

March 23, 1937.

W. C. PETERMAN

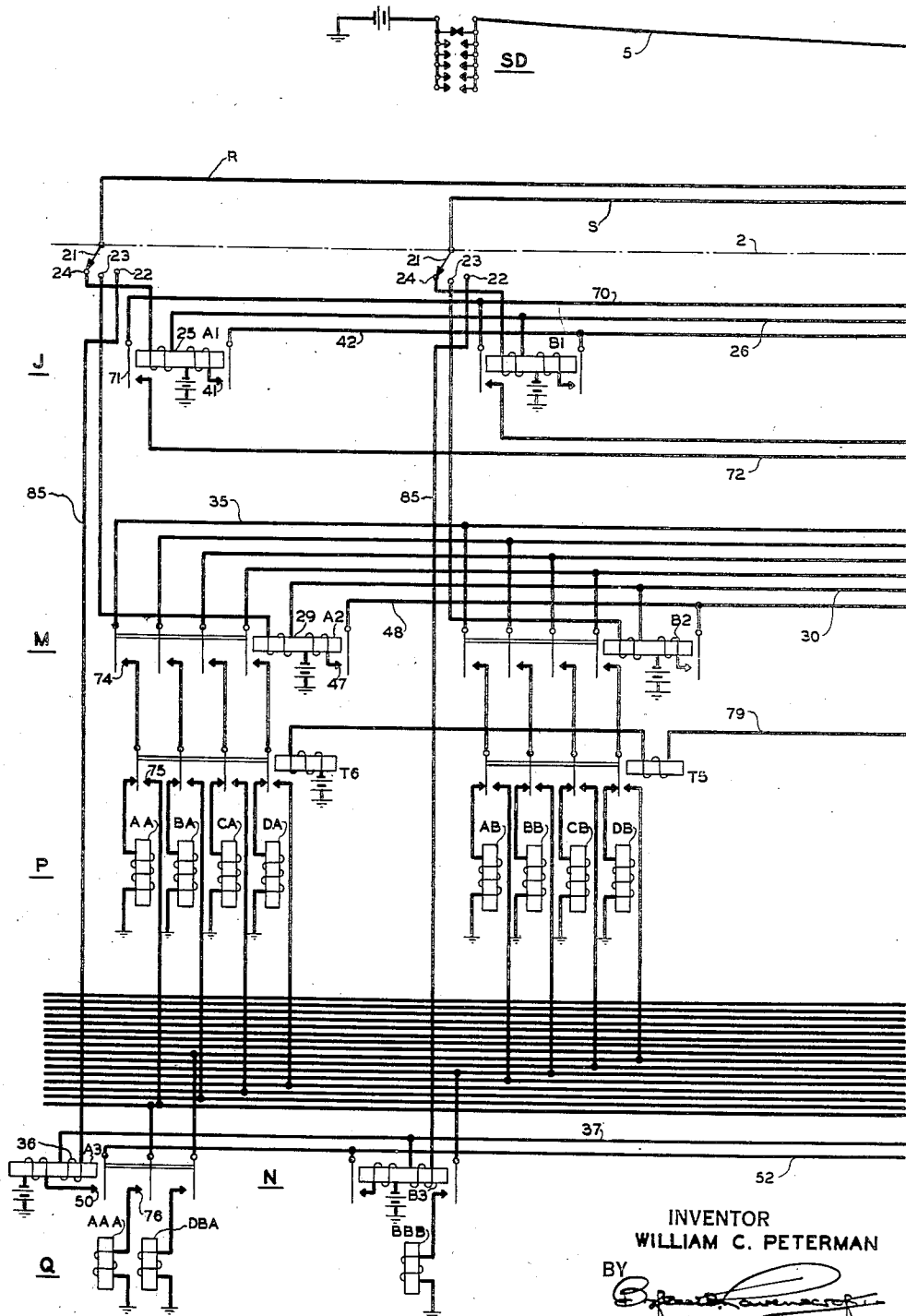
2,074,423

SELECTING SYSTEM

Filed May 8, 1930

2 Sheets-Sheet 1

FIG. 1



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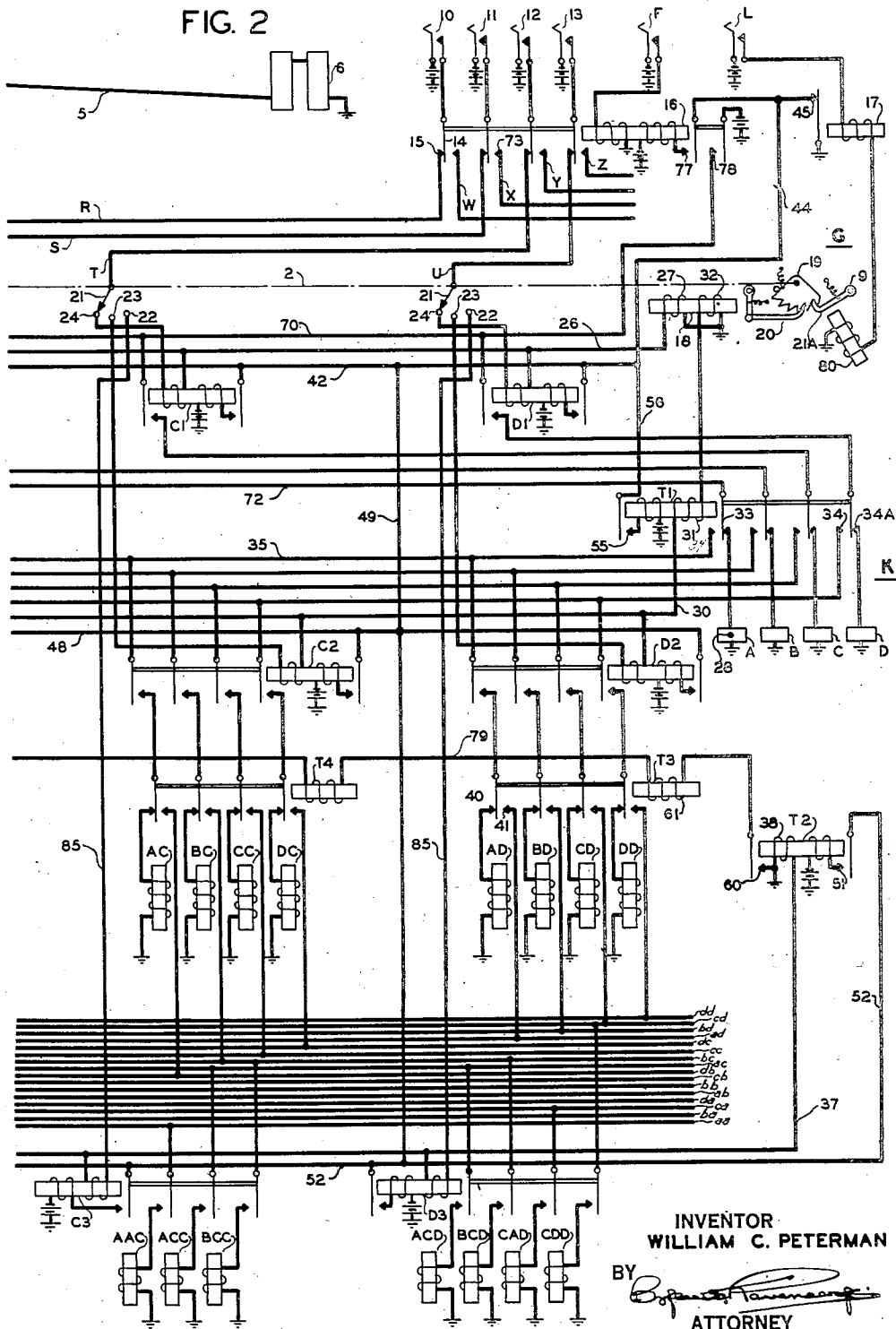
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2 Sheets-Sheet 2

FIG. 2



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SELECTING SYSTEM

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Application May 8, 1930, Serial No. 450,706

8 Claims. (Cl. 177—353)

This invention relates to a selecting system, and more particularly to a selecting system in which any one of a plurality of electromagnets, each designated by a single character or by combinations of two or more characters, can be selected by transmitting, in the order of their occurrence, the designating characters of the electromagnets to be selected.

The invention will be described with reference to its application to stock quotation systems, for the reason that it will probably have its widest use in that field. It is to be noted, however, that the principles involved in the invention are not limited to that field, but are of general application; consequently, the present invention is applicable to any system where it is necessary to select one of a plurality of electromagnets designated by varying numbers of characters.

In stock quotation board practice, the stocks are designated by combinations of one, two or three letters, and these designations appear on the ticker tape. Heretofore, in transmitting quotations from a central point to stock quotation boards at outlying points, a difficulty arose, for no means were available by which stock units on the board, adapted to display quotations pertaining to stocks designated by three letters, could be selected by transmitting such letters in the order of their occurrence. To surmount this difficulty, the stock relays adapted to select stock units designated by three letters were assigned arbitrarily two letter designations. Accordingly, a particular three letter stock unit could be selected by transmitting the two letters assigned to the proper stock relay. This solution, however, raised a difficulty, for it required the sending operator to read the three letter designation appearing on the ticker tape, and then mentally to translate that into the arbitrary two-letter designation before transmitting the quotation. This mental substitution of the two for the three letter designation naturally reduced the speed of transmission. To avoid this mental substitution on the part of the operator, an alternative method of selection provided a separate key corresponding to each stock. As the operator was required, however, to select the proper key from a comparatively large number on the keyboard, it is likewise apparent that this method also delayed the speed of transmission. Besides being open to the objection that they reduced the speed of transmission, these two methods are also defective in that they limit the number of stocks that can be displayed on the quotation board; the first

method because the possible combinations of the alphabet taken singly, and then two at a time is comparatively small, and the second because there is a marginal number of keys from which an operator can select with a reasonable amount of speed.

