Dec. 30, 1947. E. C. CARTER 2,433,647

CASH REGISTER

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FIG. 2

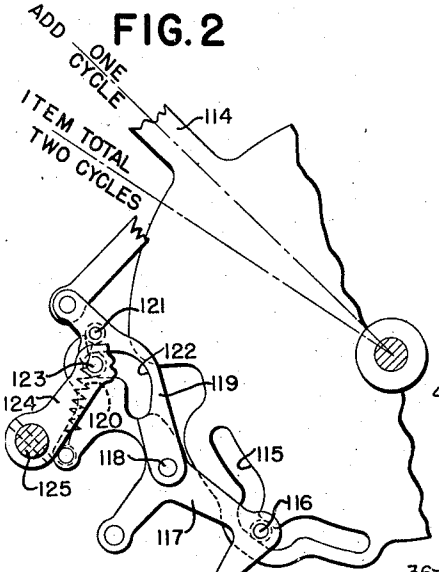


FIG. 1

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CASH REGISTER

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FIG. 3

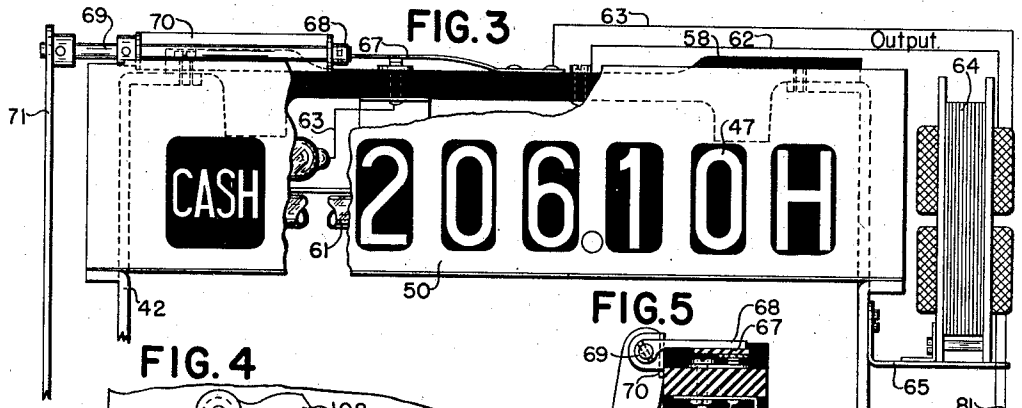


FIG. 4

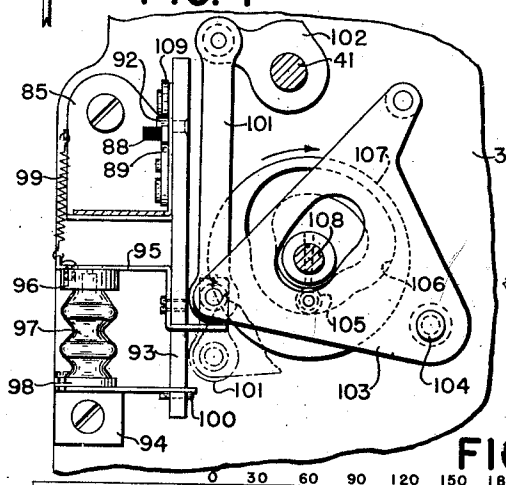


FIG. 5

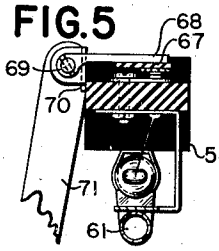


FIG. 6

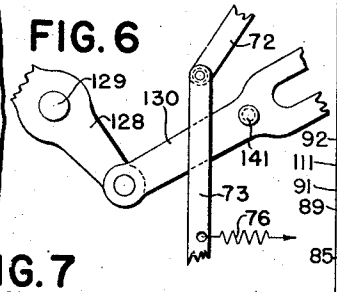


FIG. 7

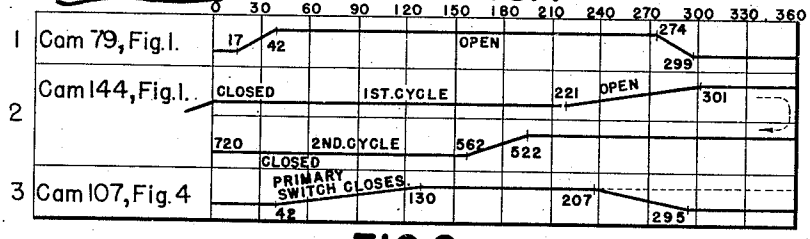
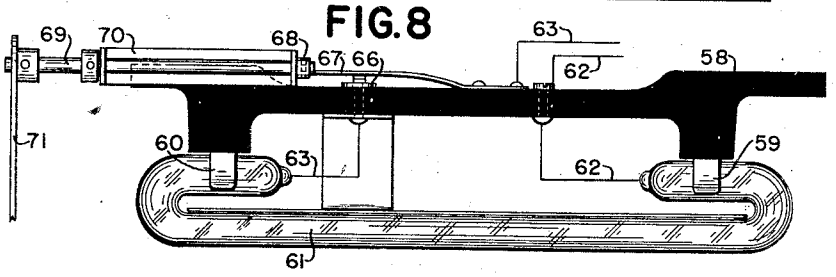


FIG. 8



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UNITED STATES PATENT OFFICE

2,433,647

CASH REGISTER

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Application October 11, 1944, Serial No. 558,246

14 Claims. (Cl. 235—23)

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The present invention relates to improvements in cash registers and/or accounting machines and is directed particularly to means for improving the visibility of the indicating mechanisms of such machines.

One of the objects of the present invention is to provide means to improve the visibility of the indicating mechanisms for cash registers and/or accounting machines.

Another object is the provision of novel means for illuminating the indicating mechanisms for cash registers and/or accounting machines.

