

March 6, 1951

J. E. OSTLINE

2,543,983

CALENDAR CLOCK MECHANISM

Original Filed June 12, 1939

5 Sheets-Sheet 1

FIG. 1

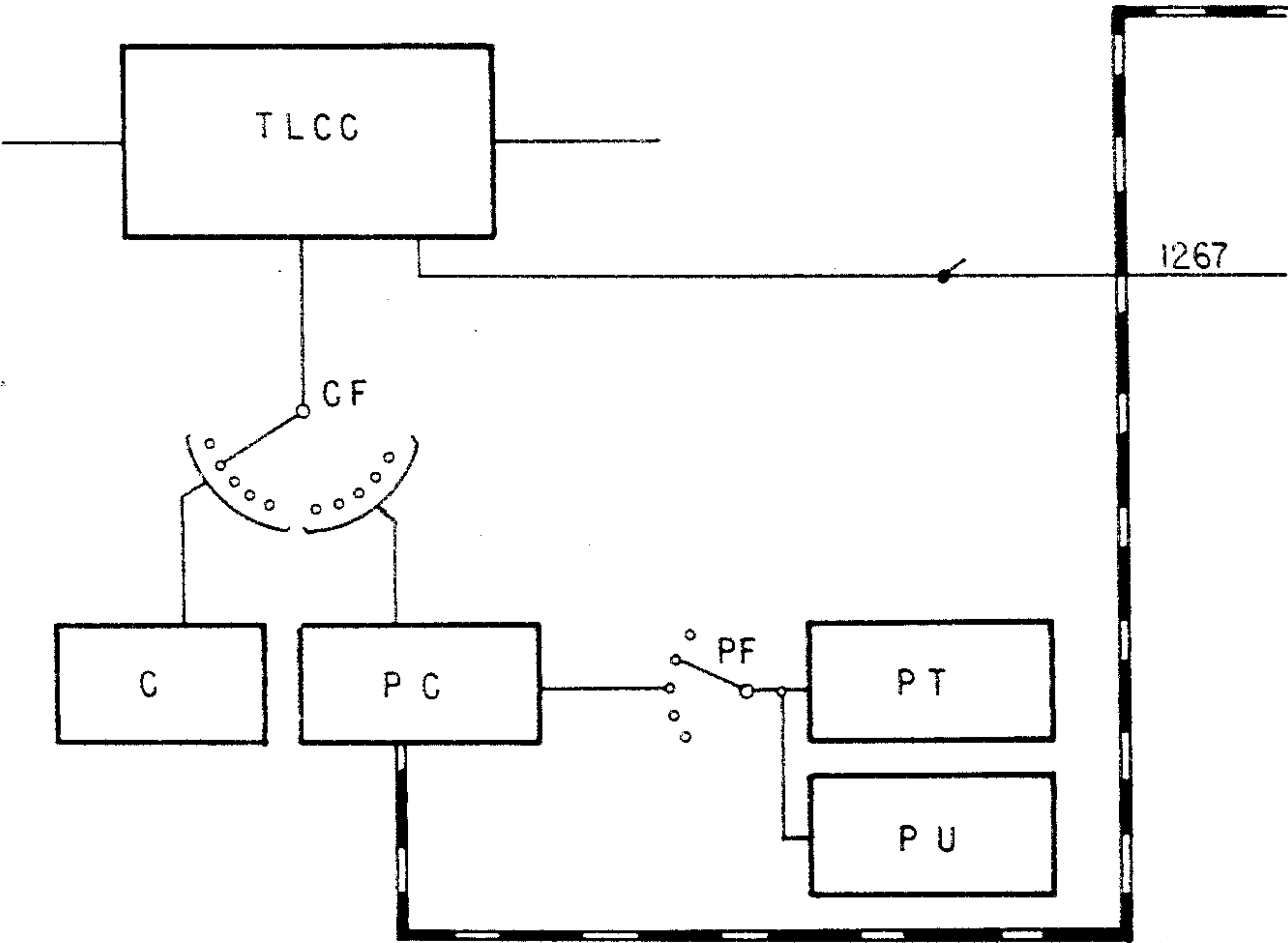
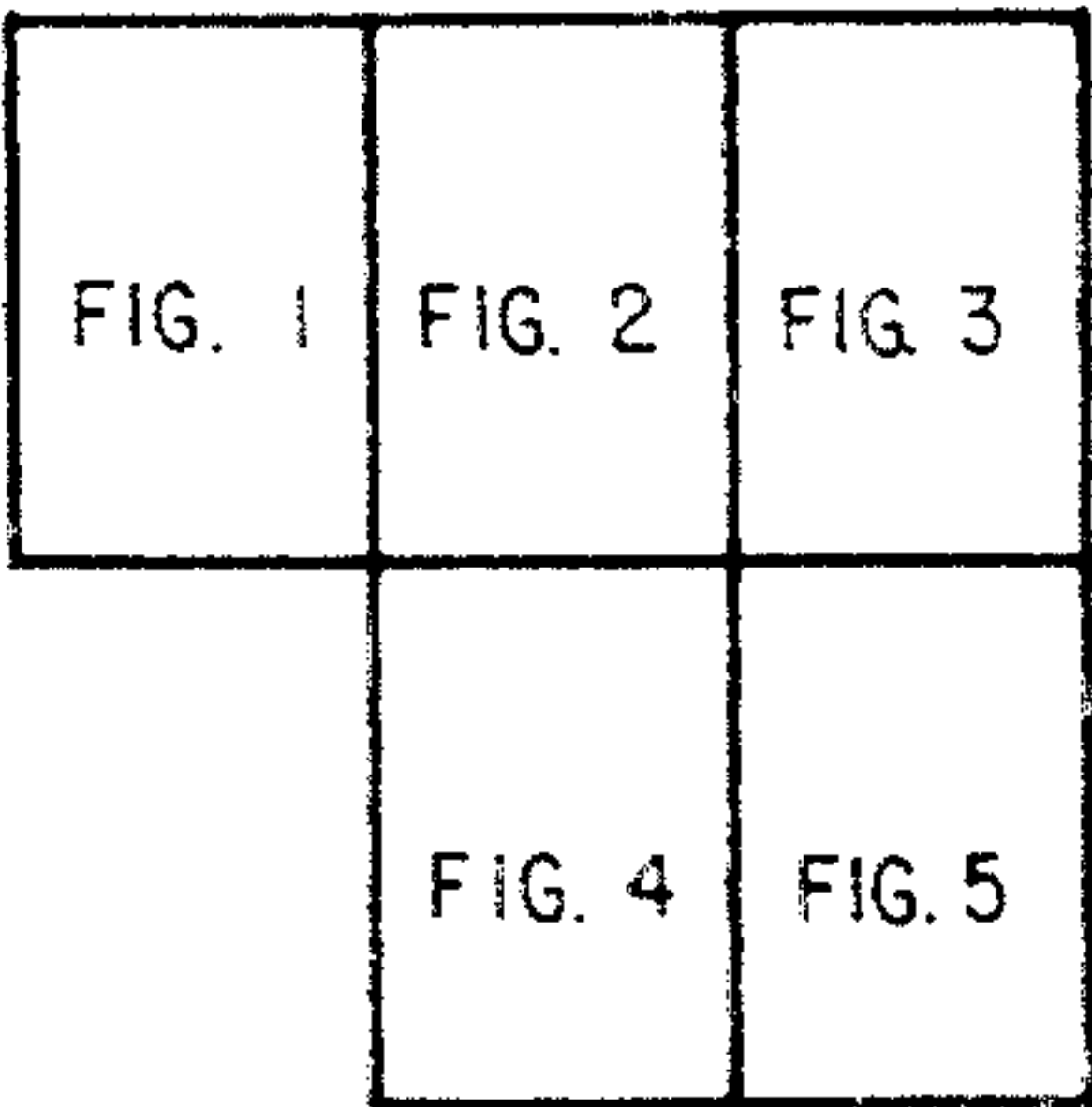