The present invention is designed to eliminate the above-mentioned limitations of previous systems by permitting the sending operator to transmit the stock designations of one, two or three letters, as they appear on the ticker tape and thus select the necessary stock relay to prepare a stock unit of the proper designation for the reception of price quotations.

The invention is exemplified in the combination and arrangement of parts that are shown in the accompanying drawings and described in the following specification; while it is more particularly pointed out in the appended claims.

Figs. 1 and 2 illustrate schematically an embodiment of the invention applied to a stock selecting system.

To afford a clearer understanding of the invention, a general description of the system will first be given.

The present invention contemplates the transmission of stock quotations from a central sending station to a number of stock quotation boards at remote points. The quotations are to be transmitted in the ordinary start-stop printer code, and preferably by some form of storage transmitter that will permit a free keyboard action without delaying transmission. The invention extends, however, only to the means for selecting the stock units adapted to display quotations pertaining to a particular stock. Each stock, as is well known, is designated by an individual combination of letters. These letters are transmitted by the sending operator in the order that they appear on the ticker tape, and they are received at the various stock quotation boards by an apparatus, termed herein a selector, but often known as a permutation relay.

Referring to the drawing, SD designates a start-stop transmitter at a sending station. A line 5 connects SD with a receiving station at which a selector 6, frequently termed a permutation relay, controls a plurality of contacts 10—L, of which 10—13 are letter contacts and F and L are "special" contacts. Stock selecting circuits R, S, T and U are normally associated with the letter contacts, while price selecting circuits W, X, Y and Z are adapted to be connected to the same contacts upon the termination of the

stock selection. The stock selecting circuits comprise three groups of selecting relays J, M and N, a step-by-step switch G, three groups of stock relays K, P and Q which contain respectively, one, two and three letter stock relays, and two transfer relays T₁ and T₂, with the latter of which are associated auxiliary transfer relays T₃—T₆. The step-by-step switch G, which is advanced upon each actuation of selector 6, serves to connect individual selecting relays in consecutive groups with particular letter contacts 10—13. In response to letter signals transmitted from SD the selector 6 successively closes predetermined contacts in the group 10—13, thereby operating a predetermined selecting relay in a number of the consecutive groups J, M and N equal to the number of successive closures of contacts 10—13. The selecting relays prepare a circuit for operating a predetermined stock relay in one of the groups K, P or Q, depending upon the number of selecting relays that have been operated by the selector 6. For example, if three letters were transmitted from SD, there would be three successive closures of contacts 10—13, consequently a selecting relay in each of the groups J, M and N would be operated, and a particular stock relay in the third or three letter group Q would be selected. Following the transmission of the letter signals, a figure shift signal is sent, and this signal causes the operation of the selected stock relay and the transfer of the contacts 10—13 into operative association with the price selecting circuits W, X, Y, Z. The other ends of these circuits are connected to the indicators in the proper stock unit by the operation of the selected stock relay. Price quotations are then sent by SD. The arrangement and operation of the price selecting circuits form no part of the present invention, but are disclosed here for the purpose of showing the manner of applying the invention to a stock quotation system. At the termination of the price quotation transmission, a shift letter signal is sent which restores both the stock selecting circuits and the price selecting circuits to normal. Before describing the system in detail, it may be mentioned that, to simplify the description to follow, only a representative portion of the system will be set forth. For example, only four letter contacts 10—13 and two "special" contacts F and L are shown in the drawings. Likewise, only four contact banks on the step-by-step switch G, four selecting relays in each of the groups J, M and N, and a small number of the possible stock relays are disclosed in the drawings. In actual practice, however, when a five unit code is employed, the selector 6 controls thirty-two contacts, twenty-six of which correspond to the letters of the alphabet and six of which correspond to "special" contacts; the step-by-step switch G has twenty-six contact banks with as many contacts in each bank as may be desired, each group of selecting relays contains twenty-six relays, the first group of stock relays contains twenty-six, the second 26² and the third 26³; although in practice probably only a few of this large number of stock relays would be utilized, and relays not to be utilized could, of course, be omitted. When the invention is applied to a stock quotation system, the additional special contacts (not shown) may be used for shelf selection, that is, two of the special contacts may serve to connect in the price dials of a well known type of register unit (likewise not shown) for the purpose of posting a new high or a new low quotation. These special contacts may also be arranged to

perform the figure shift function, that is to say, to transfer the letter contacts 10—13 into association with the price selecting circuits W, X, Y, Z in a manner hereinafter described. To accomplish this result, each of the four special selection contacts can be arranged to actuate the figure shift contact F.

