Feb. 26, 1935. S. B. WILLIAMS 1,992,271

AUTOMATIC STOCK QUOTATION SYSTEM

Filed Sept. 17, 1931 6 Sheets-Sheet 1

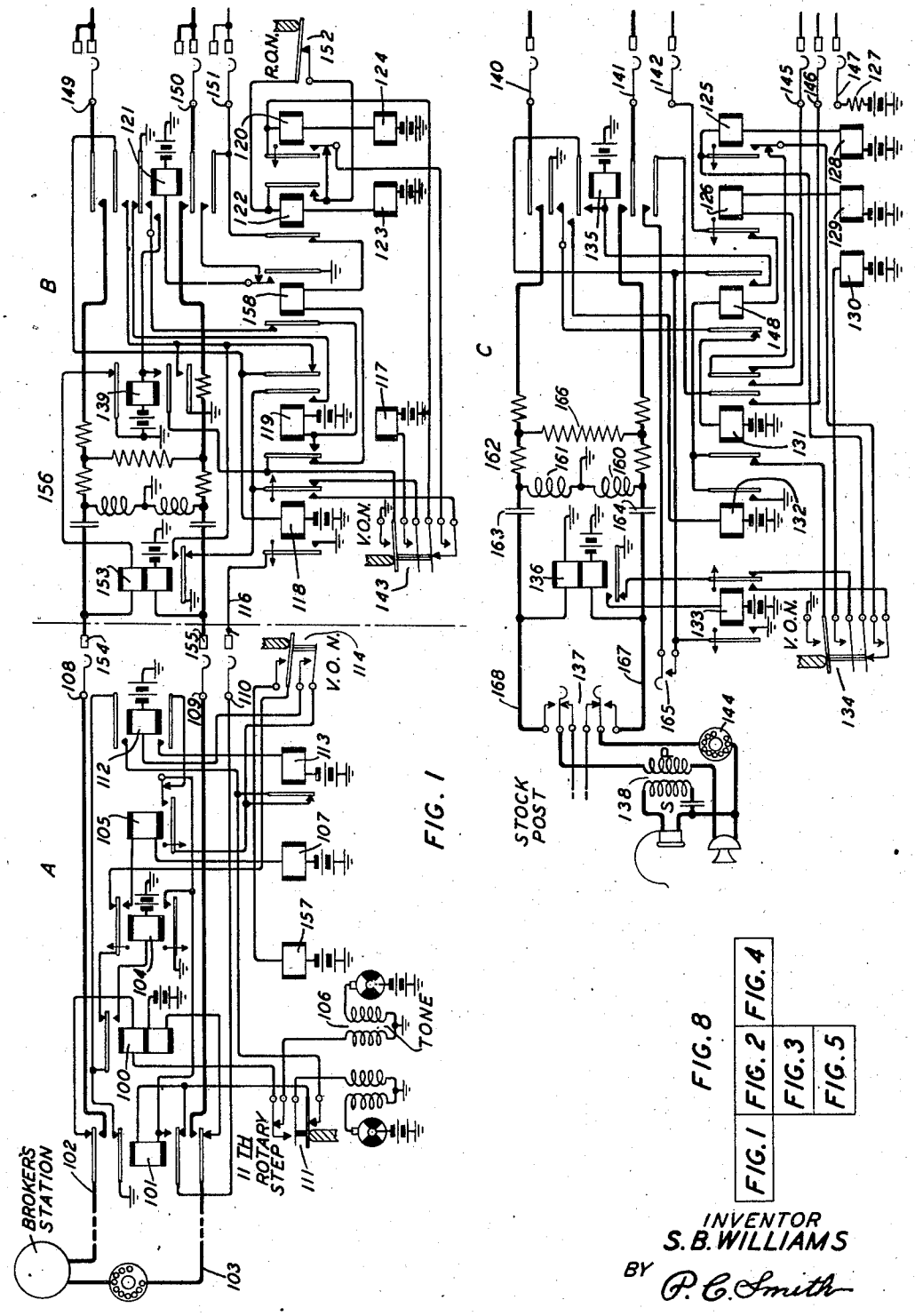

FIG. 1

FIG. 8

FIG. 1	FIG. 2	FIG. 4
	FIG. 3	FIG. 5

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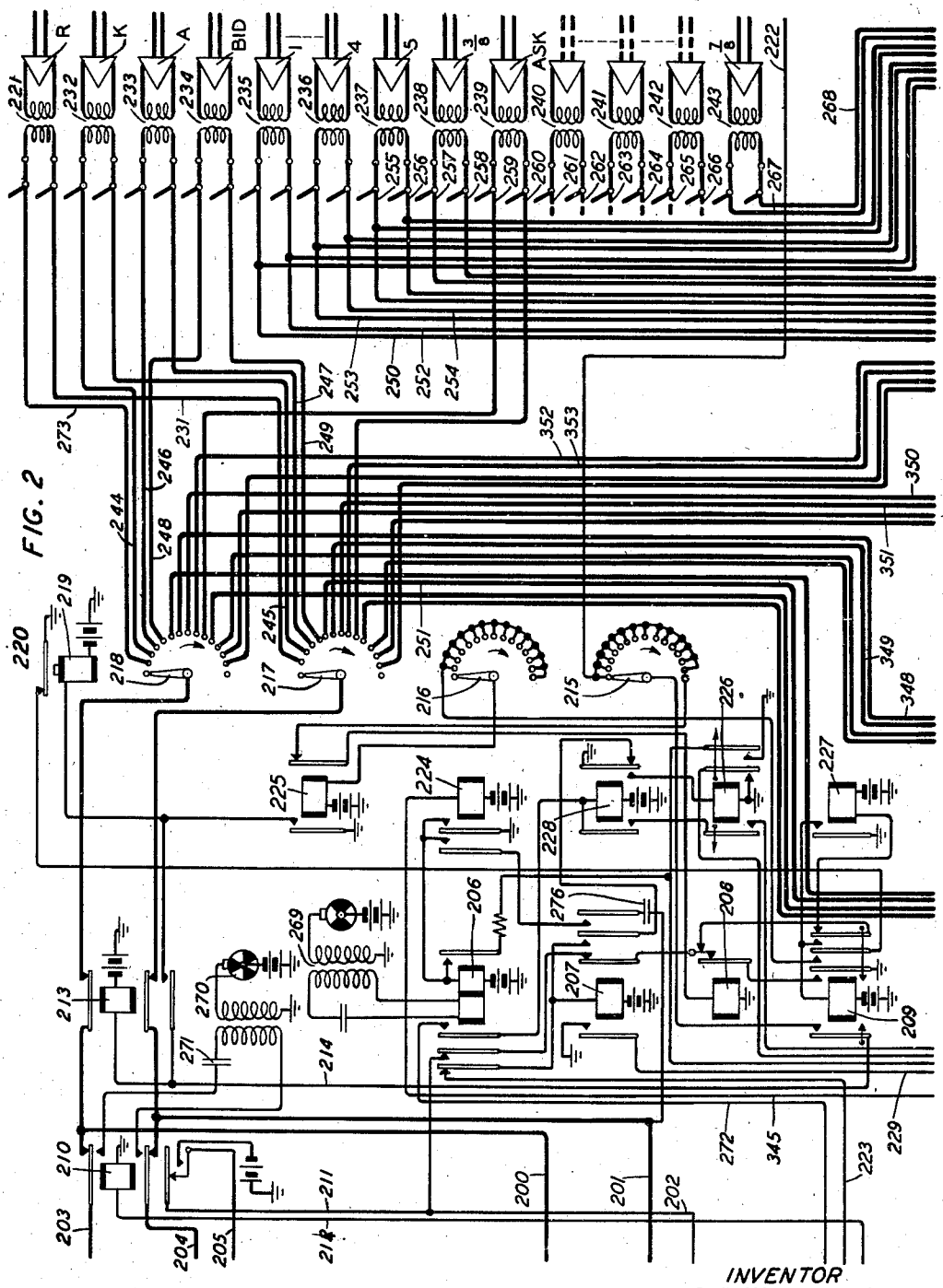

FIG. 2

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AUTOMATIC STOCK QUOTATION SYSTEM

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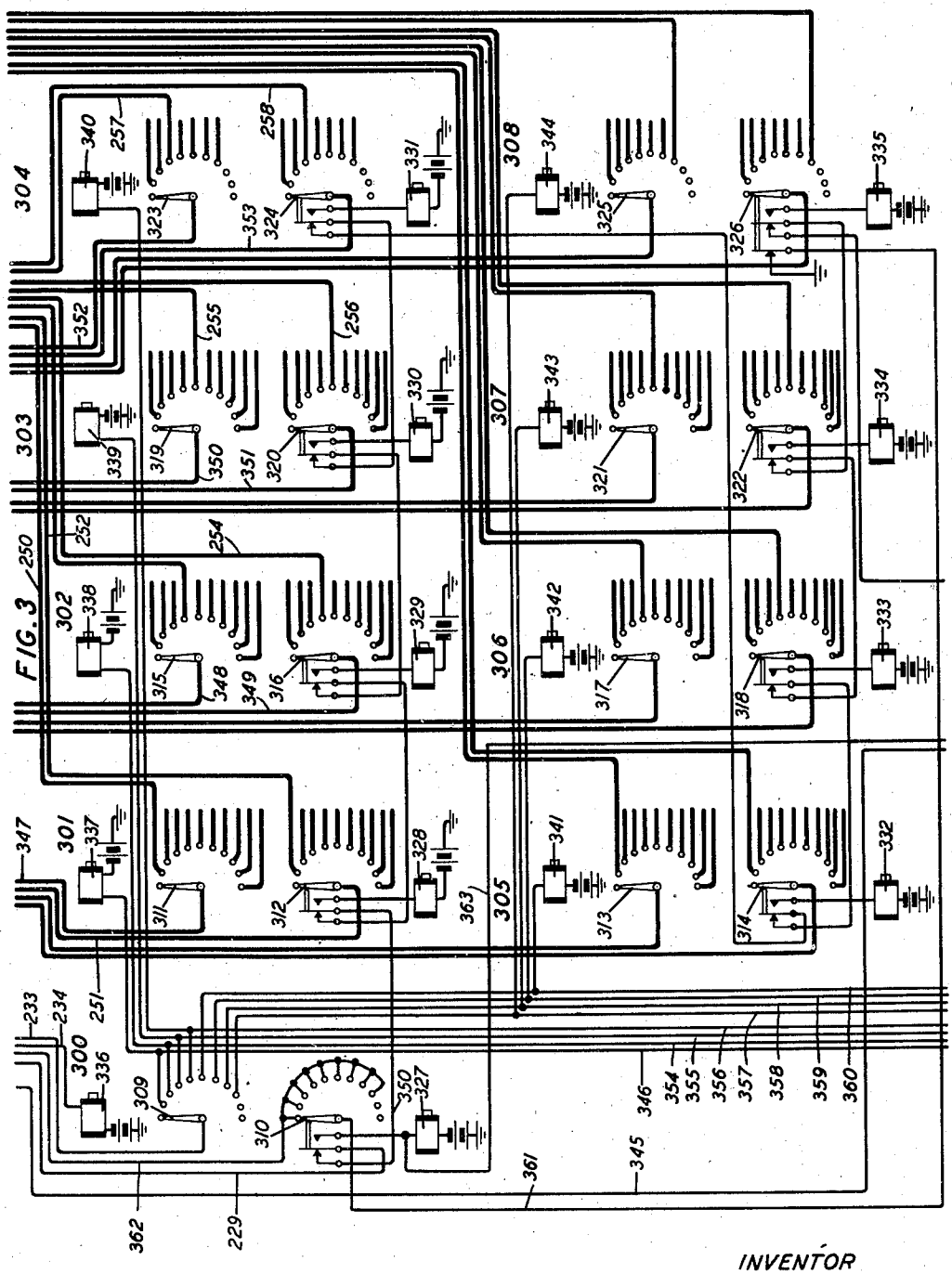

