

Nov. 11, 1958

H. REIL

2,859,850

BUSINESS MACHINE IMPROVEMENT

Filed May 15, 1956

4 Sheets-Sheet 1

FIG. 1

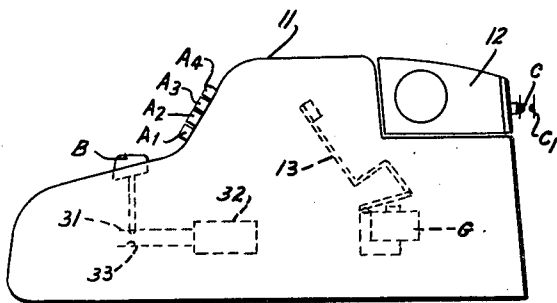


FIG. 4

I	II	III	IV
-0-	0	-0-	0
1	1	1	1
2	2		2
3	3		3
	4	-4-	
	-5-		5
	6		6
	7		7
	8		8
	9		9

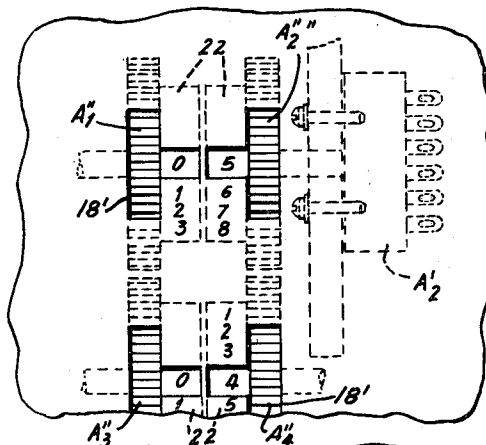


FIG. 7

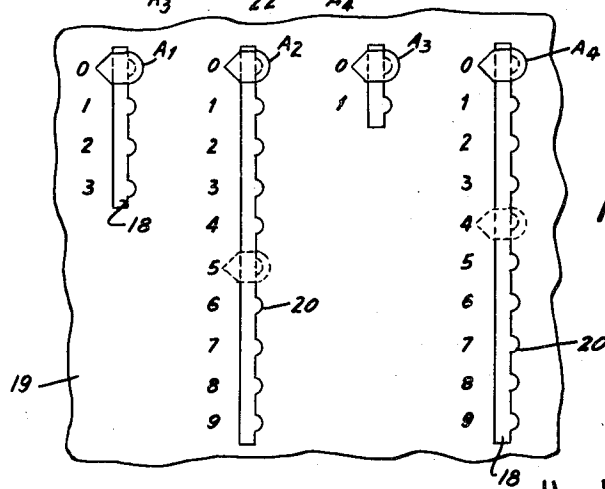


FIG. 3

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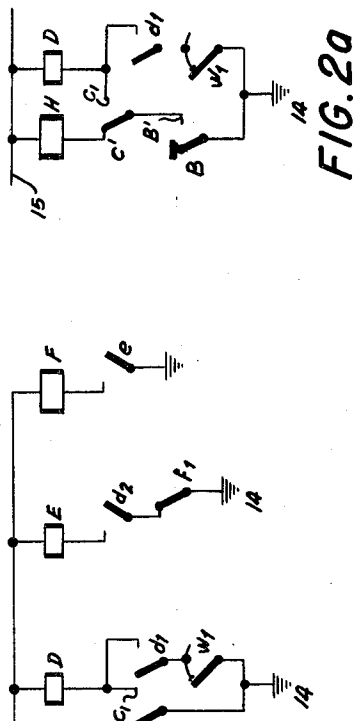
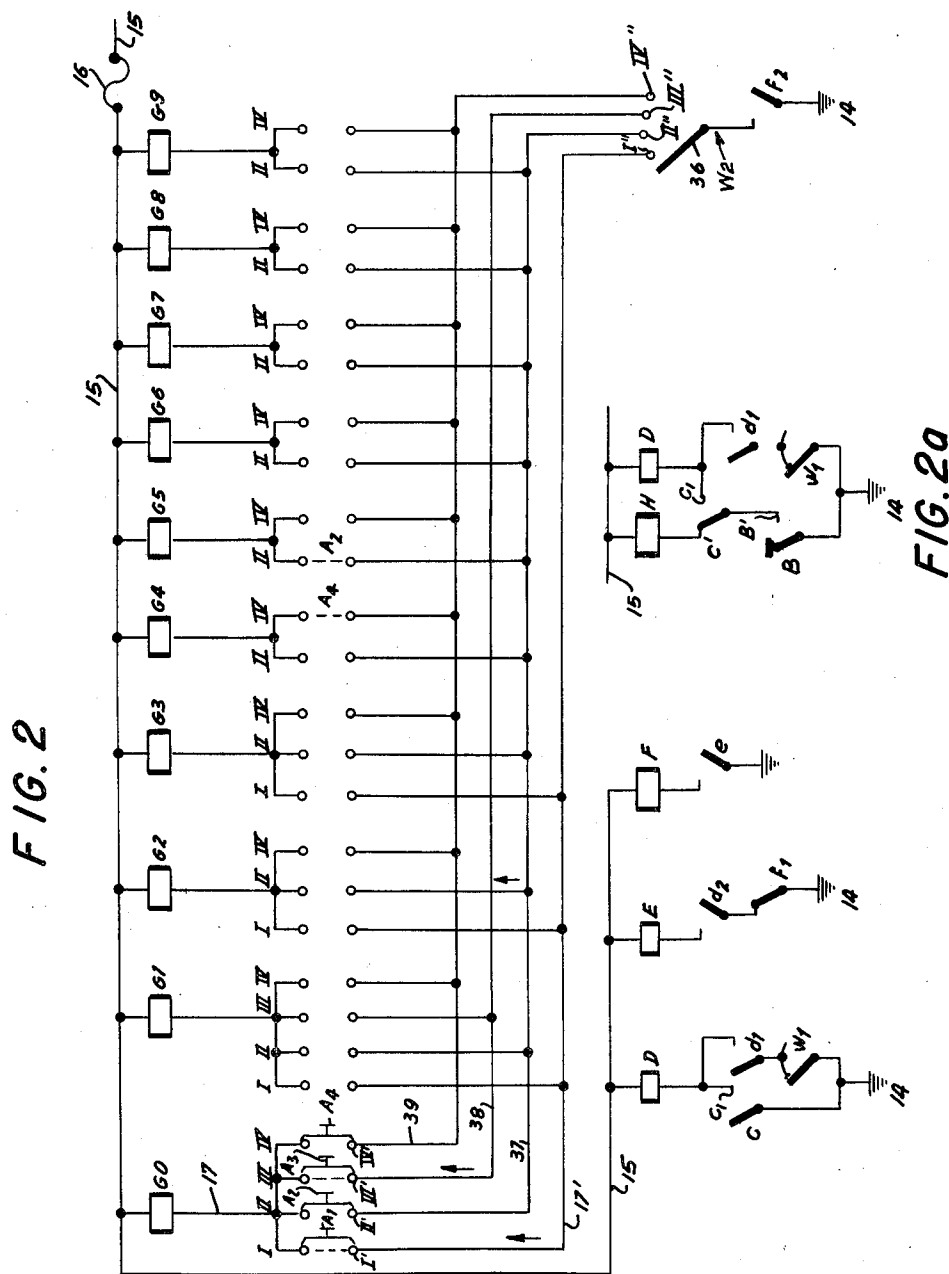
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BUSINESS MACHINE IMPROVEMENT

