

March 7, 1967

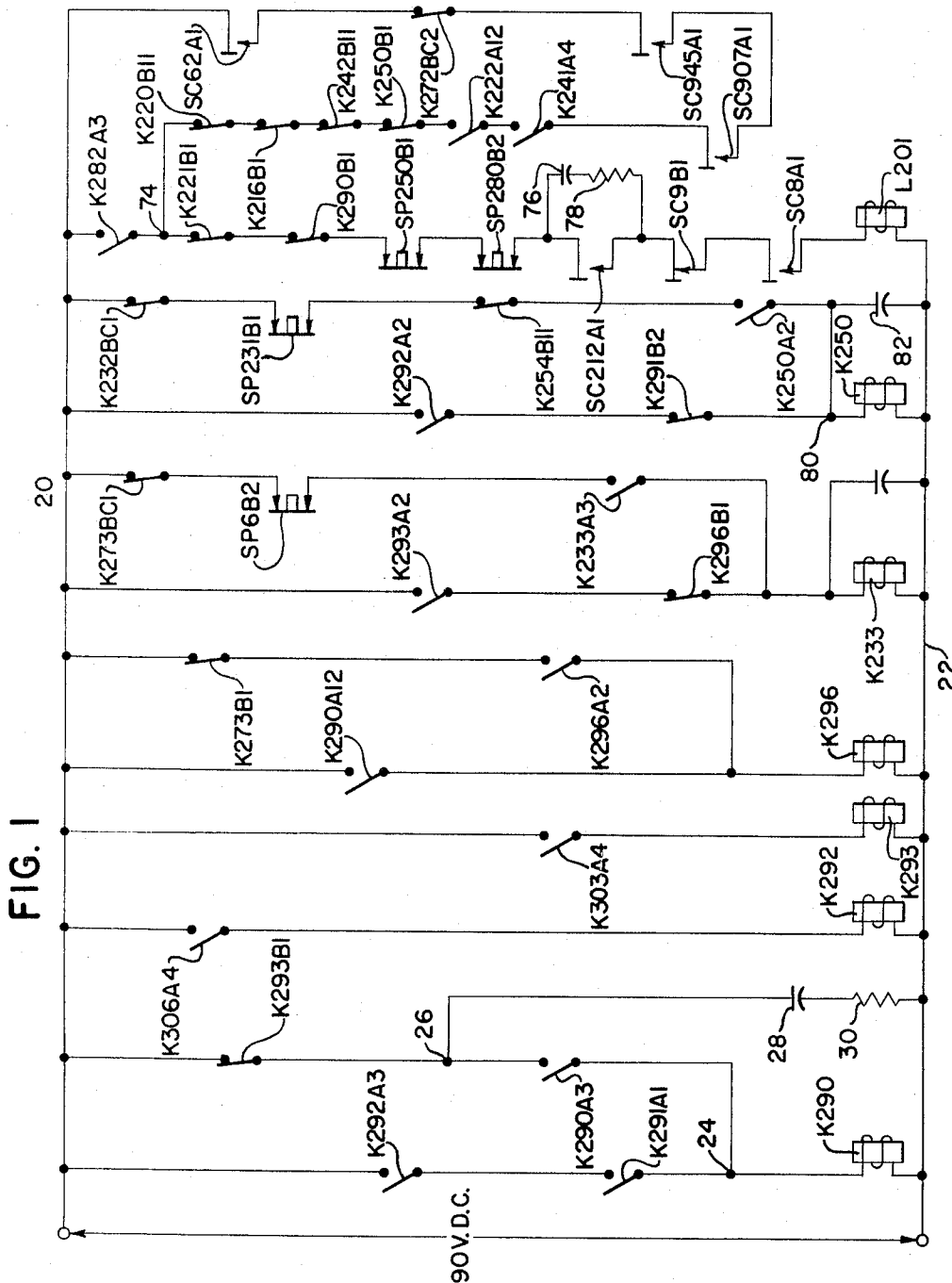
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3,308,273

PRINTING CONTROL MEANS FOR ACCOUNTING MACHINES

Filed March 18, 1963

4 Sheets-Sheet 1



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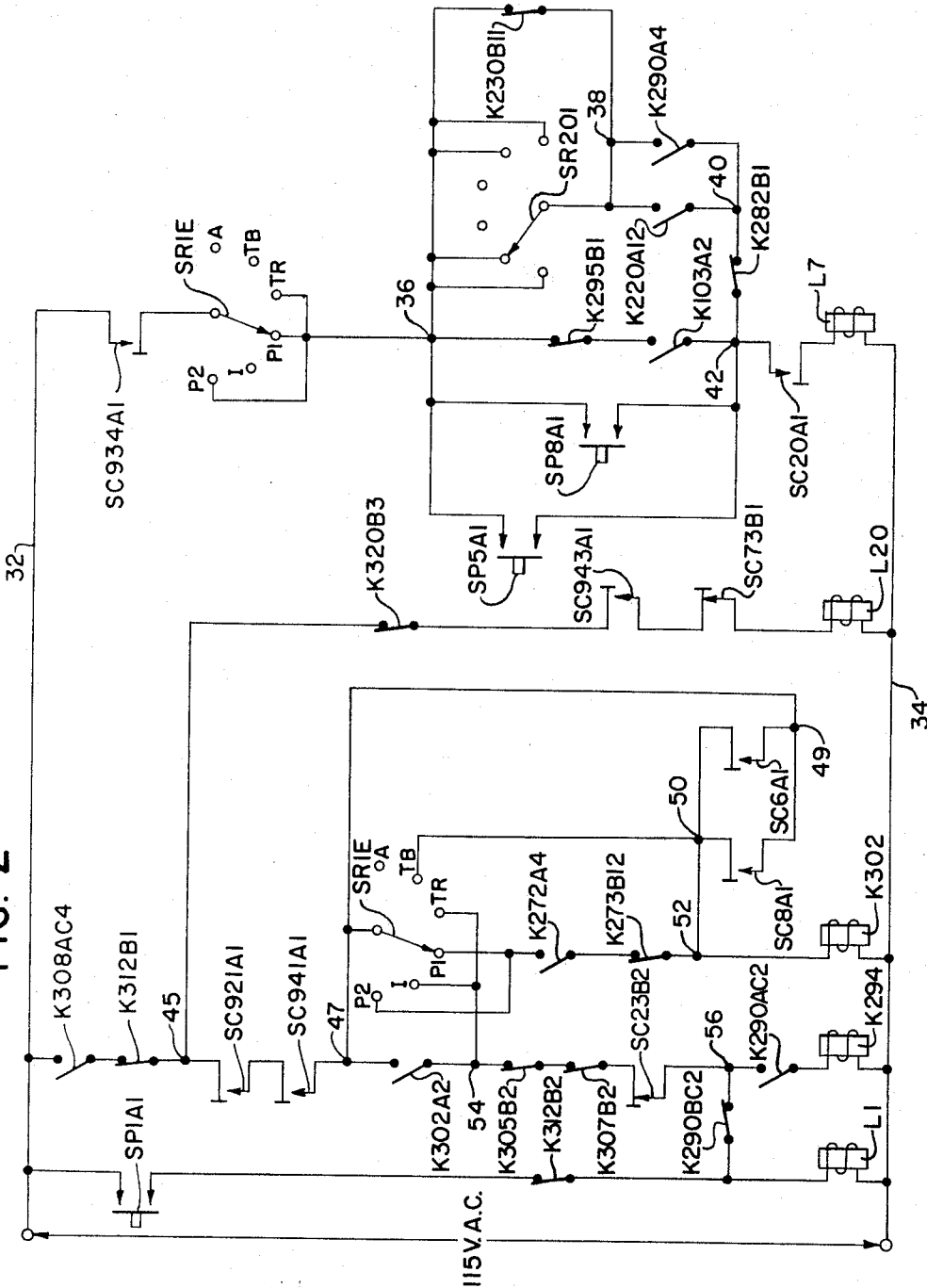
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PRINTING CONTROL MEANS FOR ACCOUNTING MACHINES