Still another object is to provide automatically controlled means for illuminating the indicating mechanisms of cash registers and/or accounting machines after said indicating mechanisms have been set up, and to retain said indicating mechanisms illuminated for a predetermined period after machine operation has been completed.

Still another object is to provide translucent indicators for cash registers and/or accounting machines and further to provide automatically controlled means to illuminate the indicators, said illuminating means being rendered effective after the indicators have been set up and remaining effective for a predetermined period after machine operation has been completed.

A further object of the present invention is to provide a cash register and/or accounting machine, capable of one-cycle operations and two-cycle operations, with translucent indicators and with means to illuminate the indicators, said illuminating means being rendered effective near the end of one-cycle operations and remaining effective for a certain interval after machine operation has been completed, and further to provide means, effective in two-cycle operations, to vary the operation of the illuminating means to cause the indicators to be illuminated near the end of said two-cycle operations and to remain illuminated for a certain interval after machine operation has been completed.

With these and incidental objects in view, the invention includes certain novel features of construction and combinations of parts, the essential elements of which are set forth in appended claims and preferred forms or embodiments of which are hereinafter described with reference to the drawings which accompany and form a part of this specification.

In the drawings,

Fig. 1 is a right side elevation of the machine with the right-hand end of the cabinet removed, showing in particular the indicator-illuminating mechanism and the secondary switch and associated mechanism for controlling said illuminating mechanism.

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Fig. 2 is a detail view, partially broken away, of the total control lever and a part of the mechanism associated therewith for controlling the movement of the zero throwout shaft in two-cycle operations.

Fig. 3 is a back elevation showing in general the indicating mechanism and the primary and secondary switch mechanisms for controlling the indicator-illuminating mechanism.

Fig. 4 is a left-hand elevation showing in detail the bellows mechanism for retaining the primary switch effective after machine operation has been completed.

Fig. 5 is a detail, partially sectioned, of the secondary switch mechanism.

Fig. 6 is a detail view of a modified form of the mechanism for controlling the secondary switch in total and sub-total recording operations.

Fig. 7 is a time chart showing in graphic form the timing of the important mechanism for controlling the illuminating means.

Fig. 8 is a detail back view of the secondary switch and the illuminating tube controlled thereby.

Description

The present invention is directed to means for illuminating the indicating mechanisms of cash registers and/or accounting machines. This illuminating means includes a gas-filled cold cathode tube of the fluorescent type. The illuminating tube is of the medium frequency type and is energized by voltage from the secondary portion of a transformer having an input of 110 volts A. C. into the primary portion thereof.

The machine chosen to illustrate the present invention is provided with indicator targets formed of translucent plastic material having the indicia outlined thereon through the medium of an opaque paint. The present machine is provided with front and back indication, and the illuminating tube is located midway between said front and back indication, so that both are illuminated equally.

The lighting of the illuminating tube is controlled by a secondary switch located between said tube and the secondary portion of the transformer, and by a primary switch located between the power input, or source of electrical energy, and the primary side of the transformer, said

two switches being necessary to effect the desired control over the operation of the illuminating device.

The primary switch is rendered effective near the end of each machine operation and is provided with a delaying or retarding device which causes said switch to remain effective until a short time after machine operation has been completed to provide ample time for properly reading the illuminated indication.

The secondary switch is provided for controlling the initial lighting of the indicator illuminating tube, and, when the machine is at rest, this switch is closed. In adding operations, near the beginning of machine operation, the secondary switch is opened and remains open until after the indication has been set up under influence of the various amount, transaction, and clerks' keys, after which said switch is closed and remains thus at the end of machine operation, thus permitting the primary switch mechanism to control the length of time that the indicators remain illuminated, as explained above.

The secondary switch mechanism functions in the manner explained above in adding and subtracting operations (one-cycle operations). However, in total and sub-total recording operations, which require two cycles of operation of the machine instead of the one cycle required for adding and subtracting operations, it is necessary to alter the control of the secondary switch to prevent the lighting of the indication illuminating tube before the indication has been set up.

The present machine is arranged for itemizing transactions, in which the different items of a complete item transaction are set up individually on the amount keys and, in a series of one-cycle adding operations, are indicated by the indicators, recorded by the printing means, and entered in the item totalizer. After all the items have been entered in this manner, the item transaction is completed by moving the total control lever downwardly one step to "Item total" position to condition the machine for a two-cycle item total operation, in which the total of all the items is indicated by the indicators, recorded by the printing means, and simultaneously cleared from the item totalizer. At the end of the item total operation, the total control lever is automatically returned to its central or adding position.

In one form of total control mechanism for the indicator illuminating means, manual movement of the total control lever to the item total position, through the usual zero throw-out mechanism, opens the secondary switch for the illuminating means, and said switch remains thus until near the end of the two-cycle item total operation, whereupon automatic returning of the total control lever to adding position closes the secondary switch so that the indicators will be illuminated to reveal the total amount of the various items constituting the item total transaction.

In the above modification, item total operations are the only total operations in which the indicators are illuminated.

A variation of the construction outlined above causes the indicators to be illuminated in any sub-total or total recording operation, also often referred to as reading or resetting operations.

In this latter construction, movement of the total control lever out of adding position to any total or sub-total recording position effectuates mechanism which operates, through the zero throwout mechanism and in conjunction with the mechanism which normally opens the switch in

one-cycle operations, to cause the secondary switch to be opened near the end of the first cycle of a total or sub-total recording operation and to remain open until after the amount of the total or sub-total has been set up on the indicators. Near the end of the second cycle of operation, the secondary switch is rendered effective or closed to cause said total or sub-total to be illuminated.

