

Dec. 13, 1932,

M. L. HASELTON

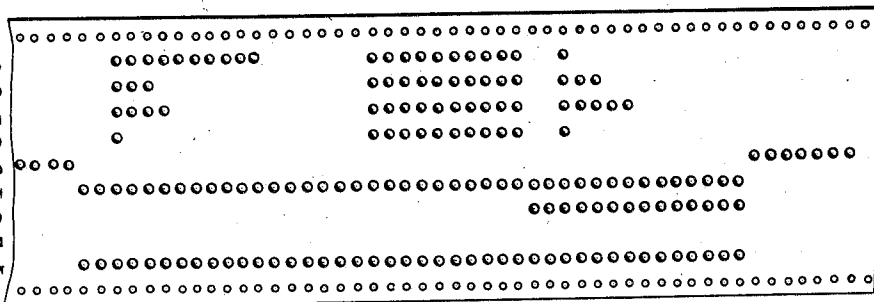
1,890,877

ELECTRICAL SIGNALING

Original Filed Jan. 6, 1928

5 Sheets-Sheet 1

SELECTION OF TWO INDICATORS IN ONE GROUP

$$\overbrace{123456789}$$


1008

SELECTION OF ONE INDICATOR IN A GROUP

1 2 3 4 5 6 7 8 9

11/2/3/4 0 11/2/3/4

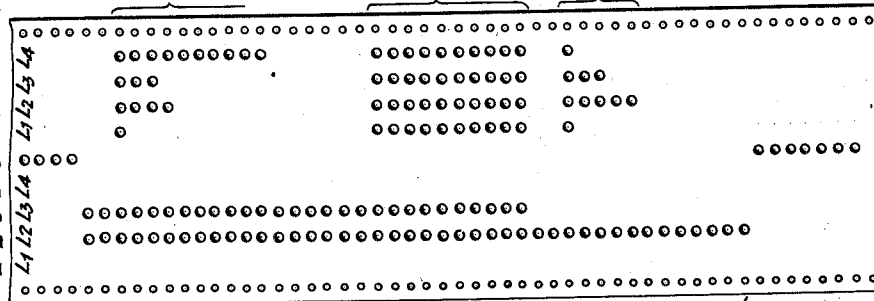


Fig. 2.

[illegible]

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Fig. 3.

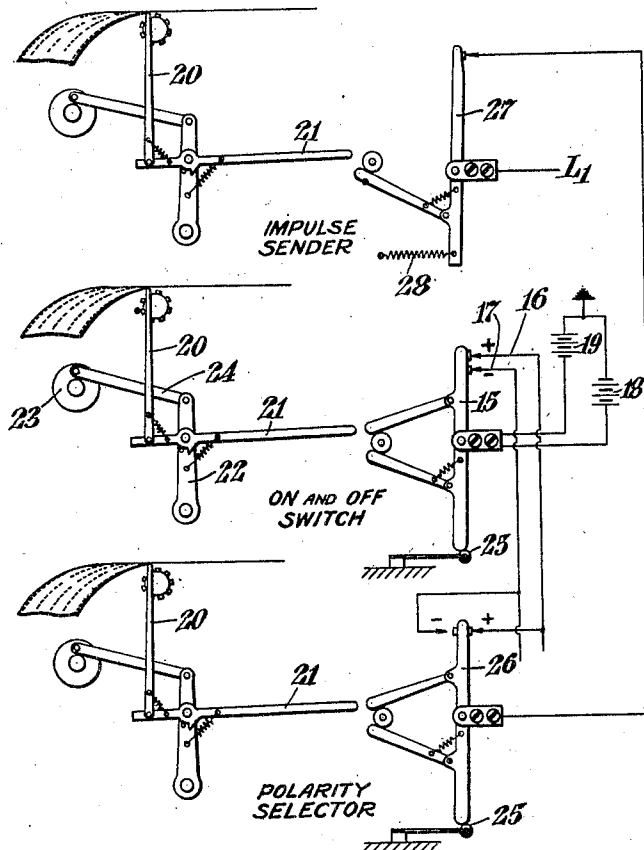
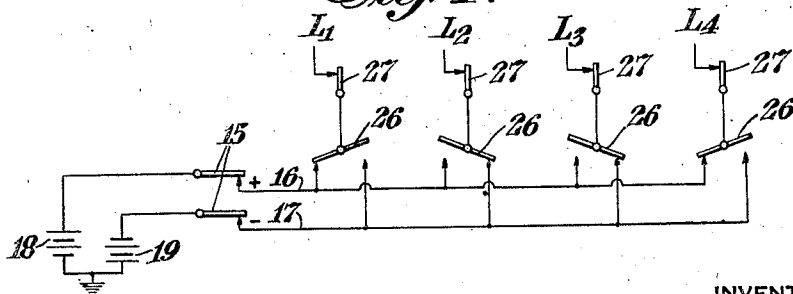


Fig. 4.