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FIG. 2



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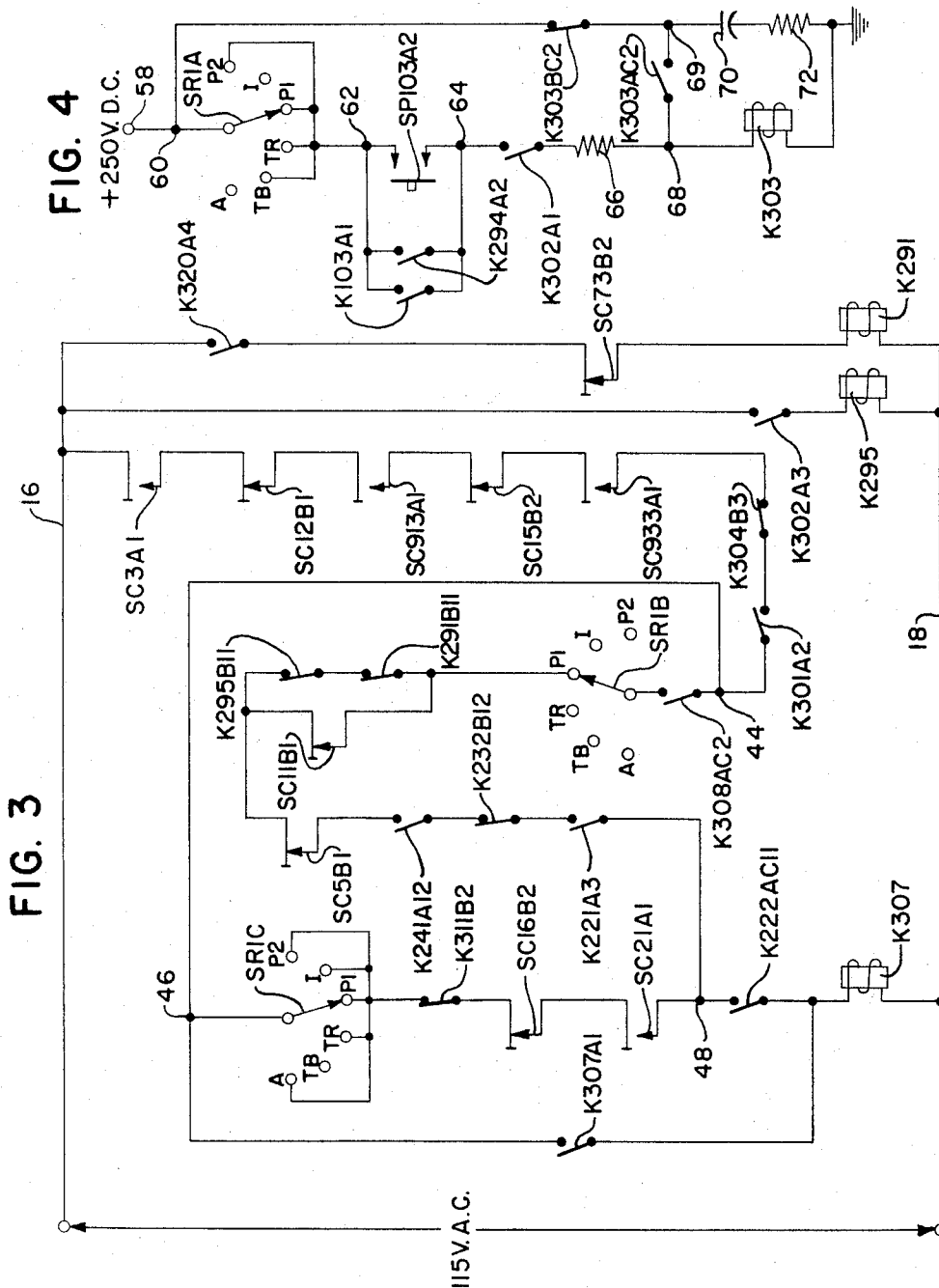
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PRINTING CONTROL MEANS FOR ACCOUNTING MACHINES

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PRINTING CONTROL MEANS FOR ACCOUNTING MACHINES

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FIG. 5

REF. NO.		CHECKS	DEPOSITS	DATE	BALANCE	REF. NO.	CHECKS	DEPOSITS	DATE	BALANCE
975		25.00	BAL. FORWARD	JAN 5,60	784.50	S 1006		10.00	MAY 23,60	721.23
977		10.40		JAN 7,60	759.50	1011		5.50		
974		7.80				1010		15.00		
973			150.00	JAN 12,60	741.30					
980				JAN 14,60	891.30					
979		32.50		JAN 15,60	858.80					
983		105.00		JAN 22,60	709.10					
978		44.70		JAN 25,60	706.35					
982		2.75								
986		15.80		JAN 27,60	940.55					
984		17.40	250.00							
985		10.75								
976		27.10		FEB 7,60	885.30					
981		20.00		FEB 8,60	865.30					
987		30.00		FEB 9,60	835.30					
1000										
1007		125.40	1200.00	MAY 6,60	975.50					
1006		37.50								
1008		10.87		MAY 17,60	1801.73					
1005		50.00		MAY 20,60	751.73					

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3,308,273

PRINTING CONTROL MEANS FOR ACCOUNTING MACHINES

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7 Claims. (Cl. 235-61.9)

This invention relates generally to accounting machines which operate in conjunction with a magnetically encoded ledger card to enable the picking up of an old balance and other information on the ledger card at the end of an accounting transaction. A machine of this type is shown in the United States Patent No. 2,947,475, issued August 2, 1960, to Konrad Rauch et al.

More particularly, the present invention relates to a machine of the type described above, in which printing controls are provided for causing printing entries to be made in a plurality of columns on one face of the ledger card, with successive entries being made in one column until the space available in that column is exhausted, after which automatic control means require printing in another column, on successive lines. A printing control device to accomplish this, adapted for use with the type of accounting machine described above, is shown in the United States Patent No. 3,060,846, issued October 30, 1962, to William F. Sommer et al.

One limitation of the print control device disclosed and claimed in the Sommer et al. patent is that no automatic operation is provided for causing an entry to be made in the first line of a second column on the ledger card following the entry which exhausts the last line space of the first column. That is, when the last line of the first column is exhausted, an operator must then make a manual operation of the machine in order to effect the first entry in the second column. This limitation is of no particular consequence when the machine is being used in a manual mode of operation, as disclosed in the Rauch et al. patent. However, a system has been developed, employing an automatic card-feeding device, a tape-reading device, and an automatic controller unit, which makes possible completely automatic operation of the accounting machine. This system is disclosed in the United States patent application Serial No. 840,701, filed September 17, 1959, by William C. Arnold et al., inventors, now Patent No. 3,102,950.

It is obviously a considerable disadvantage, in an automatic type of system, in which a print control means, such as that described in the Sommer et al. patent, is utilized, to require that an operator make a manual operation of the machine to effect the first entry in the second column of the ledger card.

