Sept. 20, 1949. R. H. HALVORSEN 2,482,271

PRINTING ARRANGEMENT FOR MERCHANDISING CONTROL SYSTEMS

Filed Sept. 20, 1947 2 Sheets-Sheet 1

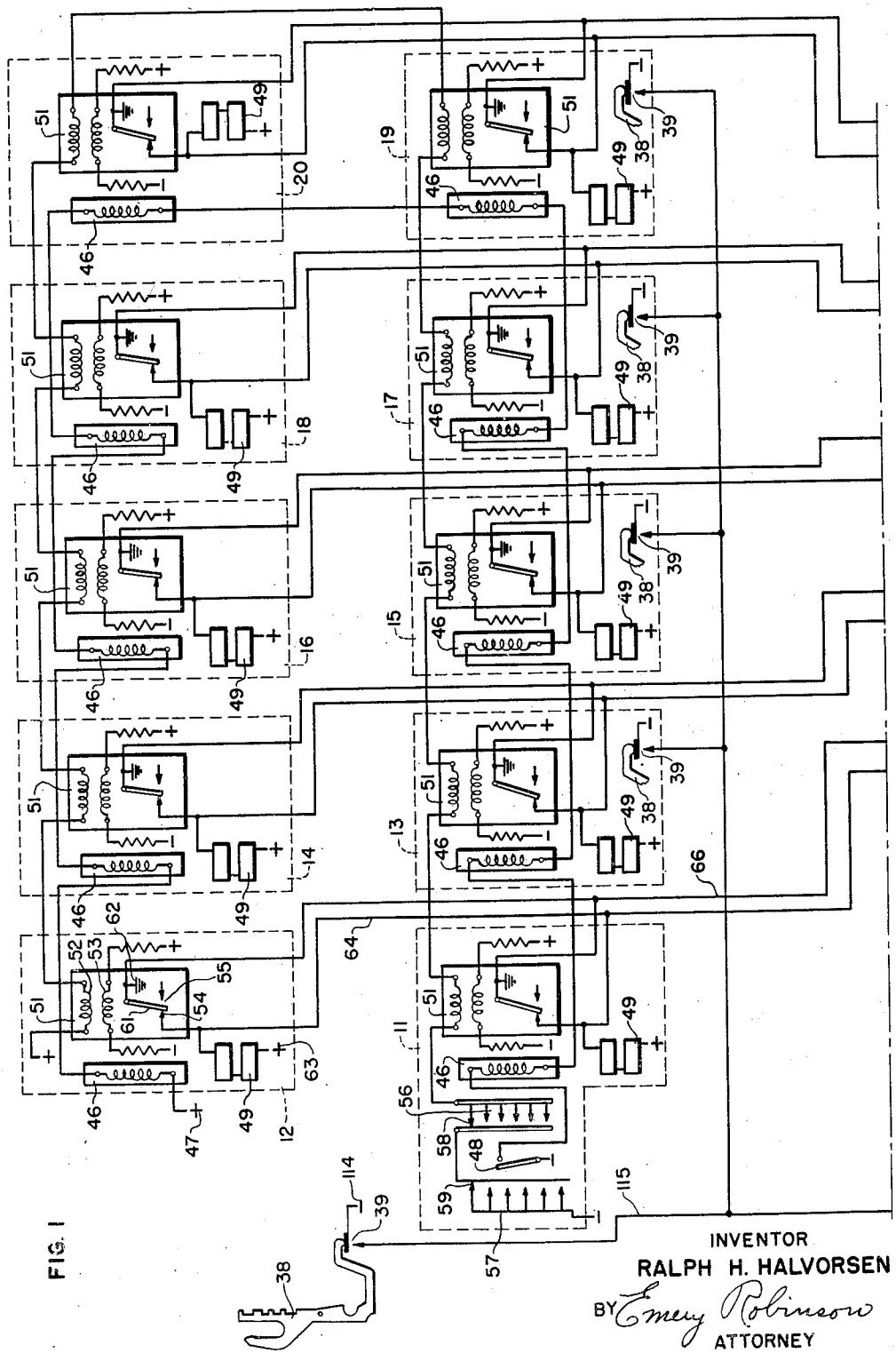


FIG. 1

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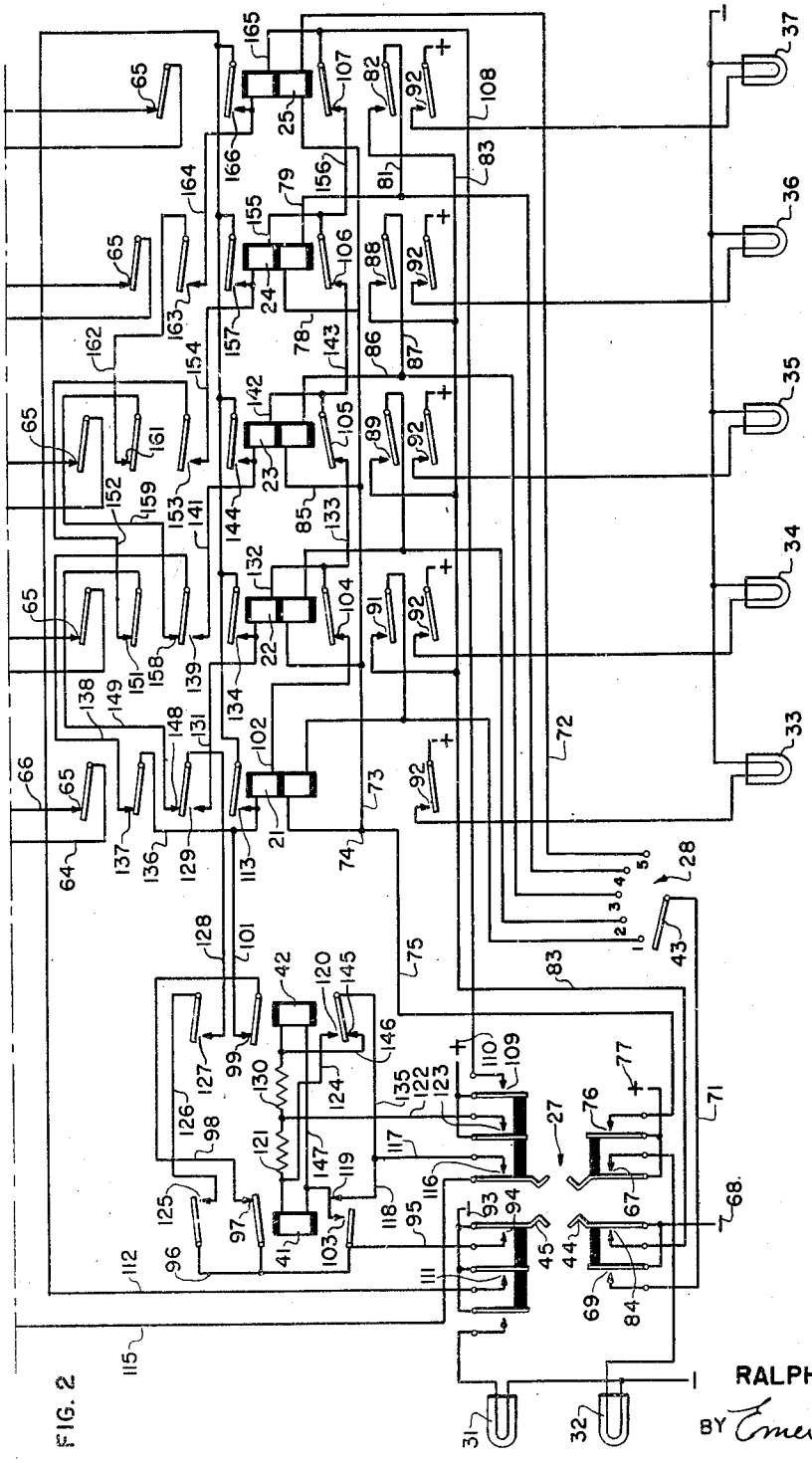


FIG. 2

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# UNITED STATES PATENT OFFICE

2,482,271

## PRINTING ARRANGEMENT FOR MERCHANDISING CONTROL SYSTEMS

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4 Claims. (Cl. 178—2)

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The present invention pertains to a control system for recording devices and more particularly to the use of such devices for accounting and other business applications.