FIG. 3

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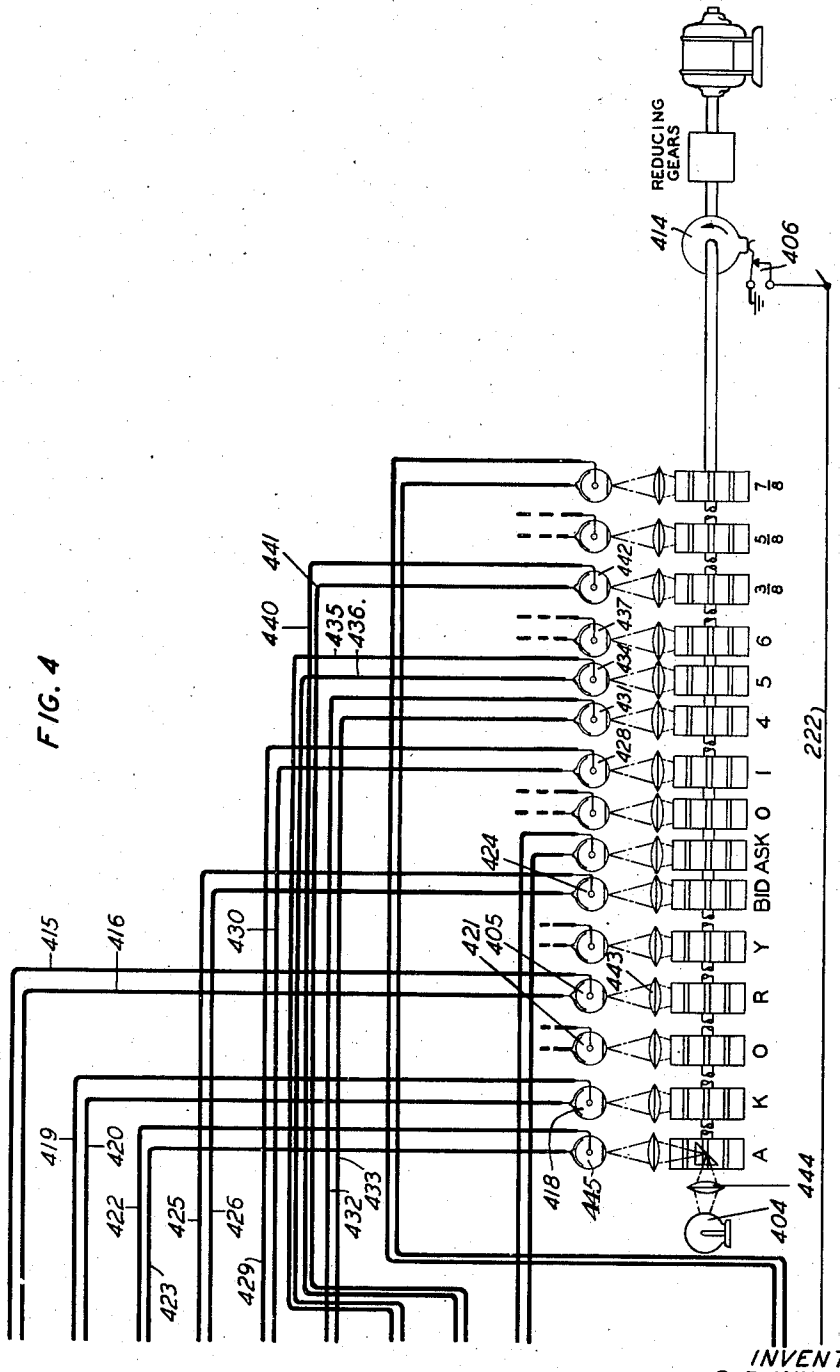

FIG. 4

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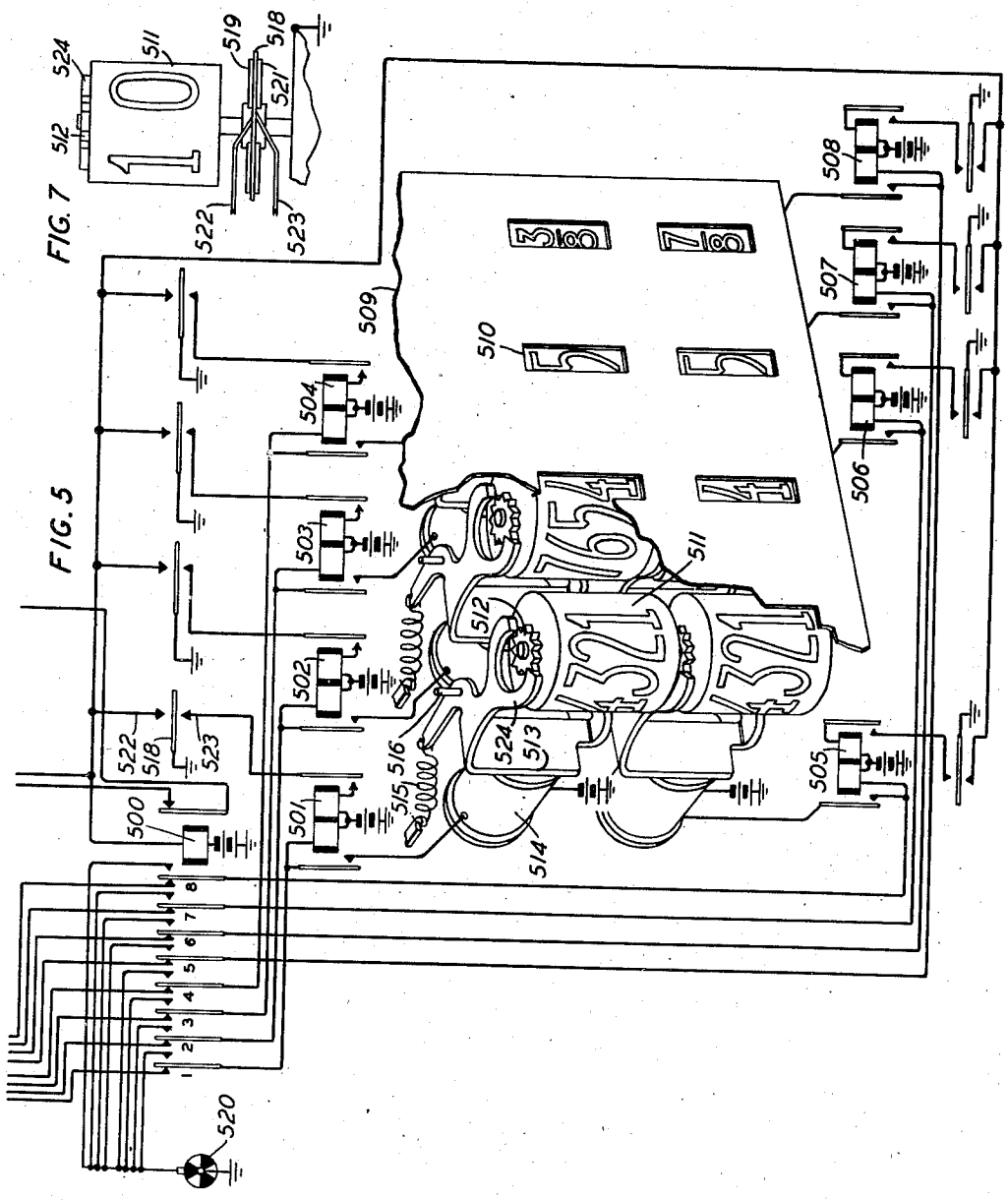
FIG. 7