The present invention solves this problem by providing automatic means for causing a printed entry in the first line space of the second column of a ledger card following exhaustion of the last line space in the first column of the ledger card. This is accomplished by causing a given sequence of operations of the accounting machine to take place, by means of the novel circuit arrangement disclosed herein. When the last line is reached in the first column on the ledger card, a new balance operation is automatically initiated, which prints the balance in the appropriate accounting machine totalizer at this time on said last line, and stores said balance magnetically on the card. As part of the new balance operation, a magnetic signal is stored on the card, by means disclosed in the Sommer et al. patent, to cause the next printed entry to be made in the second column, and additional magnetic line-finding signals are stored, as disclosed in the Rauch et al. patent, to cause the next entry to be made in the topmost line space of the ledger card. The new balance

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operation is immediately followed by an automatically-initiated balance pick-up operation. Following this balance pick-up operation, a conventional posting of the next item entry to the account being processed takes place on the first line of the second column of the ledger card. During the new balance and balance pick-up operations, the card-feeding device, the tape-reading device, and the controller unit are prevented from operating by various interlock means, which interlock means are rendered inoperable following the balance pick-up operation, so that normal functioning of the system can proceed.

Accordingly, it is an object of the present invention to provide accounting means capable of automatic sequential recording in a plurality of columns on a record member.

Another object of the present invention is to provide a machine accounting system capable of performing accounting computations and recording them sequentially in a plurality of columns on a record member, said system including means to enable an automatic transition of printing from the last line of one column to the first line of another column.

A further object of the present invention is to provide, in a machine accounting system, means for initiating an automatic sequence of operations to effect a transition of recording on a record member from the bottom line space of one column to the topmost line space of another.

An additional object of the present invention is to provide a system in which automatic posting of entries pertaining to a particular account is carried out on a record member without the need for manual operations by an operator.

With these and other objects, which will become apparent from the following description, in view, the invention includes certain novel features of construction and combinations of parts, a preferred form or embodiment of which is hereinafter described with reference to the drawings which accompany and form a part of this specification.

In the drawings:

FIGS. 1, 2, 3, and 4 show operating circuitry utilized in an accounting system embodying the present invention.

FIG. 5 shows a ledger card on which entries have been made, utilizing an accounting machine system embodying the present invention.

GENERAL DESCRIPTION

As indicated above, the present invention constitutes an improvement of the printing control means of the previously cited United States Patent No. 3,060,846. That invention, in turn, was disclosed as being embodied in an accounting machine of the type described and claimed in the previously-mentioned United States Patent No. 2,947,475. The accounting machine disclosed therein is controlled from a ledger card, on which are printed the usual amounts pertaining to the account, such as checks and deposits, the balances after each transaction entry, the sign of the balance, the date, etc. In addition, the ledger card has magnetically recorded thereon the last balance and related data, such as a comparator number, the sign of the balance, and the number of the line on which the next entry is to be printed on the ledger card.

It may be noted that in such an accounting machine, in the event that the last, or lowest, line space on the ledger card has been printed upon in the previous item entry, then the zero, or "balance forward," line is stored magnetically on the card, to cause the movable card-holding carriage of the accounting machine to be set accordingly in the next machine operation. It may also be noted that the line spaces extend completely across the card and are independent of the particular columns in which printing is to take place, column selection being determined by control of the appropriate printing mechanisms.

A plurality of sensing and recording means are provided in said accounting machine, for sensing the data which is magnetically encoded on the ledger card, and for erasing previously-stored data and recording new data thereon. The heads are electrically connected to the data-retaining means in the accounting machine, so that data on the ledger card may be entered into the accounting machine, and so that data produced by the accounting machine may be recorded on the card. The machine is also controlled from a keyboard, on which data may be set, to be printed on the card and to be combined with data read from the card to form new balances.

In a balance pick-up operation, information pertaining to the balance and related data is sensed by the sensing and recording heads, and entered into the accounting machine.

In a new balance operation, the data pertaining to the new balance is printed on a ledger card, the previous magnetically stored data is erased, and the new balance and related data pertaining to the new balance are magnetically stored on the card in its place.

For a more detailed description of the construction and operation of those parts of the accounting machine which do not form a part of the present invention, reference may be had to the previously-mentioned United States Patent No. 2,947,475.

As previously stated, the accounting machine may be incorporated into a system which provides for completely automatic operation. Briefly, the system includes means capable of sensing item data for the various accounts to be processed from a record medium, such as perforated paper tape, and controlling the accounting machine to cause the input of such sensed data into the accounting machine according to a predetermined arrangement. The system also includes a feeding device, which may be of the type disclosed in the United States Patent No. 3,079,145, issued February 26, 1963, to Henry Grosnickle, Jr., et al., for automatically feeding ledger cards to the accounting machine.

The data sensed from the perforated tape or other suitable record medium may include item amount information, such as checks and deposits, to be added to or subtracted from the balance of a particular account; identification information, such as an account number, to insure that the amount information is entered on the correct account; and control information pertaining to the type of transaction, such as check or deposit, and also including a signal for initiation of operation of the accounting machine. Solenoid-operated means are provided in association with the keyboard of the accounting machine for operation of the various keys, and are energized according to the signals sensed from the tape to effect entry of the information into the accounting machine. The old balance for each account, as well as account identification data and other information, is obtained from the magnetic ledger card pertaining to the account in the conventional manner, said card being fed into the accounting machine by the previously-mentioned feeding device.

Various interlocks and control circuits interconnect the accounting machine, the sensing device, and the feeding device, to insure operation of all of these mechanisms in the proper sequence, and to prevent the entry of erroneous information. For a more detailed description of the construction and operation of those parts of the system which do not form a part of the present invention, reference may be had to the previously-described United States patent application, Serial No. 840,701.

SYSTEM CIRCUITRY

The circuitry in which the present invention is embodied will now be described. Since this circuitry is associated with other circuitry utilized in the accounting machine, the ledger card feeding device, and the tape reader, all of which may form a part of the accounting system in which the present invention is embodied, only so much

of the circuitry of the various components as relates to the present invention will be described herein. For a description of the remaining system circuitry, reference may be had to the previously-mentioned United States patents, Nos. 2,947,475; 3,060,846; and 3,079,145, and to the previously-mentioned United States patent application Serial No. 840,701. Where necessary to the understanding of the present invention, certain portions of these previously-described operating circuits have been incorporated in the circuitry included in this application.

It is believed that the circuitry of the present invention may be described most clearly by an explanation of the manner in which it functions during certain operations of the system. Accordingly, it will be assumed at the beginning of this description that the system has been set to accomplish an automatic posting run, and that it is in the process of posting entries to a particular account, the entries being recorded in the left column of a ledger card, such as the ledger card 12 shown in FIG. 5, having magnetic storage areas 14 on the back thereof.

It will also be assumed that the previous entry in the left column was recorded in line space 39, and that the next entry is being recorded in line space 40. Since the ledger card used in the illustrative example has a "balance forward" line space plus forty regular line spaces extending horizontally across the card, it will be seen that the current entry will exhaust the available line spaces in the left column of the ledger card for entry of a check item, although space is still available in the same line space for a "new balance" entry.

At the time that the item entry operation for making an entry on line 40 is initiated, the relay K291 (FIG. 3) has previously been energized, over a path which extends between conductors 16 and 18, to which conductors is applied a 115-volt, 60-cycle A.C. potential, said energizing path including contacts K320A4, which are closed by energization of the left-right print relay K320 (not shown herein, but shown in FIG. 4 of the previously-cited United States Patent No. 3,060,846); the contacts SC73B2, controlled by the manually-operable "left-right print" control of the accounting machine; and the relay K291.