In certain business routines it is customary to prepare shipping instructions on out-of-stock items in advance. For example, assuming that an order comprising ten items is received and it is found that only five items are in stock, it is then the usual practice to ship the items in stock and to prepare individual shipping instructions for each of the out-of-stock items so that these items may be shipped as soon as each is received in stock. These latter items are generally known as back ordered items.

It is the principal object of this invention to provide an arrangement for expeditiously preparing a plurality of invoice forms having fixed information common to all forms and variable information individual to each form.

Another object of the invention is to provide an invoice printing system in which the fixed information is printed on the sets of forms simultaneously and the variable information is printed on each form sequentially.

The above and other objects and features of the present invention will appear from the following description when taken in conjunction with the accompanying drawings, in which:

Figs. 1 and 2 are printer and control portions, respectively, of the operating circuit for a specific embodiment of the invention.

According to the particular embodiment of the invention shown in Figs. 1 and 2, a plurality of pairs of printers 11—12, 13—14, 15—16, 17—18, and 19—20 are provided on which the invoice forms are to be printed. These printers are arranged to operate in tandem; that is, printers 11 and 12 are controlled by a control relay 21 (Fig. 2), printers 13 and 14 are controlled by control relay 22, printers 15—16 are controlled by control relay 23, and control relays 24 and 25 control printers 17—18 and 19—20, respectively. Printer 11 is of the type disclosed in U. S. Patent No. 1,965,572, issued July 10, 1934, to C. W. Burcky et al., and printers 12 to 20 inclusive are of the type shown in U. S. Patent No. 1,904,164, issued April 18, 1933, to S. Morton et al.

The printer 11 has been modified to include a control panel containing a lever control switch 27 and a rotary control switch 28. Suitably mounted on printer 11 are a series of indication lamps 31 to 37, inclusive. Printers 11, 13, 15, 17, and 19 contain a line feed function lever 38 (schematically shown in Fig. 1 for clarity, as de-

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tached from the printer 11) designed to close contacts 39 connected in parallel for activating the control relays 41 and 42. Printer 11 also supports a mounting plate carrying the seven control relays 21 to 25 and 41 and 42. The line feed function lever 38 (Fig. 1) is comparable to the line feed function lever 237 shown in Fig. 11 of Patent No. 1,904,164. All of the control equipment just mentioned is located in printer 11.

The control relays 21 to 25 are operated from the rotary switch 28; for example, if the switch arm 43 is rotated to position 3, relays 21, 22, and 23 will be operated in a manner which will hereinafter be described. The printer indicating lamps 33 to 37 will be lit to indicate which of the control relays 21 to 25 are operated; thereby also indicating which pair of printers 11—12, etc., are connected in the transmitting circuit.

The lever operated key 27 is provided with an "address" set of contacts 44 and an "item" set of contacts 45, which control the operating paths to the printers, depending on whether the information being typed is fixed or variable. The relays 41 and 42 in cooperation with the contact 39 operated by the line feed lever 38 control the sequential operation of the control relays 21 to 25. Each of the printers 11 to 20 are provided with motors (not shown) which are controlled by motor control relays 46 individual thereto. Relays 46 are connected in series over an obvious circuit extending from battery 47, through the windings of relays 46 then through a manually operable switch 48 located in the master control printer unit 11, to ground.

