price marking apparatus wherein price, and also preferably weight information, are automatically obtained and recorded upon a price slip or directly upon the wrapping of the article in question, without the need for an operator to read a scale, and record such information through manual means.

Another and more specific object of the present invention is to provide an improved automatic or semi-automatic price computing and recording machine as above described which may utilize, as a weighing instrumental-ity, a weighing scale of a type now commonly in use.

Still another object of the invention is to provide a price marking machine of the type above described which has provision for readily adjusting the machine for operation at different prices per pound, so that the machine may be used to compute and record prices for a number of different commodities through an adjustment which takes a matter of seconds to make, such as by the mere turning of a knob or the like.

A further object of the invention is to provide a price marking machine as above described, wherein the moving mechanical parts forming the heart of the computing section of the machine are continuously rotating elements, to minimize inertial effects and increase the speed of operation thereof. An ancillary object of the present invention is to provide such a machine as just described wherein the weighing portion of the machine has associated therewith a balancing switch which prevents operation of the computing section of the machine until the very instant the scale comes to balance, to provide for maximum accuracy and speed.

Another object of the invention is to provide article weighing and price-marking apparatus which is so arranged that a maximum number of articles per unit of time may be weighed and marked with the price thereof with a minimum number of operators.

A still further object of the invention is to provide an arrangement of conveyors, platforms, weighing apparatus and price-marking apparatus which enables one or two operators to feed individual articles to be weighed and priced to weighing and price marking stations at a very high speed. An ancillary object of the present invention is to provide such an arrangement of components wherein the computing section of the machine is operative to compute the price for an article then on the scale platform at the same time that the price information for the article previously weighed is being printed at a remote point where the latter article has been moved.

A related object of the invention is to provide a price-marking machine capable of accurately and reliably performing weighing, computing and price-marking operations relating to a number of different articles at the same time with a minimum of confusion to the operator.

In accordance with one aspect of the invention, there is provided means for generating a selection of pulse trains for each position of a scale platform, which pulse

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trains respectively are a measure of the number of basic price units, such as pennies, for a product of the particular weight involved at different prices per pound. Counting means, preferably a series of decade electronic counters, are provided for counting the pulses so that digital information on the price of the article being weighed can be readily obtained and printed upon the package containing the article or a strip of paper or the like to be attached to the article.

Most preferably, the means for generating the pulse trains is a continuously rotating disk, drum or the like, having a series of concentric pulse-producing tracks. The tracks may comprise transparent slits spaced along the length of the track, magnetized pulse-producing points or some other means for producing pulses when the disk, drum or the like is moved relative to a pulse-receiving unit. In the case where transparent slits are utilized, the preferred form of the invention, a light source having a narrow beam is positioned on one side of the transparent slits, is directed upon one of the tracks and a photocell or the like is placed on the other side of the tracks in the path of the light beam to provide electrical pulsations. The number of pulse-producing points in corresponding segments of the tracks differ as a function of different preselected prices per pound. Selector means are provided for selecting the track corresponding to the price per pound desired. In the case where a light source and photocell are used in conjunction with transparent slits in a disk, drum or the like the light source and photocell are preferably mounted for movement together across the various pulse-producing tracks so that track selection may be readily obtained.

In the most preferred form of the invention, a gating means is provided for gating the output of the pulse-receiving means. The pulse output of the gated portion of the system is fed to a suitable counting means, such as the above mentioned decade electronic counters. Control over the gating and counting operations is obtained through a number of cooperating switches. These switches include a scale switch which is operated when an article is placed on the scale, a balancing switch which is held in its active position only when the scale comes to balance, and a priming switch is operated when the beginning of the selected track is moved opposite the pulse-receiving means. After all of the above-mentioned switches have been operated, the counter is reset to 0 and the gating means is prepared for a gate-closing operation. Closure of the gating means is controlled by a pair of cooperating control members, one of which is controlled by the platform scale position and the other of which is controlled by the position of the rotating disk, drum or the like. The control members are preferably mounted for movement along opposed concentric circular paths and are adjusted to be opposite one another when the scale platform is in its zero weight-indicating position and the selected track is moved opposite the pulse-receiving means. In the most preferred form of the invention, one of these members comprises a light source which is interrupted by the other control member when the two are opposite one another. When these two control members are opposite one another, the aforementioned gating means is closed. It can be readily seen that, with this arrangement, the point in a pulse-train generating cycle at which the control members are moved opposite one another is a function of the weight of the article being weighed. By suitably controlling the spacing of the pulse producing points in the tracks of the disk, drum or the like, the number of pulses passing through the gating means up until the time the gate is closed may be equal to the price in pennies of the article being weighed at the selected price per pound. Weight information is preferably obtained in the same manner as the price information

through use of a separate track on the disk, drum or the like, and separate pulse-receiving means and counting means for providing in digital form the weight of the article being weighed in ounces and pounds.

The information in the price and weight counters is used to position associated printing wheels to the proper digit positions. Then, the printing wheels are either moved into engagement with a recording surface or the latter is moved against the printing wheels to provide a record of weight and price.

For maximum efficiency, the scale platform is placed between spaced, coplanar platform sections which are at approximately the same elevations as the scale platform under normal load conditions. An in-feeding conveyor is provided for feeding the articles to be weighed onto the platform section immediately in front of the scale platform, and an out-feeding conveyor is provided extending from the other platform section. Space is preferably provided for only one article station between the in-feeding conveyor and the scale platform and two stationary article stations between the scale platform and the out-feeding conveyor. At the article sections immediately behind the out-feeding conveyor, there is provided a price slip-issuing machine. With this arrangement, while one article is sitting on the scale platform, and pulse trains corresponding to its weight and price are being generated and counted, the weight and price information on the article previously weighed which is resting at the next article station is being printed on a strip of paper. Practically at the same time, the above-mentioned price slip-issuing machine issues a paper slip containing the weight and price information on the article at the last article station. Preferably, the operator holds the last-mentioned article against the slip-issuing machine which secures the slip by heat sealing or otherwise adhering the slip to the preferably prepackaged article. Then after depositing the article on the out-feeding conveyor, the operator, by grasping the article on the weighing scale with his right hand, moves it to the next article station while he pushes the article ahead of it beneath the label-issuing machine with the back of the right hand. Simultaneously, he grasps the article on the first article station with his left hand and moves it onto the scale platform. The in-feeding conveyor then delivers a new article to said first station. With this arrangement, articles can be weighed and furnished with weight and price indicating strips in one or two seconds utilizing a single operator.

To enable simultaneous price weighing and marking of different articles, suitable interlocks are provided between the computing and printout portions of the machine so that a printout operation cannot begin until the computing section has completed its operation, and once the printout section has been set to operate, then the computing section is free to compute the price and weight for a new article while printout proceeds.

These and other features of the invention will be explained in the specification to follow, taken in conjunction with the drawings wherein:

FIG. 1 is a diagrammatic representation of one form of price-marking machine of the present invention;

FIGS. 2a, 2b, 2c and 2d together represent a detailed schematic diagram of one form of price-marking machine of the invention;

FIG. 3 is an improved form of the invention;

FIG. 4 is a time chart illustrating the various operations which are performed by the embodiment of the invention shown in FIG. 3;

FIG. 5 is a diagram of the control circuit utilized with the form of the invention in FIGS. 3 and 4; and

FIG. 6 shows a relay contact arrangement for one of the relays in FIG. 5.

As above outlined, the invention provides an automatic weighing, price calculating and label printing system whereby an article, as for example a cut of meat, may

be weighed, the weight multiplied by a preselected price per pound, and the resulting total price as well as the weight printed on a label to be affixed to the meat package. To these and other ends the invention in its presently preferred form comprises a system as schematically shown in FIG. 1. Referring to FIG. 1, a scale of the commercially available type identified as 1 has been modified by the extension of the rotating shaft 2 carrying a conventional scale wheel 2' so that it extends beyond the normal enclosure. Coaxially located but mounted in such a manner as to preclude any type of mechanical contact is shaft 3 driven by a fractional horsepower induction motor 4.

Affixed to this shaft 3 and rotating with it is an opaque disk 5 which, preferably by means of suitable photographic methods carries a multiplicity of transparent sections in the form of rectangular slots or slits through which suitably focussed light will pass.