Also, at the time that the item entry operation for making an entry on line 40 is initiated, the relays K290, K292, K293, K294, K295, K296, K233, K250, K302, K303, and K307 are deenergized, as are the solenoids L1, L7, and L20. The trip coil L201 for the tape-reading device is deenergized after having caused operation of the tape-reading device to read from the tape the item data to be entered into the accounting machine.

During the item entry operation for making an item entry on line 40, as the ledger card carriage of the accounting machine is positioned to the proper location for enabling printing on line 40 of the ledger card, the line 40 relay K306 (not shown) is energized by closing of a carriage-controlled switch in the energizing circuit of said relay. Energization of the relay K306 causes the contacts K306A4 to close in the energizing circuit for the relay K292 (FIG. 1), said circuit including the contacts K306A4 and the relay K292, and extending between two conductors 20 and 22, to which is applied a 90-volt D.C. potential.

Energizing of the relay K292 closes the contacts K292A2 in the energizing circuit for the relay K250 (FIG. 1), but said relay is not energized at this time, since the contacts K291B2, in series with the contacts K292A2, are open.

Energization of the relay K292 also closes the contacts K292A3 in the energizing circuit for the relay K290 (FIG. 1), to complete said circuit, which extends between the conductors 20 and 22, and which includes the contacts K292A3 and K291A1, and a point 24, as well as the relay K290. The relay K290 is thus energized.

Energization of the relay K290 closes the contacts K290A3 to establish a holding circuit for maintaining the relay K290 in energized condition, said circuit ex-

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tending from the conductor 20 over the contacts K293B1, controlled by the relay K293 and closed at this time; a point 26; the contacts K290A3; the point 24; and the relay K290, to the conductor 22. It will be noted that an additional circuit path extends from the point 26 over an 8-microfarad capacitor 28 and a 220-ohm resistor 30, to the conductor 22. This path provides a time-delay means for delaying the deenergization of the relay K290 for a given period of time, after its energizing circuit has been interrupted. The purpose of this time delay is to insure that sufficient time is provided for certain other circuit components to function properly.

Energization of the relay K290 causes the contacts K290AC2 to close in the energizing circuit for the relay K294 (FIG. 2). However, since other contacts are open in said circuit at this time, the relay K294 does not energize.

Energization of the relay K290 also causes the contacts K290BC2 to open in the energizing circuit for the gripper solenoid L1 (FIG. 2) to prevent energization of the said solenoid.

Energization of the relay K290 also opens the contacts K290B1 in the energizing circuit for the trip coil L201 (FIG. 1), which trip coil controls the operation of the tape-reading device of the system. The prevention of energization of the trip coil L201 thus effectively prevents further operation of the tape-reading device at this time.

Energization of the relay K290 also closes the contacts K290A12 to complete a circuit for energizing the overdraft hold relay K296 (FIG. 1), said circuit extending from the conductor 20 over the contacts K290A12 and the relay K296, to the conductor 22. Energization of the relay K296 closes contacts K296A2 to complete a holding circuit for maintaining the relay K296 energized, said circuit extending from the conductor 20 over the contacts K273B1, controlled by the pick-up select relay K273 (not shown), which is not energized at this time; the contacts K296A2; and the relay K296, to the conductor 22. Energization of the relay K296 also opens the contacts K296B1 in the energizing circuit for the overdraft reset relay K233 (FIG. 1) to prevent it from energizing at this time. In a normal balance pick-up operation, the relay K233 is energized over a circuit extending from the conductor 20 over contacts K293A2 and K296B1, and the relay K233, to the conductor 22; and is maintained in energized condition over a circuit extending from the conductor 20 over the contacts K273BC1, controlled by the previously-mentioned pick-up select relay K273 (not shown); the manually-controlled contacts SP6B2; the contacts K233A3 (controlled by the relay K233; and the relay K233, to the conductor 22. However, in the balance pick-up operation which will be subsequently performed in this instance, it is not desired to reset any existing overdraft condition, since operations on the same account will be continued subsequent to the balance pick-up operation. Therefore it is desirable to prevent energization of the relay K233 at this time.

Energization of the relay K290 also closes the contacts K290A4 in the energizing circuit for the new balance solenoid L7 (FIG. 2). Closing of the contacts K290A4 prepares a path for energization of the solenoid L7, and said path will be completed near the end of the current item operation of the accounting machine, when the cam-controlled contacts SC934A1 close at 345 degrees of revolution of the main cam line of the accounting machine. The completed circuit extends between conductors 32 and 34, to which is applied a source of 115-volt, 60-cycle A.C. potential, and includes the contacts SC934A1; level SR1E of the function control switch set to "Posting 1" position; a point 36; either contacts K230B11, controlled by the overdraft relay K230, in the event that an overdraft condition does not exist, or the overdraft selection switch SR201, set to one of its posi-

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tions in which the circuit is completed; point 38; the contacts K290A4; a point 40; contacts K282B1, controlled by the item bypass relay K282 and closed at this time; a point 42; the contacts SC30A1, which prevent the making of two successive new balance operations; and the solenoid L7, to the conductor 34.

It may be noted that a number of alternate energizing paths for the solenoid L7 are provided between the points 36 and 42. A first such path includes the contacts SP5A1, which are manually-controlled contacts to enable the making of a manually-controlled new balance operation. A second such path includes the contacts SP8A1, which are similar to the contacts SP5A1 in function. A third alternate path includes a series combination of the contacts K295B1, which are controlled by the relay K295, and the contacts K103A2, which are controlled by the feeder relay K103 (not shown), and provide the capability of making a new balance operation during transferring of information from one ledger card to another. A fourth alternate path extends from the point 36 over the previously-mentioned switch SR201, the contacts K220A12, controlled by the new balance trip relay K220 (not shown), and the previously-mentioned contacts K282B1, to the point 42. This path provides means for energizing the new balance solenoid L7 during a conventional automatic run of the system.

Energization of the new balance solenoid L7 mechanically causes the closing of contacts SC21A1 in the energizing circuit for the row 1 and row 2 trip relay K307 (FIG. 3), to complete the energizing circuit for said relay, and to thus initiate a new balance operation of the accounting machine. The energizing path for the relay K307 extends from the conductor 16 over the contacts SC3A1; SC12B1; SC913A1; SC15B2, SC933A1; K304B3; K301A2; a point 44; a point 46; level SR1C of the function control switch set to "Posting 1" position; the contacts K311B2; SC16B2; SC21A1; a point 48; contacts K222AC11; and the relay K307, to the conductor 18.