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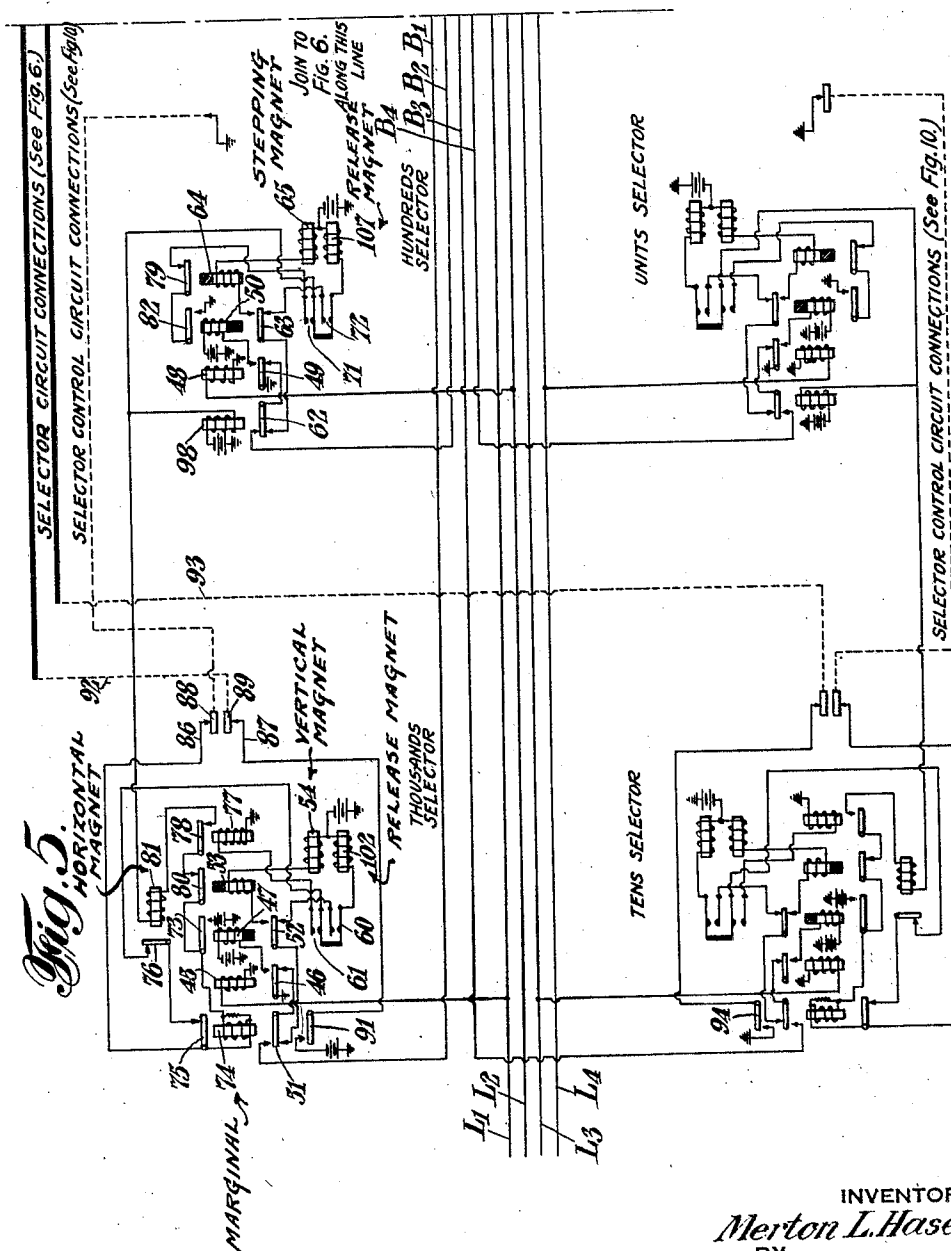
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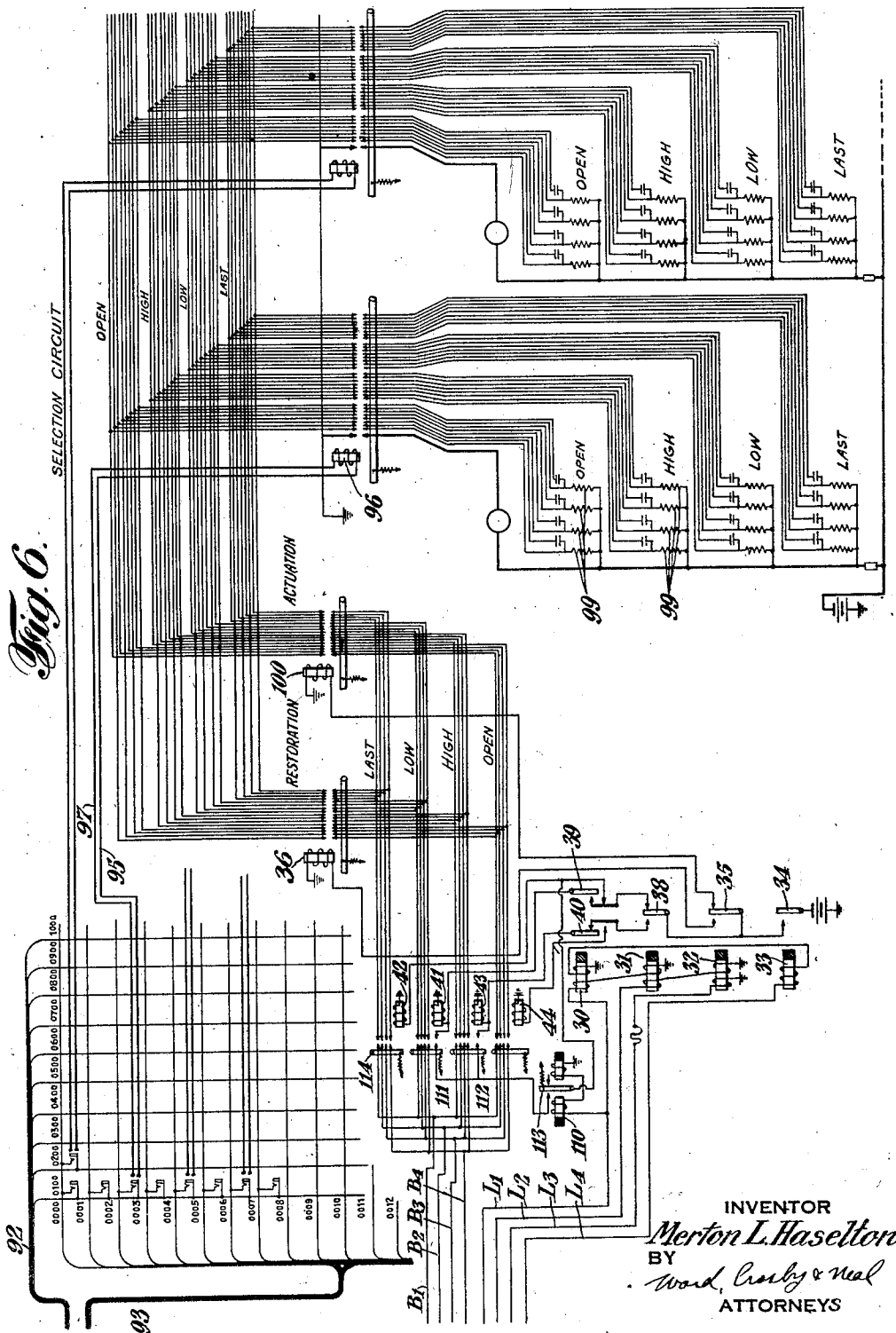
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Original Filed Jan. 6, 1928 5 Sheets-Sheet 5

Fig. 11.

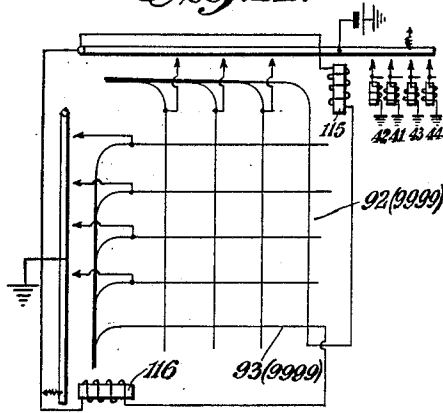


Fig. 9.