These slots are disposed in a series of concentric arcs 6 forming pulse-generating tracks all starting from a common reference point 7. The arcs extend around the disk for an angular distance equal to the angular distance moved through by the scale at its maximum capacity. This angle may be about 300°. The remaining area of about 60° is a dead area and contains no transparent slots. In each arc each slot represents one penny. Progressing inwardly, each arc contains fewer slots, and corresponds to a lower price per pound. By having a multiplicity of arcs, the price per pound of the commodity to be weighed can be selected by the selection of the desired arc by rotating price selecting control knob 8. A second group 9 of transparent slots or slits constitute the weight section of the disk. In this case each slit represents $\frac{1}{16}$ ounce. Therefore, if the disk were provided with 2560 holes for one cycle of the disk it would be possible to resolve up to 10 pounds in increments of $\frac{1}{16}$ of an ounce by passing a suitably focussed light 10 through the disk to produce 2560 light interruptions each interruption corresponding to $\frac{1}{16}$ of an ounce. Located on shaft 3 is gating light arm 11. An incandescent lamp 12 is located in light arm 11 and, by means of a suitably focussed light guide 13, directs light to gating photocell 14.

Electricity may be fed to the gating light 12 in any suitable manner such as by a rotary transformer 12' having its rotary winding connected to the light by wires (not shown) passing through or mounted along the shaft 3. When an object is placed on the platform 15 of the conventional scale 1, a scale switch 16 is operated which energizes a relay 18 in series with a balance switch 17 which intermittently opens and closes until the scale platform reaches a steady state. The relay 18 due to a dashpot 19 connected to its armature remains in its energized position until the balance switch stops oscillating. A blancing switch suitable for use in the present invention is disclosed in U.S. Patent No. 2,036,014, granted March 31, 1930. Relay 18 has a normally closed contact 18c which together with scale switch 16 are in series with a secondary relay 22 which is energized when a priming switch 25 is closed by a cam lobe 26 on rotating disk 5. Relay 18 becomes de-energized when the scale is balanced. A holding circuit is established when relay 22 is energized to lock-in the relay. That is, the balance switch 17, solenoid 18 and priming switch 25 are by-passed by holding contacts of relay 22 to render relay 22 immune to the actions of switches 17, 18 and 25 after relay 22 has once been closed. However, the removal of the object on platform 15 breaks the holding circuit to de-energize relay 22 due to opening of scale switch 16.

A balance light 21 is provided which is wired to the contact 18c so that the light goes on as soon as the scale is balanced. Extending from shaft extension 2 is a gating arm 23 which intercepts the beam from the light 12 on light arm 11 when the gating and light arms are opposite one another. These arms are opposite one

another at zero weight when the disk 5 is in a position where the beams from light sources 10 and 28 just about reach the first slit in tracks 6 and 9, the latter occurring at the same instant of time. During a weighing operation the shaft extension 2 of the scale 1 rotates the gating arm 23 through a discrete angle proportional to the weight applied to the scale. Then, the gate arm 11 intercepts the beam of gating light 12 when the beams from the counting lights 10 and 28 are passing through the slits of the tracks at points spaced a corresponding angle from the beginning of the tracks involved. Secondary relay 22, after closing, applies plate potential to a gating thyatron 34 which may be a type 2D21 tube, whereupon tube 34 becomes capable of performing control functions.

On the periphery of scanning disk 5 is located cam lobe 26 which is located in a sector of the disk which will always constitute a dead area as far as light transmission is concerned at the time cam lobe 26 actuates priming switch 25. Following the actuation of priming switch 25 by cam lobe 26, the continuously revolving disk 5 which is driven in a counterclockwise direction viewed from the motor end, will start the actual computing and reading out of both the pricing and weight of the commodity. Assuming that price selector knob 8 has so positioned the light source 28 and price counting photocell 27 so as respectively to pass and pick up light through the disk as indicated in FIG. 1, it will be seen that the pricing photocell 27 will receive a series of light impulses from light source 28, and, in each case, the number of light pulses received will represent pennies.

Simultaneously light cell 10 of the weight system will pass impulses to weight counting photocell 29. The output of photocell 27 will be amplified by linear electronic amplifier 30 and the output of weighing cell 29 will also be suitably amplified by linear electronic amplifier 31. These amplifiers, namely 30 and 31, will continuously receive and amplify pulses as the disk 5 revolves until such time as the gating light source arm 11 and its associated light source 12 intercept the scale actuated gating arm 23. The momentary interruption of the light beam from source 12 produces a modulation of light on gating photocell 14 which in turn is passed to linear amplifier 32 thence to suitable pulse forming network 33 to trigger gating thyatron 34. A bias supply 35 provides the bias divider with voltage.

The characteristic of the 2D21 thyatron 34 when operated with D.C. on the plate is such that once it has fired as a result of the positive pulse arriving at its grid, plate current continues to flow even after the cessation of pulses. The plate voltage of thyatron 34 is tapped from a bias divider 36. This continual flow of D.C. plate current from bias divider 36 provides the additional bias to gate portions of the circuit to be described.

All pulses, from the time of the initiation of the computing cycle initiated by the actuation of priming switch 25 that take place until the cessation of the computing cycle by the firing of gating thyatron 34 are heavily differentiated in suitable networks 41 and 42. Then via lines 44 and 45 the pulses pass to pulse polarizers and amplifiers 46 and 47 and via lines 48 and 49 to one shot multivibrators 50 and 51.

The output of the one shot multivibrator 51 is a pulse of appropriate polarity and rise time which energizes the commercially available Berkeley binary counter 52. Every sixteenth pulse arriving at counter 52 transfers one pulse to ounce counter 53 which is of identical construction. Every sixteenth pulse developed by counter 53 transmits a pulse to a similar counter 54 whose digital presentation will be in pounds up to 9.

Referring back to one shot multivibrator 50 of the price channel, a pulse of appropriate polarity and rise time is transmitted via line 55 to commercially available Berkeley counter 56. This counter differs from counter 52 in that it has a scale of 10 rather than 16 and

indicates pennies. Every tenth pulse applied to counter 56 is transmitted via line 57 to an identical Berkeley counter 58. This counter is designated as the dimes counter. Again by similar process every tenth pulse via line 59 is transmitted to identical counter 60 whose presentation reads in dollars. Again by the same process via line 61 every tenth pulse is transmitted to counter 62 whose presentation is in tens of dollars.

Two basically different methods are provided for reading out the Berkeley counters to properly position printing wheels in a suitable label imprinting mechanism. The first method is semi-automatic in that a manual operation is required to complete the process; yet the possibility of human error and inaccuracy inherent in visually reading the usual computing scale chart is eliminated. In this method the price-imprinting mechanism is provided with keyboard means (not shown) for setting the printing device whereby a single key is depressed for each digit to be printed. Neon glow lamps are provided in each key of the keyboard, these being the lamps normally found in the Berkeley counters, and being correspondingly connected to the Berkeley units. When the cycle of computation has been completed as previously described, the visual presentation is made on the keyboard in the form of lighted keys. The operator depresses the lighted key, thus correctly setting the printing means without possibility of error.

The second method for reading out is fully automatic and is shown in FIG. 1. The indication of each Berkeley unit is made to position printing means 70 through the use of a motor actuated readout apparatus 72. The readout units are made operative at the conclusion of the counting operation. In each counter only one neon lamp is on, and it has across it a higher voltage than the other nine. A rotary solenoid rotates a switch, scanning the ten neon lamp circuits until the one with the higher voltage is encountered, which triggers a thyatron, energizing the relay to open the motor circuit. The printing means, which rotates with the switch, has thus been positioned according to the Berkeley counter indication.

One exemplary embodiment of the invention will now be described. Referring to FIGS. 2a-2d, which is an electrical schematic wiring diagram of the system, and particularly to FIG. 2c, a 115 volt 60 cycle single phase commercial power is used for primary source of power and enters via lines 101 and 102 passing through commercially available line filter 103 of the L-C type, the purpose of the this filter being to exclude power line transients from the equipment. The output of the filter is fed to energizing transformers 104 and 105 and, via line X-X energizes light sources 10 and 28 (FIG. 2a) and the line P1-P2. Transformer 104 (FIG. 2c) via high voltage winding 109, full wave rectifier tube 110, filter chokes 111 and 112 and associated capacitors 113 and 114 provide the high voltage supply. The output of this conventional full wave rectifier is regulated in the conventional manner by means of gaseous regulator tubes which may be type VR-150 and VR-105, respectively. These tubes are connected in series to give a regulated voltage of 255 volts and 105 volts respectively. This D.C. voltage of 255 volts is applied at various points in the system designated as V. The D.C. voltage whose potential is 105 volts is applied at points indicated as S.