Filed May 15, 1956

4 Sheets-Sheet 2



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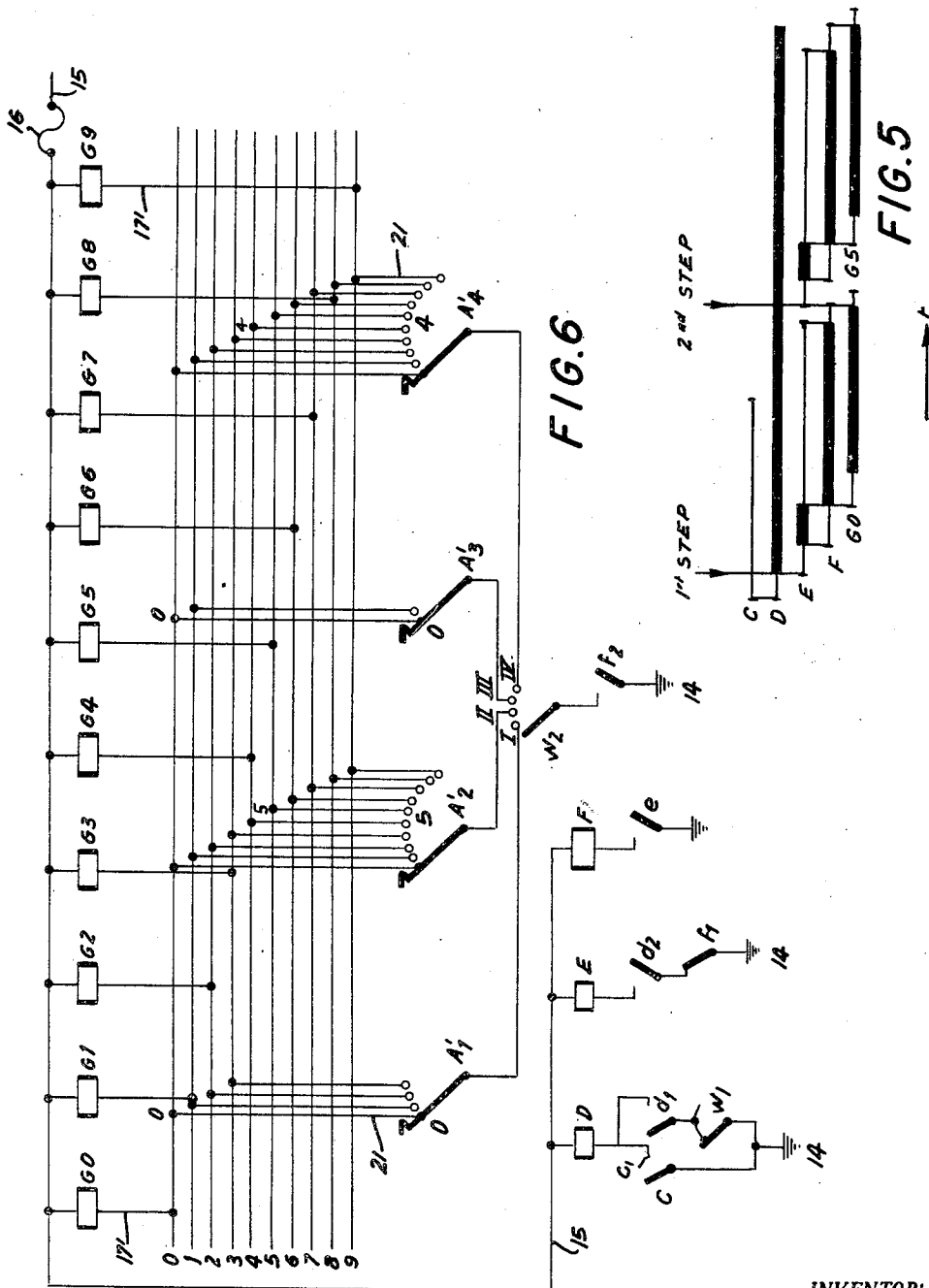
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BUSINESS MACHINE IMPROVEMENT

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4 Sheets-Sheet 3



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BUSINESS MACHINE IMPROVEMENT