FIG. 5



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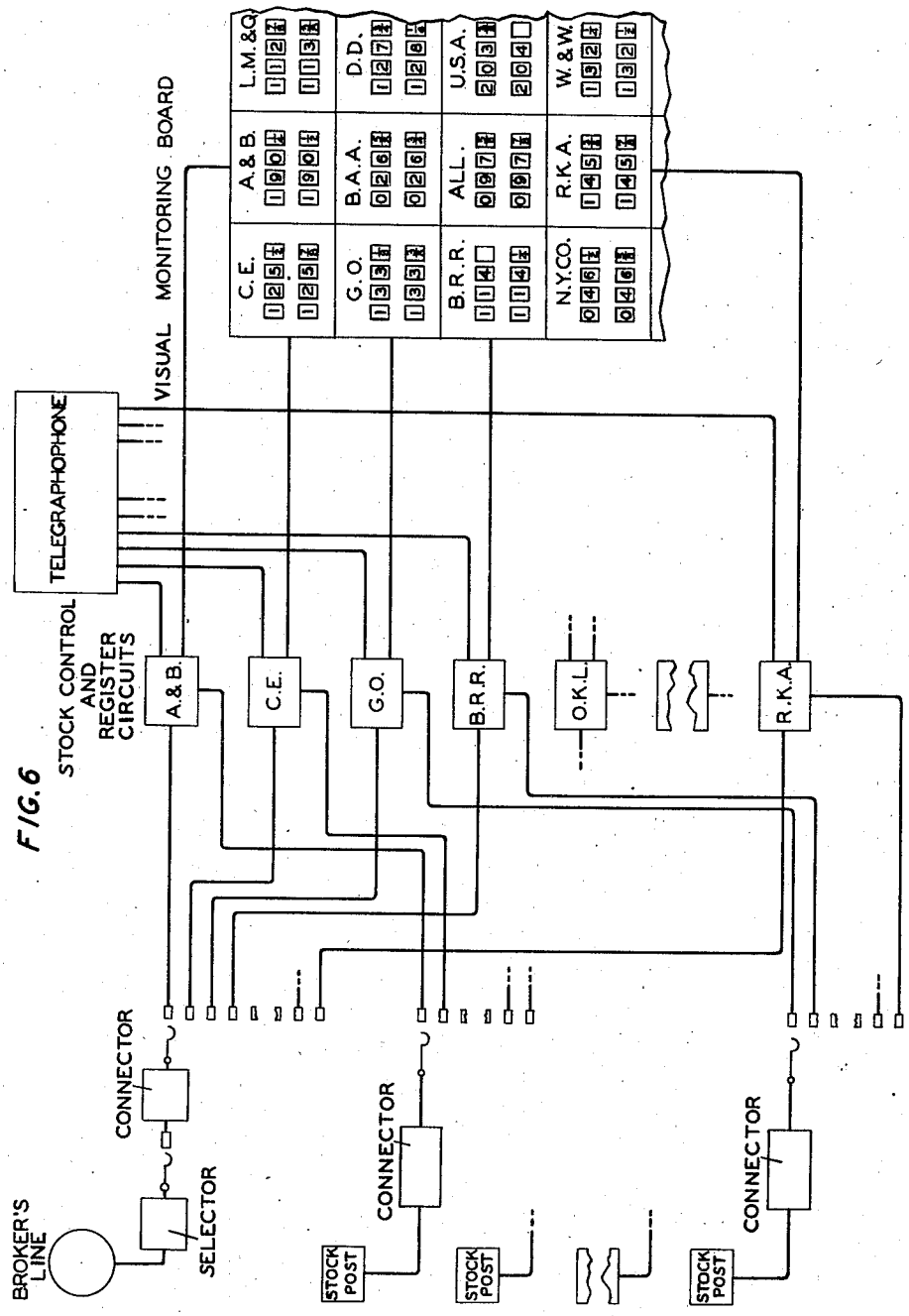

FIG. 6

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Patented Feb. 26, 1935

1,992,271

UNITED STATES PATENT OFFICE

1,992,271

AUTOMATIC STOCK QUOTATION SYSTEM

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Application September 17, 1931, Serial No. 563,285

9 Claims. (Cl. 177—353)

This invention relates to signaling systems and particularly to an automatic stock quotation system involving the use of a telegraphophone.

In metropolitan centers where the marketing of produce and securities is carried on on a large scale, it is desirable to have at hand means for quickly and accurately obtaining a quotation on the current market price of any particular product or security. In accordance with an invention disclosed and claimed in a copending application in the name of L. A. Gardner, Serial No. 564,940, filed September 24, 1931, there is provided a central agency having one unit for each product or security, which unit may be reset at any time in accordance with the current quotation by a person having the proper authority. Such a unit records this information and will give it out whenever a proper connection is established thereto.

The present invention is a specific form of this broad idea. Here a telegraphophone is used to give out the desired information over a telephone connection whenever a connection is properly established thereto. The telegraphophone is under control of a person at a stock post and the registers associated therewith may be reset over a telephone connection established therefrom.

In accordance with another feature of the invention a visual monitoring indicator may be coincidentally controlled by the stock post attendant, so that those within sight of the indicator may read the same quotations which they would receive orally by establishing a listening connection to the telegraphophone.

A clearer conception of the scope and purpose of the invention will be obtained from a consideration of the following description taken in connection with the attached drawings in which:

Fig. 1 shows the stock-brokers' switching circuits at A and B and the stock post switching circuit at C;

Fig. 2 shows a stock control circuit;

Fig. 3 shows the numerical register circuit which is a component part of said stock control circuit;

Fig. 4 shows the telegraphophone circuit and machine;

Fig. 5 shows a part of the visual monitoring indicator;

Fig. 6 shows a graphical representation of the invention contemplated herein;

Fig. 7 is a detailed front view of one of the registers forming a part of said visual monitoring indicator; and

Fig. 8 shows how Figs. 1 to 5, inclusive, are to be placed with reference to each other to describe the invention completely.

The apparatus which forms a part of the switching circuits A, B and C of Fig. 1 are the well known switches of the Strowger type used in automatic or semi-automatic telephony, while the switches forming a part of the control and register circuit shown in Figs. 2 and 3 are of the rotary type, also well known in the telephone art. It is thought unnecessary, therefore, to describe their mechanical structure in detail except to refer to any standard text on automatic or semi-automatic telephone apparatus for a description of their mechanical construction.

In order to comprehend clearly the manner in which the various parts of the system are functionally inter-related the condition will be assumed when the stock post attendant desires to register the "bid" and "asked" quotation of some particular stock whose quotation he controls. Key 137 is depressed and a circuit is completed from ground through the upper winding of relay 136, conductor 168, top make contacts of key 137, primary winding of induction coil 138 of the post telephone circuit loop, bottom make contacts of key 137, conductor 167, lower winding of relay 136 to battery. Relay 136 operates and closes a circuit to operate slow-release relay 133 over a circuit from battery through the winding of relay 133, front contacts of relay 136 to ground. The stock post attendant now dials the code of the stock whose quotation he desires to check or alter, by manipulating dial 144. At the first break of the impulse springs of the dial, relay 136 is released but relay 133, being slow-releasing, remains operated so that, for an instant, a path is completed from ground on the back contacts of relay 136, right front contacts of relay 133, normal contacts of vertical off-normal springs 134, winding of relay 125, winding of vertical magnet 128 to battery. Magnet 128 operates, moving the selector shaft and brushes 140, 141, 142, 145, 146 and 147 one step, at which time the vertical off-normal springs 134 are closed. Relay 125 is also energized at the time when the magnet operates and transfers the impulsing path through its own winding and front contacts, bottom make contacts of vertical off-normal springs 134, right front contacts of relay 133 to ground on the back contacts of relay 136. At the termination of the impulse, relay 136 reoperates and, at its back contacts, breaks the holding circuit of relay 125 and vertical magnet 128, allowing the magnet to release preparatory to moving the brush shaft another step. Relay

125, however, is slow to release and will not release during the interval between impulses. At the next impulse, relay 136 will again release and magnet 128 will advance the selector shaft another step. This action is continued during the return movement of the dial, relay 136 intermittently operating and releasing, in turn causing the brush shaft controlled by the armature of the vertical magnet to move said shaft upwards a corresponding number of steps.

At the end of the first series of impulses, relay 125 releases and, at the first break of the impulse springs of the dial for the next series of impulses, a circuit is completed from ground on the back contacts of relay 136, right front contacts of relay 133, bottom make contacts of vertical off-normal springs 134, normal contacts of relay 125, right outer back contacts of relay 131, winding of relay 126, winding of rotary magnet 129 to battery. Rotary magnet 129 operates, rotating the selector shaft and brushes 140, 141, 142, 145, 146 and 147 one step in the level of contacts to which said brushes were raised by the stepping operations of vertical magnet 128. Relay 126 is also energized at the time when rotary magnet 129 operates and removes, by opening its back contacts, the winding of relay 148 from brush 142. At the termination of the impulse, relay 136 reoperates and, at its back contacts, breaks the circuit of relay 126 and rotary magnet 128, allowing the magnet to release preparatory to rotating the brush shaft another step. Relay 126, however, is slow to release and will not release during the interval between impulses. At the next impulse, relay 136 will again release and magnet 129 will rotate the selector shaft another step. This action is continued during the second return movement of the dial, relay 136 intermittently operating and releasing, in turn causing the brush shaft controlled by the armature of the rotary magnet to rotate said shaft a corresponding number of steps.

The stock post code of any stock will ordinarily consist of no more than two digits because the number of stocks traded in at any exchange post is less than a hundred and consequently a connector switch having one vertical and one rotary movement or operation will be sufficient to operatively connect the post with the respective terminals of any of the stock control circuits which terminate on the contact banks of said connector as is evident from Fig. 6.

When the impulse dial returns to normal after the transmission of the impulses of the second digit, relay 136 will reoperate and the circuit of relay 126 and rotary magnet 129 is opened, thereby releasing rotary magnet 139 and also, after an interval, relay 126. A path is now closed which may be traced from ground on the top outer contacts of off-normal springs 134, left contacts of relay 131, winding of relay 148, contacts of relay 126, brush 142 and cooperating terminal, conductor 202, left middle contacts of relay 206, right contacts of relay 207, contacts of relay 208, right outer back contacts of relay 209, winding of relay 227 to battery. At the same time another circuit is closed from battery through resistance 127, brush 147 and cooperating contact, conductor 212, winding of relay 210 to ground, causing relay 210 to operate. The operation of relay 210 connects a tone source 270 to conductors 203 and 204 of a talking circuit described hereinafter, to warn the stock-broker subscribers who may have established connection to the control circuit, that the stock post is also connected to the same control circuit, in which event the subscribers will wait until the post connector disconnects, at which time the tone is removed. The purpose of the tone is to apprise the calling broker's station that the quotation is either being checked or changed by those in proper authority and during the period of check or revision no announcement of any sort will be transmitted, since the announcement transmitted prior to the checking might be different from the one transmitted subsequent thereto, thereby causing confusion to subscribers who might not know which of the two was correct. In any event it would be undesirable to transmit further announcements until the stock post switch is disconnected indicating thereby that the quotation recorded on the stock control register circuit is satisfactory for transmission to subscribers.

Relays 227 and 148 also operate in the above traced circuit and relay 227 closes an obvious circuit for relay 209 which also operates. The operation of relay 209 opens the circuit of relay 227 which releases and also closes a locking circuit through its right outer front contacts, contacts of relay 208 to ground on the right inner contacts of relay 209. Relay 209 connects ground over its right inner contacts, contacts of relay 208, left middle contacts of relay 206 to conductor 202 and performs functions hereinafter noted. With the operation of relay 148, another circuit is also closed from ground on the left contacts of relay 133, right contacts of relay 148, winding of relay 135 to battery. Relay 135 operates and locks over its top inner contacts to operating ground on the left contacts of relay 133. Relay 135 connects brushes 140 and 141 through the transmission bridge 162 thereby preparing a talking circuit for a future operation. Relay 132 is now caused to operate over an obvious circuit closed from ground on the top middle contacts of relay 135. Relay 209 closes a circuit traceable from battery through the winding of relay 213, conductor 214, left contacts of relay 209, brush 215 of switch 220 and normal contact cooperating therewith, conductor 222 to ground on interrupter 406 of the telegraphophone apparatus shown in Fig. 4.