At the sending station is shown the start-stop transmitter SD, but it is obvious that for this any type of telegraph transmitting apparatus might be substituted. The line 5 connects the transmitter SD to a receiving station and a selector 6 at that station. Although SD is shown connected to a single receiving station, it is apparent that a number of receiving stations can be readily associated with SD. It is likewise obvious that any communication circuit, wire or radio, capable of transmitting telegraphic signals, could be substituted for line 5 without departing from the spirit of the invention. The selector 6 consists essentially of a start-stop printer with the type wheel removed, and with contacts added, to be controlled by the selecting mechanism of the printer. As such selecting mechanisms are well known in the art, a detailed description of their operation and structure is omitted here. A complete understanding of one device of this type may be obtained from French Patent 708,289. In Fig. 2 and in the specification of this patent is disclosed the method of operating any one of thirty-two contacts in response to five unit printer code signals. The selector 6 operates momentarily in response to letter or special signals to close selectively any one of thirty-two contacts. Contacts 10—13 are adapted to be closed when the selector 6 responds to impulses representing respectively the letters A, B, C and D, while contacts F and L are adapted to be closed when the selector responds to figure and letter shift impulses respectively. The letter contacts 10—13 terminate in armatures, as 14, of a normally de-energized shift relay 16. The armatures 14 of the shift relay 16 normally rest on their back contacts, as 15, to which are respectively connected the stock selecting circuits R, S, T and U. To the normally open front contacts of the armatures 14 are connected the price selecting circuits W, X, Y and Z. Figure shift contact F is connected to ground through an operating winding of shift relay 16. This relay is also provided with a holding winding adapted to be energized, upon the operation of relay 16, over an obvious circuit controlled by the release relay 17. When operated, shift relay 16 applies battery through contact 78 to a conductor 70, for a purpose to be hereinafter described. Letter shift contact L is connected to release relay 17 and ratchet release magnet 80 over an obvious circuit. The closure of contact L effects the operation of the relay and magnet, release relay 17 removing ground at contact 45 from conductor 44, for a purpose to be described below, and magnet 80 permitting the ratchet 19 to restore.

A step-by-step switch G includes a plurality of banks of contacts, each bank being associated by means of co-operating wiper, as 21, and a particular conductor R, S, T or U, with a particular letter contact 10—13. Each bank includes a plurality of contacts as 22, 23 and 24, individual to corresponding selecting relays in the several groups J, M and N. For example, contact 24, in the bank associated with the contact 10, is connected to the winding 25 of the selecting relay A₁; contact 24 in the bank asso-

ciated with letter contact 11 is connected with the winding of selecting relay B₁; contacts 23 in the banks associated with letter contacts 10 and 11 are connected respectively to the windings of relays A₂ and B₂ in the second group M. The wipers, as 21, are adapted to be successively moved into connection with corresponding contacts 24, 23 and 22, on each of the contact banks by means of the rotary magnet 18 co-operating with a pawl 20 and a ratchet 19 to step a common shaft 2 on which the wipers are mounted. The rotary magnet is connected in common by conductors 26 and 30 to one end of the operating windings of the selecting relays in groups J and M respectively and is thus operated in series with any of the selecting relays in either of these groups. When de-energized, the rotary magnet 18 causes the pawl 20 to step the ratchet 19, which by rotating the shaft 2, moves the wipers, as 21, to the next contact in each of the banks. As previously mentioned, the operation of ratchet release magnet 80 permits the ratchet to restore to normal, thus returning the wipers to contacts 24 on which they normally rest.

The first group of selecting relays J contains a plurality of selecting relays A₁, B₁, C₁ and D₁ whose operating windings, as 25, are connected, as previously described, to the corresponding contacts as 24, in particular contact banks of the step-by-step switch G, and in common with the operating winding of the rotary magnet 18. Each of these selecting relays also has a locking winding adapted to be energized, upon the operation of its relay, over conductors 42, 44, through contact 45, to the grounded armature of release relay 17. Associated with the first group of selecting relays J is a group of single letter stock relays K, comprising stock relays A, B, C and D. Each of these stock relays has a winding as 28, connected through a back contact, as 34A, of normally de-energized transfer relay T₁, armature, as 33, of T₁, conductor as 72, to a contact of a particular selecting relay A₁, B₁, C₁ or D₁ in the first group J. The common circuit 70, previously mentioned, is multiplied to the armatures, as 71, of each of the selecting relays in the group J.

The second group of selecting relays M comprises relays A₂, B₂, C₂ and D₂. As previously mentioned, the operating winding, as 29, of each of these relays is connected to corresponding second contact, as 23, in an associated bank of the switch G, and is also connected in common with the operating windings of the other such relays to the winding 31 of transfer relay T₁ and to winding 32 of rotary magnet 18. Each of the selecting relays in the second group is also provided with a locking winding adapted to be energized over common conductor 48, 49, 42, 44 to ground on armature of release relay 17. The transfer relay T₁ is likewise provided with a locking winding adapted to be energized through contact 55, conductor 56, 44 to ground on armature of release relay 17.

Each of the selecting relays A₂, B₂, etc., in the second group M has associated with it a sub-group of two letter stock relays of the second group P. Each stock relay AA, BA, etc., of the sub-group associated with a particular selecting relay, as A₂, has an operating winding connected through a back contact of a transfer relay as T₆ associated with that sub-group to a normally open contact as 74 of that selecting relay. The number of stock relays in each sub-group may be equal to the number of operating circuits that can be com-

pleted by the selecting relays in the first group J. As there are twenty-six different circuits that can be completed by these selecting relays, there may be twenty-six stock relays in each sub-group. It is then apparent, that a particular selecting relay in the second group M will have twenty-six contacts to which will severally extend the windings of the stock relays in the associated sub-group.