The machine embodying the present invention has a plurality of denominational rows of amount keys **30** (Fig. 1), mounted in corresponding key frames **31**, in turn removably mounted in the machine proper by means of upper and lower rods, only the upper rod being shown here, supported by right and left main frames **32** and **33**. The main frames **32** and **33** (Fig. 1) are secured at their lower ends by screws **34** to upwardly extending lugs on a machine base **35**, which, together with various cross frames, bars, and rods, rigidly secure said frames **32** and **33** in proper spaced relationship to each other. A case or cabinet **36** encloses the mechanism of the machine, and said cabinet is also secured to the base **35**. Each of the amount banks has a corresponding differential mechanism for transmitting the values of the depressed amount keys to the corresponding indicators, type wheels, and totalizer wheels. Each of the amount differential mechanisms includes a link **37**, the upper end of which is pivotally connected to a corresponding segment **38** free on an indicator shaft **41** journaled in the frames **32** and **33**.

The segment **38** (Figs. 1 and 3) has an upward extension with teeth which mesh with corresponding rack teeth in the lower edge of an indicator slide **39** mounted to shift horizontally by means of parallel slots therein in cooperation with two parallel bars **40** secured between right and left frames **42** and **43** of the indicator framework, said frames being in turn secured, respectively, to the right frame **32** and the left frame **33**. Spacing members secured on the bars **40** have alined slots therein which engage the upper walls of the parallel slots in the slide **39** to properly side-space said slide and to prevent lateral displacement thereof. The slide **39** (Figs. 1 and 3) has secured thereto a front indicator cage **44** and a similar back indicator cage **45**, each of said cages having a plurality of equally spaced vertical guide slots formed therein which slidably support front indicators **46** and back indicators **47**. The indicators **46** and **47** may be formed of any suitable translucent plastic material which will permit the passage of sufficient light rays to properly illuminate the indicia on said indicators. When the indicators **46** and **47** are in their downward or unexposed position, undercut portions of the lower edges thereof rest on corresponding ledges **48** and **49** formed on the slide **39**.

When none of the amount keys **30** (Fig. 1) is depressed in a machine operation, the zero stop mechanism, in cooperation with the differential mechanism and through the link **37**, positions the segment **38** and the slide **39**, as shown here, so that the front and back indicators **46** and **47** corresponding to zero position are in operative alinement with the usual indicator lifting mechanism and are also in alinement with slots formed by front and back shields **50** and **51**, secured to the right and left indicator frames **42** and **43**.

Functioning of the indicator lifting mechanism causes it to engage extending lugs on the upper ends of the selected indicators and lift them up-

wardly into the slots and into alinement with sight apertures in the shields 50 and 51. The shields 50 and 51 and the upper portion of the indicator mechanism are enclosed in a suitable cover 52 secured to the cabinet 36, said indicator cover supporting front and back transparent windows 53 and 54 directly opposite the sight openings in the shields 50 and 51, through which the indicators are visible.

The amount keys 30 (Fig. 1), beginning with the lowermost keys, are numbered 1 to 9 consecutively, and, through their differential mechanism, the link 37 and the segment 38 cause the slide 39 to be positioned differentially according to which of the keys has been depressed. This positioning of the slide 39 moves the corresponding front and back indicators 46 and 47 into alinement with the slots formed by the front and back shields 50 and 51 and into operative relationship with the indicator lifting mechanism, which lifts said indicators into viewing position. An aliner (not shown) cooperates with teeth formed on a rearward extension of the segment 38 to aline said segment and the slide 39 in set positions while the selected indicators 46 and 47 are being lifted to and lowered from viewing position. Likewise an aliner 55 (Fig. 1) cooperates with teeth formed on a bar extending between the cages 44 and 45 to assist the segment 38 in alining the slide 39 in set position.

Each row of amount keys has associated therewith a front and back indicating mechanism similar to that explained in connection with the denomination shown in Fig. 1, and there are also a row of Clerks' keys and a row of transaction keys (not shown), which have associated therewith corresponding front and back indicators similar to the indicators 46 and 47.

The somewhat brief description of the indicating mechanism given above is believed sufficient for the purpose of this specification; however, if a more detailed description of the indicating mechanism is desired, reference may be had to the United States Patent No. 1,163,748, issued December 14, 1915, to Frederick L. Fuller, in which the indicating mechanism is fully disclosed.

An insulating bar 58 (Figs. 1, 3, 5, and 8), molded of some suitable insulating material, is secured to similar bent-over upper portions of the indicator frames 42 and 43 and has two similar downward extensions having secured thereto, respectively, clips 59 and 60 arranged to snap over the inwardly-bent ends of a fluorescent light tube 61 of the cold cathode type, said tube 61 being located midway between the front and back indicators 46 and 47 and extending the full length of the space occupied by the indicators, so as to properly illuminate said indicators. The illuminating tube 61 has two electrodes, from which extend lead wires 62 and 63. The lead wire 62 connects directly with one pole of the secondary portion of a transformer 64 (Fig. 3), mounted on a bracket 65 secured to the left indicator frame 43. The lead wire 63 is connected to a fixed contact 66 of a secondary switch, said contact being secured in the bar 58. The fixed contact 66 is engageable by a moving contact fast on the free end of a yieldable blade 67, the other end of which is secured to the bar 58. The blade 67 is connected by an extension of the lead wire 63 to the other pole of the secondary portion of the transformer 64, to complete the electrical circuit to the illuminating tube 61. The blade 67 has cooperating therewith

a block of insulating material (Figs. 5 and 8) secured to an operating finger 68 in turn secured on a shaft 69 supported in similar bent-over portions of a bracket 70 secured to the bar 58. Also secured on the shaft 69 is an arm 71 pivotally connected by a link 72 (Figs. 1 and 3) to the upper end of a switch operating lever 73 pivotally supported at its lower end by a stud 74 in a bar 75 secured to the right frame 32. A spring 76, tensioned between a stud 77 in the frame 32 and the lever 73, urges said lever clockwise to normally maintain a node 78 thereon in yielding contact with the periphery of a plate cam 79 secured on a main shaft 80 journaled in the main frames 32 and 33. The main shaft 80 drives the mechanism of the machine and, in adding and subtracting operations, makes one revolution in a clockwise direction and in sub-total and total recording or reading and resetting operations makes two such revolutions.