A brief description of each of the contacts contained in the energizing circuit described above is as follows. The contacts SC3A1 are interlock contacts to insure that the journal printing unit of the accounting machine is in place. The contacts SC12B1 are interlock contacts to prevent operation of the accounting machine when its key release lever is not in its normal position. The contacts SC913A1 are controlled by the auxiliary cam line of the accounting machine, and are closed between 350 degrees and 15 degrees of rotation of said cam line. The contacts SC15B2 are controlled by the balance pick-up solenoid L2 (not shown) and prevent energization of the relay K307 during a balance pick-up cycle. The contacts SC933A1 are controlled by the main cam line of the accounting machine, and are closed between 300 degrees and 100 degrees of rotation of said cam line. The contacts K304B3 are controlled by the storage relay K304 (not shown) and prevent relay K307 from energizing during a storage cycle of accounting machine operation. The contacts K301A2 are controlled by the warm-up restore relay K301 (not shown) and insure that relay K307 can be energized only when the relay K301 is also energized. The level SR1C of the function control switch insures that this path for energizing the relay K307 will not be completed when the machine is conditioned for a trial balance operation. The contacts K311B2 are controlled by the pawl check relay K311 (not shown) and prevent energization of the relay K307 over this path during a pawl check failure in the accounting machine. The contacts SC16B2 are controlled by depression of the sub-balance key of control row 1 of the accounting machine keyboard to prevent energization of the relay K307 for a sub-balance operation under certain conditions. The contacts SC21A1 are controlled by the new balance solenoid L7, as previously described. The contacts K222AC11 are controlled by the manual auto relay K222 (not shown) to insure that this portion

of the circuit for energizing the relay K307 is only completed during an automatic operation of the system.

It may be noted at this point that the energizing circuitry for the relay K307 which is shown in FIG. 3 constitutes only that part of said circuitry which is pertinent to the present invention, and that a number of other energizing paths for the relay K307 are provided, to cause said relay to be energized during the various manual operations of which the accounting machine is capable. For a showing and description of these other circuit paths, and the various contacts utilized in the energizing circuitry for the relay K307, reference may be had to the United States Patent No. 3,047,219, issued July 31, 1962, to Russell E. Kneisley et al., and particularly to FIG. 27A of the drawings of that patent.

Energization of the relay K307 closes the contacts K307A1 to complete a holding circuit which extends between the point 46 and one side of the relay K307 for maintaining said relay in an energized condition until the cam-controlled contacts SC933A1 open at 100 degrees of rotation of the main cam line.

Energization of the relay K307 also causes energization of the key lock line solenoid (not shown) in a conventional manner, to initiate operation of the accounting machine in a new balance operation. As previously described, in a new balance operation, in the data pertaining to the new balance is printed on the card, in this instance on line 40, the previous magnetically stored data is erased, and the new balance, and related data pertaining to the new balance, are magnetically stored on the card in its place.

Since the new balance operation takes place while the ledger card is in line 40 position, the line-finding information stored on the ledger card will cause said card to be positioned in its "balance forward" or "zero line" position in the next operation. Also, since the new balance operation is carried out with the ledger card positioned to its line 40 position, and being printed upon in the left column of the ledger card, a sequence signal will be stored on the ledger card, in the manner disclosed in the previously mentioned United States Patent No. 3,060,846, to cause the next printing operation to take place in the right column of the card.

At the completion of the new balance cycle of operation, the line 40 relay K306 (not shown) is deenergized in a conventional manner, and this opens the contacts K306A4 to deenergize the relay K292.

Also, at the completion of the new balance cycle of operation, the relay K302 (FIG. 2) is energized over a circuit which extends from the conductor 32 over the contacts K308AC4, controlled by the gate check relay K308 (not shown), which is energized at this time; the contacts K312B1, controlled by the carriage home relay K312 (not shown), which is not energized at this time; a point 45; the contacts SC921A1, controlled by the auxiliary cam line of the accounting machine and closed between 350 degrees and 15 degrees of rotation of said cam line; the contacts SC941A1, controlled by the main cam line of the accounting machine and closed between 345 degrees and 15 degrees of rotation of said cam line; a point 47; a point 49; the contacts SC6A1, which are row 1 contacts, closed during a new balance operation; a point 50; a point 52; and the relay K302, to the conductor 34.

Energization of the relay K302 closes the contacts K302A1 in the energizing circuit for the relay K303 (FIG. 4). However, this circuit path is not completed at this time, and the relay K303 is not energized.

The energization of the relay K302 also closes the contacts K302A3 in the energizing circuit for the relay K295 (FIG. 3) and energizes said relay, over a path which extends from the conductor 16 over the contacts K302A3 and the relay K295 to the conductor 18. Energization of the relay K295 causes opening of the contacts K295B11 in the energizing circuit for the row 1

and row 2 trip relay K307. This has no immediate effect upon the operation of the circuit. Also the contacts K295B1 are caused to open in the energizing circuit for the new balance relay L7, but have no effect upon operation of the circuit at this time.

Energization of the relay K302 also closes the contacts K302A2 in the energizing circuit for the relay K294 (FIG. 2). This completes an energizing circuit for the relay K294, said circuit extending from the conductor 32 over the contacts K308AC4; the contacts K312B1; the point 45; the contacts SC921A1; the contacts SC941A1; the point 47; the contacts K302A2; a point 54; the contacts K305B2, controlled by the storage relay K305 (not shown), which relay is not energized at this time; the contacts K307B2, controlled by the row 1 and row 2 trip relay K307, which is not energized at this time, having been deenergized by opening of the contacts SC933A1 in its energizing circuit; the contacts SC23B2, controlled by the line-finding solenoid (not shown), which are closed at this time; a point 56; the contacts K290AC2, which are controlled by the energized relay K290; and the relay K294, to the conductor 34.

It may be noted that the gripper solenoid L1 (FIG. 2) would also be energized over the path described above if it were not for the fact that contacts K290BC2 are open, due to energization of the relay K290. It is not desired that the solenoid L1 be energized at this time, since it controls the gripper mechanism which retains the ledger card in position on the accounting machine carriage, and if the solenoid L1 were energized, the present card would be ejected from the accounting machine, which is not desired. It may also be noted that if for any reason it is necessary to energize the gripper solenoid L1 at this time, this can be accomplished by operation of the manually-controlled contacts SP1A1 to complete an energizing circuit for said solenoid which extends from the conductor 32 over said contacts SP1A1; the contacts K312B2, which are controlled by the table home relay K312 (not shown); and the solenoid L1, to the conductor 34. However, in normal operations, the solenoid L1 would not be energized by this manual means.

As may be seen in FIG. 2, a number of alternate paths are provided for energization of the relay K302, and for energizing the solenoid L1. First of all, the contacts SC8A1, controlled by the control row 1 mechanism of the accounting machine, and caused to close during a new balance non-transfer operation, are connected between points 49 and 50, in parallel with the previously-mentioned contacts SC6A1, so that energization of the relay K302 may be effected during a new balance non-transfer operation.

Also, a number of alternate paths are provided through level SR1E of the function control switch. When the function control switch is set to "Trial Balance" position, a circuit may be completed for energization of the relay K302, which circuit extends from the point 47 through the switch level SR1E; the point 50; the point 52; and the relay K302, to the conductor 34. When the level SR1E of the function control switch is set to "Transfer" or "Install" position, an energizing circuit for the solenoid L1 may be completed from the point 47 over the switch level SR1E; the point 54; the previously-described contacts K305B2, K307B1, and SC23B2; the point 56; the contacts K290BC2; and the solenoid L1, to the conductor 34. With the level SR1E of the function control switch in "Posting 1" or "Posting 2" position, a circuit for energizing the relay K302 may be completed which extends from the point 47 over the switch level SR1E; the contacts K272A4, controlled by the trial balance select relay K272 (not shown), which may be energized at this time; the contacts K273B12, controlled by the pick-up select relay K273 (not shown), which is not energized at this time; the point 52; and the relay K302, to the conductor 34.