A second power supply fed by transformer 105 is fundamentally identical with the supply previously described and consists of high voltage winding 115 and full wave rectifier tube 116 which may be a commercially available 5U4-G tube. The output of this rectifier via filter chokes 117 and 118 and electrolytic capacitors 119 and 120 furnish a D.C. potential which is regulated by three gaseous regulator tubes connected in series to give voltages of plus 300 volts at terminal T with respect to ground and minus 105 volts with respect to ground at terminal M. The 300 volt output 121 supplies the commercially

available Berkeley counters 52, 53, 54, 56, 58, 60 and 62. The minus 105 volts is applied (FIG. 2b) to bias adjusting resistor 129 of one shot multivibrator 50 as well as to bias divider 36.

Refer now more particularly to FIG. 2a where the basic relay control circuit is shown. The energization circuit for relay 18 extends from line P1 and includes a line filter 64, scale switch contacts 16 which remain open until the scale platform 15 is moved down, line 65, stationary contacts 17b and 17c and oscillating contact 17a of the balance switch 17, line 66, coil 18a of relay 18 and line 67 extending through the line filter 64 and joining the other main power line P2. Thus, it can be seen that as long as the scale is not balanced, the movable contact 17a of the balance switch 17 continues to oscillate to energize intermittently the relay 18 until a balance condition of the scale exists, whereupon the movable contact 17a stops in a centered position spaced from the stationary contacts 17a and 17c.

The relay 18 has an armature 18b which is secured to the dash pot 19 so that the relay armature remains in the position it occupies when the relay is energized even though the relay is de-energized for the period it takes the movable contact 17a to traverse the space between the stationary contacts 17b and 17c. The relay 18 has a movable bridging contact 18c and stationary contacts 18d and 18e, the movable contact 18c normally bridging the stationary contacts when the armature 18b is in the position when the relay is de-energized, and being spaced from the stationary contacts when the relay is in its energized state. Accordingly, as long as the balancing switch 17 is in its unbalanced condition, movable contact 18c will be separated from the stationary contacts 18d and 18e.

As soon as relay 22 becomes energized, a holding circuit for the relay is established extending from the upper terminal of the relay 22 through line 69, closed holding contacts 22a of the relay 22, line 71, line 65, scale switch 16, power lines P1 and P2 and through line 67 leading to the other terminal of the relay coil 22. The relay 22 has other sets of contacts 22b, 22c and 22d which perform functions to be explained hereinafter.

The scale light 21 is connected between stationary contact 18e and line 67 so that the light 21 lights as soon as a balanced condition of the scale is reached.

As shown in FIG. 2b, the modulated output of the photocell 14 is capacity coupled to the input stage of linear amplifier 32 which has a conventional pentode amplifier stage 73 whose output is coupled to a triode amplifier stage 74 whose output, in turn, is coupled to a triode amplifier stage 75. At the output of the amplifier stage 75 there is a differentiating circuit 33 comprised of capacity 76 and a potentiometer resistance 77. When the beam of gating light 12 is interrupted, the voltage pulse produced is differentiated by circuit 33 which provides a sharp high voltage pulse across resistance 77 which fires the gating thyatron 34 practically the instant that the beam from light source 12 is interrupted.

The grid of the thyatron tube 34 is connected to the wiper 78 of the potentiometer 77. The cathode of the thyatron tube is connected to a suitable point on the bias divider resistance 36 across which the bias supply is connected. The plate of the thyatron tube 34 is connected via a line 79 to normally-open contacts 22c of the secondary relay 22 and then via a line 80 to a point 81 spaced on the positive side of the point on the bias divider resistance to which the cathode of the thyatron tube is connected.

It can be seen that when the contacts 22c are closed, the thyatron tube is primed for firing. The voltage conditions on the tube are adjusted so that the tube will not fire until a positive pulse appears on the grid of the thyatron. Upon firing of the thyatron tube, a section of the bias divider becomes bypassed and the current flowing through the portion of the bias divider feeding voltage to

a cathode follower resistor 177 is greatly increased. This increased voltage is such that it will cut off a tube 178 following a cathode follower tube 174, thus gating the output of the tube 178.

Gating voltage for the pulse polarizer and amplifier stage 47 associated with the weight indicating portions of the system is obtained across a resistor 83 (FIG. 2a) having one terminal connected to the line 80 and the opposite terminal grounded. A lead 141 extending from a cathode follower resistor in the pulse polarizer and amplifier section 47 (FIG. 2c) connects with a tap-off point on the resistor 83.

Referring now more particularly to FIG. 2c, light source 10 may be of the heavy filament type and may be rated at 10 candlepower. Due to the heavy filament and to further instrumentation, it can effectively be considered a steady source of light. This light via suitable optical system 132 impinges on the continuously revolving scanning disk 5. This disk which has been previously described will pass light by means of the pulse-producing slits 9 which in turn will impinge on gas photocell 29. This cell is energized and decoupled from the basic D.C. supply by a resistance-capacity filter and voltage divider consisting of resistors 134 and 134' and filter capacitor 134''. The variations in light level resulting from the transparent slits in disk 5 will produce an electrical modulation in current in resistor 136 at a rate proportional to the rate at which the slits on disk 5 intercept light beam 137. Each sinusoidal alternating component in current through resistor 136 will, as previously described, represent a weight increment of $\frac{1}{16}$ of a pound. The pulsations of current in resistor 136 are effectively passed to weight amplifier 31 by capacitor 138. Amplifier 31 is identical with the amplifier 30 of the pricing system which will be described later. The output of weight amplifier 31 is fed to the stages 40, 42, 45 and 51 previously briefly described and finally there is produced a negative pulse whose peak value is approximately 100 volts and whose rise time is less than two microseconds. This pulse via line 140 energizes Berkeley counter 52, 53 and 54 (FIG. 2d) in a manner previously briefly explained. Counter 54 gives a visual presentation of weight in pounds, counter 53 a visual presentation of weight in ounces and counter 52 a visual presentation of weight in 16th of an ounce.

Light source 28 (FIG. 2a) may be a 10 candlepower heavy filament lamp and by means of optical system 142, directs a very small spot of high intensity light on scanning disk 5. This spot is centered by means of suitable mechanical adjustments on the correct arc of the slits corresponding to the price per pound of the commodity in terms of pennies, the total number of slits in a circle being equal to the price per pound times the number of pounds representable on the counters, namely 9 pounds $15\frac{15}{16}$ ounces. This means that for one revolution of the disk, assuming that the light beam is centered on a circle of holes representing \$1.00 per pound, the total number of slits will be 100 times 9 pounds $15\frac{15}{16}$ ounces or 999. Light passing through disk 5 will impinge on vacuum photocell 27 which is of the gas type and commercially referred to as type 926. This cell is energized and decoupled from the basic D.C. supply by resistance-capacity filtering and a voltage divider consisting of resistors 144, 145 and filter capacitor 146. Fluctuations in current through load resistor 147 correspond to the transparencies scanning the light beam. The A.C. component of the current changes existing in resistor 147 is passed by line 148 and capacitor 149 to the grid of vacuum tube 150 forming part of amplifier 30. This vacuum tube may be type 6SJ7. The values of the resistors and capacitors associated with this tube are conventional for the frequencies under consideration.

Cathode by-pass capacitor 151 and grid coupling capacitor 149, whose values are preferably .5 and .001 microfarad, respectively, are purposely selected to produce a de-emphasis of frequencies below 500 cycles per second, the purpose being to prevent amplification of any 120 cycle

component of light modulation possibly present on light source 107. Line 153 via capacitor 154 passes the A.C. component of current in plate resistor 152 to the grid of vacuum tube 155 which is a type 6SJ7 connected and used in a manner identical with vacuum tube 150. The output of vacuum tube 155 via line 156 and via capacitor 157 energizes the grid of vacuum tube 158A. Vacuum tube 158A is again, as in the case of vacuum tubes 152 and 153, used as a class A linear amplifier. The associated resistors and capacitors as in the previous stages have been selected to discriminate against frequencies of 500 cycles and lower by virtue of relatively short time constants associated with the resistors and capacitors as in the grid, plate and cathode circuits.