The primary portion of the transformer 64 (Fig. 3) is connected by a lead wire 81 directly to the one side of the electrical energy supply source, and by another lead wire 82 to a yieldable blade 83 of a primary switch, one end of said blade being secured on a block 84 formed of insulating material and in turn secured on a bracket 85 fast to the left frame 33 (Figs. 3 and 4). The blade 83 carries a contact point which cooperates with a fixed contact point 86 secured in the block 84, said fixed contact being connected by lead wire 87 to the other side of the supply source of electrical energy.

The switch blade 83 is engageable by block 88 of insulating material secured on a switch operating arm 89 pivoted on a stud 90 in the bracket 85. The arm 89 has a camming surface 91, which cooperates with a stud 92 secured in the upper end of a switch operating bar 93 mounted to shift vertically by means of alined slots in the bracket 85 and in the horizontal portion of a bracket 94 secured to the left frame 33. The bar 93 (Fig. 4) has secured thereto a step plate 95, an upper horizontal portion of which has secured thereto a round flanged member 96, to which is connected the upper end of a collapsible bellows 97 composed of suitable plastic material such as natural or synthetic rubber. The lower end of the bellows 97 is connected to a lower round flanged member 98 secured to the horizontal portion of the bracket 94.

A spring 99 (Figs. 3 and 4), tensioned between the upper portion of the plate 95 and the bracket 85, urges said plate 95 and the bar 93 upwardly to normally maintain the bellows 97 in an extended condition, as shown here, such movement of said parts being limited by a pin 100 in said bar 93 in cooperation with the lower surface of the horizontal portion of the bracket 94. A lower horizontal extension of the step plate 95 underlies and cooperates with the lower end of a link 101, pivotally connected between a crank 102, free on the indicator shaft 41, and a cam lever 103, turnably supported by a stud 104 in the left frame 33. The cam lever 103 carries a roller 105, which extends into a camming groove 106 in a cam 107 secured on a short shaft 108 journaled between the left frame 33 and the printer framework, said shaft 108 being driven one clockwise revolution, as viewed in Fig. 4, in adding and subtracting operations, and two such revolutions in sub-total and total recording operations.

The mechanism shown in Fig. 4 and described above, including the lever 103 and the cam 107, is a part of the regular Clerks' differential mecha-

nism which is fully disclosed in Fig. 8 and the description in connection therewith in the United States Patent No. 2,238,517, which issued April 15, 1941, to Arthur R. Colley et al., to which reference may be had for a more detailed description of said mechanism.

Functioning of the illuminating mechanism in one-cycle operations

In one-cycle operations—that is, adding and subtracting operations—in which the main shaft 80 (Fig. 1) and the shaft 108 (Fig. 4) make one clockwise revolution, initial movement of said shaft 80 causes the cam 79 to function according to the time given in space 1 of the time chart (Fig. 7), to rock the cam lever 73 counter-clockwise, which movement, through the link 72, rocks the arm 71 and the shaft 69 clockwise, as shown in Fig. 1, and counter-clockwise, as shown in Fig. 5. Counter-clockwise movement of the arm 71 and the shaft 69 (Fig. 5) carries the finger 68 in unison therewith to release the yieldable blade 67 of the secondary switch to open said switch, to break the circuit between the secondary portion of the transformer 64 and the illuminating tube 61.

After the secondary switch has been opened, as explained above, the cam groove 106 in the cam 107 (Fig. 4), operating according to the time given in space 3 of the chart (Fig. 7), rocks the lever 103 counter-clockwise, causing the downward end of the link 101, in cooperation with the lower step of the plate 95, to carry said plate and the bar 93 downwardly against the action of the spring 99, to collapse or deflate the bellows 97.

Downward movement of the bar 93 (Figs. 3 and 4), in addition to collapsing the bellows 97, likewise causes the stud 92 in said bar, in cooperation with the camming surface 91, to rock the switch operating arm 89 clockwise, causing the insulating block 88, in cooperation with the blade 83 of the primary switch, to close said switch, to complete the circuit from the primary portion of the transformer 64 to the source of electrical energy. Downward movement of the bar 93, in addition to closing the primary switch, likewise withdraws the stud 92 from the lower surface of a latching pawl 109 to release said pawl to the action of a spring 110, tensioned between the pawl 109 and the arm 89, whereupon said spring urges said pawl counter-clockwise to latch a tooth formed thereon over the upper end of an upwardly extending tail 111 formed on said arm 89. This latches the switch arm 89 in clockwise position to insure that the primary switch remains closed.

Continued rotation of the cam 107 (Figs. 3 and 4 and space 3, Fig. 7) returns the link 101 upwardly to withdraw the lower end thereof from the lower step of the plate 95. However, the bellows 97 has an adjustable check valve in its upper end which is adjusted so as to cause said bellows to inflate and extend slowly under influence of the spring 99, after said link 101 has been restored upwardly to normal position. Near the end of machine operation, the high portion of the periphery of the cam 79 (Fig. 1 and space 1, Fig. 7) moves beyond the node 78, permitting the spring 76 to return the lever 73 clockwise, which, through the link 72, the arm 71, the shaft 69, and the finger 68, closes the secondary switch to complete the circuit to the illuminating tube 61 to cause said tube to properly illuminate the translucent front and back indicators 46 and 47 after they have been set, as explained before.

The gradual restoring or extending action of the bellows 97 (Figs. 3 and 4) permits the primary switch to remain closed for a predetermined interval of time, usually about 30 seconds, after machine operation has been completed. As the bellows 97 near the terminus of its restoring movement, the stud 92 engages the bottom surface of the pawl 109 to disengage the tooth of said pawl from the upper end of the tail 111 to release the switch arm 89 to the action of the spring 110, which immediately rocks said arm counter-clockwise. Counter-clockwise movement of the switch arm 89 opens the primary switch to break the circuit to the illuminating tube 61 to terminate the illumination of the indicators.