Associated with the transfer relay T₁ and with the selecting relays in the second group M is a multiple switching arrangement that serves to extend any of the conductors, as 72, to a particular stock relay in a selected sub-group of the second group P, when the selecting relay individual to that sub-group and the transfer relay T₁ are operated. This switching arrangement comprises a number of conductors, as 35, each of which is connected to a particular contact, as 34, of the transfer relay T₁, and each of which is connected in common to a similar armature of each of the selecting relays A₂, B₂, C₂ and D₂ in the second group M.

The third group of selecting relays N includes relays A₃, B₃, C₃ and D₃. Each of these relays has an operating winding, one terminal of which is connected to contact 22 in an associated bank of switch G, and the other terminal of which is connected in common with the operating windings of other selecting relays in the same group to a conductor 37, which extends through winding 38 of a transfer relay T₂ to ground. Each of the selecting relays in this group has a locking winding adapted to be energized over common conductor 52, to conductor 49. The transfer relay is also provided with a locking winding adapted to be energized through contact 51 and over same circuit as the selecting relays. A plurality of auxiliary transfer relays T₃—T₆, each associated with a sub-group of stock relays in the second group P, are connected in series over an obvious circuit adapted to be closed by the operation of T₂. Each of the auxiliary transfer relays is normally de-energized, and has an armature for each of the stock relays in the associated sub-group. These armatures normally rest against their back contacts, and through them, the operating windings of the several stock relays in the associated sub-group are extended to the several contacts of the selecting relay individual to that sub-group.

Each of the selecting relays A₃, B₃, etc., in the third group N, has associated with it a sub-group of three-letter stock relays of the third group Q. Each stock relay AAA, DBA, etc., of the sub-group associated with a particular selecting relay, as A₃, has an operating winding connected to a contact, as 76, of the associated selecting relay.

Associated with the auxiliary transfer relays T₃—T₆ and with the selecting relays in the third group N is a multiple switching arrangement similar to the one previously described and having the same function. This arrangement comprises a plurality of conductors aa, dd, cd, bd, etc., each of which is connected to a particular contact, as 75, of a particular transfer relay, as T₆, and each of which is connected in common to a similar armature of each of the selecting relays A₃, B₃, C₃, D₃. When a particular selecting relay in the third group is operated, with which are operated the auxiliary transfer relays T₃—T₆, the switching circuit serves to extend the circuit, previously extended from common circuit 70, conductor, as 72, conductor as 35, to a two-letter stock relay in the group P, to a particular three-letter

stock relay in the sub-group individual to selecting relay of group N that has been operated.

The operation of the structure just described when the three letter stock relay AAA is to be selected, will now be explained. The operator at the sending station causes SD to transmit a series of impulses representing the letter A and these impulses operate the selector 6 to momentarily close contact 10. Battery is thus extended through armature 14, contact 15 of shift relay 16, stock selecting conductor R, wiper 21, first contact 24, winding 25 of selecting relay A1, stepping conductor 26, and operating winding 27 of the rotary magnet 18, to ground. Relay A-1 and rotary magnet 18 are energized, the former locking over a circuit previously traced. The energization of rotary magnet 18 advances the pawl 20 one tooth in the ratchet 19 and when the contact 10 opens and the rotary magnet 18 is released, the ratchet 19 is advanced a single step causing the several wipers as 21 of the step-by-step switch G to advance one step and to rest on the second contact 23 in each of the various banks of contacts. As the step-by-step switch includes 26 wipers, each co-operating with an associated bank of contacts, and, as there are 26 relays in each group of selecting relays, it is apparent that the wipers have now associated individual selecting relays in the second group with individual selecting circuits such as R, S, T, U, etc. The operation of selecting relay A1 prepares a circuit for operating stock relay A. This circuit may be traced from contact 78 of shift relay 16, conductor 70, armature 71 of relay A1, conductor 72, armature 33, of transfer relay T1 to winding 28 of stock relay A and ground. As the stock selecting circuit R is now extended to operating winding 29 of selecting relay A-2 in the second group N to transfer relay T-1 through conductor 30 and through winding 32 of rotary magnet 18 to ground, reception of the next group of impulses representing the letter A again closes contact 10 to energize selecting relay A-2, transfer relay T-1 and rotary magnet 32.

Selecting relay A2 and transfer relay T-1 lock up to grounded armature of release relay 17 over a circuit previously traced. The operation of the transfer relay T-1 extends the operating circuit 72 previously prepared for single letter stock relay A to a multiple connection 35 associated with an armature on each of the selecting relays in the second group M. Since all of the selecting relays in this group except A-2 are de-energized, the operating circuit is extended to the two-letter stock relay in the sub-group associated with the selecting relay A-2, that is, to the stock relay designated AA. Rotary magnet 18 having been energized attracts pawl 20 and, upon the opening of contact 10, rotary magnet 18 is de-energized causing ratchet 19 to advance the several wipers 21, to the third contact, as 22, in each bank. This connects the selector contacts 10-13 etc., to conductors as 85, of the selecting relays A-3, B-3, C-3, etc., in the third group N.