The output of the resistance coupled amplifier stages utilizing triode 158A is passed to the grid of triode 158B by capacitor 159. Triode 158B is connected as a conventional cathode follower for the purpose of developing an effective low impedance load when looking into load resistor 160. The A.C. component of current developed through cathode resistor 160 is transmitted to resistor 161 via coupling capacitor 162. The purpose of coupling capacitor 162 is to remove the positive D.C. potential from the grid of triode 163A. Triode 163A is provided with a very low value of plate voltage. Series grid resistor 164, in view of the fact that triode 163A, a commercial type 6SN7, is operated without bias, functions so as to produce both grid and plate limiting. The A.C. component of plate current is now a square wave as a result of both limiting and clipping the sine wave applied to resistor 161.

Capacitor 165 couples tube section 163A to 163B and passes a square wave which is further squared by further plate limiting action. The same procedure is again followed in the succeeding triode 166. The output of this final limiter is now a square wave whose amplitude will be virtually constant for minor changes in signal level developed across resistor 161. The purpose of the three squaring and limiting stages is to obtain a signal that is virtually independent of minor variations of the light intensity of lamp 28 and the gain of the cascade linear amplifier made up of vacuum tubes 150, 155 and 158A. The square wave existing in the plate current of vacuum tube 166 serving as a limiter is transferred by a capacitor 167 to the grid of triode 167A (Fig. 2b). Diode rectifier 168, type 1N34, effectively short circuits the positive going pulse. Triode 167A is connected and used as a cathode follower for the purpose of developing a low impedance source of square wave power. The square wave of voltage appears across a cathode resistor 168' which voltage is heavily differentiated by capacitors 169, resistor 170 and again by capacitor 171 and resistor 172. The time constants of these differentiating resistors and capacitors are chosen so as to be at least 20 times shorter than the highest frequency transmitted. As a result of the great loss in amplitude due to the heavy differentiation networks, the positive and negative squared pulses become spikes across resistor 170 and 172 and are amplified in triode 168B connected as a linear amplifier but utilizing very short time constants in plate, grid and cathode circuits to assist in the process of differentiation.

Positive and negative pulses appearing in plate resistor 173 are passed to the grid of triode 174 via capacitor 175. The negative going pulse is virtually short circuited to ground by diode rectifier 176, type 1N34. The positive going pulse is applied to the grid of triode 174 connected as a cathode follower. The positive side of cathode resistor 177 is connected directly to the grid of triode 178 and to bias divider potentiometer 36 through a wiper 36' which adjusts the value of the bias voltage. It is the grid of triode 178 that is heavily biased, thus gating the amplifier output, when thyatron 34 is triggered by the gating pulse.

Capacitor 208 conducts the spike shaped component across plate resistor 209 to the grid of triode 210A. Capacitor 211 conducts the component across plate resistor

212 to potentiometer 213 which provides means for adjustment of amplitude to the grid of tube 210B. A comparatively wide variation in gain or input signal through the previous stages can be compensated for so that one shot multivibrator stage 50, triggered by the output of tube 210B, can be provided with an input amplitude which renders the multivibrator the utmost in stability.

The signal component from tube section 210B across plate resistor 214 is transmitted through capacitor 215 to the first section of the multivibrator tube 216A; a component then is produced across plate resistor 217. Capacitor 218 and resistor 219 couple the output of tube section 216A to the grid of 216B and partially determine the frequency and therefore the steepness of the multivibrator output spike shaped pulse. The grid of tube section 216B returns to bias supply M92 via resistor 220 so that the multivibrator can be set to operate within an appropriate input signal margin and still be stable. Capacitor 221 serves to feed back a portion of the multivibrator output signal to return the primary stage, tube section 216A, to a restive state for the following input pulse.

Capacitor 222 passes the negative going pulse of approximately 100 volts having a rise time of less than 2 microseconds to Berkeley pennies counter 56. In a coupling method identical to that used with the Berkeley weight counters counter 52, upon reaching the count of 10, returns to zero and passes a pulse to dimes counter 58. Dimes counter 58, upon reaching 10, reverts to zero and passes a pulse to dollars counter 60. Counter 60 returns to zero after the tenth pulse to it and passes a count to tens of dollars counter 62. The price counter group can therefore count to 699.99. The weight counter group can count to 9 pounds 15 $\frac{15}{16}$ ounces.

Each of the counters has associated therewith a set of 10 neon lights numbered 0-9 (FIG. 2d). Each neon light is associated with one of the ten stages of the decade counter and the counter circuit is such that as the counter receives pulses the neon lights will become energized in succession and in accordance with the number of pulses fed thereto since the counter was last reset into a zero count state. When gating thyatron 34 is fired, the numbers appearing on the lighted neon light associated with counters 56, 58, 60 and 62 will be the price of the object weighed and the lighted neon lights associated with counters 52, 53 and 54 will give the weight of the weight on the scale. An operator could then manually enter the price and weight of the article involved on a strip of paper to be attached to the article.

However, in accordance with a preferred form of the invention, the price and weight information is automatically printed upon a strip of paper, or directly upon the article itself. To this end, a printing wheel such as printing wheel 231, is associated with each counting unit and readout means is provided which sets the printing wheels to the digit positions corresponding to the associated lighted neon lights. In the explanation to follow, only the readout apparatus associated with counter unit 56 will be described, it being understood that similar apparatus is associated with each counting unit 58, 60, 62, 52, 53 and 54.

Referring to the neon lights associated with counter unit 56, one of the corresponding terminals of the neon lights associated with counter stage 0, 2, 4, 6 and 8 are connected to a common line 232 and the corresponding terminals of the neon lights associated with stages 1, 3, 5, 7 and 9 are connected to a common line 234. The other corresponding terminals of neon light pairs, 0-1, 2-3, 4-5, 6-7 and 8-9 are respectively connected to lines 263, 238, 240, 242 and 244. Common lines 232 and 234 are associated with a ten-position rotary switch 250 having contacts numbered 0-9. Contacts 0, 2, 4, 6 and 8 thereof are electrically connected together and terminals 1, 3, 5, 7 and 9 thereof are electrically connected together. The common line 232 associated with neon

lights of even number are connected to the even commonly connected terminals of the rotary switch 250 whereas common line 234 which is associated with the odd numbered neon lights is connected to the odd commonly connected terminals of switch 250.

Lines 236, 238, 240, 242 and 244 are associated with another ten-positions rotary switch 251. This switch has terminals numbered 0-9, with adjacent contact pairs 0-1, 2-3, 4-5, 6-7 and 8-0 respectively connected together. Line 236 associated with the corresponding terminals of neon lights 0 and 1 are connected to the 0 and 1 terminals of the switch 251. In a like manner, lines 238, 240, 242 and 244 are respectively connected to terminal pairs 2-3, 4-5, 6-7 and 8-9 of the switch 251.

Switches 250 and 251 have wiper contact terminals 252 and 253 which are coupled across a resistor 255 connected between the grid and cathode of a thyratron control tube 257. The wiper contacts 252 and 253 of the switches 250 and 251 are mounted on a common shaft and are similarly oriented so that they contact corresponding stationary contacts at any given time. The common shaft of these switches is driven from a suitable ratchet-motor 260 which has an energization circuit which is partly under the control of the thyratron tube 257. Connected to the plate of the thyratron tube 257 is a relay coil 262 which in turn is connected to a plate resistor 264 and a potentiometer resistor 265 joining the input resistor 255. The cathode of the tube 257 is connected to the wiper of the potentiometer 265 for adjustment of the operating conditions of the thyratron.

A single phase rectifier circuit 267 is connected across resistors 264 and 265, the rectifier circuit including a filter capacitor 279, a rectifier tube 281 and a power transformer 282. The primary of the transformer 282 is connected between terminals M-M to be referred to later.

It can be readily seen that a voltage will appear across the stationary terminals of the switches 250 and 251 which have numbers corresponding to the energized neon light. Thus, when the wiper contacts 252 and 253 contact the latter stationary terminals, gating thyratron 257 will fire.