In case a subsequent machine operation is begun before the primary switch has been opened by the expanding movement of the bellows 97, as explained above, initial movement of the cam 79 (Fig. 1), in cooperation with the lever 73, opens the secondary switch in the manner explained previously, to break the circuit to the illuminating tube 61 at the very beginning of said subsequent operation.

Functioning of the illuminating mechanism in item total operations

In Item total recording operations, it is desirable that the total amount of a group of items constituting a single purchase be illuminated near the end of such operation, and such control of the illuminating mechanism is effected by the usual and well-known total control lever, which is normally in Add position but which in Item total operations is moved in resetting direction to the first position below Add position—i. e., to Item total position. Manual movement of the total control lever from Add position to Item total position through the well-known mechanism which is fully disclosed in the Bernis M. Shipley United States Patent No. 1,865,147, issued June 28, 1932, rocks the usual zero throwout shaft a slight distance, which, through connecting mechanism, shown in Fig. 1 and to be described presently, opens the secondary switch to interrupt the flow of current to the illuminating tube 61.

All sub-total and total recording operations, including Item total operations, consist of two cycles of movement or two complete revolutions of the main shaft 80, and in such operations the secondary switch is retained open until near the end of the second cycle of operation, so that functioning of the primary switch mechanism (Fig. 4), as explained above, during the first cycle of such operations will not energize the indicator illuminating tube 61. Near the end of the second cycle of Item total operations, the total control lever is automatically restored from Item total position to normal or Add position. This automatic restoring of the total control lever permits the mechanism shown in Fig. 1 to close the secondary switch in the manner explained previously, so that the illuminating tube will be energized and illuminate the indication of the item total.

As previously stated, the present machine is provided with a total control lever 114 (Fig. 2), which functions in the well-known manner to control the types of operations performed by the machine. Normally the total control lever 114 is in its central or Add position but may be manually moved either upwardly, to any one of several reading or sub-total recording positions, or downwardly, to any one of several resetting or total recording positions. The first downward position of the total control lever is the Item total position,

in which the item totalizer is selected and conditioned for a total recording or resetting operation to clear therefrom the amount of the total items and to set the indicators and the printing mechanism accordingly.

The total control lever 114 has a cam slot 115 engaged by a stud 116 in the lower end of a lever 117 pivoted on a stationary stud 118. Also pivoted at its lower end on the stud 118 is an arm 119, urged counter-clockwise by a spring 120, tensioned between said arm and the lever 117, and acting to normally maintain a stop stud 121, carried by said arm 119, in contact with a stop surface on an upward extension of said lever 117. The arm 119 and the lever 117 together form a yieldable camming slot 122, which engages a stud 123 in an arm 124 secured on a zero throwout shaft 125 rotatably mounted in the framework of the machine.

Also secured on the shaft 125 is a crank 126 (Fig. 1) pivotally connected by a link 127 to a lever 128 free on a stationary stud 129. The lever 128 is pivotally connected at its lower end to the forward end of a pitman 130 shiftably supported by a slot 131 therein in cooperation with a stud 132 secured in the main frame 32. A large-headed screw threadedly engages a hole in the stud 132 and acts to retain the pitman 130 against lateral displacement.

Moving the total control lever 114 (Figs. 1 and 2) from Add position to Item total position causes the slot 115, in cooperation with the stud 116, to rock the lever 117 and the arm 119 counter-clockwise. Counter-clockwise movement of the lever 117 and the arm 119 causes the slot 122, in cooperation with the stud 123, to rock the arm 124, the shaft 125, and the crank 126 a slight distance clockwise. Clockwise movement of the crank 126, through the link 127, rocks the lever 128 also clockwise to shift the pitman 130 forwardly a slight distance to effect the proper control of the machine for two-cycle operations in the manner fully disclosed in the Shipley and the Colley patents referred to previously.

Forward movement of the pitman 130 (Fig. 1) causes a stud 133, carried thereby, to engage and rock the lever 73 counter-clockwise, which movement, through the link 72 and the arm 71, opens the secondary switch to prevent the flow of current to the indicator illuminating tube 61, until the total control lever 114 is automatically restored from Item total position to Add position near the end of the Item total operation, as will be explained presently.

The mechanism for restoring the total control lever 114 from Item total position to Add position near the end of an Item total operation is fully disclosed in the United States Patent No. 1,736,067, issued November 19, 1929, to Samuel Brand, and for this reason it is believed that the general showing of the mechanism in Fig. 1 and a brief description thereof will be sufficient.

The mechanism for automatically restoring the total control lever 114 (Fig. 2) from Item total position to Add position comprises a pitman 134 (Fig. 1), which is operatively connected to the lever 128, said pitman having a camming slot cooperating with a stud 135 in a hook 136 to control the movement of said hook into operative relationship with a stud 137 in an operating lever 138.

Near the end of an Item total operation, the mechanism referred to in general above functions in the manner disclosed in the Brand patent to restore the total control lever 114 from Item total position to Add position, which movement, through the slot 115 (Fig. 2) restores the lever 117 and the arm 119 clockwise to normal position, thereby causing the slot 122 to restore the arm 124 and the shaft 125 counter-clockwise to normal position, as shown here. Counter-clockwise restoring movement of the shaft 125 (Fig. 1), through the crank 126, the link 127, and the lever 128, restores the pitman 130 rearwardly to normal position, as shown here. Rearward restoring movement of the pitman 130 withdraws the stud 133 from the lever 73 to permit the spring 76 to restore said lever clockwise to normal position immediately after the high portion of the periphery of the cam 79 moves beyond the node 78, so as not to interfere with such restoring movement clockwise of said lever 73. Clockwise restoring movement of the lever 73, through the link 72 and the arm 71, closes the secondary switch, and, inasmuch as the mechanism shown in Figs. 3 and 4 and explained earlier herein has previously closed the primary switch, the indicator illuminating tube 61 is energized and illuminates the indication of the Item total, which is the result desired.