The previously-mentioned energization of the relay K294 closes the contacts K294A2 in the energizing circuit for the balance pick-up relay K303 (FIG. 4) to cause energization of said relay. The energizing path for the relay K303 extends from a terminal 58, to which is applied a source of positive 250-volt D.C. potential, over a point 60; the level SR1A of the function control switch, set to the "Posting 1" position; a point 62; the contacts K294A2; a point 64; the contacts K302A1; a 15,000-ohm resistor 66; a point 68; and the relay K303, to a base reference potential, shown here as ground. It may be noted that in the energizing circuit for the relay K303, the path through the level SR1A of the function control switch is completed whenever said switch is in "Trial Balance," "Transfer," "Posting 1," or "Posting 2" positions. It may also be noted that a number of other contacts are connected in parallel with the contacts K294A2 between the points 62 and 64 in said energizing circuit, to enable energization of the relay K303 in certain circumstances. So connected are the contacts SP103A2, which are used when it is desired to make a manual balance pick-up operation. Also so connected are the contacts K103A1, which are closed whenever a ledger card being fed from the feeding device to the accounting machine is in transit.

Energization of the relay K303 opens the contacts K303BC2 in a charging circuit for delaying the deenergization of said relay, which charging circuit extends from the point 60 over the contacts K303BC2; a point 69; a 2-microfarad capacitor 70; and a 5,600-ohm resistor 72, to ground. Energization of the relay K303 also closes the contacts K303AC2, which connects the relay K303 into the capacitor-resistor combination of the previously-described time delay circuit. When the energizing circuit for the relay K303 is interrupted by opening of one of the contacts therein, the capacitor 70 will discharge through the coil of the relay K303 and will thus delay its deenergization, to insure that other components of the system have time to complete their functions properly.

Energization of the relay K303 also closes contacts K303A4 in the energizing circuit for the relay K293 (FIG. 1) to energize said relay over a path extending from the conductor 20 over the contacts K303A4 and the relay K293 to the conductor 22.

Energization of the relay K293 causes closing of the contacts K293A2 in the energizing circuit for the relay K233. However, since the contacts K296B1 are open in this circuit, closing of the contacts K293A2 has no effect at this time. Closing of the contacts K293A2 enables energization of the relay K233 during a normal balance pick-up operation.

Energization of the relay K293 also opens the contacts K293B1 in the holding circuit which has maintained the relay K290 in energized condition. The relay K290 is thus caused to deenergize, but its deenergization is delayed by reason of the previously-described time delay circuit incorporating the capacitor 28 and the resistor 30.

When the relay K290 is deenergized, the contacts K290AC2, controlled by the relay K290, open, and interrupt the energizing circuit for the relay K294, to deenergize said relay.

Deenergization of the relay K294 opens the contacts K294A2 in the energizing circuit for the relay K303, which causes said relay to deenergize at the end of the period of the time delay resulting from the previously-mentioned combination of the capacitor 70 and the resistor 72.

Deenergization of the relay K303 closes the contacts K303BC1 (not shown) in the energizing circuit for the auxiliary clutch solenoid (not shown) of the accounting machine, thus initiating a balance pick-up operation of the accounting machine. During the ensuing balance pick-up operation, the ledger card is moved past the reading and recording heads in conventional manner. A

left-right print signal, which was stored on the card during the new balance operation, is sensed and causes deenergization of the relay K320 (not shown) in a conventional manner. This causes the contacts K320A4 to open, thereby deenergizing the relay K291. Deenergization of the relay K320 also causes the contacts K320B3 to close in the energizing circuit for the solenoid L20 (FIG. 2), to condition said solenoid for energization during the next item entry operation of the accounting machine.

Deenergization of the relay K303 also opens the contacts K303A4 to deenergize the relay K293.

Also during the balance pick-up operation, a line-finding signal for the balance forward line, which signal was stored during the new balance operation, is sensed from the card by the reading and recording heads, and causes the accounting machine carriage to be positioned so that the ledger card will be printed upon in the balance forward line during the next operation.

Also, the new balance information which was stored on the ledger card during the new balance operation is picked up by the reading and recording heads, and is entered into the accounting machine in a conventional manner. In addition, other related information is picked up from the ledger card in a conventional manner.

Also, during the balance pick-up operation, the contacts SC921A1 open to deenergize the relay K302, which opens the contacts K302A3 to deenergize the relay K295.

Also, during the balance pick-up operation, the relay K273 (not shown) is energized, which opens the contacts K273B1 in the holding circuit for the relay K296, and thereby causes deenergization of said relay.

Deenergization of the relay K290 closes the contacts K290B1 in the energizing circuit for the tape-reading trip coil L201, to permit said coils to energize once more, in the event that any further information remains to be entered into the account being processed. The energizing path for the coil L201 extends from the conductor 20 over the contacts SC62A1; K272BC2; SC945A1; SC907A1; K241A4; K222A12; K250B1; K242B11; K216B1; K220B11; a point 74, the contacts K221B1; K290B1; SP250B1; SP230B2; the contacts SC212A1; in parallel with a series combination of a 0.5-microfarad capacitor 76 and a 220-ohm resistor 78; the contacts SC9B1; the contacts SC8A1; and the coils L201, to the conductor 22. It may be noted that all of the above-named contacts are closed at this time, except for the contacts SC907A1 and SC945A1, and these will subsequently be closed at the end of the balance pick-up cycle being described. It may be also noted that contacts K282A3, controlled by the item bypass relay K282 (not shown), are connected between the conductor 20 and the point 74, and these contacts are closed only during manual item bypass operations, in which it is desired to energize the coils L201.

A brief description of each of the contacts contained in the energizing circuit described above is as follows. The contacts SC62A1 are controlled by the control row 1 mechanism of the accounting machine and are open during a new balance operation. The contacts K272BC2 are controlled by the trial balance select relay K272 (not shown), and prevent the coil L201 from energizing when said relay is energized. The contacts SC945A1 are controlled by the main cam line of the accounting machine and are closed between 350 degrees and 15 degrees of rotation of said cam line. The contacts SC907A1 are controlled by the auxiliary cam line of the accounting machine, and are closed between 350 degrees and 15 degrees of rotation of said cam line. The contacts K241A4 are controlled by the parity failure relay K241 (not shown) and prevent energization of the coil L201 in the event of a parity failure. The contacts K222A12 are controlled by the manual auto relay K222 (not shown) and prevent energization of the coil L201 during a manual operation of the accounting machine. The contacts K250B1

are controlled by the previously-mentioned reader stop relay (FIG. 1) and prevent energization of the coil L201 when said relay is energized. The contacts K242B11 are controlled by the amount parity relay K242 (not shown) and prevent energization of the coil L201 in the event of a parity failure in the amount data sensed by the reading device. The contacts K216B1 are controlled by the comparator advance relay K216 (not shown) and prevent energization of the coil L201 during a change in account number sensed by the reading device. The contacts K220B11 are controlled by the new balance trip relay K220 (not shown) and prevent energization of the coil L201 during a new balance operation. The contacts K221B1 are controlled by the row 2 trip relay K221 (not shown) and prevent energization of the coil L201 during a control row 2 operation of the accounting machine. The contacts K290B1 are controlled by the previously-mentioned relay K290 (FIG. 1) and prevent energization of the trip coil L201 when said relay K290 is energized. The contacts SP250B1 are controlled by a "start reader" button and are used to control the time of energization of the trip coil L201 during the reader start operation. The contacts SP280B2 are manual contacts controlled by the item bypass button, and control the time of energization of the trip coil L201 during an item bypass operation. The contacts SC212A1 are controlled by the cam line of the reading device and are closed at 315 degrees and opened at 25 degrees of rotation of said cam line. The contacts SC9B1 are controlled by mechanism in the reading device and prevent energization of the coil L201 in the event that the tape being sensed by the reading device is under excessive tension. The contacts SC8A1 are controlled by the mechanism in the reading device and prevent energization of the coil L201 in the event that no tape is present to be read.