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4 Sheets-Sheet 4

FIG. 8

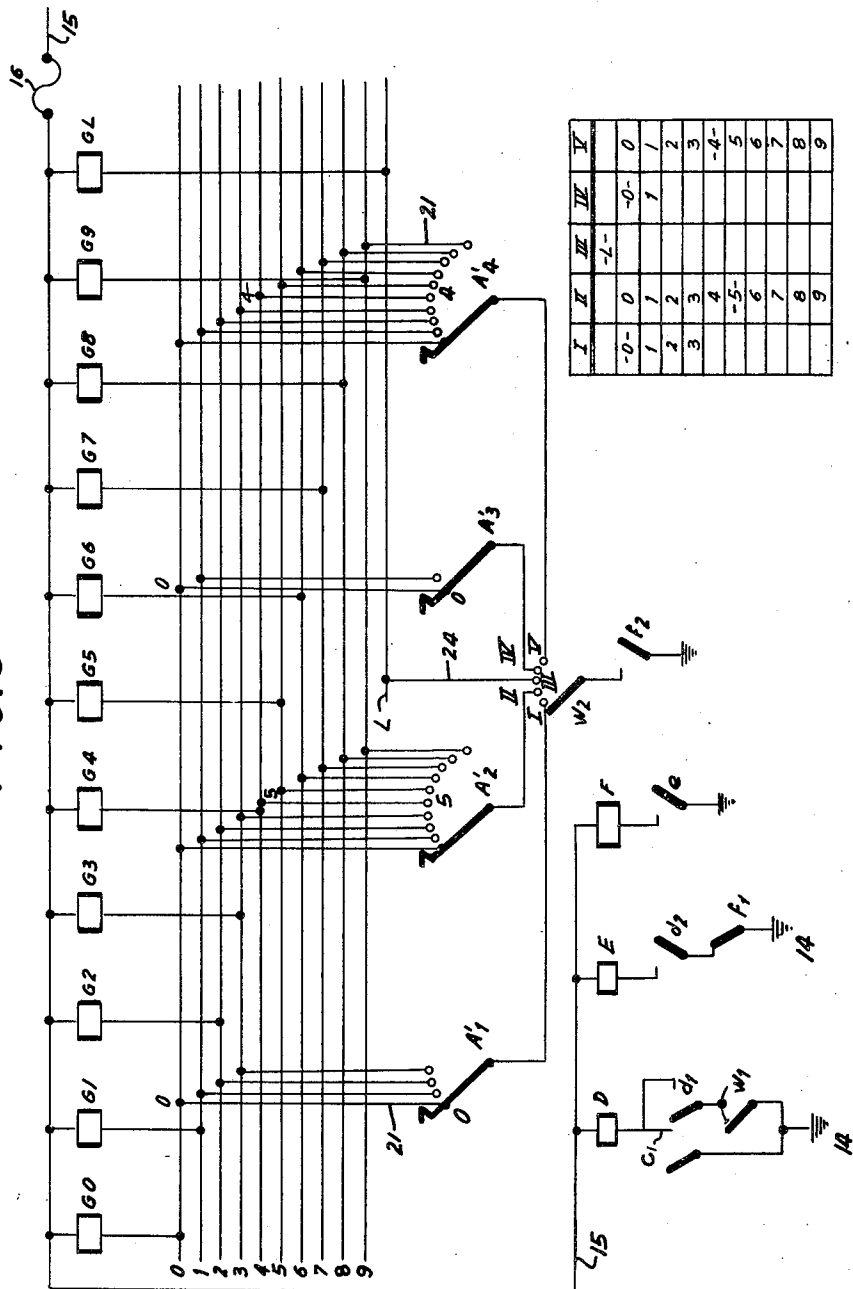


FIG. 9

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BUSINESS MACHINE IMPROVEMENT

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Application May 15, 1956, Serial No. 585,037

Claims priority, application Germany May 17, 1955

8 Claims. (Cl. 197—19)

The present invention relates to a new and improved business machine. More particularly, the present invention relates to a new and improved arrangement for electrically operated business machines wherein a predetermined combination of printing members may be actuated a plurality of times.

In conventional business machines, such as bookkeeping machines, it is often necessary to print the same combination of numbers a plurality of times. For example in making bookkeeping entries, it is often necessary that the date of the particular bookkeeping entry, whether it is a debit or a credit, be entered adjacent the column in which the entry itself is to be made. In addition other types of information is sometimes repeatedly made and entered in bookkeeping ledgers. For example a particular customer may have a certain customer's number which identifies this customer in the bookkeeping ledger. Accordingly, this customer's number is printed before an entry is made in a column referring to the transaction had with that particular customer.

With ordinary electrically operated bookkeeping machines, it is necessary to print the date manually each time this information is required. This information is usually necessary every time an entry is made in a new column in the bookkeeping ledger. It is apparent that such arrangements require the same numbers or dates to be entered at the beginning of each new column by the manual operation of the printing or typewriting levers.

On the other hand, with the present invention, the desired information is automatically printed just before a new entry is to be made. For example, the tabulating key on the business machine determines the positions of the various columns in the bookkeeping ledger. Accordingly, with the present invention every time the tabulating key is depressed to move the carriage holding the bookkeeping ledger to the new column position, the required information, such as the date, is printed at the beginning of the column.

It is accordingly an object of the present invention to overcome the above described disadvantages of conventional bookkeeping machines.

A second object of the present invention is to provide a new and improved electrically operated business machine wherein information which must be printed a plurality of times on the same paper in the business machine, is automatically printed thereon.

Another object of the present invention is to provide a new and improved method and apparatus used with electrically operated business machines wherein a predetermined desired combination is printed a plurality of times on different portions of the paper in the business machine, whenever desired.

A further object of the present invention is to provide a new and improved method and apparatus for use with electrically operated business machines wherein the date of a bookkeeping entry is automatically printed whenever desired, without manual operation of the printing members of the business machine.

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Still another object of the present invention is to provide a new and improved method and apparatus for use in electrically operated bookkeeping machines wherein a predetermined printed combination is automatically printed at the start of every new column in the bookkeeping ledger.

Still another object of the present invention is to provide a new and improved method and apparatus for use in electrically operated bookkeeping machines wherein a predetermined combination of printing members is automatically operated every time the tabulating key of the machine is depressed.