It is to be understood that the entire indication, both front and back and including the amount of the Item total, the Clerks' identification letter, and the symbol or name of the type of transaction being performed, is illuminated by the tube 61.

Functioning of the illuminating mechanism in sub-total and total operations

While it is not often desirable to illuminate the indication of ordinary sub-totals and/or grand totals, still a variation of the mechanism shown in Figs. 1 and 2 is provided for illuminating such sub-totals and grand totals, said mechanism being shown in Fig. 6.

The mechanism for controlling the illumination of the indication of sub-totals and grand totals comprises a stud 141 (Fig. 6), similar in every respect to the stud 133 and spaced on the pitman 130 so that manual movement of the total control lever 114 (Fig. 2) and consequent forward movement of said pitman 130 will not rock the lever 73 in the manner explained above but will move the stud 141 within operating range of said lever, so that the mechanical movement imparted to said pitman 130 near the end of the first cycle of sub-total or total operations will maintain said lever 73 and connected mechanism in the position into which they are adjusted by the cam 79, in the manner explained above, to maintain the secondary switch open until near the end of the second cycle of operation. Secured on the main shaft 80 (Fig. 1) is a gear 142, which meshes with a larger gear 143 free on the stud 132. The gear 143 has a counter-boring which freely supports a cycle control cam 144 having a cam slot 145, which cooperates with a roller 146 mounted on the pitman 130.

When the total control lever 114 (Figs. 1 and 2) is in Add position, as shown here, the pitman 130 is retained in its rearward position, in which position the roller 146 engages a notch adjacent to the cam slot 145 to lock the cam 144 against rotation in adding operations. Manual movement of the total control lever 114 out of Add position to any of its sub-total or total positions, through the mechanism shown in Fig. 2 and explained above, rocks the shaft 125 clockwise, which movement, through the crank 126, the link 127, and the lever 128, shifts the pitman 130 for-

wardly a sufficient distance to disengage the roller 146 from the notch and to move said roller into alinement with the cam slot 145. Forward movement of the pitman 130 likewise carries a connecting slide 147, mounted freely in a slot in the face of the cam 144, forwardly in unison therewith to move a connecting projection on said slide into a notch in the gear 143 to connect said cam 144 to said gear for unitary rotative movement.

As previously explained, the main shaft 80 and the gear 142 (Fig. 1) make one clockwise rotation in adding and subtracting operations and two such rotations in sub-total and total or reading and resetting operations, said gear 142 in turn driving the large gear 143 one-half rotation in adding operations and a complete rotation in reading and resetting operations. In reading and resetting operations, the cam 144 moves in unison with the gear 143, and the cam slot 145 in said cam, in cooperation with the roller 146, shifts the pitman 130 forwardly an additional distance and back according to the time given in space 2 of the time chart, Fig. 7. This additional forward movement of the pitman 130 (Fig. 6) causes the stud 141 to engage the upper end of the lever 73 after the high portion of the periphery of the cam 79 (Fig. 1) has moved beyond the node 78 to retain the secondary switch open during the two cycles of a reading or resetting operation to prevent energizing of the illuminating tube 61 at the end of the first cycle of such operations (compare spaces 1 and 2, Fig. 7). Near the middle of the second cycle of a reading or resetting operation, the cam slot 145 (Figs. 1, 2, and 6), in cooperation with the roller 146, returns the pitman 130 rearwardly to move the stud 141 away from the upper end of the lever 73 to surrender control of said lever to the cam 79. The cam 79 functions in the manner explained earlier herein to close the secondary switch near the end of the second cycle of operation and, after the indicators have been properly adjusted, to energize the illuminating tube 61 to cause the indication of the sub-total or total to be illuminated.

Mode of operation

It is believed that a full understanding of the operation of the machine will have been obtained from a perusal of the preceding specification. However, a brief outline of the functioning of the illuminating mechanism may be helpful and will now be given.

In adding and subtracting operations, the cam 79 and connecting mechanism, shown in Fig. 1, open the secondary switch for the illuminating tube 61 at the beginning of such operations and retain said switch open until near the end of machine operation to prevent said illuminating tube 61 from being energized while the indication is being set up. Before the secondary switch is closed near the end of an adding or subtracting operation, the primary switch, shown best in Fig. 3, is closed by the mechanism shown in Fig. 4, said mechanism at the same time collapsing the bellows 97, which inflates slowly at a predetermined rate and opens the primary switch at a predetermined time after the machine operation has been completed.

In Item total operations, movement of the total control lever 114 (Figs. 1 and 2) to Item total position opens the secondary switch in the manner explained above, and said switch remains open while the indicators are being adjusted. Near the end of Item total operations, automatic returning of the total control lever 114 from Item total position to Add position closes the secondary switch to cause the indication of the item total to be illuminated.

A modification of the item total mechanism, which is effective in all types of sub-total or reading and total or resetting operations, is shown in Fig. 6 and consists principally of relocating the stud 133 so that manual movement of the total control lever 114 does not open the secondary switch, but said secondary switch is opened at the beginning of said reading or resetting operation by the cam 79 (Fig. 1) exactly the same as in adding operations. The stud 141 then becomes effective to hold the switch open during the interval between the end of the first cycle and the beginning of the second cycle, when said switch would normally be closed by the action of the cam 79. In the second cycle, control of the secondary switch is surrendered to the cam 79, which closes said switch in the usual manner.

Summarizing briefly, the present invention discloses unique means for illuminating the indication of cash registers and/or accounting machines, said illuminating means remaining effective a short period after machine operation has been completed, so as to provide ample time for reading the indication and so as to attract the purchaser's attention to the indication.

While the forms of mechanism shown and described herein are admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the forms or embodiments disclosed herein, as it is susceptible of embodiment in various other forms all coming within the scope of the claims which follow.