When the third series of impulses corresponding to the letter A are received, contact 10 is again closed and selecting relay A-3 in the third group and transfer relay T-2 are energized over a circuit extending from battery, contact 10, stock selecting circuit R, wiper 21, to ground over a previously traced circuit. Selecting relay A-3 and transfer relay T-2 lock up over a previously traced circuit to grounded armature of release relay 17. The operation of selecting

relay A-3 connects the operating winding of each stock relay in the associated sub-group with the multiple circuits adapted to extend the operating circuit from a two-letter stock relay to a three-letter stock relay in any of the sub-groups. Transfer relay T-2 upon energizing causes the operation of the auxiliary transfer relays T-3, T-4, T-5, T-6. Upon the operation of these transfer relays, the operating circuit prepared for the two-letter stock relay AA is extended through contact 75 to the multiple circuit as connected to an armature of each of the selecting relays in the group N, but, as the selecting relay A-3 has alone been operated, the operating circuit is extended to a three-letter stock relay in the sub-group associated with the selecting relay A-3 namely, to the stock relay designated AAA.

Following this operation, the operator transmits a special figure shift signal closing contact F. The closure of this contact operates shift relay 16, which locks up through contact 77 and back contact 45 of release relay 17. Relay 16 transfers the armatures as 14 associated with the contacts 10, 11, 12, 13, etc., controlled by the selector 6 from the stock selecting circuits R, S, T, U, etc., to contacts as 73 associated with the numerical or price selecting circuits W, X, Y, and Z. Shift relay 16 also at contact 78 connects battery to the circuit prepared for operated stock relay AAA and thus operates that relay. The operation of the stock relay AAA connects the other end of the price selection circuits, which have been associated with the permutation device 6 by the operation of relay 16, to the various indicators or dials for posting the quotations for the stock designated by AAA. In a similar manner, whenever a stock relay has been operated simultaneously with relay 16, the price selecting circuits are associated with the permutation device 6 and with the indicators or dials for posting the quotations for the stock designated by the selected stock relay.

After the price selection has been received, the operator transmits a "letter shift" signal to close the letter shift contact L momentarily, causing relay 17 and release magnet 80 of the step by step switch G to operate. Relay 17 opens contact 45 and removes ground from all the locking circuits, releasing all relays previously locked up; that is, ground is removed from locking conductors 42, 48, 52, and 56 of the selecting relays and transfer relays T1, T2 as well as the shift relay 16. Relay T2, releases in turn transfer relays T3, T4, T5 and T6 and the stock selected relay AAA.

Release magnet 80 attracts the locking armature 21 permitting ratchet 19 to return to its normal position with the several wipers on first contacts as 21. In actual practice, armatures 20 and 21A will be mechanically coupled, in a manner well understood so that both pawls are free of the ratchet when the release magnets operate.

In case described above, three letter signals were received before the figure shift signal with the result that one of the three letter stock relays was operated. If it is assumed that the figure shift signal is received after only two letters have been transmitted, then relay 16 will operate at a time when none of the selecting relays of the third group has been operated and when transfer relays T2, T3, T4, T5, and T6 have not operated. Under these circumstances, a stock selecting circuit will be closed for operating one of the selecting relays of the second group. Where, for example, it is desired to select double letter stock relay AA, selecting relays A1 and A2

are operated as previously described so that the wipers 21 are positioned on the middle contacts 23 and transfer relay T1 has shifted stock selecting circuits as 35 from the back contacts 34A to the front contacts as 34. If at this time a figure shift signal is received, contact F closes, operating relay 16 which closes contact 78, grounding the stock control circuit 70 to energize stock relay AA. This stock relay circuit includes, battery, closed contact 78, stock relay control circuit 70, closed contact 71 of relay A1, conductor 72, contact 34 of relay T1, conductor 35, closed contact 74, a back contact of transfer relay T6, winding of double letter stock relay AA and ground.

In case where the selection is for a single letter stock relay the figure shift signal is received after only one letter selection has been made, and in this instance none of the second selecting relays nor the transfer relay T1 will be operated. If, for example, stock relay A is to be selected, contact 10 is closed to energize selecting relay A1 which locks up and also closes contact 71, preparing the stock control circuit 70 to operate single letter stock relay A. After the single letter stock control circuit is prepared, the operator transmits a figure shift signal closing contact F, to operate shift relay 16 which closes contact 78, and consequently extending battery thru the previously prepared single letter stock control circuit to energize the single letter stock relay A.

Thus it is apparent that any of the relays of the several groups of selecting relays may be operated by sending the proper signal combinations consisting of one, two or three letters followed by a figure shift, and preparatory to the transmission of the figure shift signal, a stock control circuit is prepared for operating a single, double or triple letter stock relay, and as a result of the operation of the shift relay upon the receipt of the figure shift signal, the selected stock relay is energized.