With the above objects in view the present invention mainly consists of an apparatus for use in an electrically operated business machine having printing members and including a plurality of electrically energizable actuating members for actuating the printing members, whenever the actuating members are energized, a paper carriage, energizing means connected in circuit with each of the actuating members for energizing the same whenever an energizing circuit therefor is completed, a plurality of first switching means connected in circuit between the energizing means and each of the actuating members, each of the first switching means being movable between a plurality of circuit-closing and circuit-opening positions, a plurality of second switching means connected in circuit between said first switching means and said energizing means, each of the second switching means being respectively movable between a circuit-closing position for each of the first switching means respectively and a circuit-opening position therefor, operating means for sequentially moving the second switching means through each of its circuit-closing positions whereby when one of the first switching means and one of the second switching means are simultaneously in circuit-closing position, an energizing circuit for one of the actuating members is completed and the actuating member is energized and actuates at least one of the printing members of the business machine; and third switching means operated by the paper carriage to actuate the operating means.

In one of the preferred embodiments of the present invention the first switching means includes a plurality of slidably mounted members whereas in a second preferred embodiment the first switching means includes a plurality of rotatably mounted members.

In still a further embodiment of the present invention instead of each actuating member actuating a printing member, at least one of the actuating members actuates a spacing member so that no printing is entered on the paper in the business machine but rather a space is provided between two adjacent entries, whenever desired.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a side view of an electrically operated business machine in which the present invention may be incorporated;

Fig. 2 is an electrical schematic diagram of a first embodiment of the present invention;

Fig. 2a is an electrical schematic diagram of a second embodiment of the present invention;

Fig. 3 is a diagrammatic view of a portion of the keyboard of the business machine, which portion includes the control members for the present invention;

Fig. 4 is a table showing the possible arrangement of the printing members to provide the different desired

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combinations which are to be automatically and repeatedly printed in accordance with the present invention;

Fig. 5 is a graph showing the variation of the different operating members of the present invention with respect to time;

Fig. 6 is an electrical schematic diagram of still another embodiment of the present invention;

Fig. 7 is a view of a portion of the keyboard of the electrically operated business machine incorporating the principles of the present invention showing another embodiment of control members therefor;

Fig. 8 is an electrical schematic diagram of a further embodiment of the present invention; and

Fig. 9 is a table showing the different printing combinations available with the embodiment illustrated in Fig. 8.

Referring to the drawings and more particularly to Fig. 1, it can be seen that the electrically operated business machine includes a main housing 11 having a carriage 12 by means of which a paper is to be inserted in the business machine and on which paper the bookkeeping entries are to be made. Adjacent the paper carriage 12 is shown a printing lever 13 together with its electromagnetic actuating member G. That is, whenever an electromagnet G for a particular typing member 13 is energized, that typing member will be moved into contact with the paper on the paper carriage 12 so that whatever character is arranged on the particular actuated typing member will be imprinted on the paper in the bookkeeping machine.

Arranged on the rear portion of the paper carriage 12 is a contact C which is adapted to make sliding contact with a second contact member C₁. The relative positions of the contact members C and C₁ may be displaced in the manner of tabulator keys in an ordinary business and bookkeeping machine. Therefore, each time the paper carriage is shifted through a position wherein contacts C and C₁ make contact with each other, a circuit is closed, which circuit corresponds to a particular tabular or column position on the paper in the paper carriage of the machine.

On the front portion of the machine are shown diagrammatically, movable contacts A₁, A₂, A₃ and A₄. The purpose of these contacts will be explained hereinbelow with reference to Figs. 2 and 3. In addition, in Fig. 1, a movable member B is shown cooperating with a movable contact 31 connected to a relay winding 32. It can be seen that the relay 32 includes a second, fixed, contact 33 which is adapted to cooperate with the contact 31. When the member B is manually depressed the contacts 31 and 33 may be electrically connected to each other so that an energizing circuit for the relay 32 may be completed. The member B may be a tabulating member, for example, for the business machine.

Referring now to Figs. 2, 3 and 4, an embodiment of the present invention will be described which is particularly adaptable for the printing of the date of entry at the start of each new column of the paper in the paper carriage 12. In Fig. 3, it can be seen that the four members A₁-A₄ are slidably arranged on the keyboard of the bookkeeping machine. The member A₁ may be moved into any one of four positions identified as 0, 1, 2, and 3. Similarly, the member A₂ may be moved to any one of ten positions identified with the numerals 0-9. The member A₃ may occupy any one of two positions identified as 0 and 1, and the member A₄ may be moved into any one of ten different positions identified as 0-9. This arrangement corresponds to a day and month arrangement for the date. The particular arrangement shown in Fig. 3 corresponds, for example, to the European type of date indication wherein the first number is the day of the month and the second number is the month. Since for most bookkeeping purposes it is

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not necessary to print the year this indication is omitted from the embodiment. However, it will be apparent that any additional printing members may be provided.

In the arrangement of Figs. 3 and 4 it can be seen that the member A₁ corresponds to the first printing space and represents the tens space of the day of the month. Similarly, the member A₂ corresponds to the second printing space and identifies the unit space of the day of the month. The member A₃ identifies the tens space of the month and the member A₄ identifies the unit space of the month. Since there are no more than 31 days in the month, it is apparent that positions 0, 1, 2 and 3 are sufficient for the tens space for the day of the month and similarly, the positions 0 and 1 for the member A₄ are sufficient for the tens space for the month.

Referring now to Fig. 2 it can be seen that the members A₁-A₄ are represented as four slidably mounted members which may be moved as bridging contacts between normally open contacts in the apparatus. Each of the pairs of normally open spaced contacts correspond respectively to a different actuating member for the printing levers 13. It can be seen that ten actuating members G₀, G₁, G₂, G₃, G₄, G₅, G₆, G₇, G₈ and G₉ are arranged in side by side relationship in Fig. 2. One terminal of each of the actuating members G₀-G₉, which may be electromagnetic relays, for example, are connected to a common conductor 15 which is in turn connected to the positive terminal of a source of direct current potential. This source is not illustrated in order to avoid unnecessarily complicating the drawing. In addition a fuse 16 is arranged in the conductor 15 to protect the unillustrated voltage source.