Now the telegraphophone mechanism, shown in Fig. 4, illustrates one form which such a mechanism may take. It comprises a series of drums having opaque and partially transparent sections, the partially transparent sections being photographic records of the sound corresponding to the digits from 0 to 9, those corresponding to the fractions ⅛, ¼, ⅜, ½, ⅝, ¾ and ⅞, those corresponding to the words "bid" and "asked" and finally those corresponding to each letter of the alphabet all of which are used, in appropriate combinations, to designate the abbreviations of the various stocks. The light from a source, such as lamp 404, may be directed by any suitable means through each of the speech records to the photoelectric cells, such as cell 442, and the output currents are amplified by suitable vacuum tube amplifiers each in series with one side of a step-up transformer and transmitted in the manner hereinafter described over the loop circuit to the stock-broker's telephone set, or to the stock post telephone set. Those vacuum tube amplifiers and the transformers operatively connected to each of them which are necessary to illustrate the operation of the invention are graphically represented in Fig. 2; the former by the triangle with the letter or des-

ignation within it indicating to which sound record light-sensitive cell it is connected, and the latter by the usual conventional representation of a transformer the primary winding of which is connected to the associated amplifier. The telegraphophone mechanism, such as disclosed in Patent No. 1,645,573, granted October 18, 1927 in the name of H. M. Bascom and therein designated as a call announcer may also be employed.

The interrupter 406 engages cooperating lifting finger of the cam 414 coupled to the shaft which drives the film drums. A little less than one revolution of the shaft measures the time during which the sound records on the various drums are exposed to their respective light sources and the shaft is driven at a speed and the circumference of the cam is such that when the interrupter 406 opens its contact by getting out of engagement with the cam finger, the light sources begin traversing such parts of the speech records as contain the actual sound record of the number, letter or word on the record. By the time the shaft has revolved to the point where the cam finger again closes contacts 406, the light sources will have completed traversing the photographic records. The time during which contacts 406 are contacting, that is, riding on the cam finger, represents a period of silence, since, during this time, the light sources are not traversing the sound records themselves on the respective drums.

It will be assumed, at present, that no quotation is registered on the stock registers 301 to 308, inclusive, and that the control switch 300 is normal. It will be recalled that relay 209 operated and locked to ground on its right outer contacts. The same ground is now connected through to conductor 202 by way of the contacts of relay 208 thereby short-circuiting relay 148 and causing it to release. With the release of relay 148, a path is closed for operating relay 131 from battery through the winding of relay 131, left contacts of relay 148 to ground on the top middle contacts of relay 135. Relay 131 operates.

The stock post attendant, after having depressed key 137, listens in his telephone instrument. If a registration were recorded in the stock control and register circuit, he would hear, at this time, a pronouncement of that quotation in the manner described hereinafter. Since, however, it has been assumed that no quotation has been registered, no announcement will be heard, indicating to him that the registers are normal. He will now proceed to record a "bid" and "asked" quotation. To do this he momentarily depresses key 165 and a circuit is closed from ground on the left contacts of relay 133, contacts of key 165, bottom outer contacts of relay 135, right inner contacts of relay 131, brush 146 and cooperating terminal, conductor 223, left outer contacts of relay 206, winding of relay 207 to battery. Relay 207 operates and locks over its right intermediate front contacts to ground on the right back contacts of relay 228. If now all of the register switches 301 to 308, inclusive, and register control switch 300 are normal, a circuit is closed which may be traced from ground on the left front contacts of relay 207, conductor 229, normal contacts controlled by brush 310, similar contacts controlled by brushes 312, 316, 320, 324, 314, 318, 322 and 326, right contacts of relay 500, conductor 345, winding of relay 224 to battery. Relay 224 operates and, in turn, causes the operation of relay 206. With the operation of relay 206, an interrupted tone circuit is induced over the secondary winding of relay 206. This tone is reinduced over the right hand winding of said relay, outer contacts of relay 224, outer right front contacts of relay 207, condenser 276, conductor 201 and cooperating contact, brush 141, bottom inner contacts of relay 135, winding 160 of autotransformer 161 to ground. This tone is reinduced over the loop including the post attendant's telephone set, previously described, and indicates that the apparatus is ready to receive the impulses representing the stock quotation of the stock to which the post is connected. If, however, the registers are not normal, relay 206 will not have operated, and circuits are closed to restore the switches to normal in the manner described hereinafter before the dial tone circuit is closed as indicated above.

As soon as the post attendant receives dial tone, he dials the hundreds numerical designation of the "bid" price. At the first open period of the dial, relay 136 releases and an impulsing circuit is closed from ground on the bottom contacts of relay 136, right front contacts of relay 133, bottom outer make contacts of off-normal springs 134, normal contacts of relay 125, right outer front contacts of relay 131, brush 145 and cooperating contact, conductor 272, left inner contacts of relay 206, winding of relay 228 to battery. Relay 228 operates and, in turn, causes the operation of relay 226. Relay 226, over its right outer contacts, provides a locking circuit for the right winding of relay 206 in addition to that supplied from ground on the contact springs controlled by brush 326 of switch 308, conductor 361, brush 310 of switch 300. Relay 228 also opens the locking circuit of relay 207 which releases since its initial circuit was opened by the operation of relay 206, relay 207, in turn, releasing relay 224. Relay 226 closes a circuit from ground on its right inner front contacts, conductor 234, switch magnet 336 of register control switch 300 to battery. Switch 300 operates and advances its brushes 309 and 310 to the second set of terminals at which time the transfer set of springs associated with brush 310 are operated thereby opening at another point the circuit of relay 224. Relay 206, however, does not release since it is now held locked over the paths above described. When brush 309 engages the second terminal on the cooperating arc, the impulsing ground is extended from ground on the left contact of relay 228, left contact of relay 226, conductor 233, brush 309 and cooperating terminal, winding of magnet 337 of hundreds register switch 301 to battery and, in parallel therewith on conductor 346, back contacts of the No. 1 contact set of relay 500, left winding of relay 501 to battery. Magnet 337 operates and advances its associated brushes 311 and 312 one step. Relay 501 also operates and locks in a manner and to perform functions hereinafter described. Both magnets, that is, magnest 336 and 337, will now remain operated, the former from the front contacts of relay 226 and the latter from the impulsing ground traced to the left inner contact of relay 228. Relay 226, however, is slow-release and will hold operated during the reception of a series of impulses so that, during the reception of the said impulses, switch 300 will remain operated.

When the open period of the impulse is over, relay 136 reoperates and the circuit of relay 228 is opened at the back contacts of relay 136, causing relay 228 to release. The release of relay 228 opens the circuit of magnet 337 thereby causing said switch to prepare to advance its brushes another step at the next impulse. Each succeed-

ing impulse of the series will then cause a corresponding step to be taken by switch 301 until all the impulses of the hundreds designation are registered on the arc of switch 301 corresponding to the hundreds designation of the "bid" quotation. When the series of impulses comprising the hundreds quotation figure are terminated, relay 228 releases in turn releasing relay 226. Relay 226 opens the circuit of magnet 336 of switch 300 thereby causing this switch to prepare to advance its brushes another step.

The attendant now dials the tens digit of the "bid" quotation. On the open period of the first impulse relay 136 releases and closes the previously described circuit for relay 228, causing it to operate and in turn operating relay 226. The previously described circuit is now closed for switch magnet 336 causing the magnet to operate and advance its brushes 309 and 310 to the next set of terminals. Also another circuit is closed from ground on the winding of relay 228, left inner contacts of relay 228, left contacts of relay 226, conductor 233, brush 309 and cooperating third terminal, winding 338 of switch 302 to battery and in parallel with the winding of magnet 338, conductor 354, back contacts of the No. 2 contact set of relay 500, left winding of relay 502 to battery. Relay 502 operates. Magnet 338 operates and advances the brushes 315 and 316 of switch 302. At the end of the first impulse, relay 136 reoperates, relay 228 releases and magnet 338 likewise releases. Relay 226 does not release and consequently switch 300 will remain with its switch magnet operated preparatory to advancing the associated brushes. Each succeeding impulse of the tens digit will therefore cause the advancement of brushes 315 and 316 of switch 302 one step so that when the dial has restored to normal the tens digit impulses have been transmitted and switch 302 will have taken a corresponding number of steps while relay 502 will have likewise operated and locked to perform functions hereinafter noted. At the end of the tens digit series of impulses, relay 228 releases and, after an interval, relay 226 releases. The circuit of magnet 336 is now opened, causing said magnet to release preparatory to advancing brushes 309 and 310 to the fourth set of terminals.

The attendant next dials the units digit of the "bid" quotation and, as in the case of the hundreds and tens digits, relays 228 and 226 are operated as previously described and the consequent train of impulses cause the stepping of switch 303 by the operation of magnet 339 and the operation of relay 503 over the following circuit: Ground on the winding of relay 228, left inner contacts of said relay, left front contacts of relay 226, conductor 233, brush 309 and cooperating fourth terminal of the associated arc, winding of magnet 339 to battery and, in parallel to the winding of magnet 339 over conductor 355, back contacts of the No. 3 contacts of relay 500, left winding of relay 503 to battery. Switch 303 will accordingly take as many steps as there are impulses in the train while relay 503 will operate and lock in the same manner as relay 502. When the dial has returned to normal, relays 228 and 226 release as previously described and switch 300 releases preparatory to advancing brushes 309 and 310 to the fifth set of terminals.

The "bid" fractions quotation is next dialed. The fractional quotation is usually in terms of eighths and the number dialed by the attendant expresses the numerator of said fractional quotation thus $\frac{1}{8}$, $\frac{2}{8}$ ($\frac{1}{4}$), $\frac{3}{8}$, $\frac{4}{8}$ ($\frac{1}{2}$), $\frac{5}{8}$, $\frac{6}{8}$ ($\frac{3}{4}$) and $\frac{7}{8}$. This registration is recorded in the contact arcs cooperating with brushes 323 and 324 of switch 304 and the manner of their setting is identical with the manner in which the brushes of the previous switches are set. Also relay 504 operates and locks on the first impulse of the series in a circuit over conductor 356 to perform functions hereinafter described.

After the "bid" fractional quotation is dialed, the attendant next proceeds to dial the "asked" quotation which, like the "bid" quotation, consists of hundreds, tens, units and fractional designations. Each of these designations is recorded respectively on the arcs of switches 305, 306, 307 and 308 in the manner previously described for the "bid" quotation and relays 505, 506, 507 and 508 are each respectively operated and locked on the first impulse of the separate trains of impulses to perform functions hereinafter described. Since the circuit conditions and operations are the same in both cases except for the fact that between each set of impulses switch 300 advances the impulsing circuit to the succeeding register switch, it is not thought necessary to encumber this specification with a further description of each of the circuits involved; each of them being easily traceable from the winding of relay 228 to the winding of the magnet of the switch which records the particular registration.