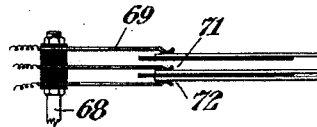
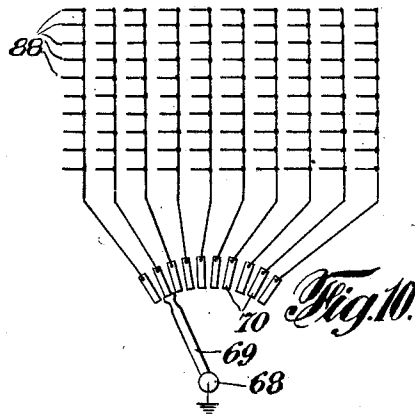
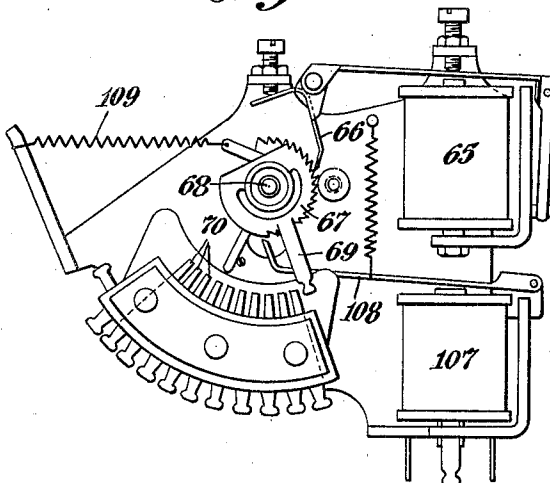


Fig. 8.



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UNITED STATES PATENT OFFICE

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ELECTRICAL SIGNALING

Original application filed January 6, 1928, Serial No. 244,873. Divided and this application filed January 6, 1930, Serial No. 418,801. Renewed May 6, 1932.

This invention relates to electrical signaling and more particularly to signaling apparatus and methods such as described in my application Ser. No. 244,873, filed January 6, 1928, for electrical signaling apparatus, of which this is a division, whereby distinctive current variations representative of certain information may be transmitted from a central point or points to one or more receiving stations at which the information is to be displayed or posted or otherwise made available for use.

The invention according to one of its phases, although not restricted thereto, is particularly adaptable to the transmission of varying stock or commodity price quotations from a central point such as a stock exchange, to a plurality of brokers' offices, at each of which quotations of stocks which are there of particular interest may be automatically posted on a bulletin board, the information being preferably made available, generally speaking, in the same arrangement as with the conventional types of manually attended stock boards, or "black boards" as heretofore used. However, with the apparatus of this invention the posting of quotations may be accomplished with greater rapidity and accuracy than with stock boards which are manually attended and in addition a substantial saving of labor is made possible since the equipment for numerous brokers may be operated from the central point by a single operator or group of operators.

The objects of my invention generally include the provision of apparatus of the above indicated class which will be adaptable with a wide degree of flexibility to various operating conditions and which will be accurate, rapid and dependable in operation.

One object of this invention is the provision of means for restoring and/or actuating one or more indicators of a group of indicators simultaneously.

Another object is the provision of means for restoring corresponding indicators of several or all of the groups to zero simultaneously.

Further and more specific objects, features and advantages will clearly appear from the

following description taken in connection with the accompanying drawings and claims which form a part of this specification.

The invention comprises the novel signaling methods, features, circuit arrangements, and combinations of circuits and parts as hereinafter described, but by way of example only, as illustrative of certain preferred embodiments of the invention.

In the drawings, Fig. 1 shows two sections of the transmitting tape;

Fig. 2 shows a polarity selection chart;

Fig. 3 shows the transmitting mechanism;

Fig. 4 is the wiring diagram for the mechanism shown in Fig. 3;

Figs. 5 and 6 taken together show the wiring diagram for the selection, restoration and actuation of the various indicators;

Fig. 7 shows the thousands selector;

Fig. 8 shows the hundreds selector;

Fig. 9 shows the off-neutral switch in the hundreds selector;

Fig. 10 shows a detail of the contact mechanism of Fig. 8; and

Fig. 11 shows the mechanism for connecting several or all of the groups of indicators to the transmitting mechanism.

With the conventional forms of manually attended brokers' boards, provision is ordinarily made for posting the quotations of numerous stocks, commodities, or other items, each quotation generally comprising four digits, namely, the hundreds, tens, units and a fraction value. The brokers' customers are generally desirous of knowing the "open", "high", "low" and "last" quotations for each stock or item, and accordingly, it is customary to provide space for such quotations, that is, for a total of 16 digits in all for posting the quotations of a single stock or other such item.

In order to electrically control the indicators at a plurality of brokers' offices from a distant point, it is economically impracticable with the prevailing line wire costs, to provide separate line connections for giving quotation service for each of the multitude of listed stocks. Accordingly, it is desirable to provide means for sending current variations representative of the quotations of numerous

stocks over a relatively small number of line wires, and to provide selecting means at each broker's office to identify the quotations of particular stocks and to prepare the corresponding indicators for energization. However, in thus reducing the number of line wires to a relatively small number, special attention must be directed to the necessary rapidity of operation of the indicators. Taking into account the reasonable future requirements, provision should now be made in an apparatus of this class for sending quotations for more than a thousand different stocks or items, each of which must be individually identified by the selecting means. After such identification four digit indicators preferably should be actuated to show a particular quotation, and in the event that the "high" or "low" quotations are to be simultaneously set up, then as many as eight digit indicators may be actuated. With stock market transactions conducted at the present rate, provision must be made for transmitting from 30 to 60 new quotations per minute. Such speed of operation of a multitude of indicators at different offices, but all selected and actuated in a dependable manner over a relatively small number of line wires, necessarily requires novel circuit arrangements which have no counterpart in other classes of signaling apparatus.

According to my invention I have found it desirable to provide for each unit of signaling apparatus four line wires or equivalent "impulse channels" which are associated with a common ground return circuit, and may be utilized first to simultaneously operate four selecting devices for choosing one particular stock to be quoted. Thereafter the same four line wires or "impulse channels" may be conveniently utilized to simultaneously, but independently actuate the four digit indicators of a particular quotation, that is, for example, the hundreds, tens, units, and fractional digit indicators, if all of these need to be changed.