FIG. 6



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5 Sheets-Sheet 2

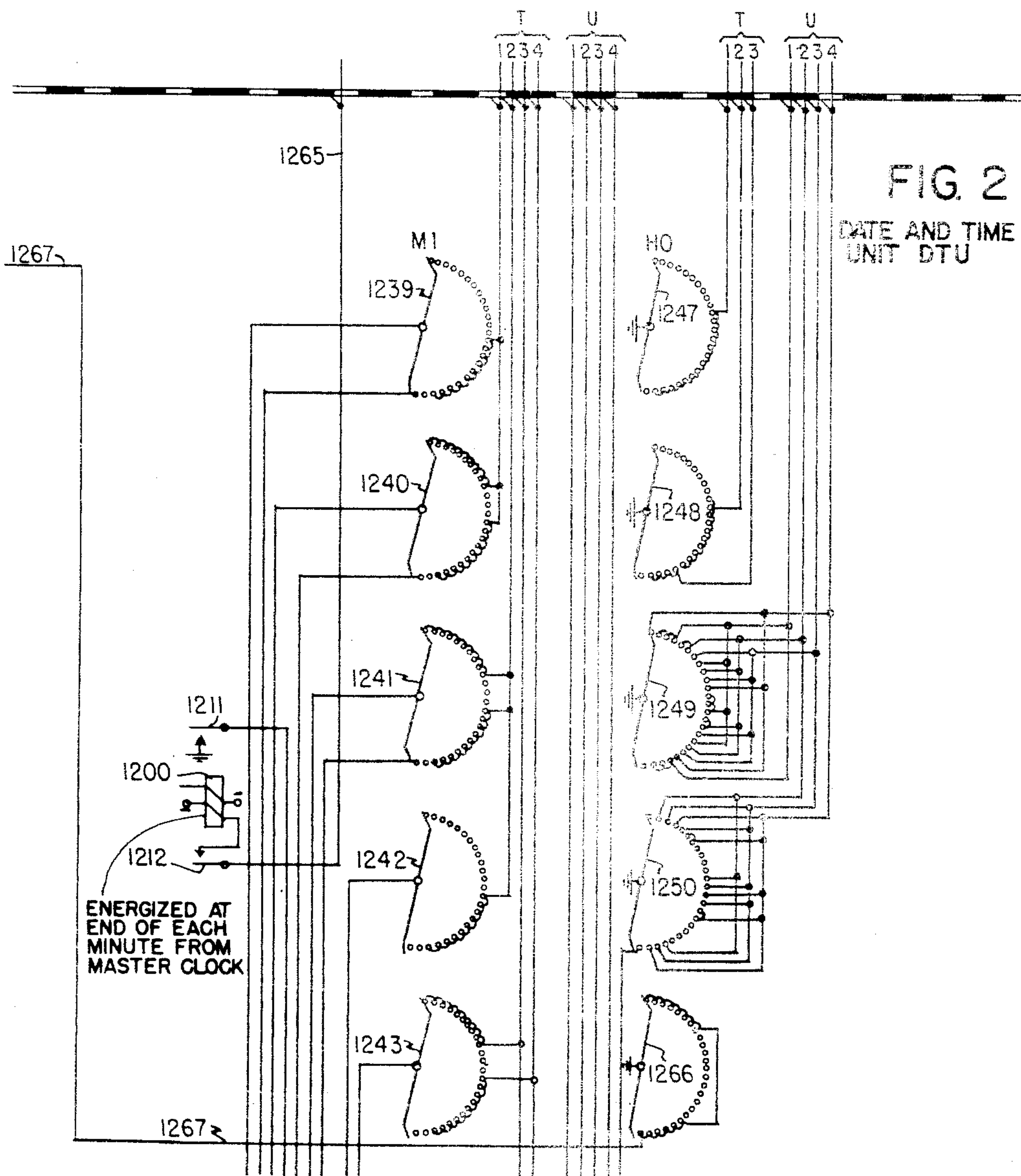


FIG. 2

DATE AND TIME  
UNIT DTU