The solenoid motor 260 includes a solenoid coil 286 which operates an armature 288 acting as a ratchet pawl which imparts step-by-step rotation to a ratchet gear 290 which in turn operates a set of interrupter contacts 292 in the energization circuit of the solenoid 286. This energization circuit may be traced from one of the terminals of the solenoid coil 286 through line 294, normally-closed contacts 262-1 of the relay 262 in the plate circuit of the thyratron tube 257, line 297, interrupter contacts 292, and a single phase rectifier circuit 298 which provides direct current for operating the ratchet motor 260. The rectifier circuit 298 is fed by transformer 300 whose primary winding is connected to the same terminals M-M that feed the above-mentioned power transformer 282 associated with the thyratron tube 257. The bottom terminal of the primary winding of the transformer 300 is connected via a line 302 to a line 303 which leads to an A.C. power line P3 (see FIG. 2a). The upper terminal of the primary winding of transformer 300 extends via a line 305 to normally-open contacts 307 of a relay 309. The contacts 307 connect with a line 311 which joins the normally-open contacts 22b of secondary relay 22 (see FIG. 2a) which contacts, in turn, are connected to power line P4 associated with the A.C. line P3. The ratchet motor 260 will thus be energized when the relay 309 controlling contacts 307 is energized.

Relay 309 has an upper terminal connected via line 314 to a stationary contact 316 of a timer 318. The timer 318 serves the purpose of initiating the energization of the ratchet motor 260 after a time starting with the depression of the priming switch by the disk lobe 26 which period of time is sufficient to enable the longest arc of the disk slots to pass by the light beams of the

light sources 10 and 28. The counting circuits thus must have their full count before the readout circuit is allowed to operate. When this initial time period has passed, a movable contact 320 of the timer makes contact with stationary contact 316 thereof for at least a sufficient period to enable the wiper arms 252 and 253 of the rotary switches 250 and 251 to be moved by contacts 0-9 by the ratchet motor 260. The timer 318 is energized by any suitable means, such as by a relay or solenoid 322 which is connected across lines 303 and 311. Since the line 311 extends through the normally-open contacts 22b of the secondary relay 22, the timer will not be set into operation until the relay 22 is energized.

When the ratchet motor 260 is set into operation, the wipers 252 and 253 of the rotary switches 250 and 251 move over the stationary contacts thereof until the contacts are reached across which the associated lighted neon light is connected. At that moment, the thyratron tube 257 will fire thereby energizing the plate relay 262. Energization of plate relay 262 will open the contacts 262-1 breaking the energization circuit of the solenoid 286 of the ratchet motor 260 to stop the operation thereof.

The shaft of the rotary switches 250 and 251 are geared or otherwise connected to the shaft of the printing wheel 231 so that the printing wheel is positioned to print the number corresponding to the contacts on which the rotary switch wipers have come to rest. Thus, when the thyratron 257 fires, the printing wheel is set to print the digit corresponding to the digit of the lighted neon light of the associated counter unit. The printing operation may be obtained either by moving the printing wheel 231 against the surface to be printed upon or, the surface to be printed upon may be moved against the printing wheel. In FIG. 2d, the latter situation is illustrated. To this end, a platen 323 is provided upon which is carried the paper 325 to be printed upon. A strip of paper may be utilized or the paper package of the article itself may be carried by the platen 23. The associated printing wheels associated with the various counter units are preferably mounted together in alignment. The platen 323 may be mounted for pivotal movement about a pivot point 327, and the distal end of the platen 323 may be secured to an armature 328 of a solenoid 330. The solenoid 330 is energized by a circuit including a series circuit arrangement of contacts 262-2, 262-3, etc., one for each printing wheel, these contacts being controlled by the relays in the plate circuits of the readout thyratron tubes like 257. When all the thyratrons have been fired, indicating that all printing wheels have been adjusted to their proper numbers, the solenoid 330 will be energized thereby moving the platen 323 against the printing wheels.

When the article is removed from the scale platform 15, scale switch 16 opens which de-energizes the secondary relay 22. Upon de-energization of relay 22, contacts 22b thereof open de-energizing and resetting the timer 318. Relay contacts 22c also open which extinguish the gating thyratron 34. Upon de-energization relay 22, its contacts 22b also open to reset the various counter units to 0.

Embodiment of FIGS. 3 Through 6

Refer now to the embodiment shown in FIGS. 3 through 6 wherein a modified price and weight marking system is illustrated. In accordance with this form of the invention, operations on a number of different articles to be weighed and priced may be carried on simultaneously so that the time necessary for weighing and marking each article is cut to a minimum. This form of the invention seals or otherwise secures a label or price slip to a prewrapped package which label contains price and weight information of the article in question. With the modified system to be described, while the label for one package is being applied thereto a label for another package is being printed, and simultaneously the counters are operating to obtain price and weight information for

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a third package then on the scale platform. Just preceding the above-mentioned simultaneous operations, the third mentioned package was placed on the scale while the rotary switches were being positioned in accordance with the count in the counters for the second package. This operation of the system requires interlocking between various sections of the system, and these will be described in connection with the schematic diagram of FIG. 5.

Referring first, however, to FIG. 3 showing a platform and conveyor layout for use with the modified system just outlined. It includes a belt or other suitable conveyor 404 which delivers the articles 406 to be weighed to a platform section 408 which is at the same elevation as the upper section of the conveyor belt 404. The articles 406 may comprise an outer thermoplastic wrapping where labels are to be heat sealed thereto. Also, in such case, the label may include a thermoplastic base upon the upper side of which a suitable layer of printing-ink-receiving material is secured, such as paper.

When a packaged article is moved upon platform 408 by the conveyor belt, the friction between the article and the platform may be such that the conveyor belt is unable to push the article completely off the belt, whereupon a line of articles remains stationary upon the conveyor belt as the belt scrapes by the bottoms of the articles, so that an article will not be moved upon the platform section 408 until the article already thereon is moved to the next station where the scale platform is located. The level of the scale platform under normal load is approximately the same as the level of the platform section 408.

On the opposite side of the scale platform from the one adjacent to the platform section 408 is another platform section 409 of a length to form two article stations. The platform section 409 is at the same level as platform section 408. A labeling device 416 overlies the endmost article station. The labeling device contains a roll of heat-sealable material from which the label or price slip is to be formed. It contains the printing wheels 231, and suitable means for severing and feeding the roll at the proper time. When the operator raises the article which is beneath the labeling device and presses the top of the article against downwardly extending portions 418 thereof, the end of the roll containing the weight and price information involved is severed from the roll and heat sealed or otherwise adhered to the top of the article in question.

At the end of the platform section 409 is an outfeeding conveyor belt 420 which is at the same level as the platform 409 so that the article just wrapped may be readily placed upon the conveyor 420 and moved to a suitable disposal location. After the article is placed upon the conveyor 420, the operator grasps the article on the platform section 408 with his left hand and the article on the scale platform with his right hand and moves the latter article to the next article station while pushing the article ahead of it with the back of the right hand beneath the labeling device 416. Simultaneously the left hand moves the article it is holding upon the scale platform. At the same time, the conveyor 404 moves the article behind it onto the platform section 408. While the newly positioned article on the scale platform 15 is being weighed by the scale, the label for the article adjacent thereto is printed with the weight and price information and the already printed label for the third article is applied thereto. With this arrangement, one man can operate the apparatus with a minimum of time between successive applications of labels to the packages.

Refer now to FIG. 5 which shows the control circuit for the embodiment of FIGS. 3 and 4. The operation of this circuit preferably includes the following interlocked control of balancing, counting, readout, printing, label-applying and strip feeding operations:

(a) The counting operation for a new article begins

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after the scale is balanced and the previous count has been readout to the print wheels;

(b) The readout of the count in the counters begins when the counters have been set and the print wheels have completed printing the price and weight information previously set in the counters;

(c) The printout of the data set in the print wheels on the label strip is not effected until the readout of the data in the counters and the previous printout operation has been completed; and

(d) The severing of a label from the label strip and the application of the same to the article to be marked begins after the data on the article previously weighed has been printed; a strip advancing operation for feeding the next label into position to be applied to the next article occurs upon return of the label severing and applying apparatus to their start positions.