The other terminal of the actuating relay G₀ is connected by a conductor 17 to the normally open contacts numbered I, II, III, and IV. That is the second terminal of the relay G₀ is connected to four different fixed contacts, one for each of the members A₁-A₄. Opposite the contact I is a second contact I' which is connected by conductor 17' to a fixed contact I''. The fixed contact I'' is one of a plurality of contacts I'', II'', III'', and IV'' which are arranged on a switch w₂. The switch w₂ has a movable member 36 which is adapted to be moved sequentially into contact with each of the fixed contacts I''-IV''.

The second contact II' is connected by conductor 37 to the second fixed contact II'' of the switch w₂. Similarly, the third contact III' is connected by conductor 38 to the third fixed contact III'' of the switch w₂ and the contact IV' is connected by a conductor 39 to the fourth contact IV'' of the switch w₂.

In the illustrated position each of the spaced contacts I-I', to IV-IV' are shown bridged by the members a₁-a₄. It can be seen that each of the members a₁-a₄ may be moved to bridge any one of the respective bridge contacts for the nine other actuating members G₁-G₉. The actuating member G₁ is connected to four contacts I-IV. The actuating members G₂ and G₃ are connected respectively to contacts marked I, II and IV. Finally, the actuating members G₄-G₉ are each respectively connected to two contacts marked II and IV.

It is apparent that the actuating members A₂ and A₄ may be moved to bridge any one of the ten circuits for the ten actuating members G₀-G₉. Similarly the actuating member A₁ may be used for bridging the energizing circuit of energizing members G₀-G₃ and the member A₃ may be used for bridging the energizing circuits for the actuating members G₀ and G₁.

It can also be seen that the contacts which are spaced from the contacts of the actuating members G₁-G₉ are also connected to their respectively numbered contacts I''-IV'' of the switch w₂. Similarly the power supply conductor 15 is connected to one terminal of relays D, E and F. The other terminal of the relay D may be connected to ground through two parallel circuits, one of which includes the

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normally open switch C and the other of which includes the normally open switches d_1 and w_1 . The other terminal of the relay E may be connected to ground through the normally open switch d_2 and the normally closed switch f_1 . Finally, the other terminal of the relay F may be connected to ground through the normally open switch e . Also, the stepping switch w_2 may be connected to ground through its movable member 36 and the normally open switch f_2 .

The operation of the apparatus incorporating the principles of the present invention may best be indicated by way of an illustrative example and by reference to Figs. 2 and 5. If it is desired to print the date corresponding to April 5, for example, the day of the month indicators A_1 and A_2 are set to indicate the fifth day of the month. Therefore A_1 remains at 0 and A_2 is moved to bridge the open contacts II and II' of the actuating relay G_5 . This is shown in dotted lines in Fig. 2 and in Fig. 3. Similarly since April is the fourth month, the member A_3 remains in the zero position and the member A_4 is moved to the fourth position wherein it bridges the contacts IV and IV' in the energizing circuit of the actuating member G_4 .

When the contacts C, C_1 are closed due to the position of the paper carriage 12 of the bookkeeping machine, the relay D is energized. In Fig. 5, the energization and deenergization of a particular relay is indicated by a small vertical line. Therefore it can be seen that the closure of the contacts C, C_1 and the energization of relay D occur simultaneously. The thin horizontal line corresponds to the time interval during which a relay is energized or a contact remains closed but before the relay itself is actually actuated or deactuated. Similarly the thick black line of the time diagram of Fig. 5 indicates the time interval during which a relay is actually actuated.

Therefore it is seen that although the relay D is energized as soon as the contacts C and C_1 are closed, the relay D is not actually actuated for a short time period indicated by the start of the heavy black horizontal line corresponding to D in Fig. 5. When the relay D is actually actuated, its normally open contacts d_1 and d_2 are closed. It therefore can be seen that the relay E is energized through the closed contact d_2 and the normally closed contact f_1 . After a short time interval corresponding to the thin line segment of Fig. 5 the relay E is actuated and closes its normally open contact e . This energizes the relay F which becomes actuated after a short time interval. When the relay F is actuated it closes its normally open contact f_2 and opens its normally closed contact f_1 . The closing of the contact f_2 energizes the stepping switch w_2 and causes the movable contact 36 thereof to move into electrical contact with the first fixed contact I'. Simultaneously, the switch w_1 is closed to maintain the relay D in energized and actuated position regardless of the further operation of the contact C.

Accordingly, the first energizing circuit for the member A_1 is completed and the actuating member corresponding to the member A_1 is energized and actuated. In the illustrative example the member A_1 remained in the energizing circuit for the actuating member G_0 and therefore this actuating member will be actuated and the numeral 0 imprinted in the first typewritten space at the start of the column.

However, when the normally closed contact f_1 opens, the relay E becomes deenergized. However, this relay is a time delay relay so that it does not open up for a period of time which is sufficient to permit the actual imprinting of the first printed numeral corresponding to the position of the member A_1 . After this predetermined time delay, which actually can be very short, the relay E causes its normally open contact e to open, thereby deenergizing the relay F and opening the contact f_2 .

When the contact f_2 is opened the energizing circuit for the actuating member G_0 is opened causing the same

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to be deactuated. When the relay F is deactuated, however, its normally closed contact f_1 is again closed. Since the relay D is now self-holding, the normally open contact d_2 will remain in closed position so that the relay E is again actuated. This will close the normally open contact e , thereof and again energize the relay F. This closes the normally open contact f_2 causing the stepping switch w_2 to step to its next position corresponding to the contact II'. This completes the energizing circuit for the member A_2 , which in the illustrative example causes the energization of the actuating member G_5 . The cycle is then repeated so that the numeral 5 is printed on the next typing space. It should be noted that in accordance with conventional business machines once an actuating member causes the printing movement of the typewriting lever 13, the paper carriage 12 will be stepped into its next typing position by the conventional apparatus contained therein. Therefore the next actuated typing member, which in this case was the member containing the numeral 5 and actuated by the actuating member G_5 , it is printed in the proper space therefor. Of course, when the paper is shifted by the shifting apparatus of the business machine, the contacts C and C_1 are opened. As indicated hereinabove, this is of no consequence since the relay D has already become self-holding. After the relay F has become actuated, the normally closed contact f_1 thereof is opened to again deenergize the relay E. Therefore the cycle is repeated and the stepping switch w_2 is stepped through the subsequent positions thereof to complete the energizing circuit sequentially for the members A_3 and A_4 .