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5 Sheets-Sheet 3

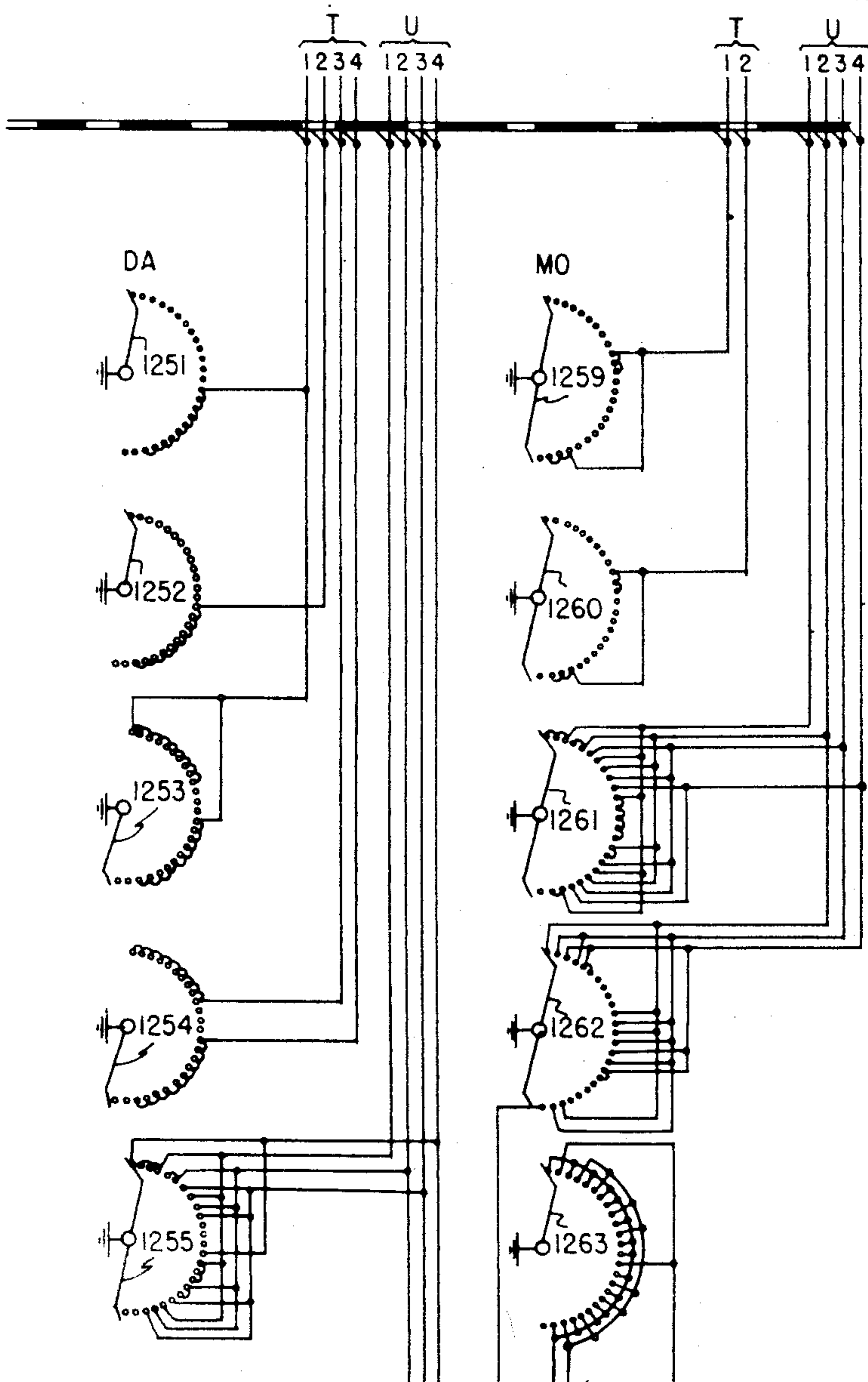


FIG. 3

DATE AND TIME UNIT  
DTU