The current variations or impulses for selecting and actuating the indicators may take either the form of positive spaced impulses, or may be in the form of undulations or interruptions in a sustained potential applied to the line wires. With the particular form of selecting devices described in connection with the example of the invention herein disclosed the latter method is followed, that is, the distinctive current variations comprise short interruptions or reductions in the line wire potential. The selecting devices may be constructed with a sufficient number of contacts so as to select not only the desired stock but also the particular quotation as the "open", "high", "low" or "last", which has to be changed, or on the other hand, only a smaller number of selector contacts need be provided where the selectors merely choose the partic-

ular desired stock. According to the embodiment of my invention herein described, I have provided means whereby one of the quotations, either "open", "high", "low" or "last", or combinations thereof, are selected merely by the polarities of the several line wires. That is, the sustained potential applied to each line wire may be relatively positive or negative in respect to the other line wires, and accordingly, numerous combinations of polarities may be obtained, sufficient in number to readily choose between the "open", "high", "low" and "last" indicators and combinations thereof, thus materially reducing the work to be done by the selecting devices and the time necessary for the operation thereof. Use is also made of different polarities on one of these lines to establish restoration and actuation paths for the impulses transmitted to the indicators.

The method of using a maintained line potential not only simplifies the selecting problem in this manner but also makes possible in a simple manner the use of an adaptation of the well known "Strowger" "up and around" selecting devices as are well known in the art of automatic telephony switching. The construction and operation of such selectors is set forth in detail, for example, by H. H. Harrison in his book entitled "Automatic Telephony", published in 1924 by Longmans, Green & Co., and also by R. G. Kloeffer in "Telephone Communication Systems", Macmillan Co. 1925, Chapter XIV, and accordingly the constructional details of such selectors will not be here fully described, although such features as are necessary to adapt the same to my invention are hereinafter fully disclosed. Since this type of selector automatically restores itself to a normal position upon any extended interruption of the line potential, such selectors are particularly desirable for use with this invention inasmuch as such restoration to normal after each operation substantially precludes all possibility of cumulative errors or false quotations on the multitude of indicators.

This invention comprises a transmitting mechanism such as shown in Figs. 3 and 4 in the transmitting station, a plurality of line wires extending from the transmitting station to the receiving station or stations and mechanism in the receiving station such as indicated in Figs. 5, 6, 7, 8, 9 and 10. The selection of the various groups of indicators and the indicators within the groups and the restoration and forward actuation of the indicators are all made by various electrical impulses sent from the transmitting station over a number of line wires L_1 , L_2 , L_3 , L_4 . For the purpose of imposing combinations of positive and negative polarities on these line wires and for the purpose of interrupting these potentials, suit-

able switch mechanism such as shown in Figs. 3 and 4 is provided. These switches may be controlled by manual means such as keys but in the form shown therein they are controlled by a tape such as shown in Fig. 1. This tape is shown as provided with nine fields to receive perforations. The fifth field controls an on and off switch 15 (Figs. 3 and 4) to connect lines 16 and 17 with positive and negative potentials 18 and 19 shown in Fig. 4. Cooperating with this field is a sensing pin 20 (Fig. 3) carried by a switch throw bar 21 pivoted on an arm 22 which is rocked back and forth by a disk 23 through a link connection 24. The free end of the throw bar 21 will be in the position indicated when the pin 20 cooperates with a blank portion of the field. If the switch 15 at this time is in the off-position, the bar 21 upon movement to the right, will throw the switch into the on-position. If a perforation is opposite the sensing pin the free end of the bar 21 will be lowered to throw the switch into the off-position. Cooperating with the lower end of the switch 15 is a spring-pressed roller 25 which will hold the switch 15 in either on or off position when there is a succession of blank spaces or a succession of perforations. Cooperating with the fields 1, 2, 3 and 4 of the tape are switch members 26 (Figs. 3 and 4) similar in construction to the switch member 15 and adapted to connect the lines L_1 , L_2 , L_3 , L_4 with either source of potential, to impose positive and negative potentials on these lines in various combinations. Cooperating with the fields 6, 7, 8 and 9 of the tape are switches 27, which are interposed in lines L_1 , L_2 , L_3 , L_4 . These switches are normally held closed by springs 28 but are opened by mechanisms similar to the mechanisms controlling the on and off switch, and the polarity selector switches whenever the controlling sensing pins 20 pass through perforations in the tape. The spring 28 is provided so that the switch 27 will return to closed position as the bar 21 is moved to the left.

By means of the mechanism so far described, the field 5 of the tape will control connection of the lines 16 and 17 to the source of positive and negative potentials. The mechanism cooperating with the fields 1, 2, 3, 4 will control the connection of lines L_1 , L_2 , L_3 , L_4 with the lines 16 and 17 and therefore control the sign of potentials imposed on the lines L_1 , L_2 , L_3 , L_4 and the switches 27 will cause short interruptions in the potentials imposed on lines L_1 , L_2 , L_3 , L_4 .

Selection of main indicator bus lines and connection therewith of the corresponding restoration bus lines

The various potentials imposed on lines L_1 , L_2 , L_3 , L_4 by the switches energize selecting magnets 30, 31, 32 and 33 (Fig. 6). Line L_1

is extended through the coils of magnets 30 and 31 and line L_2 is extended around the coils of magnets 31 and 32. The operation of these two magnets is to effect selection of indicators within a group of indicators by connecting the various bus lines "last", "low", "high" and "open", with main actuating lines B_1 , B_2 , B_3 , B_4 . Line L_3 is extended through the coil of magnet 32 which controls the selection of restoration and actuation busses for the indicators. Line L_4 is extended through the coil of the magnet 33 and the coil of the magnet 30. The magnet 33 connects the various selecting switches and magnets to the battery.

As the tape at the left in Fig. 1 is fed past the sensing pins, positive potentials are set up in lines L_1 and L_4 and negative potentials in L_2 and L_3 . Line L_4 energizes the magnet 33 which through its switch 34 connects the switch system to the battery. The potentials on lines L_2 and L_3 being of like sign the magnet 32 will be energized and its switch member 35 will be drawn into the position shown to complete a circuit from the battery through the restoration magnet 36 connecting all the restoration bus lines to the main bus lines for the "last", "low", "high" and "open" indicators. The positive potential on line L_1 and the negative potential on line L_2 will have no effect on the magnet 31 and, accordingly, its spring switch 38 will remain in the position shown. The positive potential on line L_1 and the positive potential on line L_4 will cause energization of the magnet 30 and closing of the open switch 39 and opening of the closed switch 40. This completes the circuit from the battery through switches 34, 38, 39 to "low" magnet 41, which connects the main "low" bus wires to the main actuating wires B_1 , B_2 , B_3 and B_4 . The potentials imposed on these lines have therefore connected the restoration bus lines for the "low" indicators, to the main actuating lines B_1 , B_2 , B_3 , B_4 . The "last", "high" and "open" magnets 42, 43 and 45 are controlled respectively by potentials as shown in Fig. 2.