At the end of the last position of the stepping switch w_2 , the next actuation thereof will open the contact w_1 thereof, thereby opening the self-holding circuit of the relay D and deenergizing this relay. At this point the operating apparatus of the present invention is completely deenergized.

It is of course appreciated that the time scale shown in Fig. 5 is greatly magnified so that the actual printing of the four numerals corresponding to the four control members A_1 - A_4 occurs substantially instantaneously. It is also clear that these four numerals have been printed without any additional manual operation by the operator of the business machine. It is also clear that these numerals or any other desired predetermined combination of numerals may be printed on the paper at any desired location, as long as the contacts C and C_1 are closed just prior to the desired column position.

Similarly, it is not essential that the predetermined combination of printed members correspond to a date. For example, this combination can correspond to a particular customer wherein the entry in the bookkeeping ledger applies to the customer and identifies the customer. Also, it is also clear that the present invention need not be limited to a printing apparatus since any type of marking or other types of storing means may be actuated by the various actuating members G_0 - G_9 .

Referring now to Fig. 2a a slightly modified circuit is provided wherein the same predetermined combination of characters to be printed may be printed a plurality of times along the same horizontal line of the paper. For example, the predetermined characters may be printed at the start of each column entry in the bookkeeping ledger along a horizontal line on the bookkeeping ledger. In Fig. 2a, the switch C, here indicated as C' is constructed as a double throw switch rather than as a single throw. In this embodiment, it can be seen that when the member B, corresponding to the tabulator key on a business machine, is depressed to make contact with the fixed electrical contact B', an energization circuit for the relay H is completed. The relay H corresponds to the tabulator actuating relay so that the paper carriage is moved in the conventional manner for such machines into its next column position in accordance with the previously set

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tabulator members, usually located at the rear of the machine.

When the carriage 12 of the business machine has been moved into its new column position, the sliding contact C on the back of the carriage makes contact with the previously set mating contact C₁. This completes the energization circuit for the D relay in the same manner as indicated for Fig. 2. Accordingly, the energized D relay, upon actuation thereof, closes its normally open contacts d₁ and d₂ to start the printing cycle for the predetermined combination of typing members chosen in accordance with the position of the control members A₁-A₄.

It is apparent that the remaining elements of the circuit of Fig. 2a are the same as the elements in the circuit of Fig. 2 and accordingly these elements are not illustrated. With the circuit of Fig. 2a, the predetermined combination of characters to be printed will be printed each time that the tabulator key B is depressed, if so desired.

Of course, if it is desired not to have this combination printed each time the tabulator key is depressed, an additional cutout switch may be provided for rendering the circuit ineffective. However, if it is desired to print the predetermined combination of characters each time a new entry is to be made in the bookkeeping ledger, the circuit of Fig. 2 is advantageous. Of course, once the predetermined combination of characters has been printed on the paper in the business machine and this circuit is deenergized and deactuated, the operator of the business machine is free to manually operate the keys of the business machine in the conventional manner. In this way the usual entries are made on the bookkeeping ledger to indicate what items have been subjects of transaction and the dates of these entries will be automatically entered each time the carriage is moved to a new tabulator and column position. The advantages of such an arrangement are obvious.

Referring now to Figs. 6 and 7, an arrangement is shown wherein the control members A'₁-A'₄ are each arranged as rotatable switches rather than slidable switches as shown in Figs. 2 and 3. It can be seen in Fig. 7 that the rotatable switches A'₁-A'₄ are respectively manually set by knurled rotatable members A''₁-A''₄, respectively.

As can be seen in Fig. 7, the numerals 0, 5, 0, 4 have been positioned by the manually rotatable members A''₁-A''₄ respectively and these numbers are readily visible through transparent windows or other openings 18' in the housing of the machine. As is apparent from Fig. 7, the desired numerals to be illustrated are engraved on rotatable wheels 22 attached respectively to the manually rotatable knurled members A''₁-A''₄.

As in Fig. 2, the control circuit of Fig. 6 provides ten actuating electromagnetic relays G₀-G₉, respectively. One terminal of each of the actuating relays or members G₀-G₉ is connected to the energization source conductor 15 through the switch 16 and the other terminal of each actuating member is connected to a conductor 17'. Each of the contacts of the rotatable switches A'₁-A'₄ is connected respectively to the other terminals of the actuating members G₀-G₉. Therefore, when the switches A'₁-A'₄ are moved to the chosen characters so that the predetermined combination of characters is provided, the circuit is ready for operation.

As explained hereinabove with respect to Fig. 2 when the contact C which is dependent upon the desired column position on the paper in the business machine, makes contact with its mating contact C', the relay D is energized. The relay D then acts to close its normally opened contacts d₁ and d₂ with the same cyclical results explained with respect to Fig. 2. It should be noted that the switch w₂ can be either mechanically or electromagnetically actuated. That is, when the contact f₂ is moved into circuit closing position it can be mechanically con-

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nected to the switch w₂ which may be a cam-operated switch, for example, so that the switch w₂ is automatically moved into its next sequential position.

After the time cycle described hereinabove with respect to Figs. 2 and 5 is carried out in the circuit of Fig. 6, all of the predetermined combinations of characters are printed and the circuit becomes deactuated. At this point the business machine is ready for the entry to be made on the ledger. When the entry is completed and the carriage is moved to the next column position, the column-dependent contact C again mates with its mating contact C₁ and the cycle is repeated.