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March 6, 1951

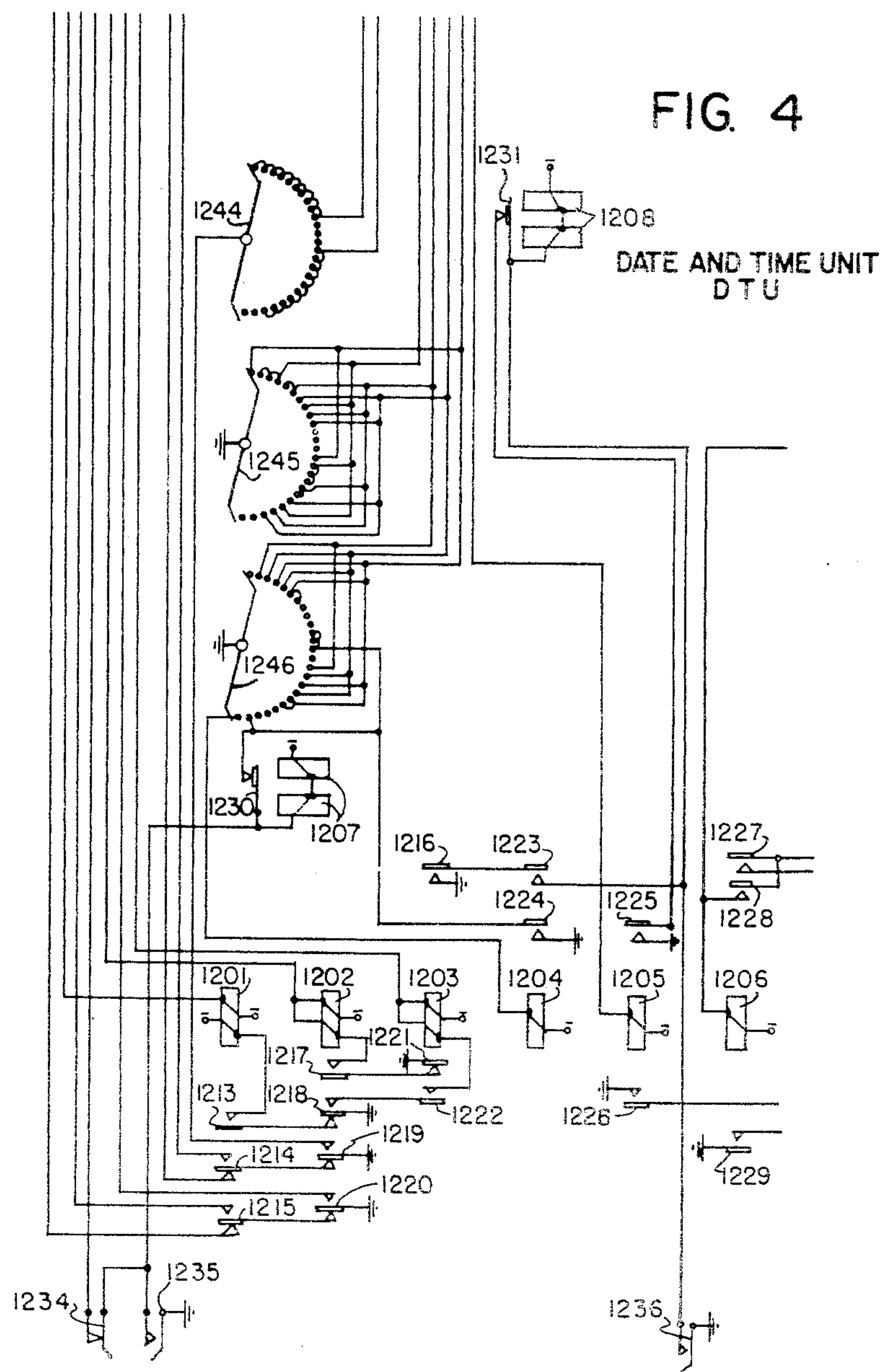
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CALENDAR CLOCK MECHANISM