The control circuit of FIG. 6 includes most of the components described in connection with the embodiment of FIGS. 1 through 2 and similar components in these figures have been similarly numbered. Thus, when an article to be weighed is placed upon the scale platform 15, the scale switch 16 closes and the armature of the balancing switch 17 will oscillate to make contact with the stationary contacts on opposite sides thereof to energize intermittently the relay 18. The secondary relay 22 has an energization circuit including priming switch 25, the normally-closed contacts 18-1 of relay 18, normally-closed contacts ROE-1 of a readout relay ROE and the scale switch 16. Accordingly, as soon as the balancing switch reaches a steady state condition, relay 18 is de-energized and its normally-closed contacts 18-1 close to prepare the secondary relay 22 for energization when the priming switch 25 is closed by the lobe on the scanning disk 5. The secondary relay 22 then seals-in through a holding circuit including holding contacts 22-1 of relay 22 and normally-closed contacts ROE-2 of relay ROE. When relay 22 is energized, the gating thyatron 34 becomes primed for operation upon closing of contacts 22-2 in the plate circuit of the thyatron, as in the embodiment of FIGS. 1 and 2.

The contacts ROE-1 and 2 in the energization circuit of relay 22 are momentarily opened upon the energization of the readout relay ROE which is energized upon the completion of the readout of information from the counters. This enables the scanning and gating circuits to begin a new cycle of operation since it de-energizes secondary relay 22 which, in turn, extinguishes the thyatron 34.

The contact arrangement which enables the contacts ROE-1 and 2 to be momentarily opened upon energization of readout relay ROE is shown in FIG. 6. This contact arrangement includes a number of sets of contacts such as ROE-1, one of the contacts of each set having an extension 434 which is in the path of movement of a pivoted arm 436 operated by the relay ROE. The arm 436 engages and passes by the extension 434 to separate momentarily the set of contacts involved when the arm 436 is drawn toward the core of relay ROE. When the arm 436 moves in the opposite direction it can be seen that the set of contacts involved remain closed since the force of the arm 436 is in a direction which maintains contact between the contacts involved.

From the description of the embodiment of FIGS. 1 and 2, it is apparent that the counting circuits for weight and price information are frozen in their count positions occurring at the moment that the gating thyatron 34 fires. The input to the counting circuit is then gated until the thyatron is extinguished upon the de-energization of the secondary relay 22.

When the gating thyatron fires, a relay 432 in the circuit thereof becomes energized to close a set of contacts 431-1 thereof which are connected in series with a readout control relay ROS. The contacts 432-1 are in series with normally-closed contacts POE-1 of a printout rela-

tion POE which becomes energized upon completion of a printing operation. When the latter relay becomes energized, the contacts POE-1 momentarily open in the same manner as the contacts ROE-1 and 2 previously described. The relay ROS has a holding circuit including holding contacts ROS-1 and normally-closed contacts POE-2 of relay POE so that the relay ROS seals-in upon the firing of the gating thyatron 34. It can be seen that the relay ROS is de-energized upon completion of a printout operation to reset the readout circuits controlled by the relay ROS so that the new count in the counters can be readout to the printing apparatus.

The readout circuit is somewhat modified from that used with the embodiment of FIGS. 1 and 2 in that the readout thyratrons, such as thyatron 257, are each prepared for operation upon closure of normally-open contacts ROS-1 of the readout relay ROS, which contacts are connected between the output of the rectifier circuit 267 and the plate circuits of the readout thyratrons. No timers are needed in this circuit as were used in the embodiment of FIGS. 1 and 2. As in the latter embodiment, the relays 262 in the plate circuits of the readout thyratrons have contacts, such as 262-1, in the energization circuits of associated ratchet solenoid motor circuits as in FIGS. 1 and 2 which advance the wipers of the associated rotary switches and the associated print wheels. When the various readout thyratrons fire, the ratchet solenoid motors become de-energized to stop the print wheels in their positions which will print out the digits of the count number in the various counters. Then, the secondary relay 22 becomes de-energized to reset the counting and gating circuits for a new cycle of operation upon momentary opening of contacts ROE-1 and 2, as above explained.

The label strip 325 upon which the price and weight information is printed is located in the label-issuing device 416. The strip passes over a printing platen 323' (FIG. 5) mounted for movement toward and away from the assembly of printing wheels 231. The movement of the platen 323' is controlled by printout relay POS which, when energized, effects the movement of the platen 323' toward the print wheels 231 so that the strip 325 is pressed against the print wheels. The energization circuit of relay POS includes normally-closed contacts POE-3 of relay POE and normally-open contacts ROE-1 of the relay ROE. Thus, upon completion of a readout operation, the energization of relay ROE will result in the closure of contacts ROE-1 and the energization of relay POS. When the platen moves into a printing position, a switch S-1 is closed by the platen 323 to effect the energization of the relay POE whose energization circuit includes switch S-1. The relay POE seals-in through a holding circuit including normally-closed contacts ROS-2 and holding contacts POE-4 of the relay POE. As relay POE becomes de-energized, its contacts POE-1 and POE-2 momentarily open to de-energize the relay ROS to free the readout circuits for a new cycle of operation.

Energization of relay POE also de-energizes the relay POS upon opening of the contacts POE-3. Relay POE remains energized until the readout circuit ROS becomes energized at the beginning of a new readout operation period. At that time, the printout relay POE becomes de-energized upon momentary opening of the contacts ROS-2 in a manner similar to that explained in connection with the contacts ROE-1. Then, the printout relay POS becomes prepared for operation upon closure of the contacts POE-3 when the readout operation is complete, signalled by the energization of the relay ROE.

When the relay POE initially became energized, this prepared a relay HS for energization upon closure of contacts POE-5 in series therewith. The latter contacts are also in series with a switch S-2 which is closed when the operator holds the article to be marked against the projections 418 (FIG. 3) of the label-issuing device 416. Thus, upon completion of a printout operation and the

placing of an article beneath the label-issuing device 416, relay HS becomes energized. Relay HS seals-in through a holding circuit including holding contacts HS-1 of the relay HS and a normally-closed switch S-3. Energization of relay HS results in the downward movement of a heat sealing and strip cutting assembly including a heated piston member 450 and an attached knife element 452'. The knife 452' severs a section from the end of the label strip 325 containing the price and weight information of the article at the endmost station of the platform section 409 (FIG. 3). The piston 450 presses the severed section of the label strip against the article to secure the label thereto. The sealing operation could be effected by means of an adhesive layer on the label strip 325 which is rendered tacky by the heat of the piston 450 or else the body of the strip 325 could be made of a thermoplastic material which is heat sealed upon a similar thermoplastic covering for the article in question.

When the piston 450 reaches the lowermost point of its downward path of travel where the severed label is applied to the article in question, a projection 453 extending from the piston 450 depresses an extension 454 associated with the normally-closed switch S-3 to momentarily open the latter to de-energize the relay HS. This results in the returning of the assembly of the piston 450 and knife 452' to its uppermost position. By means of a suitable ratchet and gear mechanism 456, the upward movement of the piston 450 advances a ratchet wheel to effect the advancement of the label strip 325 a given amount to bring the next pointed portion thereof beneath the piston 450 and knife 452'.

The above embodiment of FIGS. 3 through 6 just described, enables a number of operations to be performed simultaneously relating to three articles which respectively rest upon the scale platform 15 and on the two article stations of the platform section 409 (FIG. 3). Thus, referring to the timing diagram of FIG. 4, when the light 21, which lights up upon firing of the gating thyatron 34, is lit, the operator advances the various articles one station position in the manner above explained (move A in FIG. 3). During this time, the readout circuit is reading out the count to the print wheels on the price and weight of the article just moved from platform 15. As soon as move A is completed, the operator brings the article beneath the label-issuing device 416 against the projections 418. Upon completion of a printout operation for the article just preceding the article in question, the label-issuing device then operates to apply the severed label strip to the article. The operator can feel the moment the label is being applied by feeling the slight downward pressure of the piston applying the label to the article so that he is aware of when the severing and sealing operation is complete.

As the last-mentioned readout operation continues, the new article is being balanced. As soon as the readout operation is complete, the gating thyatron is prepared for operation during the scanning interval while, at the same time, the information set up in the print wheels is being printed upon the label strip. Upon completion of the printing thereof, the readout of the information in the counters can begin after the scanning operation is completed, that is when the gating thyatron is fired. Then, when the scale light again lights indicating completion of a scanning operation, the operator again advances the article one station position.