As already explained, relays 501 to 508 inclusive have each responded to the first impulse in the plurality of series of impulses comprising the "bid" and "asked" quotations. Now Fig. 5 shows a partly cut away section of the visual monitoring indicator board illustrated diagrammatically in Fig. 6. The purpose of this board is to supply a visual indication of the stock quotations as registered in the stock control circuits by the respective post attendants. It comprises a plurality of sections, each of which contains a group of indicator registers which show the quotation for the particular stock assigned to that section. Each section, therefore, forms a "bid" and "asked" quotation display panel for some one listed stock. The board comprises a front panel 509 with eight rectangular apertures 510 in each section and through which is disclosed a digit figure. The four upper apertures disclose the three digits and fractional figure designations indicating the "bid" quotation while the four apertures immediately below disclose the three digits and fractional figure designations indicating the "asked" quotation. The series of digits from 0 to 9 for each aperture are carried on a cylindrically shaped member 511 of insulating material, forming a part of the register. The said member is supported at each end through a central axis to a supporting frame, about which axis it has free rotational movement, said frame and axis not being shown in Fig. 5. At the top of said axis is an escapement wheel 512 whose teeth are positioned between the arms of escapement 524 forming a part of the armature 513 of the register magnet 514. The armature is connected to the restoring spring 515 and is supported on the axis 516.

Considering, now, Fig. 7 which illustrates a skeletonized conventional front view of one of the indicator registers, the cylinder 511 carries on its supporting axis a cam wheel 518 of insulating material having top and bottom conducting segments 519 and 521 with which contacts 522 and 523 engage as the cam wheel rotates between them, but both of which contacts, how-

ever, are insulated from the metal parts of the register while the segments 519 and 521 are connected to ground through the supporting metal frame. The cam segments and contacts together form an off-normal contact combination wherein the segments of said cam are cut away so that when the cooperating contacts 519 and 521 engage said cut away portions, the cam and contacts are electrically insulated from one another. The cylindrical body 511 has a blank space between the digits 0 and 1 and when the cylinder is set so that this space faces the panel aperture 510, the cam and contacts are insulated from each other.

While the mechanical structure of the numerical indicator register briefly described herein has been adapted to this invention, such registers, in many forms, are well known to the electrical art, and since the structure of such a register forms no part of this invention, it is understood that the invention is not limited to any particular type of register so long as its electromechanical structure permits its use with the cooperating circuit in the manner described hereinafter.

Referring back to the operations of the circuit, the operation of relay 501 closed a parallel circuit to magnet 514 of the register indicator. The magnet operates, attracts its armature 513 whose escapement 524 engages a tooth of the escapement wheel 512 and rotates the number-carrying cylinder one half step but not sufficiently to bring the figure of the next numeral within full view in the panel aperture 510. When the impulse is completed, ground is removed from the operating winding of relay 501 and hence also from the winding of magnet 514, thereby causing the magnet to release. The return of the armature 513 by spring 515 causes the escapement to engage another tooth of the escapement wheel and the cylinder 512 is rotated through another half step which is then sufficient to rotate the numeral figure directly to the center of the panel aperture.

As soon as magnet 514 operates and rotates the cylinder through the first half step, cam 518 is rotated with it. If the indicator register was originally in the normal position, that is, the position in which the blank space between the 0 and 1 on the cylinder faces the panel aperture, then the first movement of the cylinder will cause contacts 522 and 523 to engage the metallic segments of cam 518, thereby establishing electrical contact between the two contacts and ground. That is to say, these contacts are closed so that once relay 501 is operated as a result of the first impulse and the cylinder 511 is rotated slightly, a locking circuit is completed for relay 501 from ground on the cam 518, bottom spring 523, right contact and winding of relay 501 to battery. Each succeeding impulse of the series will now cause the operation of magnet 514 but relay 501 will remain locked until the cylinder is rotated to its normal position. In this manner the number of impulses representing the digits of a quotation as dialed by the post attendant are not only recorded on the appropriate numerical registers of the control circuit but are also registered on the corresponding indicator registers of the section. Each series of impulses is dialed into a separate indicator register, controlled by one of the relays 501 to 508 inclusive and, when the post attendant has completed dialing the entire "bid" and "asked" quotations, the numerical designation of said entire quotation is displayed on the eight indicator registers of the visual monitoring board which are allocated to the specified stock.

The "bid" and "asked" quotation having been recorded on the stock register switches, the attendant is in a position to check the verbal transmission of the quotation, as dialed, by tl telegraphophone without any further operations on his part.

It will further be assumed that the stock letter designation corresponding to the impulse code available to the post attendant to move the connector to the terminals of the stock control circuit individual to that stock, corresponds to the letter designation RKA and that the "bid" and "asked" quotations dialed into said stock control circuit are 145⅜ and 145⅞, respectively.

When the attendant has dialed the fraction designation of the "asked" quotation, relays 228 and 226 release, switch 300 releases and since the fraction's register 308 has been operated, the off-normal springs associated with brush 326 have also operated and consequently ground on conductor 361 connected to brush 310 is removed. Relay 206, therefore, also releases. When the start interrupter 406 closes its contacts at the start of an announcing cycle, a circuit is closed from ground on the contacts of the interrupter 406, conductor 222, brush 215 and normal contact on its cooperating arc, left contacts of relay 209, winding of relay 213 to battery. Relay 213 operates and, over its bottom outer contacts, closes an obvious circuit for magnet 219 of steering switch 220. Magnet 219 operates, but its brushes are not advanced on the operation of the magnet as was the case with the numerical switches as this switch is of the type which advances on the release of the magnet. When interrupter 406 opens its contacts ground is removed from conductor 222, relay 213 is released and magnet 219 then releases and advances its brushes 215 to 218, inclusive, one step.

Immediately after the interrupter 406 opens, the telegraphophone film shaft, which is constantly rotating at a predetermined speed, rotates the film drums into the zone where the speech records become illuminated by their respective lamps, such as lamp 404. The rays of light are converged and concentrated by lenses, such as 444, on the revolving film and the corresponding variation of the transmitted light through the photographic record and lens such as 443 effects a corresponding change in the resistance of the light-sensitive electric cells such as cell 405 which causes a corresponding flow of current in a circuit traceable from one side of the cell 405, conductor 415, amplifier R, conductor 416, to the other side of cell 405. This current is then changed into an alternating current by transformer 221 and the attendant hears the pronouncement of the letter "R" in his receiver, the circuit being traced as follows: Upper terminal of the secondary winding of transformer 221, conductor 273, brush 218 and cooperating terminal, top contacts of relay 213, conductor 200 and connected terminal, brush 140, top outer contacts of relay 135, top arm of transmission unit 162, condenser 163, conductor 168, top make contacts of key 137, primary of induction coil 138, telephone transmitter and dial, bottom front contacts of key 137, conductor 167, condenser 164, lower arm of transmission unit 162, bottom inner contacts of relay 135, brush 141, conductor 201 and connected terminal, bottom inner contacts of relay 213, brush 217 and cooperating terminal, conductor 231, to the other side of the secondary

winding of transformer 221. The current is then further induced over the secondary S of induction coil 138 into the receiver of the telephone instrument. The attendant thus hears the oral pronouncement of the letter "R" which is the first letter of the stock code.

During the time that the pronouncement records are exposed to the illumination of their respective lamps, interrupter 406 is open. The circumference of the interrupter cam 414 is such that by the time the pronouncement record drums have been entirely traversed by the light of their respective lamps interrupter 406 will again engage the cam finger, as already explained. Consequently, when the pronouncement of the letter "R" is over, interrupter 406 again closes its contacts and ground is connected to the commoned contacts of the arc cooperating with brush 215, whereupon previously traced circuits are closed to relay 213 and magnet 219 causing the former to operate and open the transmission circuit and the latter to operate and prepare to advance its brushes to the next set of terminals. When the interrupter opens its contacts, relay 213 releases and closes the transmission circuit while magnet 219 releases and advances its brushes, whereupon the telegraphophone shaft by this time has been rotated into the position in which the sound records are again exposed to their respective sources of light. The corresponding changes in light sensitive cell 418 produce a flow of current through a circuit traceable from one side of cell 418 associated with sound record drum K, conductor 419, through amplifier K, conductor 420 to the other side of cell 418. The variable current is transformed into an alternating current through the secondary of transformer 232 in a circuit traceable from one side of the secondary winding of said transformer, conductor 244, brush 218 and cooperating contact, over the loop previously described to brush 217 and cooperating contact, conductor 245 to the other terminal of the secondary winding of transformer 232. The attendant now hears the oral pronouncement of the letter "K" which is the second letter of the stock code.

When a revolution of the speech record shaft has been completed, interrupter 406 again closes its contacts and ground is connected once again to conductor 222. The previously described circuit for relay 213 is again closed through the commoned terminals of the arc cooperating with brush 215 and magnet 219 is, in consequence, energized. At the break of the interrupter contacts, relay 213 and switch magnet 219 again release advancing the brushes of switch 220 one step and immediately thereafter the telegraphophone shaft is rotated into the position for exposing the sound records to the light of the respective lamps. The corresponding changes in light-sensitive cell 445 produce a flow of current through a circuit traceable from one side of cell 445, conductor 422, through amplifier A, conductor 423, to the other side of cell 445. This variable current is transformed into an alternating current through the secondary of transformer 233 in a circuit traceable from one side of the secondary winding of said transformer, conductor 246, brush 218 and cooperating contact, over the loop previously described to brush 217 and cooperating contact, conductor 247 to the other terminal of the secondary winding of transformer 233. The attendant now hears the oral pronouncement of the letter "A" which is the third and final letters of the stock code.

At the end of the revolution of the telegraphophone shaft, interrupter 406 closes its contacts and previously described circuits for relay 213, and magnet 219 are again closed. When the interrupter opens, relay 213 releases and switch magnet 219 releases and advances its brushes another step.

The telegraphophone shaft now begins its fourth revolution and the light-sensitive circuit of the word "bid" is completed as follows: One side of cell 424, conductor 425, through the amplifier designated "bid", conductor 426 to the other side of the cell 424. This variable current is transformed into an alternating current through the secondary of transformer 234 in a circuit traceable from one side of the secondary winding of said transformer, conductor 248, brush 218 and cooperating contact, over the loop previously described to brush 217 and cooperating contact, conductor 249 to the other terminal of the secondary winding of transformer 234. The attendant now hears the oral pronouncement of the word "bid".