Referring now to Figs. 8 and 9 a circuit similar to Fig. 6 is shown having an additional feature. This additional feature is provided by the additional electromagnetic relay GL. The relay GL is operated to provide a space between the character corresponding to the day and the character corresponding to the month. The table of Fig. 9 shows that in the first two printing or typing spaces any numerals from 0-39 may be entered for the day of the month. Similarly the fourth and fifth typing spaces may provide any combination of numerals between 0-19 for the month of the year. This is in agreement with the table shown in Fig. 4. However in Fig. 9, the third typing or printing space is shown to be blank. This corresponds to the spacing actuating member GL.

In Fig. 8 it can be seen that the switch w₂ is provided with five fixed contacts instead of the four fixed contacts. In this figure the center or third fixed contact is connected on a conductor 24 to a conductor L to one side of an actuating member or relay GL. The other terminal of the relay GL is connected to the power supply conductor 15 in the same manner as the other relays G₀-G₉. In operation, when the column-dependent movable contact C mates with the contact C₁, the energization circuit for the relay D is completed. Therefore, this relay moves its normally open contacts d₁ and d₂ into circuit-closing position. This energizes the relay E and upon actuation thereof the relay F is energized due to the circuit-closed position of the switch e.

The energized and actuated relay F attracts its normally open contact f₂ to move the switch w₂ into its first sequential position to complete the energization circuit for the actuating member controlled by the member A'₁. As before the switch w₂ is moved in sequence through its various positions. However, when the third contact is placed in circuit-completing position, the relay GL is actuated so that the carriage of the bookkeeping machine is stepped one typewriting space without any character being imprinted on the paper. This provides the desired spacing position. It is clear that this spaced position can be arranged so as to occur in between any of the desired characters merely by properly connecting the switch w₂.

After the relay GL has been actuated, the switch w₂ is moved into its next sequential position to complete the energization circuit for the actuating member set up by the member A'₃. When the cycle is completed and the switch w₂ has been moved through its five operating positions, the relay D becomes deenergized, as before, and the circuit becomes deactuated. Again, the bookkeeping machine is now ready for additional entries by manual operation of the remaining keys thereof.

It is therefore apparent that in any of the above described embodiments of the present invention, the typing or printing keys of the business or bookkeeping machine are sequentially operated to print a desired combination of characters. The desired combination may be predetermined by the setting of the control members A₁-A₄. Of course it is clear that there is no practical limit to the number of control members that may be used and that any type of entries can be automatically made whether it includes numbers or letters or the like. These predetermined numbers or letters are manually set up by the

operator on the machine before the typing or printing operation begins. Then as the entries are made in the bookkeeping machine, in the usual fashion, the desired combination of characters is automatically imprinted on the paper before the transaction is ended in the proper column. Since the four numbers used in the illustrative example hereinabove can be typed or printed at a substantially higher rate than is possible by manual operation of the keys, it is clear that a substantial time saving is involved. In addition, the repetitious entry is avoided so that operator fatigue is lessened. This also eliminates the human error wherein the operator of the machine may forget to enter the necessary date or customer identification number. In such instances a great deal of work is sometimes necessary to find which customer should be charged for a particular transaction or to find the date of the particular transaction.

With the automatic operation provided by the new and improved circuit and apparatus of the present invention these difficulties are avoided.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of electrically operated machines differing from the types described above.

While the invention has been illustrated and described as embodied in an electrically operated bookkeeping machine, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In an electrically operated business machine having printing members, in combination, a movable carriage member mounted on the business machine and adapted to have a paper mounted therein for printing purposes; a plurality of electrically energizable actuating members for respectively actuating the printing members upon energization thereof; energizing means connected in circuit with each of said actuating members for energizing the same whenever an energizing circuit therefor is completed; a plurality of first switching means connected in circuit between said energizing means and each of said actuating members, each of said first switching means being respectively movable between a plurality of circuit-closing and circuit-opening positions; a plurality of second switching means connected in circuit between said energizing means and said plurality of first switching means, each of said second switching means being respectively movable between a circuit-closing position for each of said first switching means, respectively, and a circuit-opening position therefor; operating means for sequentially moving said second switching means through each of said circuit-closing positions whereby when one of said first switching means and one of said second switching means are simultaneously in circuit-closing position, an energizing circuit for one of said actuating members is completed and said one actuating member is energized to actuate at least one printing member; and third switching means cooperating with said carriage member and adapted to be moved by the same between circuit-opening and circuit-closing positions for initiating the action of said operating means at a predetermined position of said carriage member.

2. In an electrically operated business machine hav-

ing printing members, in combination, a movable paper carriage; a plurality of electrically energizable actuating members for respectively actuating the printing members upon energization thereof to print on paper mounted on said paper carriage; energizing means connected in circuit with each of said actuating members for actuating the same whenever an energizing circuit therefor is completed; a plurality of manually operable first switching means connected in circuit between said energizing means and each of said actuating members, each of said first switching means being respectively movable between a plurality of circuit-closing and circuit-opening positions; a stepping switch connected in circuit between said energizing means and said plurality of first switching means, said stepping switch being sequentially movable through a plurality of respectively different circuit-closing positions, in each of which said stepping switch cooperates with a respectively different one of said first switching means to energize at least one of said actuating members; operating means for moving said stepping switch sequentially through its circuit-closing positions and thereby energizing at least one of said actuating members to actuate at least one of said printing members; tabulating means cooperating with said movable paper carriage to move the same into predetermined tabular positions, whenever desired; and third switching means associated with said movable paper carriage and operated by the same when said carriage is moved to a new tabular position whereby said operated third switching means initiates operation of said operating means.