It should be understood that the label-issuing device 416 may be modified so that it merely drops a label strip upon an unwrapped article resting upon the endmost station of the platform section 409 instead of heat sealing or otherwise applying the same to the article wrapping. In such case, another operator may wrap a cellophane or other transparent type of material about the article leaving the markings on the price and weight visible from the outside of the package.

The various embodiments of the present invention

above described have thus provided a means for automatically printing weight and price information of an article being weighed. Further, by means of interlocking control circuit as shown in FIG. 5 and the conveyor platform arrangement shown in FIG. 3 together with the label-applying device 416, there is provided means for the printing and applying of a price slip or label upon an article in a minimum amount of time using one or two operators. Obviously, additional machinery could be added to substitute for the operator or operators in question without departing from the spirit of the present invention.

We claim as our invention:

1. Price computing and indicating means for use with weighing apparatus having a movable weight-responsive means, said price computing and indicating means comprising: first means responsive to movement of said weight-responsive means for providing respective groups of electrical signals which represent the prices of articles having different prices per pound for the weight corresponding to any one of a number of positions of said weight-responsive means, selector means for operating said first means to provide an electrical signal group corresponding to a selected price per pound, and digital indicating means responsive to the selected signal group for providing a digital numerical indication of the price of the article being weighed.

2. Price computing and indicating means for use with weighing apparatus having a movable weight-responsive means, said computing and indicating means comprising: first means responsive to movement of said weight-responsive means for providing a pulse train for each of a number of different positions of said weight-responsive means, the number of pulses in each pulse train being a measure of the price of an article having the weight indicated by the position of the weight-responsive means at a given price per pound, pulse counting means for counting the pulses in the generated pulse train, and price-indicating means responsive to the count of said counting means for indicating the price of the article being weighed.

3. Price computing and indicating means for use with weighing apparatus having a movable weight-responsive means, said computing and indicating means comprising: first means responsive to movement of said weight-responsive means for providing a number of pulse trains for each of a number of different positions of said weight-responsive means, the number of pulses in each pulse train being a measure of the price of an article having the weight indicated by the position of the weight-responsive means at a different given price per pound, selector means for operating said first means to provide the pulse train corresponding to the selected price per pound, and pulse counting means for counting the pulses in the generated pulse train.

4. Price computing and indicating means for use with weighing apparatus having movable weight-responsive means, said price computing and indicating means comprising: first means for generating a number of pulse trains having different respective pulse rates representing different prices per pound, selector means for operating said first means to produce any selected one of said pulse trains, gating means to which the selected pulse trains are fed, and means responsive to the position of said weight-responsive means for closing said gating means when the number of pulses in the selected pulse train which have passed through the gating means equals the price of the article being weighed.

5. Price computing and indicating means for use with weighing apparatus having a movable weight-responsive means, said price computing and indicating means comprising: first means for generating a pulse train having a number of pulses representing the price of the largest weight to be accommodated by the machine at a given

price per pound, gating means to which the pulse train is fed, means responsive to the position of said weight-responsive means for closing said gating means when the number of pulses of the generated pulse train which have passed through the gating means equals the price of the article being weighed, and pulse counting means for counting the pulses in the generated pulse train.

6. Price-determining means for use with weighing apparatus having movable weight-responsive means comprising: pulse-generating means including continuously rotating means for generating a pulse train having a predetermined number of pulses for each revolution of said rotating means, counting means for counting said pulses, normally open gating means for controlling the number of said pulses which reach said counting means, cooperating first and second control means mounted for movement along opposed, coaxial circular paths, said first control means being mounted for movement with said weight-responsive means and said second control means being mounted for continuous rotational movement with said rotating means, for any fixed position of said first control means said second control means passing opposite said first control means at a point during the generation of a pulse train by said pulse-generating means where the number of pulses generated in the train up to that time is a measure of the price of the article weighed at a given price per pound, third control means for resetting said counting means and for preparing said gating means for a gate-closing operation, a control circuit for said third control means including priming switch means which is operated when said rotating means reaches a point where a new pulse-train generating cycle begins, said control circuit operating said third control means to effect said resetting and preparing operations when said scale priming switch means is in said operated condition, said gating means then being open to allow passage of pulses to said counting means, and means responsive to the movement of said second control means opposite said first control means for closing said gating means when prepared for a closing operation by said third control means.

7. Price computing and indicating apparatus for use with weighing apparatus having a movable weight-responsive means, said price computing and indicating apparatus comprising: pulse generating means having a pulse-producing price track having pulse-producing points thereon spaced along the length of the track, the number of pulse-producing points in said track representing the price of an article having the maximum weight to be accommodated by the apparatus at a given price per pound, pulse-receiving means for receiving pulses one at a time from said price track, means for moving one of said pulse generating means and pulse-receiving means relative to the other in a continuous path wherein said pulse-receiving means repeatedly traverses said track, pulse counting means for counting the generated pulses, means for activating said counting means to begin a new counting cycle when the pulse-receiving means is contiguous to the start of the track, first control means movable with said weight-responsive means and cooperating second control means movable with the movable one of said pulse-receiving means and generating means along a path extending opposite the path of travel of said first control means, said first and second control means, when said pulse-receiving means is opposite the beginning of said track, having relative spaced apart positions proportional to the weight of the article being weighed, means for freezing the count in said counting means when said control members are opposite one another.

8. Price computing and indicating apparatus for use with weighing apparatus having a movable weight-responsive means, said price computing and indicating apparatus comprising: pulse generating means having a number of different pulse-producing tracks having pulse-producing points thereon spaced along the length of the tracks,

the number of pulse-producing points in corresponding segments of said tracks being different and representing different prices per pound for various articles to be weighed, pulse-receiving means for receiving pulses one at a time from said price tracks, selector means for selecting the track from which the pulses are to be obtained, means for continuously moving one of said pulse generating means and pulse-receiving means relative to the other in a continuous path wherein said pulse-receiving means repeatedly traverse the selected track, pulse counting means for counting the generated pulses, means for activating said counting means to begin a new counting cycle when the pulse-receiving means is contiguous to the start of the selected track, first control means movable with said weight-responsive means and cooperating second control means movable with the movable one of said pulse-receiving means and generating means along a path extending opposite the path of travel of said first control means, said first and second control means, when said pulse-receiving means is opposite the beginning of said track, having relative spaced apart positions proportional to the weight of the article being weighed, and means for freezing the count in said counting means when said control members are opposite one another.

9. Apparatus for use with weighing apparatus having movable weight-responsive means, said apparatus comprising: pulse generating means having a pulse-producing track falling along the arc of a circle, said pulse-producing track having pulse-producing points spaced therealong comprising narrow transparent areas, means on one side of said pulse-producing track for directing a narrow beam of light through one of the transparent areas of the track, pulse-receiving means on the other side of the track comprising photosensitive means positioned to intercept the beam of light passing through the track, means for imparting continuous rotational movement to one of said pulse-receiving means and said track-bearing pulse-generating means about an axis of rotation coaxial of said track to provide a train of pulses at the output of said pulse-receiving means for each revolution of the rotating means, pulse counting means for counting the pulses received by said pulse-receiving means, means responsive to the angular position of said rotating means for activating said counting means to begin a new counting cycle when the pulse-receiving means is near the beginning of said pulse-producing track, first control means movable with said weight-responsive means and second control means movable with said rotating means, said first and second control means both moving along a circular path which is coaxial and opposite the path of movement of said rotating means, said first and second control means being opposite one another when said pulse-receiving means is positioned at a point along the pulse-producing track which is spaced from the beginning of the track an amount proportional to the weight of the object being measured, and means responsive to the coming together of said first and second control means for holding the count in said counting means at that time.