At the end of the drum shaft revolution interrupter 406 is closed and the previously described circuits for relay 213 and magnet 219 are closed, while at the opening of said interrupter contacts, relay 213 releases and magnet 219 advances its brushes to the next set of terminals. The consequent advance of the film shaft to the pronouncement position now causes a circuit to be prepared for the oral pronouncement of the hundreds numerical designation of the "bid" quotation. Remembering that the assumed "bid" quotation is 145⅜, this circuit is closed from one side of light-sensitive cell 428 which receives light from the film carrying the photographic record of the numeral 1, conductor 429, amplifier "1", conductor 430 to other side of cell 428. This variable current is transformed into an alternating current through the secondary of transformer 235, in a circuit traceable from one terminal of secondary winding of said transformer, conductor 250, brush 311, which has been set on terminal 1, conductor 347, brush 218 and cooperating terminal, over the loop previously described to brush 217 and cooperating terminal, conductor 251, brush 312 and cooperating first terminal, conductor 252, to the other terminal of the secondary winding of transformer 235. The attendant hears the oral pronouncement of the numeral "1".

At the end of the shaft revolution interrupter 406 again closes its contact and a circuit is completed to the winding of relay 213 as previously described. Relay 213 operates and, in turn, causes the operation of switch magnet 219. On the opening of the interrupter contacts, magnet 219 releases and advances the brushes of switch 220 one step. An announcing circuit is now closed from one side of cell 431 which receives light from film having the photographic record of numeral 4, conductor 432, amplifier 4, conductor 433 to the other side of cell 431. This variable current is transformed into an alternating current through the secondary of transformer 236 in a circuit traceable from one side of secondary winding of said transformer, conductor 253, brush 315 which has been set on terminal 4, conductor 348, brush 218 and cooperating terminal, over the loop previously described to brush 217 and cooperating terminal, conductor 349, brush 316 and cooperating fourth terminal, conductor 254 to the other terminal of the secondary winding of transformer 236. The attendant hears the oral pronouncement of the numeral "4".

At the end of the shaft revolution, interrupter 406 again closes its contact connecting ground thereby to conductor 222 and consequently to brush 215 and cooperating terminal. Relay 213 and switch magnet 219 now operate as previously described and the switch brushes are advanced to the next set of terminals at the opening of the interrupter. An announcing circuit is now closed from one side of cell 434 which receives light from the film having the photographic record of numeral 5, conductor 435, amplifier 5, conductor 436 to the other side of cell 434. This variable current is then repeated and transformed through a circuit including the secondary winding of transformer 237 over a path traceable from one side of secondary winding of said transformer 237, conductor 255, brush 319 which has been set on terminal 5, conductor 350, brush 218 and cooperating terminal, over the loop previously described to brush 217 and cooperating terminal, conductor 351, brush 320 and cooperating fifth terminal, conductor 256, to the other terminal of the secondary winding of transformer 237. The attendant, therefore, hears the oral pronouncement of the numeral "5".

At the end of the shaft revolution, interrupter 406 again closes its contact causing previously described circuits to operate relay 213 and switch magnet 219 and the consequent advance of the brushes of switch 220 to the next set of terminals when the interrupter opens its contacts. An announcing circuit is now closed from one side of cell 442 which receives light from the film having the photographic record of the fractional designation 3/8, conductor 440, amplifier 3/8, conductor 441 to the other side of cell 442. This variable current is then repeated and transformed through a circuit including the secondary winding of transformer 238 over a path traceable from one side of secondary winding of said transformer, conductor 257, brush 323 which has been set on terminal 3, conductor 352, brush 218 and cooperating terminal, over the loop previously described, to brush 217 and cooperating terminal, conductor 353 brush 324 and cooperating third terminal, conductor 258, to the other terminal of the secondary winding of transformer 238. The attendant, therefore, hears the oral pronouncement of the fractional designation "3/8".

It is believed that a sufficient number of circuits have been described to illustrate clearly the manner in which, by the setting of the numerical registers and the permanent connection of the letter code record of the stock to the terminals of the control switch associated with that stock, the attendant may hear repeated back in his telephone instrument the oral pronouncement of the stock code and the "bid" and "asked" prices as dialed into the registers. It is not thought necessary to further describe in detail the remaining "asked" registration circuits as they are of the same order as the ones previously described for the "bid" prices except for the fact that the hundreds, tens, units and fractional designation circuits of the "bid" quotation are carried through the brushes and cooperating terminals of switches 305, 306, 307 and 308 respectively. When, therefore, the entire announcement has been made, the brushes of switch 220 will have advanced to their last set of terminals. A circuit is now completed from ground through the winding of relay 208, right contacts of relay 225, brush 215 and cooperating fourteenth terminal, left contact of relay 209, conductor 214 to the winding of relay 213. Both relays 213 and 208 operate. Relay 213 causes the operation of switch magnet 219. In the meanwhile the operation of relay 208 unlocked relay 209 which causes it to release. The release of relay 208 opens the circuit of relay 213 thereby causing it to release. Switch magnet 219 likewise releases and advances the brushes of switch 220 to normal. The circuit shown in Fig. 2 is now normal but the numerical switches shown in Fig. 3 remain in the position to which they were advanced and the indication on the monitoring board will also remain undisturbed.

When the attendant dials the stock code and sets the connector switch on the terminals of the corresponding stock control circuit, he may simply wish to check the pronouncement of the stock quotation as already registered therein and not disturb either the switch or monitoring board setting. Under such circumstances the attendant merely operates key 137 and dials the stock code. When the connector switch has engaged the stock control circuit terminals, relays 227 and 209 operate as already described. If the post attendant merely desires to check the quotation pronouncement, however, key 165 is not operated so that no circuit is available to operate relay 207. Prior to making the check, however, it is necessary to insure that switch 220 is in its normal position as there is no control exercised over the time when the post attendant may wish to check the quotation of a stock and, under such circumstances, he may cause the engagement of the post connector switch C to the stock control circuit at any period of a pronouncement over connector B and consequently when the brushes of switch 220 are connected to any of the terminals of their respective cooperating arcs. Therefore, as soon as relay 209 operates and with switch 220 off normal, a circuit is closed from ground on the interrupter contacts of magnet 219, right middle contacts of relay 209, brush 216 and any off-normal terminal of the cooperating arc, winding of relay 225, to battery. Relay 225 operates and closes an obvious circuit to the winding of switch magnet 219. Magnet 219 operates, breaks its interrupter contacts and thereby releases relay 225, whereupon the circuit of magnet 219 is opened, causing it to release and advance the switch brushes one terminal. With the reclosure of the magnet interrupter contacts, the circuit of relay 225 is reestablished and, in consequence, magnet 219 is caused to operate again. The switch now takes another step, the above cycle of operations continuing until the brushes have been advanced to the normal terminals, at which time there is no further closure of the circuit for relay 225 and the brushes of switch 220 remain on their respective normal terminals. However, due to the fact that the remaining switches remain off normal, relays 224 and 206 do not operate and consequently the attendant does not receive dial tone. At the beginning of the announcement cycle, interrupter 406 closes the previously described circuit for operating relay 213. Relay 213 then closes a circuit for switch magnet 219 and the operations thereafter are the same as those previously described wherein the attendant hears a pronouncement in accordance with the setting of the switches.

If the attendant is satisfied that the announcement as heard, checks with what he dialed, or what was originally on the registers, key 137 is released. Relay 136 releases and, after an interval, relay 133 also releases. Relay 135 is

unlocked by the removal of ground on the left contacts of relay 133 causing this relay to release also. With the release of relay 136 a circuit is closed for release magnet 130 from battery through the winding of said release magnet, middle contacts of vertical, off-normal springs 134, right back contacts of relay 133 to ground on the back contacts of relay 136. Release magnet 130 operates and causes the restoration to normal of the brush shaft carrying the selector brushes 140, 141, 142, 145, 146 and 147. If, however, the attendant is not satisfied with the pronouncement or he wishes to make a change in the registered quotation, he proceeds to momentarily operate key 165, whereupon a previously traced circuit causes the operation of relay 207. A holding circuit for relay 207 is now closed from ground on the right back contacts of relay 228, right middle front contacts of relay 207 to the winding of relay 207, while said relay connects ground to conductor 229, inner make contacts of contact springs associated with brush 310, which is off normal, winding of release magnet 327 of switch 300 to battery. The ground is further extended in parallel to conductor 363, to the winding of relay 500 causing it to operate. Relay 500 locks over parallel paths to the top off-normal contact 522 of each indicator register, since these registers are off normal when a quotation is registered therein. Relay 500 performs functions hereinafter described. Magnet 327 operates and releases the brushes of switch 300 to their normal position, at which time the front contacts of said springs are opened and the back contacts closed. The ground on conductor 229 is now extended over said back contacts, conductor 350, front contacts of springs controlled by brush 312, winding of release magnet 328 of switch 301 to battery. Magnet 328 operates and likewise releases brushes 311 and 312 to normal at which time the make contacts of said springs are opened and the back contacts closed. In the same manner the release circuit is, in succession, extended to release magnets 329, 330, 331, 332, 333, 334 and 335.

In the meanwhile the operation of relay 500 disconnects the winding of each of the register indicator control relays 501 to 508, inclusive, from their respective operating circuits and connects each of these windings to a separate conductor all of which are strapped together to a common grounded impulse interrupter 520. The impulsing ground is now connected through each of the left front contacts of relays 501 to 508, inclusive, to the windings of the magnets of the separate indicator registers. Each impulse operates each of the magnets and the respective associated digit-carrying cylinders are rotated a step with each impulse. As each register reaches its normal position, that is, the position in which the blank cylindrical space between 0 and 1 faces the panel opening, contacts 522 and 523 engage the insulating portion of cam 518, as shown in Fig. 7, and the locking circuit of the associated control relay like relay 501, is opened while the corresponding parallel locking circuit to relay 500 is also opened. When all indicator registers are normal, all the off-normal contacts are opened and relay 500 is released, since, by this time, switch 300 will have been already returned to normal and opened the operating circuit of relay 500. The visual monitoring indicating circuit of the particular stock RKA is now receptive to another setting.

When the last register switch, that is, switch 308, is restored to normal and relay 500 has released, a previously described circuit for relay 224 is closed, causing this relay to operate, further controlling circuits which transmit dial tone to the attendant, as already described. The attendant now dials the new "bid" and and "asked" quotations, causing the resetting of the register switches and monitor indicator to conform with them and the subsequent pronouncement of the quotations by the telegraphophone apparatus.

The operations having to do with a stock-broker dialing a stock code in order to automatically obtain a pronouncement of the "bid" and "asked" quotation of the stock represented by that code will now be described.