Deenergization of the relay K290 also closes the contacts K290BC2 in the energizing circuit for the gripper solenoid L1, so that said solenoid will once more be permitted to energize under the appropriate circumstances in which it would be normally energized in a conventional automated operation of the system.

Following the completion of the balance pick-up operation and the energization of the trip coil L201, the system will now operate in a normal manner to effect the next item entry pertaining to the account being processed. At the conclusion of reading from the tape of the information pertaining to the next item entry, a trip symbol will be read, and this will cause a control row 2 operation of the accounting machine. Reading of the trip symbol will effect the energization of the row 2 trip relay K221 (not shown), which will close the contacts K221A3 in an energizing path for energization of the relay K307. This energizing path extends from the conductor 16 over the contacts SC3A1; SC12B1; SC913A1; SC15B2; SC933A1; K304B3; K301A2; the point 44; the contacts K308AC2, controlled by the gate check relay K308 (not shown), to prevent energization of the relay K307 over this path in the event of a gate check condition in the accounting machine; the level SR1B of the function control switch in "Posting 1" position; the contacts K291B11 and K295B11, said contacts being in parallel with the contacts SC11B1, which are controlled by the table-positioning mechanism of the accounting machine, and which are open at this time, since said positioning mechanism is in its home position; the contacts SC5B1, which open when the carriage is positioned to line 40 to prevent the relay K307 from being energized at such time over this path; the contacts K241A12, controlled by the parity failure relay K241 (not shown), to prevent energization of the relay K307 over this path in the event of a parity failure; the contacts K232B12, controlled by the account bypass relay K232 (not shown) to prevent energization of the relay K307 over this path during an account bypass operation; the contacts K221A3, controlled by the row 2 trip relay K221 (not shown) to energize the relay

K307 to initiate a cycle of machine operation, when a "trip" symbol is sensed from the tape by the reading device; the point 48; the contacts K222AC11, controlled by the manual-auto relay K222 (not shown) to prevent energization of the relay K307 over this path except during automatic operations; and the relay K307, to the conductor 18.

Energization of the relay K307 closes the contacts K307A1 to complete the previously-described holding circuit for maintaining said relay in energized condition.

Energization of the relay K307 also causes energization of the key lock line solenoid (not shown) of the accounting machine in a conventional manner to initiate an item entry operation. During this item entry operation, at 5 degrees of the revolution of the main cam line of the accounting machine, the contacts SC943A1 close, and remain closed through 180 degrees of rotation, completing an energizing circuit for the solenoid L20 (FIG. 2), said circuit extending from the conductor 32 over the contacts K308AC4; the contacts K312B1; the point 45; the contacts K320B3; the contacts SC943A1; the contacts SC73B1, controlled by the manually-operable "left-right print" control on the accounting machine; and the solenoid L20, to the conductor 34.

Energization of the solenoid L20 causes operation of print control means in the accounting machine to effect printing of the desired item information in the right column of the ledger card, in a manner which is fully described in the previously-mentioned United States Patent No. 3,060,846.

Subsequent item operations can now be carried out in a conventional manner until all of the item entries pertaining to the account being processed have been made, after which a new balance operation of the accounting machine will be automatically initiated in the manner described in the previously-mentioned United States patent application Serial No. 840,701.

When an item entry is posted in line 40 of the right column of the ledger card 12, the relay K306 (not shown) is energized in a conventional manner, closing the contacts K306A4, and thus energizing the relay K292. This closes the contacts K292A2, which energizes the reader stop relay K250 over a path extending from the conductor 20 over the contacts K292A2, the contacts K291B2, a point 80, and the relay K250, to the conductor 22.

Energization of the reader stop relay K250 opens the contacts K250B1 in the energizing circuit for the trip coil L201, thus preventing further energization of the coil, and halting operation of the reader. An arc-suppressing capacitor 82 is connected in parallel with the relay K250 between the point 80 and the conductor 22.

Energization of the relay K250 also closes the contacts K250A2, to complete a holding circuit for maintaining the relay K250 energized. Said circuit extends from the conductor 20 over contacts K232BC1, controlled by the account bypass relay K232 (not shown), to permit the reader stop relay K250 to be deenergized by a manual bypass operation; contacts SP231B1, which may be opened manually to deenergize the relay K250 when said relay has been energized over another circuit (not shown) by the occurrence of an overdraft condition in the accounting machine; contacts K254B11, controlled by the start reader relay K254 (not shown), which relay can be manually energized when it is desired to start operation of the reader; the contacts K250A2; the point 80; and the relay K250, to the conductor 22.

Stopping of the reading device by energization of the relay K250 enables the operator for the system to make a transfer operation to transfer the last balance and related information from the filled account card to a new account card, after which the automatic operation may continue.

While the form of mechanism shown and described herein is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to

confine the invention to the one form or embodiment disclosed herein, for it is susceptible of embodiment in various other forms.

What is claimed is:

1. In a device of the class described, having an accounting machine, a feeding device for feeding record members to the accounting machine, and a data input device for entering information into the accounting machine, said accounting machine including printing means, computation means, record member receiving and positioning means, and means to cause a record member to be positioned for printing on its first available line space following a balance operation in which printing has taken place in the last available line space of a record member, said accounting machine being capable of performing computations and recording the results as item and balance entries on successive line spaces in a first column and a second column on a record member, the combination comprising

line detecting means for detecting the exhaustion of available line spaces in each column of the record member;

column detecting means capable of assuming either one of two conditions, depending upon whether recording is taking place in the first column or the second column of the record member;

operation control means controlled by the line detecting means and by the condition of the column detecting means according to the record member line and column being printed upon to energize when the last line space in the first column of a record member has been exhausted;

first disabling means controlled by energization of the operation control means and capable of preventing operation of the feeding device when the last line space in the first column of a record member has been exhausted;

second disabling means controlled by energization of the operation control means and capable of preventing operation of the data input device when the last line space in the first column of a record member has been exhausted;

new balance means controlled by energization of the operation control means, and operable to initiate automatically a new balance operation of the accounting machine when the last line space in the first column of a record member has been exhausted;

balance pick-up means for automatically initiating a balance pick-up operation immediately following a new balance operation initiated by the new balance means;

means controlled by initiation of a balance pick-up operation to cause deenergization of the operation control means, thus rendering the first and second disabling means inoperable, and permitting further operation of the feeding device and the data input device; and

print control means for controlling the printing means of the device to cause printing to take place in the second column of the record member in an item entry operation following the new balance operation, whereby recording on the record member during an item entry operation following said balance pick-up operation takes place in the first available line space of the second column of the record member.