Selection of groups of indicators

In referring to Fig. 5 it will be noted that the potential on line L_1 has energized magnet 45 which has attracted its spring switch 46 to complete a circuit from a battery through the coil of a slow-to-release magnet 47, and the spring switch 46 to the ground. The polarity imposed on line L_2 has energized magnet 48 in the hundreds selector which has completed through its spring switch 49 a circuit from a battery through the coil of a slow-to-release magnet 50 to the ground. Similar magnets in the tens selector and units selector have been energized, but the description of the selecting mechanism will be limited to the cooperating thousands and hundreds selectors, which are the same respec-

tively as the tens and units selectors. As the perforations in the group marked "Group selection" in Fig. 1 pass over the impulse sender pins shown in Fig. 3, the potentials over lines L_1 , L_2 , L_3 , L_4 are interrupted. Considering, first, the interruptions of potential in line L_1 , the effect of an interruption is to de-energize the magnet 45 so as to complete a circuit from the ground through spring switch 46, spring switch 51, spring switch 52 of magnet 47, through the coil of the slow-to-release magnet 53, and the coil of the vertical stepping magnet 54, which is shown as a pair of magnets in Fig. 7, to a battery and ground. When the magnets 54 (Fig. 7) are energized they will attract the movable armature 55 carrying a spring pressed pawl 56 cooperating with teeth 57 on the thousands selector shaft 58, to raise this shaft one step for each energization of the magnets 54. As the shaft 58 is raised its shoulder 59 permits the switches 60 and 61 to close and remain closed as long as the shaft is in elevated position. An interruption of the potential on line L_2 de-energizes the magnet 48 in the hundreds selector and establishes a circuit from the ground through spring switch 49, spring switch 62, spring switch 63 of slow to release magnet 50, coil of the slow to release magnet 64 and coil of the stepping magnet 65 to the battery and ground. The energization of the magnet 65 in Fig. 8 operates a pawl 66 cooperating with a ratchet 67 on the hundreds selector shaft 68. This shaft carries a grounded switch arm 69 which is moved over a series of contacts 70 as the shaft is rotated. The shaft also carries off neutral switches 71 and 72 (Figs. 9 and 5) which are constructed to close and remain closed as long as the shaft 68 is out of home position. After the interruptions over lines L_1 and L_2 have ceased, that is when the vertical adjustment of the shaft 58 in Fig. 7 and the angular adjustment of shaft 68 in Fig. 8 have been completed, the cessation of interruptions of potentials on line L_1 will cause the magnet 45 to remain energized, which will maintain the magnet 47 energized and prevent further energization of magnets 53 and 54 and causes the slow to release magnet 53 to de-energize. Energization of the magnet 47 has drawn its switch member 73 to complete the circuit from the ground battery, switch member 73, coil and shunt of magnet 74, switch member 75, switch member 76, switch 61 through the coil of magnet 77 to the ground, thus preparing a circuit through the switch member 78 of the magnet 77. The cessation of impulses on line L_2 maintains the magnet 48 energized which maintains the circuit over the magnet 50 and breaks the circuit over the magnet 64, which closes a circuit at the point 79. As the magnet 53 in the thousands selector de-energizes, it closes a circuit from the battery over the

switch 73, switch 80, switch 78, over the coil of the horizontal stepping magnet 81 (Figs. 5 and 7), over the switch 71 in the hundreds selector, switch 79, and switch 82 of magnet 50 to the ground. This energizes the magnet 81 which attracts its armature 83 and through a pawl 84 carried by it and in engagement with a ratchet drum 85 on the shaft 58, rotates the shaft one step. The movement of the armature 83 breaks the switch 76 which breaks the circuit through the magnet 77 thus breaking the circuit through the magnet 81. When the circuit through the magnet 81 is broken the switch 76 again completes the circuit through the magnet 77 which in turn completes the circuit through magnet 81.

Secured to the shaft 58 in Fig. 7 are two contacts 86 and 87 which are adapted to cooperate respectively with pairs of fixed contacts 88 and 89. When the shaft 58 is elevated by interruptions over line L_1 as previously described, the contacts 86 and 87 are raised into alignment with a horizontal row of contacts 88 and 89. As the magnet 81 is energized and de-energized to rotate the shaft 58 these contacts are moved along the selected row of contacts 88 and 89 and the energization and de-energization of the magnet 81 is continued until the contact 86 finds a live contact 88 which is grounded through one of the contacts 70 (Fig. 10) and the arm 69. When this occurs the circuit over the magnet 77 will be shunted and the magnet 74 (Fig. 5) will be energized to attract its switch 75 and prevent further energization of the magnet 77. This in turn prevents completion of the circuit through the magnet 81 over the switch member 78. Energization of the magnet 74 also moves the switch member 51 to connect the line B_1 through switch members 51 and 46 to the ground. Energization of magnet 74 also attracts its switch member 91 which extends a circuit from a battery over switch member 91, contacts 87 and 89, selector line 92 to a panel board (Fig. 6). One of the tens selector lines 93 has been connected by mechanism similar to that in the thousands selector through a switch 94 to the ground. The selector line 92 at the point of intersection with the line 93, is connected by one side of a double plug to a line 95 extending over the coil of a group selector magnet 96 and then over line 97 to the other side of the plug to the line 93 and to ground. This energizes the magnet 96 and selects a group of indicators corresponding to the adjustment of the selectors in Fig. 5 under the control of the impulses caused by the group selector perforations in this section of the tape at the left of Fig. 1. Each of the indicator elements of the indicator units of the groups of indicators is diagrammatically indicated at 99.

When the circuit was made at 79 in the hundreds selector the magnet 98 in the hundreds selector was energized by a circuit 130

from ground, battery, coil of the magnet 98 over switch 71, switch 79, switch 82 to ground. Energization of the magnet 98 attracts the switch member 62 and connects line B₂ through the switch member 62 and switch member 49 to the ground, upon de-energization of magnet 48 by interruptions on line L₂. In the same manner lines L₃ and L₄ are connected respectively to lines B₃ and B₄ in the tens and units selectors.