The subscriber's station is connected to the terminals of a stock control circuit through a number of switching selectors, the number supplied being governed by the number of subscribers as well as the quantity of traffic to be handled. In Fig. 1 two such switching stages are shown, a selector A and a connector B although it is to be understood that the invention is not limited to any particular number, as the switching facilities can be easily increased or diminished by any one skilled in the art. Furthermore, the number of digits comprising the subscriber code of each stock, as distinguished from the post code for the same stock, is a function of the number of selectors to be set by dial impulses, one group of impulses controlling the setting of each selector except the last, that is, the last switching stage or connector, which for its setting, necessitates the use of two sets of impulses.

In accordance with the illustration of Fig. 1, wherein a selector and a connector are shown, it will be assumed that stock codes will be three digit numbers and that the stock-broker will dial the particular code assigned to the stock. It will further be assumed, in order not to encumber this specification with a repetition of what has already been described, that the stock-broker will dial the code of stock RKA and that the "bid" and "asked" quotations are those set by the stock post attendant in the manner already described and that such quotations are "Bid—145⅜ asked—145⅞".

When the subscriber removes his receiver from the hook the line is extended to the first selector in any suitable manner, such as by a line finder or line switch means, well known to the automatic telephone art. When the line is so extended, relay 100 operates over a circuit which may be traced from battery through the lower winding of relay 100, bottom outer back contacts of relay 101, through the line finding equipment, conductor 103, subscriber's loop, conductor 102, top outer back contacts of relay 101, top winding of relay 100, top normally made contacts of rotary off-normal springs 111, secondary winding of tone coil 106 to ground. Relay 100 closes a circuit to operate relay 104 over a circuit from battery through the winding of relay 104, front contacts of relay 100, top inner contacts of relay 101 to ground.

The subscriber is now ready to dial, having received notice of the readiness of the central office apparatus to receive impulses by the reception of dial tone which is induced in the line through the secondary winding of tone coil 106. At the first break of the impulse springs of the dial, relay 100 is released but relay 104, being slow-releasing remains operated so that, for an instant, a path is completed from ground on the top inner contacts of relay 101, back contacts of relay

100, top front contacts of relay 104, winding of relay 105, winding of vertical magnet 107 to battery. Magnet 107 operates, moving the selector shaft and brushes 108, 109 and 110 one step at which time the vertical off-normal springs 114 are closed. Relay 105 is also energized at the time that the magnet operates and closes a path from battery through the winding of relay 112, bottom contacts of off-normal springs 114, make contacts of relay 105 to ground on the bottom contacts of relay 104. Relay 112 operates and locks itself over a path through its winding, bottom contacts of off-normal springs 114, contacts of rotary magnet 113, top contacts of relay 112 to ground on the top inner contacts of relay 101. At the termination of the impulse, relay 100 reoperates and, at its back contacts, breaks the circuit of relay 105 and vertical magnet 107, allowing the magnet to release preparatory to moving the brush shaft another step. Relay 105, however, is slow to release and will not release during the interval between impulses. At the next impulse relay 100 will again release and magnet 107 will take another step. This action is continued during the return movement of the dial, relay 100 intermittently operating and releasing, in turn causing the brush shaft controlled by the armature of the vertical magnet to move said shaft upward a corresponding number of steps.

At the end of the first series of impulses, relay 105 releases and a circuit is completed from battery through the winding of rotary magnet 113, bottom contacts of relay 112, normal contacts of relay 105, to ground on the bottom contacts of relay 104. Rotary magnet 113 operates and rotates the brush shaft to the first set of terminals in the level to which the brushes were raised. The operation of the rotary magnet also causes its contacts to be broken and thereby opening the locking circuit of relay 112 which releases. Relay 112, in releasing, breaks the circuit of rotary magnet 113 at its bottom contacts causing it to release also. If, now, the stock record connector circuit to the terminals of which the brushes of the selector have been connected on the first rotary step is idle, there will be no ground from another first selector whose sleeve brush is connected to sleeve conductor 116 and multipled terminal. Under such circumstances a circuit is closed from battery through the winding of relay 112, bottom contacts of off-normal springs 114, contacts of rotary magnet 113, bottom contacts of rotary normal springs 111, winding of relay 101 to ground on the bottom contacts of relay 104. Relay 101 operates in this circuit, but due to the high resistance of its winding, relay 112 does not operate. Relay 101 closes its contacts and extends conductors 102 and 103 to brushes 108 and 109 respectively, through its top and bottom outer front contacts. It also breaks the circuit for the impulsing relay 100 which in releasing, releases relay 104.

If, on the other hand, the first set of terminals to which the brushes have been connected are the terminals of a connector circuit which is busy, then relay 118 of the said connector is operated and conductor 116 is grounded. In such a case the busy ground is extended to conductor 110 and thence over the inner lower back contacts of relay 101 to one side of the winding thereof and the path previously traced through the winding of relay 112 to the said side of the winding of relay 101 will be effective in operating relay 112 while relay 101 remains shunted. Relay 112 recloses the previously traced circuit for magnet 113 which now rotates the brush shaft to the next set of terminals and also releases relay 112 which, in restoring, deenergizes rotary magnet 113 as previously described. This cycle of operations is repeated until an idle or ungrounded sleeve terminal is reached, at which time relay 112 will remain released, stopping the further rotation of the brushes and energizing relay 101 as previously described.

A circuit is now closed from ground on the top contacts of relay 139, upper winding of relay 153, terminal 154, brush 108, top outer front contacts of relay 101, conductor 102, the subscriber's loop, conductor 103, bottom outer front contacts of relay 101, brush 109, terminal 155, lower winding of relay 153, to battery. Relay 153 operates and closes a circuit to operate relay 118 from ground on the front contacts of relay 153, right outer contacts of relay 119, winding of relay 118 to battery. Relay 118, in operating, connects ground over its left contacts to conductor 116 and associated terminal and thereby marks the connector as busy to preceding testing selectors and also locks relay 101 operated.

The broker now dials the second digit of the stock code. At the first break of the impulse springs of the dial, relay 153 is released but relay 118, being slow releasing remains operated so that, for an instant, a path is completed from ground on the back contacts of relay 153, right front contacts of relay 118, bottom normally made contacts of vertical off-normal springs 143, winding of relay 120, winding of vertical magnet 124 to battery. Magnet 124 operates, moving the selector shaft and brushes 149, 150 and 151 one step at which time the off-normal springs 143 are closed. Relay 120 is also energized at the time that the magnet operates but performs no function. At the termination of the impulse, relay 153 reoperates and, at its back contacts, breaks the circuit of relay 120 and magnet 124, allowing the magnet to release preparatory to moving the brush shaft another step. Relay 120, however, is slow to release and will not release during the interval between impulses. At the next impulse relay 153 will again release and the impulsing circuit for magnet 124 and relay 120 will now be from ground on the back contacts of relay 153, right front contacts of relay 118, lower make contacts of vertical off-normal springs 143 which operated upon the taking of the first step by the connector shaft, make contacts of relay 120, winding of relay 120, winding of vertical magnet 124 to battery. Magnet 124 will take another step. This action is continued during the return movement of the dial, relay 153 intermittently operating and releasing, in turn causing the brush shaft controlled by the armature of the vertical magnet to move said shaft upward a corresponding number of steps.

At the end of the series of impulses, relay 120 releases and a circuit is completed from battery through the winding of rotary magnet 123, winding of relay 122, contacts 152 of the rotary off-normal springs, normal contacts of relay 120, bottom make contacts of vertical off-normal springs 143, right front contacts of relay 118 to the back contacts of relay 153. When, therefore, at the beginning of the first impulse of the last series of impulses of the stock code, relay 153 releases, the aforetraced circuit is closed and rotary magnet 123 operates and rotates the brush shaft to the first set of terminals in the level to which the brushes were raised and also breaks contacts 152. Relay 12[illegible] also operates at the time magnet

123 operates and does not release during the interval between impulses, the said relay being of the slow-release type. At the next impulse relay 153 will again release and the impulsing circuit for magnet 123 and relay 122 will now be from ground on the back contacts of relay 153, right front contacts of relay 118, bottom make contacts of off-normal springs 143, normal contacts of relay 120, right contacts of relay 122, winding of relay 122, winding of rotary magnet 123 to battery. Magnet 123 will take another step. This action is continued during the return movement of the dial, relay 153 intermittently operating and releasing, in turn causing the brush shaft controlled by the armature of the rotary magnet to rotate said shaft a corresponding number of steps. At the end of the last series of impulses, relay 122 releases and relay 153 reoperates.

It will be noted that if, at the time the connector engages the terminals of the stock record circuit, the stock post switch C is likewise connected to the terminals of the same stock record circuit then the fact that brush 147 is connected to conductor 212 will cause relay 210 to be operated as already described. A circuit is then completed for relay 158 from ground on the top contacts of off-normal springs 143, left back contacts of relay 119, winding of relay 158, left contacts of relay 122, brush 151 and cooperating contact, conductor 205, bottom outer front contacts of relay 210 to battery. Relay 158 operates and, over its right front contacts, closes an obvious circuit for relay 121 which also operates. Relay 121, on operating, closes an obvious circuit for operating relay 139, partially prepares a locking circuit for itself over its bottom outer contacts and closes through the talking circuit over brushes 149 and 150 to conductors 203 and 204 respectively. Relay 139, by breaking its top contacts, removes ground from the upper winding of relay 153 and, over its bottom contacts, locks to ground on the top contacts of off-normal contacts 143. Relay 153 is now effectively disconnected from the broker's station and any further manipulation of the dial at the station will not disturb the established setting of the circuit. Relay 118, however, will not release with the release of relay 153 as the operation of relay 139 closes a holding circuit to ground for relay 118 through its bottom outer contacts and top middle contacts of relay 121.

As soon as the talking circuit is closed through to conductors 203 and 204 and the fact that relay 210 is operated, a tone circuit is closed through to the broker's station as an indication to the station that the post apparatus is connected to the stock control circuit RKA and for the period of such connection no quotation announcement will be made. The tone circuit is traced as follows: one side of the transformer, condenser 271, top front contacts of relay 210, conductor 203, brush 149, top outer contacts of relay 121, top arm of transmission unit 156, terminal 154, brush 108, top outer front contacts of relay 101, conductor 102, broker's station loop, conductor 103, bottom outer front contacts of relay 101, brush 109, terminal 155, bottom arm of transmission unit 156, bottom inner contacts of relay 121, brush 150, conductor 204, bottom inner front contacts of relay 210, to the other side of transformer connected to source of tone 270. The subscriber will continue to receive the tone until relay 210 releases, that is, until the stock post connector C disconnects. During the time that the stock post connector is engaged to the terminals of the stock record circuit, a plurality of other connectors, like connector B, may all become engaged with the terminals of the same stock control circuit. The connectors so engaged will be connected to terminals multiplied to conductors 203, 204 and 205, and if, at that time, the stock post connector is likewise connected to the stock terminals, all the brokers' stations will receive the same tone and nothing further happens until the stock post connector is disengaged from the stock control circuit.