What is claimed is:

1. In a machine of the class described, having settable translucent indicators and electrical means to illuminate the indicators, the combination of a first switch to open and close the electrical circuit to the illuminating means; a second switch to open and close the electrical circuit to the illuminating means; means to close and open the second switch; a delayed action device cooperating with and actuated by the closing and opening means and effective to delay the opening movement of said closing and opening means to cause it to open the second switch at a predetermined time; and means to control the first switch to open the circuit to the illuminating means while the indicators are being set and to close the circuit after said indicators have been set, to properly illuminate said indicators.

2. In a machine of the class described, having translucent indicators settable to indicate data, the combination of an electric light to illuminate the indicators; a first switch normally closed to control the flow of electrical current to the light; a second switch normally open to control the flow of electrical current to the light; means to close and open the second switch; delayed action means to control the opening movement of the opening and closing means to cause the second switch to open after a predetermined interval has elapsed; and means to open the first switch prior to the setting of the indicators and to close said switch after the indicators have been set to prevent illumination of said indicators while they are being set.

3. In a machine of the character described having a plurality of translucent indicators for displaying data resulting from a machine operation, and means to set the indicators in accordance

with the data to be displayed, the combination of electrical means to illuminate the indicators; a first switch normally closed to control the flow of electrical current to the illuminating means; a second switch normally open to control the flow of electrical current to the illuminating means; means to close and open the second switch; means, controlled by the opening and closing means, to latch the second switch in closed position; a delayed action device cooperating with and rendered effective by the closing and opening means and functioning to cause said opening and closing means to unlatch the latching means, after said second switch has been closed for a predetermined time; and means to open the first switch prior to the setting of the indicators and to close said switch after said indicators have been set to cause said indicators to be properly illuminated.

4. In a machine of the class described, having a plurality of settable translucent indicators for displaying data relating to a machine operation, the combination of electrical means to illuminate the translucent indicators; a switch, normally open, to control the flow of electrical current to the illuminating means; means operable during a machine operation to close the switch; means controlled by the closing means to latch the switch in closed position; a delayed action device cooperating with and rendered effective by the closing means and operating to cause said closing means to unlatch the latching means to allow the switch to open after a predetermined length of time following the operation of the machine so that the indicators can be maintained illuminated for said predetermined length of time after the machine has operated; and additional control means for the illuminating means to interrupt current thereto while the indicators are being set, whereby the indicators will not be illuminated during their setting even though a subsequent operation of the machine occurs during said predetermined length of time.

5. In a machine of the class described, having a plurality of settable translucent indicators for displaying data relating to machine operations, the combination of electrical means to illuminate the translucent indicators; control means for the illuminating means to prevent current from being supplied to the illuminating means while the indicators are being set; a switch also operable to control the flow of current to the illuminating means, said switch normally open; means to close the switch; means operable during an operation of the machine to actuate the closing means; means controlled by the actuating means to latch the closing means in closed position to retain the switch closed; and a delayed action device cooperating with and set in motion by the actuating means and operating to cause the actuating means to operate the latching means to release the closing means and allow the switch to open only after a predetermined interval of time has elapsed after an operation of the machine so that the illuminating means can illuminate the indicators for the desired length of time after the operation of the machine unless a subsequent operation of the machine takes place during this time and the control means is operable to interrupt current to the illuminating means while the indicators are being set.

6. In a machine of the class described having a plurality of settable translucent indicators for displaying data relating to machine operations, the combination of electrical means to illuminate the translucent indicators; control means for the illuminating means to interrupt current thereto while the indicators are being set; a switch also operable to control the flow of current to the illuminating means, said switch normally open; means to close the switch; means operable during an operation of the machine to actuate the closing means; means engageable with the closing means to latch it in closed position to retain the switch closed, said latching means controlled by the actuating means; and a delaying device, including a spring-returned bellows connected to the actuating means and functioning to cause it to unlatch the latching means to release the switch only after a predetermined interval has elapsed after the operation of the machine whereby the illuminating means can illuminate the indicators for the desired length of time after operation of the machine; said control means being effective to interrupt the current to the illuminating means during said desired length of time if a subsequent operation of the machine and a setting of the indicators take place during this time.

7. In a machine of the class described having a plurality of settable translucent indicators for displaying data relating to machine operations, the combination of electrical means to illuminate the translucent indicators; a spring blade switch to control the flow of current to the illuminating means, said switch normally open; an element to close the switch; a latch cooperating with the element to latch it and the switch in closed position; means operating in each operation of the machine, in an initial direction and in a return direction and effective when operating in initial direction to move the element to switch-closing position and to render the latch effective, said means effective when operating in return direction to render the latch ineffective and to return the element to switch-opening position; a delaying device connected to the moving means and functioning to prolong the return movement thereof to delay the opening of the switch and thereby cause the illuminating means to illuminate the indicators for a predetermined interval of time after the operation of the machine has been completed; and further control means for the illuminating means to interrupt current thereto while the indicators are being set during an operation of the machine even though a subsequent operation of the machine occurs during said predetermined interval of time and the switch has remained closed.

8. In a machine of the class described having a plurality of settable translucent indicators for displaying data relating to machine operations, the combination of electrical illuminating means to illuminate the translucent indicators; an operating circuit for said illuminating means; control means in said circuit to open the circuit while the indicators are being set; a spring blade switch also in said circuit, normally open, to control the flow of current to the illuminating means; an element to close the switch when the element is operated; a latch to secure the element in operated position and the switch in closed position; means including a member shiftable in initial direction to operate the element and to allow the latch to become effective to retain the element in operated position, and shiftable in return direction to cause the latch to be rendered ineffective and allow the element to move from operated position and the switch to open; means operable in a machine operation to shift

the member in initial direction; yieldable means to shift said member in return direction; and means including a bellows connected to the member and collapsible upon initial movement thereof and slowly expandable upon return movement of said member to delay the return movement of the member to allow the switch to remain closed for a predetermined time to cause the illuminating means to illuminate the indicators for a predetermined time after the operation of the machine.