3. In an electrically operated business machine having printing members, in combination, a movable paper carriage; a plurality of first electrically energizable actuating members for respectively actuating the printing members upon energization thereof to print on paper mounted on said paper carriage; at least a second electrically energizable actuating member for moving said paper carriage upon energization thereof; energizing means connected in circuit with each of said actuating members for actuating the same whenever an energizing circuit therefor is completed; a plurality of manually operable first switching means connected in circuit between said energizing means and each of said actuating members, each of said first switching means being respectively movable between a plurality of circuit-closing and circuit-opening positions; a stepping switch connected in circuit between said energizing means and said plurality of first switching means, said stepping switch being sequentially movable through a plurality of respectively different circuit-closing positions, in each of which said stepping switch cooperates with a respectively different one of said first switching means to energize at least one of said actuating members; operating means for moving said stepping switch sequentially through its circuit-closing positions and thereby energizing at least one of said actuating members to actuate at least one of said printing members and said actuating member to move the paper carriage a predetermined amount; and third switching means associated with said movable paper carriage and operated by the same when said carriage is moved to a new position whereby said operated third switching means initiates operation of said operating means.

4. In an electrically operated business machine having printing members, an arrangement for automatically printing a predetermined combination of characters a plurality of times, comprising, in combination, a movable paper carriage; a plurality of electrically energizable actuating members for respectively actuating the printing members of the predetermined combination upon energization thereof to print on paper mounted on said paper carriage; energizing means connected in circuit with each of said actuating members for actuating the same whenever an energizing circuit therefor is completed; a plurality of manually operable first switching means connected in circuit between said energizing means and each

of said actuating members, each of said first switching means being respectively movable between a plurality of circuit-closing and circuit-opening positions to establish the predetermined combination of characters; a stepping switch connected in circuit between said energizing means and said plurality of first switching means, said stepping switch being sequentially movable through a plurality of respectively different circuit-closing positions, in each of which said stepping switch cooperates with a respectively different one of said first switching means to energize at least one of said actuating members; operating means for moving said stepping switch sequentially through its circuit-closing positions and thereby energizing in each of its circuit-closing positions, respectively, at least one of said actuating members to actuate at least one of said printing members of said predetermined combination; tabulating means cooperating with the movable paper carriage to move the same into predetermined tabular positions, whenever desired; and third switching means associated with said movable paper carriage and operable by the same when said carriage is moved to a new tabular position whereby said operated third switching means initiates operation of said operating means.

5. In an electrically operated business machine having printing members, an arrangement for automatically printing a predetermined combination of characters a plurality of times, comprising, in combination, a movable paper carriage, a plurality of electrically energizable actuating members for respectively actuating the printing members of the predetermined combination upon energization thereof to print on paper mounted on said paper carriage; energizing means connected in circuit with each of said actuating members for actuating the same whenever an energizing circuit therefor is completed; a plurality of manually operable first switching means connected in circuit between said energizing means and each of said actuating members, each of said first switching means being respectively movable between a plurality of circuit-closing and circuit-opening positions to establish the predetermined combination of characters; a plurality of indicating means connected to said manually operable switching means for indicating the combination of characters determined by the positions of said first switching means; a stepping switch connected in circuit between said energizing means and said plurality of first switching means, said stepping switch being sequentially movable through a plurality of respectively different circuit-closing positions, in each of which said stepping switch cooperates with a respectively different one of said first switching means to energize at least one of said actuating members; operating means for moving said stepping switch sequentially through its circuit-closing positions and thereby energizing in each of its circuit-closing positions, respectively, at least one of said actuating members to actuate at least one of said printing members of said predetermined combination; tabulating means cooperating with said movable paper carriage to move the same into predetermined tabular positions, whenever desired; and third switching means associated with said movable paper carriage and operable by the same when the carriage is moved to a new tabular position whereby said operated third switching means initiates operation of said operating means.

6. In an electrically operated business machine having printing members, in combination, a movable carriage member mounted on the business machine and adapted to have a paper mounted therein for printing purposes; a plurality of electrically energizable actuating members for respectively actuating the printing members upon energization thereof; energizing means connected in circuit

with each of said actuating members for energizing the same whenever an energizing circuit therefor is completed; a plurality of first switching means connected in circuit between said energizing means and each of said actuating members, each of said first switching means being respectively movable between a plurality of circuit-closing and circuit-opening positions; a plurality of second switching means connected in circuit between said energizing means and said plurality of first switching means, each of said second switching means being respectively movable between a circuit-closing position for each of said first switching means, respectively, and a circuit-opening position therefor; electromagnetic operating means having a plurality of normally opened and normally closed contacts connected in circuit between said energizing means and second switching means and adapted to operate in combination for sequentially moving said second switching means through each of said circuit-closing positions whereby when one of said first switching means and one of said second switching means are simultaneously in circuit-closing position, an energizing circuit for one of said actuating members is completed and said one actuating member is energized to actuate at least one printing member; and third switching means cooperating with said carriage member and adapted to be moved by the same between circuit-opening and circuit-closing positions for initiating the action of said operating means at a predetermined position of said carriage member.

7. In an electrically operated business machine having printing members, in combination, a movable paper carriage, a plurality of electromagnetic actuating members for respectively actuating the printing members upon energization thereof to print on paper mounted on said paper carriage; energizing means connected in circuit with each of said actuating members for actuating the same whenever an energizing circuit therefor is completed; a plurality of manually operable first switching means connected in circuit between said energizing means and each of said electromagnetic actuating members, each of said first switching means being respectively movable between a plurality of circuit-closing and circuit-opening positions; a cam-operated stepping switch connected in circuit between said energizing means and said plurality of first switching means, said stepping switch being sequentially movable through a plurality of respectively different circuit-closing positions, in each of which said stepping switch cooperates with a respectively different one of said first switching means to energize at least one of said actuating members; electromagnetic operating means for moving said stepping switch sequentially through its circuit-closing positions and thereby energizing at least one of said actuating members to actuate at least one of said printing members; tabulating means cooperating with said movable paper carriage to move the same into predetermined tabular positions, whenever desired; and third switching means associated with said movable paper carriage and operable by the same when said carriage is moved to a new tabular position whereby said operated third switching means initiates operation of said operating means.

8. A business machine as set forth in claim 1 wherein said first switching means include a manually operated slide contact.

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