When relay 210 releases, the circuit of relay 158 is disconnected from battery at the bottom combination of continuity contacts of relay 210, and is completed over conductor 211, left middle back contacts of relay 206, right contacts of relay 207, contacts of relay 208, right outer back contacts of relay 209, winding of relay 227 to battery. In the case of a plurality of connectors simultaneously engaging the stock record circuit, relay 158 of each connector is connected in parallel with relay 227, the resistance of relay 227 being sufficiently low to permit of their operation and holding until relay 209 operates. The operations which follow, therefore, are not only true for the single connection illustrated in Fig. 1 but also for all other connections which are in parallel therewith at that time.

Relay 227 operates and causes the operation and locking of relay 209 as already described and the consequent release thereafter of relay 227. The operation of relay 209, momentarily opens conductor 211 and connects the locking ground of relay 209 to the said conductor, thereby shunting relay 158. When relay 209 operates a previously described circuit is closed for relay 225 in order to restore switch 220 to normal, if said switch is not already restored. When the switch is normal, relay 213 operates at the beginning of the announcing cycle over a previously described circuit. The release of relay 158 causes a circuit to be closed from battery through the winding of relay 119, left contacts of relay 158, to ground on the top inner contacts of relay 121. Relay 119 operates and locks to ground on the off-normal contacts 143. The locking circuit of relay 121 is now completed by way of the right normal contacts of relay 158, and bottom outer contacts of relay 121, brush 151 to ground on conductor 211, thereby passing the control of this relay to the contacts of relay 208.

The function of transmitting the oral pronouncement of the stock record to the broker, as set up on the registers, is the same as previously described in reference to a similar pronouncement to the stock post attendant, except for the fact that the transmission loop is now over the top contacts of relay 210, conductor 203 and associated terminal, brush 149, top outer contacts of relay 121, top arm of transmission unit 156, terminal 154, brush 108, top outer front contacts of relay 101, conductor 102, broker's loop, conductor 103, bottom outer front contacts of relay 101, brush 109, terminal 155, bottom arm of transmission unit 156, bottom inner contacts of relay 121, brush 150 and cooperating terminal, to bottom inner contacts of relay 210. The remainder of the loop to the transmitting drums of the telegraphophone and through the various registers is the same as already described and need not be repeated.

When the entire pronouncement cycle is completed, relay 208 operates as already described, thereby opening the locking circuit of relay 121. In further consequence of the operation of relay

208, the stock control circuit restores to normal in the manner already described. Relay 121 releases and, in doing so, opens the holding circuit of relay 118 to the bottom outer contacts of relay 139. Relay 118 upon releasing also releases relay 101. The release of relay 121 opens the talking circuit to the broker's line so that after one complete announcement to the broker, no further announcements will be repeated, even though the broker may still have his receiver off the hook. A circuit is now closed for release magnet 117 from battery through the winding of said magnet, middle contacts of off-normal springs 143, right back contacts of relay 118, to ground on the back contacts of relay 153. The release magnet operates and restores the brush shaft to normal, restoring the off-normal springs 143 and closing off-normal springs 152. Relays 119, 139 are now released and the connector is normal and ready for seizure again.

In the meanwhile, the release of relay 101 closes a circuit for release magnet 157 from battery through the winding of said magnet, top contacts of off-normal springs 114, top back contacts of relays 104 and 100 to ground on the top inner contacts of relay 101. The release magnet operates and restores the selector brush shaft to normal.

It will be recalled that the stock post attendant has no knowledge of when and how many brokers are connected to a particular stock record circuit at the time he wishes to change the registration. As stock sales are made it is his duty to keep the registration consistent with the latest sale and he is free, therefore, to connect with any stock record circuit to which he has access, that is, which is traded at his post regardless of the brokers' lines connected to the same stock record circuit. To provide for this eventuality, means are provided whereby if the pronouncement to brokers is disrupted by the engagement of the stock record circuit by the post connector, a distinctive tone is connected to said lines indicating to them that the quotation record is being either checked or revised. This is accomplished as follows:

When the post connector seizes the stock record circuit, relay 210 is energized as already described. With the operation of this relay battery is connected to conductor 205, holding both relays 158 and 121 energized. The operation of relay 210 connects a tone circuit from one side of the source of tone coil associated with interrupter 270, top front contacts of relay 210 over the previously described loop either singly or in parallel depending upon whether one connection or a plurality of connections exist, bottom inner front contacts of relay 210 to the other side of the source of tone coil. This tone will persist so long as relay 210 is operated, that is, so long as the post connector is engaged to the stock record circuit. When the post connector is disengaged relay 210 is released, the tone is removed and relays 158 and 121 are again connected to conductor 205. The pronouncement will then begin at the beginning of the cycle regardless of the place it was interrupted at the time the post connector seized the stock record circuit due to the fact that with each announcement, switch 220 is returned home even though the numerical switches are undisturbed. At the end of the pronouncement cycle, disconnection takes place as already described.

It will be recalled that at the time a stock broker's station is connected to a set of stock terminals through selector A and connector B any number of other stock brokers' stations may become connected to the terminal set of the same stock since there is no guard test available through brush 151 of the other connectors either to move the connector ahead or to transmit a busy test to said other stock brokers. In such an event and during the time that the original station is receiving a stock quotation, the operation of relay 121 in each of the other connectors attached to the same set of terminals in the interval will cause the pronouncement circuit to be closed in parallel to the other stations so that such stations will get only a part of the transmitted quotation.

What is claimed is:

1. In a telephone system, a telegraphophone, a plurality of telegraphophone control circuits, each of said circuits including settable means for controlling said telegraphophone, a control station, means for establishing a connection from said control station to any of said control circuits, means for setting said settable means in said control circuit from said control station over said connection, means for establishing a listening connection from said telegraphophone to said control station over said control circuit and said connection, a telephone station, means for establishing a listening connection from said telephone station to said telegraphophone over said control circuit, and means for transmitting a pronouncement from said telegraphophone to said control station or to said telephone station over said listening connections in accordance with the setting of said control circuit.

2. In a telephone system, a telegraphophone, a telegraphophone control circuit, said circuit including settable means for controlling said telegraphophone, a control station, means for establishing a control connection from said control station to said control circuit, means operable over said established connection for setting said settable means in said control circuit, a telephone station, means for establishing a listening connection from said telephone station to said telegraphophone over said control circuit, and means in said control circuit responsive to the coexistence of said listening connection from said telephone station and of said control connection from said control station for transmitting a distinctive signal to said telephone station.

3. In a telephone system, a telegraphophone, a telegraphophone control circuit, said circuit including settable means for controlling said telegraphophone, a control station, means for establishing a control connection from said control station to said control circuit, means operable over said established connection for setting said settable means in said control circuit, a telephone station, means for establishing a listening connection from said telephone station to said telegraphophone over said control circuit, and means in said control circuit responsive to the coexistence of said listening connection from said telephone station and of said control connection from said control station for opening said listening connection and for transmitting a distinctive signal to said telephone station.

4. In a telephone system, a telegraphophone, a telegraphophone control circuit, said circuit including settable means for controlling said telegraphophone, a control station, means for establishing a connection from said control station to said control circuit, means for setting said settable means in said control circuit from said

control station over said connection, means for establishing a listening connection from said telegraphophone to said control station over said control circuit and said connection, a telephone station, means for establishing a listening connection from said telephone station to said telegraphophone over said control circuit, means for transmitting a pronouncement from said telegraphophone to said control station or to said telephone station over said listening connections in accordance with the setting of said control circuit, and means in said control circuit responsive to the coexistence of said listening connection from said telephone station and of said control or listening connection from said control station for opening the listening connection from said telephone station and for transmitting a distinctive signal to said telephone station.

5. In a telephone system, a telegraphophone, a telegraphophone control circuit, said circuit including settable means for controlling said telegraphophone, a control station, means for establishing a control connection from said control station to said telegraphophone over said control circuit, means operable over said established connection for setting said settable means in said control circuit, a plurality of telephone stations, means for establishing listening connections from each of said telephone stations to said telegraphophone over said control circuit, and means in said control circuit responsive to the coexistence of said listening connections from said telephone stations and of said control connection from said control station for transmitting a distinctive signal to each of said telephone stations.

6. In a telephone system, a telegraphophone, a telegraphophone control circuit, said circuit including settable means for controlling said telegraphophone, a control station, means for establishing a control connection from said control station to said telegraphophone over said control circuit, means for setting settable means in said control circuit over said established connection, a telephone station, means for establishing a listening connection from said telephone station to said telegraphophone over said control circuit, means for transmitting a single pronouncement from said telegraphophone to said telephone station over said listening connection, and means for thereupon opening said listening connection.

7. In a telephone system, a telegraphophone, groups of telegraphophone control circuits, each of said control circuits including settable means for controlling said telegraphophone, a control station for each group of control circuits, switching means for establishing a control connection from each of said control stations to any control circuit in its respective groups, means operable over said established connections for setting settable means in the selected control circuits, means for establishing listening connections from said stations to said telegraphophone over the connected control circuits, a plurality of telephone stations, switching means for establishing listening connections from any of said telephone stations to said telegraphophone over any of said control circuits, and means for transmitting pronouncements from said telegraphophone to said control stations or to said telephone stations in accordance with the setting of the control circuits included in said listening connections.

8. In a telephone system, a telegraphophone, a control station at which a plurality of commodities are traded in, a telegraphophone control circuit corresponding to each such commodity, each of said control circuits having registers for registering the current "bid" and "asked" prices of its assigned commodity, station controlled means for selecting any one of said control circuits and for setting the registers thereof, and means operative upon the selection of a control circuit for causing said telegraphophone to transmit to said control station a pronouncement of the designation of the commodity assigned to the selected control circuit and pronouncements of the "bid" and "asked" prices of such commodity as registered on the registers of said selected control circuit.

9. In a telephone system, a telegraphophone, a control station at which a plurality of commodities are traded in, a telegraphophone control circuit corresponding to each such commodity, each of said control circuits having registers for registering the current "bid" and "asked" prices of its assigned commodity, a monitoring board at said station having sets of indicator registers for displaying the current "bid" and "asked" prices of each of said commodities, station controlled means for selecting any one of said control circuits and the corresponding set of indicator registers and for setting the registers of the selected control circuit and the corresponding set of indicator registers, and means operative upon the selection of a control circuit for causing said telegraphophone to transmit to said control station a pronouncement of the designation of the commodity assigned to the selected control circuit and pronouncements of the "bid" and "asked" prices of such commodity as registered on the register of said selected control circuit and the corresponding indicator registers of said monitoring board.

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