Number of relays and contacts required

In the circuit as shown on the drawings, connections for only 4 of the 26 letters are shown, in order to simplify the drawing. If the system were to be arranged to select a stock relay corresponding to any one of the 18,278 possible combinations of one, two or three letters, it would be necessary to provide 26 sets of transfer contacts on relay 16 as previously mentioned, 26 wipers on the step-by-step switch, and 26 sets of transfer contacts, in addition to the locking contact on relay T1. Each of the selecting relays of the second group M would require 26 pairs of make contacts, in addition to a locking contact, and the T3, T4, T5, T6 relays would require 26×26, or 676 sets of contacts altogether. Also, each of the selecting relays of the third group N would require 676 sets of make contacts, in addition to a locking contact.

However, in stock quotation boards as usually installed, it is only necessary to select any one of about 200 stocks. For this reason, the number of relay contacts may be greatly reduced. Instead of providing 26 sets of contacts on each of the selecting relays of the second group M, it is only necessary to equip each of these relays with locking contacts and with a set of contacts for each two-letter combination that is actually used in the particular installation either for a two-letter stock, or as the first part of a three-letter stock code. In the case of two-letter combinations that are not so used, the corresponding contacts may be omitted. On relays T3, T4, T5,

etc., it is necessary to provide sets of transfer contacts only for those two-letter groups that are actually used both for two-letter stocks and as the first part of three-letter stocks.

In the case of those two-letter groups that are used as the first part of codes for three-letter stocks, but are not used for two-letter stocks, the corresponding contacts as 74 of the selecting relays of the second group M would be wired directly to the contacts of the selecting relays of the third group N, and in the case of those two-letter groups that are used as codes for two-letter stocks, but are not used as part of codes for three-letter stocks, corresponding contacts of the selecting relays in the second group M would be wired directly to the corresponding double letter stock relays. In either case a set of contacts on the transfer relays T3, T4, etc., would not be required. In the case of the selecting relays of the third group N, it is only necessary to provide enough contacts on each relay to take care of those three-letter stock codes actually used which terminate in the same corresponding letter.

The number of relay contacts required may be further illustrated by assuming a typical stock quotation board having stock indicators as listed below:

Codes	Possible number	Number of stock indicators installed
1 letter.....	26	20
2 letter.....	676	80
3 letter.....	17,576	100
Total.....	18,278	200

We may also assume that 140 different two-letter groups are used as follows:

Used for three-letter stocks only.....	60
Used for both two and three-letter stocks.....	30
Total	90
Used for two-letter stocks only.....	50
Total	140

It is obvious that for such a stock quotation board it would be necessary to provide only twenty sets of transfer contacts instead of 26 on relay T1, as there are six letters that are not used for single letter stocks, and the stock control circuits for these six letters may be wired directly from the corresponding contacts of the selecting relays of the first group J to the contacts of the selecting relays of the second group M. It would also be necessary to provide only 140 sets of contacts in addition to the locking contacts on all of the selecting relays of the second group M, or an average of about 6½ sets of contacts per relay, including the locking contacts, in order to provide for all of the two-letter groups.

The transfer relays T3, T4, T5, etc. would require a total of 30 sets of contacts in order to take care of those two-letter combinations that are used for both the two-letter and three-letter stocks. On the selecting relays of the third group N it would be necessary to provide for 100 sets of contacts altogether in addition to the locking contacts, or a total of about 5 sets of contacts per relay, in order to take care of all of the three-letter stock codes.

It should be noted that in the case of certain relays such as relay 16 and relay T1, where one

relay is required to operate a large number of contacts, these contacts could be divided into groups and several relays connected so as to operate together could be substituted for the single relays shown. Similarly, in the case of relays T3, T4, T5, etc. either a greater or less number of relays than shown could be used to operate the desired number of contacts. For example, in the typical case discussed above, where thirty sets of contacts were required on these transfer relays, three relays, each with ten sets of contacts may be utilized instead of 26 relays, one for each selecting relay, as shown.

The above disclosure has been given by way of preference for clearness and understanding. Hence no unnecessary limitations should be understood and the appended claims should be construed as broadly as the state of the art permits.

I claim:

1. In a selecting system, the combination comprising a plurality of consecutively arranged groups of electromagnets, a common circuit for conditioning said electromagnets for operation, a first and a second group of contacts, a selector variably operable in response to character signals for selectively controlling said contacts, means responsive to a number of closures of any of the contacts in said first group for extending said common circuit to a predetermined electromagnet in each of an equal number of said consecutive groups, means responsive to each of said closures except the first for disconnecting said common circuit from the electromagnet to which said circuit had been extended by the preceding closure, and means responsive to the closure of a contact in said second group for operating the electromagnet ultimately conditioned for operation.