9. In a machine of the character described, having a plurality of settable translucent indicators for displaying data pertaining to various computations which are the result of machine operations, the combination of electrical illuminating means to illuminate the translucent indicators; an operating circuit for said illuminating means; control means in said circuit to open the circuit while the indicators are being set during an operation of the machine; a resilient blade switch in said circuit, said switch being normally open, to control the flow of electrical current to the illuminating means; an element to close the switch; a latch to secure the element in closed position; means, including a member, to control the operation of the element and the latch; yieldable means to normally retain the member in position to render the element and the latch ineffective; means operable in a machine operation to move the member against the action of the yieldable means to operate the element to close the switch and to render the latch effective to secure the element in its operated position to maintain the switch closed; and a delayed action device cooperating with the member to prolong its return under influence of the yieldable means to allow the switch to be latched in its closed position for a predetermined period of time after a machine operation so that the illuminating means can illuminate the indicators for said predetermined period of time, said control means operating to interrupt said circuit while said switch remains closed, if a subsequent operation of the machine takes place during said predetermined time, thereby preventing the illumination of the indicators during their setting even though this occurs during said predetermined time.

10. In a machine of the character described having a plurality of translucent indicators for displaying data relating to computations and having means to adjust the indicators in accordance with the data to be displayed, the combination of electrical means to illuminate the translucent indicators; a first switch normally closed to control the flow of electrical current to the illuminating means; a second switch normally open to control the flow of electrical current to the illuminating means; means to close the second switch; means to actuate the closing means; means controlled by the actuating means to latch the closing means in closed position to retain the second switch closed; a delayed action device cooperating with the actuating means to cause it to unlatch the latching means after a predetermined interval of time has elapsed; and means to open the first switch prior to the adjusting of the indicators and to close said switch after said indicators have been adjusted, to insure that the indicators are not illuminated while being adjusted.

11. In a machine of the character described having a plurality of translucent indicators for displaying data relating to computations and having means to set the indicators in accordance with the data to be displayed, the combination of electrical means to illuminate the translucent indicators; a first switch normally closed to control the flow of electrical current to the illuminating means; a second switch normally open to control the flow of electrical current to the illuminating means; an element to close the second switch; a latch to secure the element in closed position; means, including a member, to control the operation of the element and the latch; yieldable means to normally retain the member in position to render the element and the latch ineffective; means to move the member against the action of the yieldable means to render the element at the latch effective to close the second switch and to secure it closed; a delayed action device cooperating with the member to delay its return under influence of the yieldable means to cause the illuminating means to illuminate the indicators for a predetermined period of time; and means to open the first switch prior to the setting of the indicators and to close said switch after said indicators have been set to insure that the illuminating means does not function before the indicators are properly set.

12. In a machine of the class described capable of one-cycle operations and/or two-cycle operations and having a plurality of translucent indicators to display data which is the result of said one- and two-cycle operations and having means to set the indicators in accordance with the data to be displayed, the combination of electrical means to illuminate the translucent indicators; a first switch normally closed to control the flow of current to the illuminating means; a second switch normally open to control the flow of current to the illuminating means; an element to close the second switch; a latch to secure the element in closed position; means including a member to control the operation of the element and the latch; means to actuate the member in an initial direction to render the element and the latch effective; yieldable means to actuate the members in a return direction to render the element and the latch ineffective; a delayed action device to prolong the return movement of the member to cause the illuminating means to illuminate the indicators for a predetermined interval of time; means effective in one-cycle operations to open the first switch at the beginning of said one-cycle operations and to close said switch near the end of said one-cycle operations to insure that the illuminating means does not function while the indicators are being set; and means effective in two-cycle operations and operating in conjunction with the above opening and closing means for the first switch to retain said switch open during the interval between the first and second cycles when said switch would normally be closed.

13. In a machine of the class described capable of one-cycle and/or two-cycle operations and having a plurality of translucent indicators to display data resulting from said one- and/or two-cycle operations and having means to set said indicators in accordance with the data to be displayed, the combination of a positionable control member to condition the machine for one- and/or two-cycle operations, said member normally in position to condition the machine for one-cycle operations; electrical means to illuminate the indicators; a first switch normally closed to control the flow of current to the illuminating means; a second switch normally open

to control the flow of current to the illuminating means; means, including an element, to close the second switch; a latch to secure the element and the switch in closed position; means operable in one direction to move the element to closed position and to simultaneously render the latch effective; yieldable means to return the moving means in another direction to render the element and the latch ineffective; a delayed action device to prolong the return of the moving means under influence of the yieldable means to cause the illuminating means to be effective for a predetermined interval of time; means effective when the control member is moved to two-cycle position to open the first switch; and automatic means to return the control member from two-cycle position to one-cycle position to close the first switch after the indicators have been set so that said indicators will not be illuminated during the setting thereof.

14. In a machine of the class described capable of one-cycle and/or two-cycle operations and having a plurality of translucent indicators for visibly displaying the data resulting from said one-cycle and/or two-cycle operations and having means to set said indicators in accordance with the data to be displayed, the combination of a positionable control member to condition the machine for one-cycle and/or two-cycle operations; an electric light to illuminate the translucent indicators; a first switch normally closed to control the flow of current to the electric light; a second switch normally open to control the flow of current to the electric light; an element to close the second switch; a latch cooperating with the element to secure the switch in closed position; movable means to control the element and the latch; yieldable means to move the movable means in one direction to render the element and the latch ineffective; mechanical means to move the movable means in another

direction to render the element and the latch effective; a delaying device connected to the moving means and rendered effective upon movement thereof under influence of the mechanical means to slacken the movement of said moving means under influence of the yieldable means to cause the electric light to illuminate the indicators over a prolonged period of time; means effective when the control member is moved to two-cycle position to open the first switch; and means effective near the end of two-cycle operations to automatically return the control member from two-cycle position to one-cycle position to close the first switch after the indicators have been set to insure that said indicators are not illuminated by the electric light while they are being set.

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