By means of the mechanism so far described the impulses sent over the lines L₁, L₂, L₃, L₄, have caused a selection of a group of indicators, of an indicator within the group, and have connected these lines with restoration busses for these indicators, and as the tape in Fig. 1 is moved to present restoration perforations to the impulse sender pins in Fig. 3, the impulses sent over the lines L₁, L₂, L₃, L₄, will cause corresponding impulses over the lines B₁, B₂, B₃, B₄, and over the restoration bus lines to the selected indicator to move the indicator elements of the selected indicator to zero. By means of a known construction, as stated in the parent application, and a structure similar to that shown in the patent to Frischknecht et al., 1,852,994, dated April 5, 1932, the circuits leading to these indicators will be broken at the time the indicators reach their zero positions. After the selected indicator has been restored to zero, the tape will be advanced and the third field in the tape will present blank spaces to its sender pin to throw positive polarity on the line L₅. This will cause de-energization of the magnet 32 in Fig. 6 which will release its switch member 35 and connect the battery to the magnet 100, which will connect the main bus lines to the forward actuation bus lines. As the tape is moved farther to present the actuation perforations to the impulse sender pins, impulses will be sent over lines L₁, L₂, L₃, L₄ and the resulting impulses over lines B₁, B₂, B₃, B₄ will pass over the indicator actuating bus lines to the selected group of indicators and the selected indicator in the group. This will actuate the indicators forwardly an amount determined by perforations in this section of the tape.

The restoration and actuation of the selected indicator is now complete and when perforations in field 5 are presented to the "on" and "off" switch member of Fig. 3, the positive and negative sources of polarity 18 and 19 (Fig. 4) will be disconnected from the lines L₁, L₂, L₃, L₄. This will cause the magnet 45 in the thousands selector (Fig. 5) to be de-energized, which causes the de-energization of magnet 47, which in turn causes de-energization of magnet 74, and all the parts will be restored to the position in which they are shown in the drawings. The same thing will occur in the hundreds, tens and unit selectors. After the magnets 45 and 47 have been de-energized a circuit will be completed

from the battery through the release magnet 102 (Fig. 5), switch 60, switch 52, switch 51, and switch 46 to the ground. Energization of the magnet 102 in Fig. 7 attracts its armature 103 and disengages holding prongs 104 and 104' from the ratchet members 57 and 85 of shaft 58. This will permit the shaft 58 to be rotated to home position by a spring 105 and to drop under the influence of gravity to vertical home position, and as it drops into its home position the shoulder 59 engages an operating lever 106 to break the switch connection 60 and 61 (see also Fig. 5). All the elements of the thousands selector are now in home position. In the hundreds selector de-energization of the magnets 48, 50 and 98 completes a circuit from the battery through the release magnet 107, through contacts 72, switch 63, switch 62 and switch 49 to the ground. This energizes magnet 107 (Fig. 8) which withdraws the releasing pawl 108 from the ratchet 67 on the shaft 68 permitting the spring 109 to return the shaft 68 to its home position. The same thing occurs in tens and units selectors.

Combination selection of indicators

It may at times be desirable to restore and actuate a plurality of indicators in a group. For this purpose the line L_i is branched over the coil of the polarized magnet 110 which is responsive to negative impulses from line L₁. When the magnet 110 is energized it prepares a circuit from the "low" and "high" magnets 41 and 43 over the switch members 111 and 112 over its own switch 113 to the circuit which controls energization of the "last" magnet 42 of the "last" switch member 114. When the polarity on line L₁ is negative and either the "low" or the "high" bus line is selected, the "last" bus line will be selected simultaneously. Referring to Fig. 1 a section of the tape at the right of this figure is perforated to select the "low" and "last" bus lines to control the restoration and forward actuation of the "low" and "last" indicators in a selected group.

Group restoration

One or more of the selector circuits, for example, the one corresponding to the number 9999, may be employed to control the operation of all the group selector switches 96 simultaneously. The selector circuit 92, 93 for this number may energize magnets 115 and 116 as shown in Fig. 11, to connect all of the lines 92 to the battery and all of the lines 93 to the ground. If desired, several relays may be provided to permit of the restoration of less than the total number of groups at one time. Other selector circuits 92 and 93 would be allotted to this purpose. If desired also the switch controlled by the magnet 115 may connect all of the magnets 42, 41, 43 and 44 to the battery to connect all of the bus lines to

the lines B_1 , B_2 , B_3 and B_4 to restore all of the indicators to zero simultaneously.

For the purpose of restoring all or several of the corresponding indicators of the various groups of indicators to zero, the tape may be provided with perforations to control the selection of one of the four bus lines, and selection of the selector circuit such as 9999, and with restoration perforations, so that all the indicators which are connected to the selected bus line may be simultaneously turned to zero. In like manner, the other three or four bus lines may be selected and the respective indicators turned to zero. If desired several of these bus lines may be connected to the main actuating lines B_1 , B_2 , B_3 , B_4 , as explained, so that two indicators in each of the selected groups may be turned to zero simultaneously. The term "register" as used in the claims is to be construed to cover indicators or other posting devices including one or more elements.

While the invention has been described in connection with the embodiments illustrated, it will be understood that this has been done for purposes of description and not by way of limitation, and that after an understanding of this invention, numerous modifications and changes may be made by those skilled in the art without departing from the spirit and scope of this invention.

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

1. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, impulse transmitting channels equal in number to the number of register elements in each register, main actuating channels for said registers common to all of the registers, main bus lines common to corresponding registers in all of the groups of registers, pairs of parallel restoration and setting-up busses common to corresponding registers in all of the groups of registers, means responsive to combinations of potentials on the impulse transmitting channels for selectively connecting all of the restoration and setting-up busses to the main bus lines and for selectively connecting said main bus lines to said main actuating channels, and means responsive to interruptions of potentials on said transmitting channels for connecting all of said restoration and setting-up busses to a group of registers and for electrically connecting said main actuating channels to said impulse transmitting channels.

2. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, a plurality of impulse transmitting channels corresponding to and equal in number to the number of register elements in each register, restoration and setting-up busses each including lines common to correspond-

ing register elements of corresponding registers of all of the groups, and means responsive to electrical variations on said channels for selectively routing subsequent concurrent impulses on said channels over said restoration and setting-up busses to the respective register elements of any one of the registers in any group of registers.

3. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, a plurality of impulse transmitting channels corresponding to and equal in number to the number of register elements in each register, restoration and setting-up busses each including lines common to corresponding register elements of corresponding registers of all of the groups, and means responsive to electrical variations on said channels for selectively routing subsequent concurrent impulses on said channels over said restoration and setting-up busses to the respective register elements of any one or a plurality of registers in any group of registers.

4. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, a plurality of impulse transmitting channels corresponding to and equal in number to the number of register elements in each register, restoration and setting-up busses each including lines common to corresponding register elements of corresponding registers of all of the groups, and means responsive to electrical variations on said channels for selectively routing subsequent concurrent impulses on said channels over said restoration and setting-up busses to the respective register elements of corresponding registers in a plurality of groups of registers.

5. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, a plurality of impulse transmitting channels corresponding to and equal in number to the number of register elements in each register, restoration and setting-up busses each including lines common to corresponding register elements of corresponding registers of all of the groups, and means responsive to electrical variations on said channels for selectively routing subsequent concurrent impulses on said channels over said restoration and setting-up busses to the respective register elements of a plurality of corresponding registers in a plurality of groups of registers.

6. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, a plurality of impulse transmitting channels corresponding to and equal in number to the number of register elements in each register, restoration and setting-up

busses each including lines common to corresponding register elements of corresponding registers of all of the groups, and means responsive to electrical variations on said channels for selectively routing subsequent impulses on said channels over said restoration and setting-up busses to the respective register elements of one or more corresponding registers of a group or groups of registers.

7. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, a plurality of impulse transmitting channels corresponding to and equal in number to the number of register elements in each register, restoration and setting-up busses each including lines common to corresponding register elements of corresponding registers of all of the groups, and means responsive to combinations of potentials on said channels for selectively routing subsequent impulses on said channels over said restoration and setting-up busses to the respective register elements of one or more corresponding registers of a group or groups of registers.

8. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, a plurality of impulse transmitting channels corresponding to and equal in number to the number of register elements in a register, a plurality of magnets controlled by combinations of potentials on said channels, electrical paths corresponding to said channels established by said magnets for routing impulses on said channels to corresponding register elements for zeroizing or setting-up any register within any group of registers, and means responsive to impulses over said channels for selecting one of said groups of registers.

9. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, a plurality of impulse transmitting channels corresponding to and equal in number to the number of register elements in a register, a plurality of magnets controlled by combinations of potentials on said channels, electrical paths corresponding to said channels established by said magnets for routing impulses on said channels to corresponding register elements for zeroizing or setting-up any register or registers within any group or groups of registers, and means responsive to impulses over said channels for selecting one or more groups of registers.

10. In an electrical system for transmitting and registering items of information, a plurality of groups of registers, each register including a plurality of register elements, means associated with each register element and responsive to impulses for operating said register element, a plurality of impulse trans-

mitting channels corresponding to and equal to the number of register elements in each register, means responsive to impulses on said channels for selecting any group of registers, means responsive to combinations of potentials on said channels for selecting any register within a group of registers, and means responsive to different combinations of potentials on said channels for controlling the restoration or setting-up operation of a selected register, said selecting and last mentioned means cooperating to rout electrical variations on said channels to the impulse responsive means associated with the register elements of the selected register.

11. In an electrical system for transmitting and registering items of information, a plurality of groups of registers, each register including a plurality of register elements, means associated with each register element and responsive to impulses for operating said register element, a plurality of impulse transmitting channels corresponding to and equal to the number of register elements in each register, means responsive to impulses on said channels for selecting any group of registers, means for imposing and maintaining various combinations of potentials on said channels, means responsive to combinations of said maintained potentials for selecting a register within a group, and means responsive to other combinations of said maintained potentials for causing restoration to zero of the selected register, said selecting and last mentioned means cooperating to rout electrical variations on said channels to the impulse responsive means associated with the register elements of the selected register.

12. In an electrical system for transmitting and registering items of information, a plurality of groups of registers, each register including a plurality of register elements, means associated with each register element and responsive to impulses for operating said register element, a plurality of impulse transmitting channels corresponding to and equal to the number of register elements in each register, means responsive to impulses on said channels for selecting any group of registers, means for imposing and maintaining various combinations of potentials on said channels, means responsive to combinations of said maintained potentials for selecting a register within a group, and means responsive to other combinations of said maintained potentials for causing a setting-up operation of the selected register, said selecting and last mentioned means cooperating to rout electrical variations on said channels to the impulse responsive means associated with the register elements of the selected register.

13. In an electrical system for transmitting and registering items of information, a plurality of groups of registers, each register including a plurality of register elements,

- means associated with each register element and responsive to impulses for operating said register element, a plurality of impulse transmitting channels corresponding to and equal
5 to the number of register elements in each register, means responsive to impulses on said channels for selecting any group of registers, means for imposing and maintaining various combinations of potentials on said channels,
10 means responsive to a certain combination of potentials for selecting a register within a group for restoration to normal, and means responsive to another combination of potentials for selecting the same register for a setting-up operation, said selecting means co-
15 operating to rout electrical variations on said channel to the impulse responsive means associated with the register elements of the selected register.
- 20 14. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, means for selecting any one of the groups of registers, and means responsive to
25 certain electrical variations for selectively controlling the restoration of any register within a selected group of registers and responsive to other electrical variations for controlling a setting-up operation of said selected
30 register.
15. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, means for selecting any one of the
35 groups of registers and means responsive to certain electrical variations for selectively controlling the restoration of any register within a selected group of registers and responsive to other electrical variations for selecting said register and controlling a setting-up operation of said register.
40
16. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, means for selecting any one of the
45 groups of registers and means responsive to a plurality of combinations of potentials for selecting a register within the selected group of registers and operable under one combination of potentials to cause a restoration of the
50 selected register and under another combination of potentials to cause a setting-up operation of the selected register.
17. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, means for selecting any one of the
55 groups of registers, and means responsive to combinations of electrical variations for establishing electrical restoration or setting-up paths to one or more of the registers within the selected group.
60
18. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, means for selecting any one of the
65 groups of registers, a plurality of electrical channels, means for imposing combinations of positive and negative potentials on said channels, means responsive to potentials on said channels for establishing actuation paths to any one of the registers of the selected group of registers, and means responsive to the character of potential on one of said channels for concurrently establishing actuation
70 paths to another register in said selected group of registers.
19. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, means for selecting any one of the
80 groups of registers, a plurality of electrical channels, means for imposing combinations of positive and negative potentials on said channels, means responsive to potentials on said channels for establishing actuation paths to one of the registers within the selected group of registers and simultaneously preparing a circuit to control the establishing of
85 actuation paths to another of the registers in the selected group of registers, and means responsive to other combinations establishing said first mentioned paths, for completing said prepared circuit.
90
20. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, means for selecting any one of the
95 groups of registers, a plurality of electrical channels, means responsive to certain combinations of potentials on said channels for selecting a register within the selected group of registers, and means responsive to one of the combinations of potentials selecting said register for selecting another register within the selected group of registers.
100
21. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, means for selecting any one of the
105 groups of registers, a plurality of electrical channels, means responsive to certain combinations of electrical variations for selecting a register within the selected group of registers, and means responsive to one of the combinations of electrical variations for effecting the selection of another register within the selected group of registers.
110
22. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, each register including a plurality of register elements, means associated with
115 each register element and responsive to impulses for operating said register element, means for selecting any one of the groups of registers, electrical channels corresponding to and equal in number to the register elements of each register, means for imposing various combinations of potentials on said
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channels, means responsive to one of a plurality of combinations of potentials adapted to select a register within the selected group of registers to control its restoration, to another combination to control its setting-up operation, to another combination to simultaneously select another register within the group and control its restoration, and to another combination to control a setting-up operation of said other register, said selecting means cooperating to route electrical variations on said channels to the impulse responsive means associated with the register elements of the selected register.