2. In a selecting system, the combination comprising a plurality of consecutively arranged groups of electromagnets, each of said groups, except the first, being divided into sub-groups, a common circuit for conditioning said electromagnets for operation, a selector responsive to character signals of a plurality of classes, means responsive to the initial operation of said selector by a character signal of one class for extending said common circuit to a predetermined electromagnet in the first group, means responsive to each additional operation of said selector by a character signal of the said class for extending said common circuit to a predetermined electromagnet in a predetermined sub-group of the group succeeding that containing the electromagnet conditioned for operation by the penultimate operation of said selector, and for disabling said last mentioned electromagnet and means responsive to a subsequent operation of said selector by a character signal of another class for causing the operation of the last electromagnet to which the common circuit is extended.

3. In a selecting system, a plurality of selecting relay groups, each having associated therewith a group of electromagnets, means whereby each of the selecting relays in the first group is adapted to select an individual electromagnet in the first group, means whereby each of the selecting relays in the second group co-operates with any selecting relay in the first group to select an electromagnet in the second group, means whereby each of the selecting relays in the third group co-operates with any electromagnet in each of the first and second groups to select an electromagnet in the third group, a selector, responsive to received signals, for causing the ac-

tuation of a predetermined selecting relay in an associated group, and a rotary switch for successively associating said selecting relays, group by group, with said selector.

4. In a selecting system, a plurality of selecting relay groups, each having associated therewith a group of electromagnets, means whereby each selecting relay in the first group is adapted to select an individual electromagnet in the first group, means whereby each of the selecting relays in the second group co-operates with any selecting relay in the first group to select an electromagnet in the second group, means whereby each of the selecting relays in the third group co-operates with any electromagnet in each of the first and second groups to select an electromagnet in the third group, a selector, operable in accordance with received signals, for effecting the actuation of a predetermined selecting relay in any of said groups, a rotary switch for placing said selecting relays, group by group, under control of said selector, and a shift relay, likewise operable by said selector, for effecting the actuation of an ultimately selected electromagnet.

5. In a selecting system, a plurality of selecting relay groups, each having associated therewith a group of electromagnets, a transfer relay associated with each selecting relay group, except the first, means whereby each of the selecting relays in the first group is adapted to select an electromagnet individual thereto in the first group, means whereby each of the selecting relays in the second group co-operates with the associated transfer relay and any selecting relay in the first group, to select an electromagnet in the second group, means whereby each of the selecting relays in the third group co-operates with the associated transfer relay and with any selecting relay in each of the first and second groups, to select an electromagnet in the third group, a selector, responsive to received signals, for causing the actuation of a predetermined selecting relay in an associated group and of the transfer relay associated with said group, and a rotary switch for successively associating the selecting relays, group by group, with said selector.

6. In a selecting system, a plurality of selecting relay groups, each having associated therewith a group of electromagnets and each group, except the first, having a transfer relay associated therewith, an auxiliary transfer relay individual to each selecting relay in the last group, means whereby said relays are operable in response to the actuation of the transfer relay associated with the last group, means whereby each of the selecting relays in the first group is adapted to select an electromagnet individual thereto in the first group, means whereby each of the selecting relays in the second group cooperates with the associated transfer relay and with any selecting relay in the first group, to select an electromagnet in the second group, means whereby each of the selecting relays in the third group co-operates with the associated auxiliary transfer relay and with any selecting relay in each of the first and second groups, to select an electromagnet in the third group, a selector, responsive to received signals, for causing the actuation of a predetermined selecting relay in an associated group and of the transfer relay associated therewith, and a rotary switch for successively associating the selecting relays, group by group, with said selector.

7. In a selecting system, a plurality of consecutively arranged selecting relay groups, a

group of electromagnets associated with each of said groups, a selector operable in accordance with received signals for selectively operating a selecting relay in any of said groups, a rotary switch normally placing the selecting relays in the first group under control of said selector, a stepping magnet responsive to each actuation of said selector for causing the rotary switch to place the remaining selecting relays, group by group, under control of said selector, means whereby each selecting relay in the first group is effective when operated to prepare an operating circuit for an individual electromagnet in the first group, and means whereby each selecting relay in any subsequent group co-operates with any selecting relay in a preceding group to prepare an operating circuit for an electromagnet in the associated group, means whereby said selector is thereafter effective to operate the ultimately selected electromagnet.

8. In a selecting system, a plurality of consecutively arranged selecting relay groups, a group of electromagnets associated with each of said groups, a transfer relay associated with each

selecting relay group except the first, a selector, operable in accordance with received signals, for selectively operating a selecting relay in any of said groups, a rotary switch normally placing the selecting relays in the first group under control of said selector, a stepping magnet, responsive to each actuation of said selector, for causing the rotary switch to place the remaining selecting relays, group by group, and the transfer relays, in the order of their association with the consecutive relays of selecting relays, under control of said selector, means whereby each selecting relay in the first group is effective, when operated, to prepare an operating circuit for an individual electromagnet in the first group, and means whereby each selecting relay in any subsequent group co-operates with the associated transfer relay and with any selecting relay in each preceding group to prepare an operating circuit for an electromagnet in the associated group, means whereby said selector is thereafter effective to operate the ultimately selected electromagnet.

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