10. Apparatus for use with weighing apparatus having movable weight-responsive means, said apparatus comprising: pulse generating means having a pulse-producing track falling along the arc of a circle, said pulse-producing track having pulse-producing points spaced therealong, pulse-receiving means, means for imparting continuous rotational movement to one of said pulse-receiving means and said track-bearing pulse-generating means about an axis of rotation coaxial of said track to provide a train of pulses at the output of said pulse-receiving means for each revolution of the rotating means, pulse counting means for counting the pulses received by said pulse-receiving means, means responsive to the angular position of said rotating means for activating said counting means to begin a new counting cycle when the pulse-receiving means is near the beginning of said pulse-producing track, first rotatably mounted control means mov-

able with said weight-responsive means, second rotatably mounted control means movable with said rotating means along a circular path which is coaxial and opposite the path of movement of said first control means, said first and second control means being opposite one another when said pulse-receiving means is positioned at a point along the pulse-producing track which is spaced from the beginning of the track an amount proportional to the weight of the object being measured, and means responsive to the coming together of said first and second control means for holding the count in said counting means at that time.

11. Apparatus for use with weighing apparatus having movable weight-responsive means, said apparatus comprising: pulse generating means having a number of pulse-producing tracks falling along the arcs of coaxial circles, pulse-receiving means for selectively receiving pulses one at a time from any one of said tracks, said pulse-producing tracks having pulse-producing points in said respective tracks representing different respective prices per pound of the articles to be weighed, means for imparting continuous rotation to one of said pulse-receiving means and said track-bearing pulse generating means about an axis of rotation coaxial of said concentrically arranged tracks to provide a train of pulses at the output of said pulse-receiving means from the selected track for each revolution of the rotating means, pulse counting means for counting the pulses received by said pulse-receiving means, means responsive to the angular position of said rotating means for activating said counting means to begin a new counting cycle when the pulse-receiving means is near the beginning of the selected pulse-producing track, first rotatably mounted control means movable with said weight-responsive means, second rotatably mounted control means movable with said rotating means along a circular path which is coaxial and opposite the path of movement of said first control means, said first and second control means being opposite one another when said pulse-receiving means is positioned at a point along the selected pulse-producing track which is spaced from the beginning of the track an amount proportional to the weight of the object being measured, and means responsive to the coming together of said first and second control means for holding the count in said counting means at that time, the number of pulses in the various tracks being such that the count in said counting means is the price of the article being weighed at the selected price per pound when the first and second control means come together.

12. Price-determining means for use with weighing apparatus having movable weight-responsive means comprising: pulse-generating means including continuously rotating means for generating a pulse train having a predetermined number of pulses for each revolution of said rotating means, counting means for counting said pulses, gating means for controlling the number of said pulses which reach said counting means, cooperating first and second control means mounted for movement along opposed, coaxial, circular paths, said first control means being mounted for movement with said weight-responsive means and said second control means being mounted for continuous rotational movement with said rotating means, for any fixed position of said first control means said second control means passing opposite said first control means at a point during the generation of a pulse train by said pulse-generating means where the number of pulses generated in the train up to that time is a measure of the price of the article weighed at a given price per pound, third control means for resetting said counting means to begin a new counting cycle, a control circuit for said third control means including priming switch means which is operated when said rotating means reaches a point where a new pulse-train generating cycle begins, said control circuit operating said third control means to effect said resetting operation when said priming switch

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means is operated, said gating means then being open to allow passage of pulses to said counting means, and means responsive to the movement of said second control means opposite said first control means for closing said gating means.

13. Price-determining means for use with weighing apparatus having movable weight-responsive means comprising: pulse-generating means including continuously rotating means for generating a pulse train having a predetermined number of pulses for each revolution of said rotating means, counting means for counting said pulses, gating means for controlling the number of said pulses which reach said counting means, cooperating first and second control means mounted for movement along opposed, coaxial, circular paths, said first control means being mounted for movement with said weight-responsive means and said second control means being mounted for continuous rotational movement with said rotating means, for any fixed position of said first control means said second control means passing opposite said first control means at a point during the generation of a pulse train by said pulse-generating means where the number of pulses generated in the train up to that time is a measure of the price of the article weighed at a given price per pound, third control means for rendering said coating means effective to begin a new count cycle, a control circuit for said third control means including scale switch means which is operated when an article is being weighed by said weighing apparatus, balance-responsive switch means which is operated when said weight-responsive means reaches a steady-state condition and priming switch means which is operated when said rotating means reaches a point where a new pulse-train generating cycle begins, said control circuit operating said third control means to render said counting means effective to begin a new count cycle when said balance-responsive switch means, said scale and priming switch means are simultaneously in said operated conditions, said gating means then being open to allow passage of pulses to said counting means, and means responsive to the movement of said second control means opposite said first control means for closing said gating means.

14. Price-determining means for use with weighing apparatus having movable weight-responsive means comprising: pulse-generating means including continuously rotating means for generating a pulse train having a predetermined number of pulses for each revolution of said rotating means, counting means for counting said pulses, gating means for controlling the number of said pulses which reach said counting means, cooperating first and second control means mounted for movement along opposed, coaxial, circular paths, said first control means being mounted for movement with said weight-responsive means and said second control means being mounted for continuous rotational movement with said rotating means, for any fixed position of said first control means, said second control means passing opposite said first control means at a point during the generation of a pulse train by said pulse-generating means where the number of pulses generated in the train up to that time is a measure of the price of the article weighed at a given price per pound, third control means for rendering said counting means effective to begin a new count cycle, a control circuit for said third control means including scale switch means which is operated when an article is being weighed by said weighing apparatus, balance-responsive switch means which is operated when an article is being weighed by said weighing apparatus, balance-responsive switch means which is operated when said weight-responsive means reaches a steady-state condition and priming switch means which is operated when said rotating means reaches a point where a new pulse-train generating cycle begins, said control circuit operating said third control means to render said counting means effective to begin a new count cycle when said balance-responsive switch

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means and priming switch means are simultaneously in said operated conditions, said gating means then being open to allow passage of pulses to said counting means, and means responsive to the movement of said second control means opposite said first control means for closing said gating means.

15. Price marking apparatus comprising: a vertically movable scale platform on which an article to be weighed is to be placed, a price-slip issuing device, printing means for printing price information on the price slip, price-determining means, readout means for reading out the price from said price-determining means, said price-determining means being responsive to the degree of movement of said scale platform for providing a digital measurement of the price of the article, and said readout means being responsive to said price-determining means for positioning said printing means to print digital price information after the price on the previously weighed article has been printed, said price-determining means thus being operative to determine the price of the article then on the scale platform while the price of the article just previously weighed is being printed on said slip, and means controlling said price-slip issuing device for issuing a completed price slip on the article weighed previous to said last-mentioned article.

16. Price marking apparatus comprising: a vertically movable scale platform on which an article to be weighed is to be placed, stationary platform sections on opposite sides of said scale platform which are at approximately the same elevation as the scale platform, the platform section on one side of said platform having two article support stations and the platform section on the other side of the scale platform having one article support station, an in-feeding conveyor arranged to feed articles one at a time to said one article support station, an out-feeding conveyor extending from the endmost of said other article stations, a price-slip issuing device at said endmost article station, printing means for printing price information on the price slip, price-determining means responsive to the degree of movement of said scale platform for providing a digital measurement of the price of the article, readout means responsive to said price-determining means for positioning said printing means to print digital price information, means for preventing operation of said readout means until said price-determining means has completed its operation and said printing means has printed the digital information previously read thereinto on said strip, and means for preventing operation of said price-determining means until said readout means has transferred the information previously provided by said price-determining means to said printing means and until said scale platform reaches a steady state, said price-determining means being operative to determine the price of the article then on the scale platform while the price of the article just previously weighed and resting at the article station behind said endmost station is being printed on said slip, and said price-slip issuing device issuing the completed price slip of the article weighed previous to said last-mentioned article and then located at said endmost article station.

17. Price marking apparatus comprising: a vertically movable scale platform on which an article to be weighed is to be placed, stationary platform sections on opposite sides of said scale platform, the platform section on one side of said platform having two article support stations and the platform section on the other side of the scale platform having one article support station, an in-feeding conveyor arranged to feed articles one at a time to said one article support station, an out-feeding conveyor extending from the endmost of said other article station, printing means for printing price information on the price slip, price-determining means responsive to the degree of movement of said scale platform for providing a digital measurement of the price of the article, readout means responsive to said price-determining means for position-

ing said printing means to print digital price information, said price-determining means being operative to determine the price of the article then on the scale platform while the price of the article just previously weighed and resting at the article station behind said endmost station is being printed on said slip, and said price-slip issuing device issuing the completed price slip of the article weighed previous to said last-mentioned article and then located at said endmost article station.

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