2. In a device of the class described, having an accounting machine, a feeding device for feeding record members to the accounting machine, and a data input device for entering information into the accounting machine, said accounting machine including printing means, computation means, record member receiving and positioning means, and means to cause a record member to be positioned for printing on its first available line space following a balance operation in which printing has taken place in the last available line space of a record member, the combination comprising

said accounting machine being capable of performing computations and recording the results as item and balance entries on successive line spaces in a first column and a second column on a record member, the combination comprising

line detecting means for detecting the exhaustion of available line spaces in each column of the record member;

column detecting means capable of assuming either one of two conditions, depending upon whether recording is taking place in the first column or the second column of the record member;

operation control means controlled by the line detecting means and by the condition of the column detecting means according to the record member line and column being printed upon;

first disabling means controlled by the operation control means and capable of preventing operation of the feeding device when the last line space in the first column of a record member has been exhausted;

second disabling means controlled by the operation control means and capable of preventing operation of the data input device when the last line space in the first column of a record member has been exhausted;

new balance means controlled by the operation control means, and operable to initiate automatically a new balance operation of the accounting machine when the last line space in the first column of a record member has been exhausted;

balance pick-up means controlled by the operation control means for automatically initiating a balance pick-up operation immediately following a new balance operation initiated by the new balance means; and

print control means for controlling the printing means of the device to cause printing to take place in the second column of the record member in an item entry operation subsequent to the new balance operation,

whereby recording on the record member during an item entry operation following said balance pick-up operation takes place in the first available line space of the second column of the record member.

3. In a device of the class described, having an accounting machine and a data input device for entering information into the accounting machine, said accounting machine including printing means, computation means, record member receiving and positioning means, and means to cause a record member to be positioned for printing on its first available line space following a balance operation in which printing has taken place in the last available line space of a record member, said accounting machine being capable of performing computations and recording the results as item and balance entries on successive line spaces in a first column and a second column on a record member, the combination comprising

line detecting means for detecting the exhaustion of available line spaces in each column of the record member;

column detecting means capable of assuming either one of two conditions, depending upon whether recording is taking place in the first column or the second column of the record member;

operation control means controlled by the line detecting means and by the condition of the column detecting means according to the record member line and column being printed upon;

first disabling means controlled by the operation control means and capable of preventing operation of the data input device when the last line space in the first column of a record member has been exhausted;

new balance means controlled by the operation control means, and operable to initiate automatically a new balance operation of the accounting machine when the last line space in the first column of a record member has been exhausted;

balance pick-up means for automatically initiating a balance pick-up operation immediately following a new balance operation initiated by the new balance means;

second disabling means controlled by the line detecting means and by the condition of the column detecting means according to the record member line and column being printed upon, and capable of preventing operation of the data input device when the last line space in the second column of a record member has been exhausted; and

print control means for controlling the printing means of the device to cause printing to take place in the second column of the record member in an item entry operation following the new balance operation,

whereby recording on the record member during an item entry operation following said balance pick-up operation takes place in the first available line space of the second column of the record member, and whereby item entry operations may continue until the last line space of the second column is exhausted.

4. In a device of the class described, having an accounting machine and a data input device for entering information into the accounting machine, said accounting machine including printing means, computation means, record member receiving and positioning means, and means to cause a record member to be positioned for printing on its first available line space following a balance operation in which printing has taken place in the last available line space of a record member, said accounting machine being capable of performing computations and recording the results as item and balance entries on successive line spaces in a first column and a second column on a record member, the combination comprising

line detecting means for detecting the exhaustion of available line spaces in each column of the record member;

column detecting means capable of assuming either one of two conditions, depending upon whether recording is taking place in the first column or the second column of the record member;

operation control means controlled by the line detecting means and by the condition of the column detecting means according to the record member line and column being printed upon;

disabling means controlled by the operation control means and capable of preventing operation of the data input device when the last line space in the first column of a record member has been exhausted;

new balance means controlled by the operating control means, and operable to initiate automatically a new balance operation of the accounting machine when the last line space in the first column of a record member has been exhausted;

balance pick-up means controlled by the operation control means for automatically initiating a balance pick-up operation immediately following a new balance operation initiated by the new balance means; and

print control means for controlling the printing means of the device to cause printing to take place in the second column of the record member in an item entry operation subsequent to the new balance operation, whereby recording on the record member during an item entry operation following said balance pick-up operation takes place in the first available line space of the second column of the record member.

5. In a device of the class described, having an accounting machine and a feeding device for feeding record

members to the accounting machine, said accounting machine including printing means, computation means, record member receiving and positioning means, and means to cause a record member to be positioned for printing on its first available line space following a balance operation in which printing has taken place in the last available line space of a record member, said accounting machine being capable of performing computations and recording the results as item and balance entries on successive line spaces in a first column and a second column on a record member, the combination comprising

line detecting means for detecting the exhaustion of available line spaces in each column of the record member;

column detecting means capable of assuming either one of two conditions, depending upon whether recording is taking place in the first column or the second column of the record member;

operation control means controlled by the line detecting means and by the condition of the column detecting means according to the record member line and column being printed upon;

disabling means controlled by the operation control means and capable of preventing operation of the feeding device when the last line space in the first column of a record member has been exhausted;

new balance means controlled by the operation control means, and operable to initiate automatically a new balance operation of the accounting machine when the last line space in the first column of a record member has been exhausted;

balance pick-up means controlled by the operation control means for automatically initiating a balance pick-up operation immediately following a new balance operation initiated by the new balance means; and

print control means for controlling the printing means of the device to cause printing to take place in the second column of the record member in an item entry operation subsequent to the new balance operation, whereby recording on the record member during an item entry operation following said balance pick-up operation takes place in the first available line space of the second column of the record member.

6. In a device of the class described, having an accounting machine including printing means, computation means, record member receiving and positioning means, and means to cause a record member to be positioned for printing on its first available line space following a balance operation in which printing has taken place in the last available line space of a record member, said accounting machine being capable of performing computations and recording the results as item and balance entries on successive line spaces in a first column and a second column record member, the combination comprising

line detecting means for detecting the exhaustion of available line spaces in each column of the record member;

column detecting means capable of assuming either one of two conditions, depending upon whether recording is taking place in the first column or the second column of the record member;

operation control means controlled by the line detecting means and by the condition of the column detecting means according to the record member line and column being printed upon;

new balance means controlled by the operation control means, and operable to initiate automatically a new balance operation of the accounting machine when the last line space in the first column of a record member has been exhausted;

balance pick-up means controlled by the operation control means for automatically initiating a balance pick-up operation immediately following a new balance operation initiated by the new balance means;

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means for preventing initiation of an item entry operation following the new balance operation until a balance pick-up operation has first been made; and print control means for controlling the printing means of the device to cause printing to take place in the second column of the record member in an item entry operation subsequent to the new balance operation, whereby recording on the record member during an item entry operation following said balance pick-up operation takes place in the first available line space of the second column of the record member.

7. In a device of the class described, having an accounting machine including printing means, computation means, record member receiving and positioning means, and means to cause a record member to be positioned for printing on its first available line space following a balance operation in which printing has taken place in the last available line space of a record member, said accounting machine being capable of performing computations and recording the results as item and balance entries on successive line spaces in a first column and a second column on a record member, the combination comprising line detecting means for detecting the exhaustion of available line spaces in each column of the record member;

column detecting means capable of assuming either one of two conditions, depending upon whether recording is taking place in the first column or the second column of the record member;

operation control means controlled by the line detecting means and by the condition of the column detecting means according to the record member line and column being printed upon;

new balance means controlled by the operation control means, and operable to initiate automatically a new balance operation of the accounting machine when the last line space in the first column of a record member has been exhausted;

balance pick-up means controlled by the operation control means for automatically initiating a balance pick-up operation immediately following a new balance operation initiated by the new balance means; and print control means for controlling the printing means of the device to cause printing to take place in the second column of the record member in an item entry operation subsequent to the new balance operation,

whereby recording on the record member during an item entry operation following said balancing pick-up operation takes place in the first available line space of the second column of the record member.

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