Each of the printers 11 to 20 is provided with a selector magnet 49 and a line relay 51. Line relays 51 are each provided with a line winding 52, bias winding 53 and contacts 54 and 55. The printer unit 11 is further provided with a set of keyboard operated transmitting contacts 56, and a set of tape controlled contacts 57. The operating windings 52 of the line relays 51 are normally energized over the circuit extending from positive battery, through the windings 52 and through the stop contacts 58 and 59 of the transmitting contact sets 56 and 57, respectively, to negative battery or ground, thereby holding the line relay armatures 61 against contacts 54 to maintain the selector magnets 49 in the marking or energized condition over individual circuits therefor extending from ground 62, over armature 61, through contact 54 thence through the winding of magnet 49 to battery 63. The magnets 49 may also be energized over a circuit extending from battery 63, through the winding of

magnet 49, then over conductor 64, through contact 65 of control relay 21 (there is also a shunt contact associated with each control relay 21 to 25), then over conductor 66 to ground 62. Thus, so long as contacts 65 remain closed the selector magnets 49 of pairs of printers 11 and 12, etc., to which they are associated cannot respond to the signals impressed on the line relays 51. As shown in Figs. 1 and 2 the printers 11 and 12, etc. are connected in tandem or parallel over their respective conductors 64 and 66. These pairs of printers are rendered operative by the opening of their respective contacts 65, as will hereinafter appear.

In the operation of the embodiment of the invention shown in Figs. 1 and 2, the closure of the motor switch 48 will cause all motor control relays 46 to become energized to start the motors on all of the printers. The lever control switch 27 is placed in the "address" position to close the "address" set of contacts 44, whereby the fixed information is typed on all forms of all printers connected in the circuit as determined by the setting of the rotary switch 28. This position of key 27 is indicated by the lighting of lamp 32 over an obvious circuit through contact 67 (now closed) of contact group 44.

The rotary control switch 28, which controls the number of pairs of printers to be operated, is then placed in the position for the desired number of sets of forms to be printed. It will be assumed that the switch arm 43 is rotated to position No. 5, whereupon a circuit will be completed from negative battery or ground 68, through contact 69 (now closed), over conductor 71, over armature 43, through contact 5 of switch 28, over conductor 72, through the lower winding of control relay 25, over conductor 73 to junction 74, over conductor 75, then through contact 76 (now closed) to positive battery 77. The operation of relay 25 will, in turn, effect the operation of relay 24 over the circuit extending from positive battery 77, through contact 76 (still closed), over conductors 75, 73, and 78, through the lower winding of relay 24, over conductors 79 and 81, through contact 82 (now closed) of relay 25, then over conductor 83 and through contact 84 (now closed) of switch 27 to negative battery or ground 68. The operation of relay 24 will then effect the operation of relay 23 over a circuit extending from battery 77, through contact 76 (still closed) over conductors 75, 73, and 85, through the lower winding of relay 23, over conductors 86 and 87, through contact 88 (now closed) of relay 24, then over conductor 83 and through contact 84 (still closed) to negative battery or ground. Similarly, the closing of contact 89 of relay 23 will establish an energizing circuit for relay 22 through its lower winding. When relay 22 energizes, it will close its contact 91 to establish an energizing circuit for relay 21 through its lower winding. Thus, all of the relays 21 to 25 are now energized, and through their lower contacts 92 (now closed) the circuits for lamps 33 to 37 are closed.

The operation of relays 21 to 25 causes their respective contacts 65 to be opened to thereby remove the shunt from the associated selector magnets 49 to permit said magnets 49 to respond to the vibrations of the armatures 61 of their associated line relays 51 in response to signaling conditions. Incidentally, with the shunt contacts 65 closed, the magnets 49 were permanently energized and incapable of responding to line signals. However, with the shunt contacts 65 opened, all ten printers 11 to 20 are placed in operative condition. All identical information may now be keyed on the keyboard of the master control printer 11 and will be printed simultaneously on all the sets of forms. Upon the completion of all address and other identical information, the forms will be line fed to the item position of the form and the lever key switch 27 will be moved to the position to open contacts in group 44 and close the contacts in group 45.