23. In an electrical system for transmitting and registering items of information, the combination of a plurality of groups of registers, each register including a plurality of register elements, means associated with each register element and responsive to impulses for operating said register element, means for selecting any one of the groups of registers, electrical channels corresponding to and equal in number to the register elements of each register, means for imposing various combinations of potentials on said channels, means responsive to various combinations of potentials for selecting a register within a selected group of registers singly or in combination with another register for simultaneous restoration or setting-up operations, said selecting means cooperating to route electrical variations on said channels to the impulse responsive means associated with the register elements of the selected register or registers.

24. The combination of a plurality of groups of registers, multicontact relays for selecting groups of registers by preparing actuation paths to the registers, a selection mechanism for selectively closing a plurality of circuits for selectively operating said multicontact relays, and means controlled by one of said circuits for closing a plurality of circuits operating a plurality of multicontact relays for preparing actuation paths to a plurality of groups of registers.

25. The combination of a plurality of groups of registers, multicontact relays for selecting groups of registers by establishing actuation paths to the registers, a selection mechanism for selectively closing a plurality of circuits for selectively operating said multicontact relays, means controlled by one of said circuits for closing a plurality of circuits operating a plurality of multicontact relays, and means operated by said last mentioned means for causing an operation of all the registers within the group or groups of register selected.

26. A receiving mechanism comprising a plurality of groups of electromagnetically operated indicators, two circuit paths to the electromagnetic means of each indicator for operating the indicators forwardly, means

whereby one of said circuit paths is adapted to be opened by the indicator as it moves forwardly into home position, pairs of bus lines corresponding to said circuit paths, multicontact relays adapted to connect the circuit paths of any group of indicators to said bus lines, and complementary selector means responsive to impulses received for selectively operating said multicontact relays and for causing subsequently received impulses to control the operation of the selected indicators over said main bus lines and said circuit paths, and means for releasing said complementary selectors and said multicontact relays at the completion of the actuation of the indicators as they are moved into the new set up position.

27. In a receiving mechanism, the combination of a plurality of groups of electromagnetically operated indicators, pairs of circuit connections to the electromagnetic means of each indicator for operating the indicator forwardly to home position and for operating the indicator forwardly to the new set up position, each of said groups of indicators including a plurality of indicator assemblies, bus lines corresponding to said assemblies and to said circuit connections, multicontact relays for connecting said bus lines to the pairs of circuit connections to all of the electromagnetic means of any desired group of indicators, a plurality of main lines over which impulses are transmitted for operating the indicators, relay means responsive to impulses received for selectively connecting said main lines to said bus lines for selectively controlling the operation of any indicator assembly, means responsive to electrical variations received for selectively energizing said multicontact relays, means for maintaining said multicontact relays and said relay means energized during the operation of the selected assembly of indicators, and means operable as the selected indicators are moved into the new set up position for releasing said multicontact relays, said relay means and said selectors.

28. A receiving mechanism comprising a plurality of groups of electromagnetically operated indicators, each group including a plurality of assembled indicators, two circuit paths for the electromagnetic means of each indicator for respectively energizing said electromagnetic means to restore the indicator to normal and to reset the same, electrical connections extending from a distant point to said receiving mechanism, selecting mechanism controlled by electrical variations on said connections for responsively connecting one of the circuit paths for the electromagnetic means of any assembly in any group to said connections, and means for thereafter disconnecting said circuit paths and for connecting the other of said circuit paths for said assembly to said connections.

29. The combination of a plurality of groups of electromagnetically operated indicators, each group including a plurality of assembled indicators, a pair of circuit paths
5 for the electromagnetic means of each indicator for respectively energizing said electromagnetic means to restore the indicator to normal and to reset the same, and means responsive to electrical variations received for
10 controlling electrical variations on either of the paths for any assembly within any group under control of electrical variations subsequently received.

30. In a receiving station, the combination
15 of a plurality of groups of electromagnetically operated indicators, electrical connections extending from a distant point to said receiving station, and means responsive to electrical variations received over said connections for
20 causing subsequent electrical variations received over said connections to control the operation of any assembly of indicators within any group of indicators, said means comprising relays energized and maintained energized by circuits maintained over said
25 connections whereby said means may be normalized upon removal of current from said connections.

31. An automatic indicating board for exhibiting and posting the fluctuating quotations of exchange, stocks or other items, comprising a great plurality of digit indicators for posting the "open", "high", "low" or
35 "last" quotations of each item, a plurality of groups of operating busses common to the various "open", "high", "low" and "last" indicators respectively, selecting means for preparing for actuation the indicators of any desired item, and selecting means for preparing
40 for operation either the "open", "high", "low" or "last" busses or combinations thereof.

32. In an electrical system for transmitting and registering items of information, the
45 combination of a plurality of groups of registers, means responsive to electrical variations received for selecting any one of the groups of registers, and means also responsive to certain electrical variations received
50 for establishing register operating circuits to one of the registers within the selected group and responsive to other electrical variations received for establishing register operating circuits simultaneously to a plurality of registers within the selected group.

In testimony whereof I have signed my name to this specification.

MERTON L. HASELTON.