As the lever key of switch 27 is moved from the address to the item position, all operated sequence relays 21 to 25 will release by the opening of the address position contact group 44. As the lever key of switch 27 closes the contacts in group 45, relay 21 will operate over a circuit extending from negative battery or ground 93, through contact 94 (now closed), over conductors 95 and 96, through contact 97 (now closed) of relay 41, over conductor 98, through contact 99, over conductor 101, through the upper winding of relay 21, over conductor 102, through contacts 104, 105, 106, and 107, over conductor 108 and through contact 109 (now closed) to positive battery 110. Relay 21 will become locked up from negative battery 93, through contact 111 (now closed), over conductor 112, through contact 113 (now closed) of relay 21, through the winding of relay 21, over conductor 102, through contacts 104, 105, 106, and 107, over conductor 108 and through contact 109 (now closed) to positive battery 110.

The contact 65 of relay 21 will be opened and the shunt path for magnets 49 of printers 11 and 12 will be removed thereby permitting the printing of the item or variable information on the first set of printers 11 and 12. Assuming that the variable information requires no more than one line, the operator will carriage return and line feed to the next line. The line feed function lever 38 will at the time the line feed function takes place, momentarily close the line feed contact 39 to complete a circuit for relay 41 extending from negative battery or ground 114, through contact 39 (closed momentarily), over conductor 115, through contact 116 (now closed), over conductors 117 and 118, through contact 119 (now closed), through the winding of relay 41, through resistance 121, over conductor 122, through contact 123 to battery 110. Relay 41 is operated, and relay 42 is shunted through contact 145 and conductor 146 and resistance 130. When relay 41 becomes energized a locking path therefor is provided from battery 93, through contact 94 (still closed), over conductor 95, through contact 103 (now closed), through the winding of relay 41, through resistance 121, over conductor 122 and through contact 123 (still closed) to battery 110.

When the line feed contact 39 opens, negative battery 114 is removed from the shunt path of relay 42 allowing this relay to operate over the holding path of relay 41 through resistance 130. Thus, with relays 41 and 42 operated, a circuit is closed from negative battery 93, through contact 94, over conductors 95 and 96, through contact 125 (now closed) of relay 41, over conductor 126, through contact 127 (now closed) of relay 42, over conductor 128, through contact 129 (now closed) of relay 21, over conductor 131, through the upper winding of relay 22, over conductors 132 and 133, through contacts 105, 106, and 107, then over conductor 108 and through contact 109 (still closed) to battery 110.

The energization of relay 22 causes its contact 104 to open, thereby breaking the energizing circuit for relay 21. The opening of contact 129 of

relay 21 will have no effect upon relay 22 because relay 22 has become locked up through its contact 134 (now closed) over essentially the same locking circuit that locked up the relay 21. The releasing of relay 21 closed its associated shunt contact 65 thereby rendering the receiving printer unit 12 and the printer portion of unit 11 inoperative by shunting the selector magnets 49 thereof. However, the transmitting portions of unit 11, exemplified by transmitting contacts 56 and 57 are still maintained operative.

With relay 22 operated, the shunt contact 65 is opened thereby making printers 13 and 14 receptive to signaling conditions. Thus, the desired information for the second set of forms may now be transmitted from unit 11 and will be printed on printers 13 and 14 only. When the line feed function again takes place, the line feed contacts 39 will momentarily close. The closure of contacts 39 will establish a circuit from negative battery or ground 114, through momentarily closed contact 39, over conductor 115, through contact 116 (still closed), over conductors 117 and 135, through contact 120 (still closed) of relay 42, over conductor 124, then through resistance 121 and over conductor 122 to battery 110, thereby shunting relay 41 causing it to release and provide a holding path through contact 119 (now closed) for relay 42. However, when the line feed contact 39 again opens, negative battery 114 will be removed from this holding path of relay 42 causing relay 42 to release.

So, when both the relays 41 and 42 are again released, a circuit is closed from negative battery 93, through contact 94 (still closed), over conductors 95 and 96, through contact 97 (now closed), over conductor 98, through contact 99 (now closed), over conductors 101 and 136, through contact 137, over conductor 138, through contact 139 (now closed), over conductor 141, through the upper winding of relay 23, over conductors 142 and 143, then through contacts 105 and 107 (still closed) and over conductor 108, through contact 109 (still closed) to battery 110. Relay 23 becomes locked up through its contact 144 over conductor 112 in the manner similar to that described in connection with relays 21 and 22. Likewise, contact 105 is opened when relay 23 becomes energized to break the locking circuit for relay 22 and the shunt contact 65 associated with relay 22 again closes to render printers 13 and 14 inoperative.

With relay 23 operated, its shunt contact 65 is opened to thereby render the printers 15 and 16 receptive to signaling conditions. Thus, the desired information for the third set of forms may now be transmitted from unit 11 and will be printed on printers 15 and 16 only. When the line feed key is again depressed causing the line feed function to take place, the line feed contacts 39 will again close momentarily to complete a circuit from negative battery 114 through contact 39, over conductor 115, through contact 116 (still closed), over conductors 117 and 118, through contact 119 (now closed), through the winding of relay 41, through resistance 121, over conductor 122 and through contact 123 to battery 110. Relay 41 is operated, and relay 42 is shunted through contact 145 and conductor 146 and resistance 130. Relay 41 is maintained operated from battery 93, through contact 94 (still closed), over conductor 95, through contact 103 (now closed) of relay 41, through the winding of relay 41, through the resistance 121, over conductor 122 and through contact 123 to battery 110. When the line feed contacts 39 again open, the shunt path through contact 145 will be removed from relay 42 causing relay 42 to operate over the holding path of relay 42 extending from negative battery 93, through contact 94, over conductor 95, through contact 103, over conductor 147, through the winding of relay 42, through the resistance 130, over conductor 122 and through contact 123 (still closed) to battery 110. Both of the relays 41 and 42 are now in operated condition.

Now, with relays 41, 42, and 23 operated, a circuit is closed from negative battery 93, through contact 94, over conductors 95 and 96, through contact 125 (now closed) of relay 41, over conductor 126, through contact 127 (now closed) of relay 42, over conductor 128, through contact 148 (now closed) of relay 21, over conductor 149, through contact 151 (now closed) of relay 22, over conductor 152, through contact 153 (now closed) of relay 23, over conductor 154, through the upper winding of relay 24, over conductors 155 and 156, through contact 107 (still closed) of relay 25, then over conductor 108 and through contact 109 (still closed) to battery 110. Relay 24 becomes locked up through its contact 157 over conductor 112 in the manner similar to that described in connection with relays 21, 22, and 23. Likewise, contact 106 is opened when relay 24 becomes energized to break the locking circuit for relay 23, and the shunt contact 65 of relay 23 again closes to render printers 15 and 16 inoperative.

When relay 24 is operated, its shunt contact 65 is opened to thereby render the printers 17 and 18 receptive to signaling conditions. Therefore, the desired information for the fourth set of forms may now be transmitted from unit 11 and will be printed on printers 17 and 18 only. When the line feed function again takes place, the line feed contact 39 will momentarily close and the closure of contacts 39 will establish a circuit from negative battery 114, through momentarily closed contact 39, over conductor 115, through contact 116 (still closed), over conductors 117 and 135, through contact 120 (still closed) of relay 42, over conductor 124, then through the resistance 121 and over conductor 122 to battery 110, thereby shunting the relay 41 causing it to release and provide a holding path through contact 119 (now closed) for relay 42. Then, when the line feed contact 39 again opens, negative battery 114 will be removed from this holding path of relay 42 causing relay 42 to release.

When both relays 41 and 42 are thus de-energized a circuit is again closed to effect the energization of relay 25 extending from negative battery 93, through contact 94 (still closed), over conductors 95 and 96, through contact 97 (now closed) of relay 41, over conductor 98, through contact 99 (now closed) of relay 42, over conductors 101 and 136, through contact 137, over conductor 138, through contact 158 (now closed) of relay 22, over conductor 159, through contact 161 (now closed) of relay 23, over conductor 162, through contact 163 (now closed) of relay 24, over conductor 164, through the upper winding of relay 25, then over conductors 165 and 108, and through contact 109 (still closed) to battery 110. Relay 25 becomes locked up through its contact 166 over conductor 112 as previously described for relay 21. Likewise, contact 107 is opened when relay 25 becomes energized to break the locking circuit for relay 24, and the shunt contact 65 of

relay 24 again closes to render printers 17 and 18 inoperative.

When relay 25 is operated, its shunt contact 65 is opened to thereby make the printers 19 and 20 receptive to signaling conditions. Consequently, the desired information for the fifth set of forms may now be transmitted from unit 11 and will be printed on printers 19 and 20 only.

As can be deduced from the foregoing description of one embodiment of the invention, all identical information such as sales number, customer and order number, shipping and billing addresses, and shipping instructions are printed simultaneously on from 1 to 5 sets of forms as determined by the setting of rotary switch 28, and any variable information is printed separately and independently on each printer as they are rendered operative sequentially under the control of control relays 21 to 25, and 41 to 42. It is apparent that only one line is printed by each pair of printers and that each line feed operation serves to control the conditioning successively of the pairs of printers.

If more than five sets of forms with identical or fixed information is desired, the printer keyboard perforator key (not shown) referred to in Patent No. 1,965,572 may be operated to place the unit 11 in the printer perforator position. In this manner a tape will be perforated simultaneously with the keyboard transmission of the identical information. This perforated tape can then be placed in a tape transmitter exemplified by the set of contacts 57 for transmission to as many pairs of printers as required, up to five in the embodiment described herein, by placing the printer control key 28 in the proper position, and the lever key 27 in the address position.

When the address information has been printed on the desired number of printers, the lever key 27 will be placed in the item position and the variable information may be typed as previously described. In the present embodiment, pairs of printers are shown connected in tandem, so that one group of printers comprising printers 11, 13, 15, 17, and 19 may be placed in one department, for example, the Service Stock Department, and the other group of printers comprising printers 12, 14, 16 and 18 and 12 may be stationed in another department, for example, the Billing Department.

Although a specific embodiment of the invention is herein disclosed, it is understood that all modifications thereof are intended which come within the scope and equivalency of the appended claims.

What is claimed is:

1. In combination, a signal line, a plurality of printers connected thereto, each of said printers provided with a line feed function lever and an electrical contact associated with each of said levers, a rotary switch device, and means for controlling the recording of fixed and variable messages on said printers, said means comprising a first relay control means conditioned for operation by said switch device for determining the number of printers to be operated simultaneously to record fixed messages, and a second relay control means activated upon each operation of said contact by said line feed function lever for operating said printers sequentially under the control of said first relay means to record variable messages.



2. In combination, a signal line, a plurality of printers connected thereto, a master control printer having transmitting facilities also connected thereto, each of said printers also provided with a line feed function lever and an electrical contact associated with each of said levers, means for normally rendering said printers nonresponsive to line signals, and a counting relay chain arrangement effective in response to each closure of said contact by said function lever to render said printers operative sequentially under the control of said master control printer.

3. In a printer control system, a signal line, a plurality of printers connected thereto, a pair of control relays, a plurality of counting chain relays under control of said control relays, a first switch for determining under the control of said counting chain relays the number of printers to be rendered operative, and a second switch conditioned to a first operative position to control through said first switch the operation of said printers simultaneously according to the setting of said first switch, said second switch conditioned to a second operative position to effectuate through the instrumentality of said counting chain relays the operation of said printers sequentially under control of said pair of control relays.

4. In a printer control system, a signal line, a plurality of printers connected thereto, a pair of control relays, a plurality of counting chain relays under the control of said control relays, a first switch for determining the number of printers to be rendered operative, a line function instrumentality in each printer, an electrical contact associated with each instrumentality, and a second switch conditioned to a first operative position for selectively controlling through said first switch the operation of said printers simultaneously according to the setting of said first switch said second switch conditioned to a second operative position to effectuate the operation of said printers sequentially upon the actuation of said pair of control relays in response to the closure of said contact under the control of said function instrumentality.

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The following references are of record in the file of this patent:

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## Certificate of Correction

Patent No. 2,482,271 September 20, 1949

RALPH H. HALVORSEN

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 8, line 41, after the word "line" insert *feed*;

and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 14th day of February, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
*Assistant Commissioner of Patents.*