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5 Sheets-Sheet 4



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5 Sheets-Sheet 5

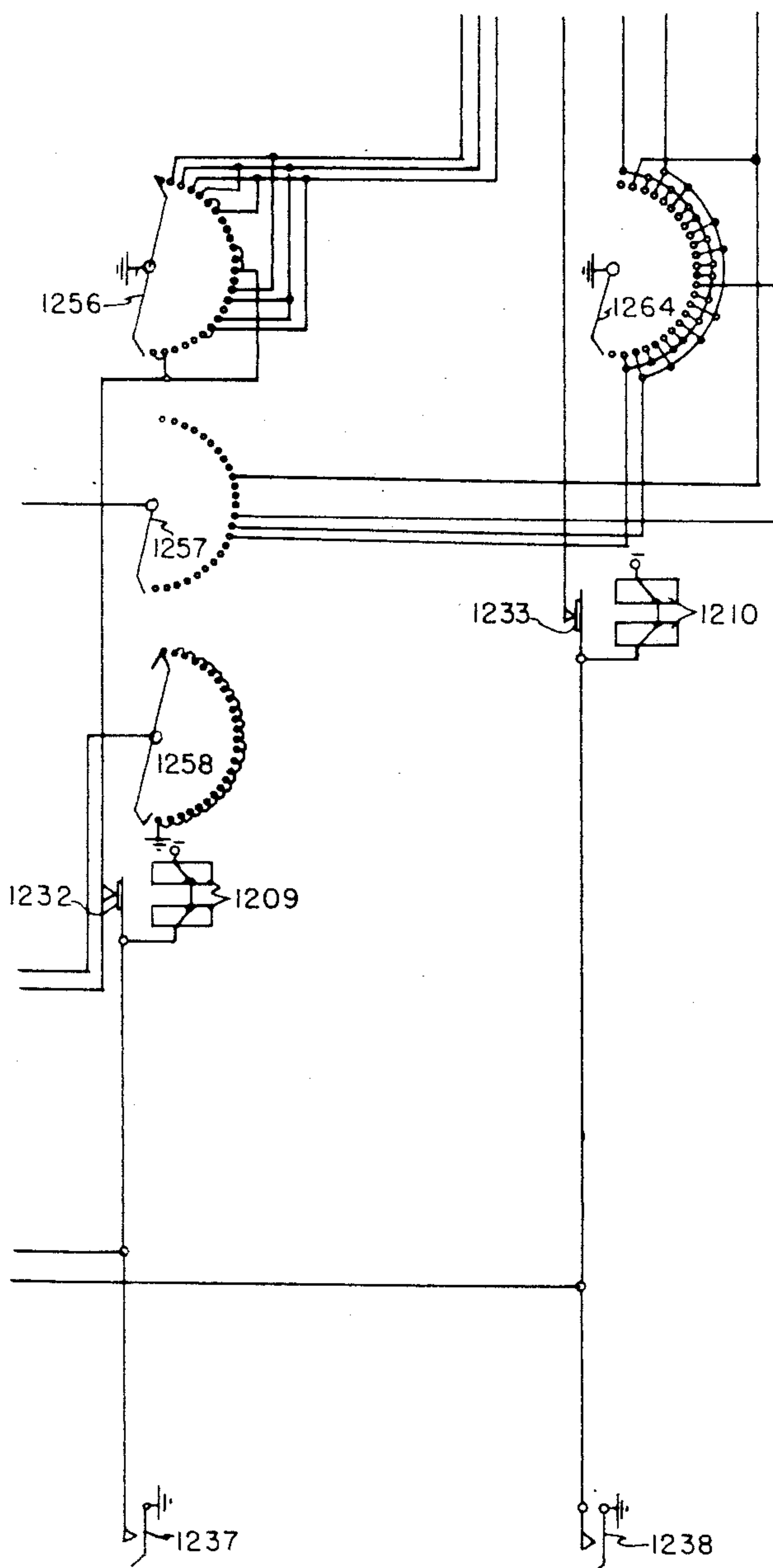


FIG. 5  
DATE AND TIME UNIT  
DTU

INVENTOR.

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BY

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## UNITED STATES PATENT OFFICE

2,543,983

## CALENDAR CLOCK MECHANISM

John E. Ostline, Chicago, Ill., assignor to Automatic Electric Laboratories, Inc., Chicago, Ill., a corporation of Delaware

Application June 18, 1942, Serial No. 447,500, now Patent No. 2,445,000, dated July 13, 1948, which is a division of application Serial No. 278,728, June 12, 1939, now Patent No. 2,373,908, dated April 17, 1945. Divided and this application November 28, 1947, Serial No. 788,620. In Great Britain June 14, 1938

13 Claims. (Cl. 58—24)

1

The present invention relates to signaling or telephone systems, and more particularly to date and time units therefor. The present application is a division of the copending application of John E. Ostline, Serial No. 447,500, filed June 18, 1942, now U. S. Patent No. 2,445,000, granted July 13, 1948; which last-mentioned application is, in turn, a division of John E. Ostline application Serial No. 278,728, filed June 12, 1939, now U. S. Patent No. 2,373,908, granted April 17, 1945.

In a signaling or telephone system of the type disclosed in the Ostline patent mentioned connections are completed by automatic switching apparatus; and in conjunction therewith, tickets are produced bearing printed items of information pertaining thereto, and including items pertaining to the dates and to the times of the connections. These date and time items are obtained from a clock-controlled date and time unit.

It is a general object of the present invention to provide for use in a signaling or telephone system of the type noted, an improved date and time unit.

Another object of the invention is to provide a clock-controlled date and time unit having improved date and time facility.

Further features of the invention pertain to the particular arrangement of the circuit elements of the date and time unit, whereby the above outlined and additional operating features thereof are attained.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with the accompanying drawings, in which Figures 1 to 5, inclusive, taken together, illustrate diagrammatically a portion of a telephone system of the type mentioned, and the details of a date and time unit having embodied therein the features of the present invention as briefly outlined above; and Fig. 6 illustrates the mode of combining Figs. 1 to 5, inclusive, to form a unified diagram. More particularly, Fig. 1 illustrates diagrammatically a portion of the telephone system mentioned; whereas Figs. 2 to 5, inclusive, illustrate the details of the date and time unit DTU.

Referring now more particularly to the drawings, the telephone system mentioned comprises lines, not shown, automatic switching apparatus, not shown, and a plurality of toll line control circuits, one of which is indicated at TLCC,

2

More particularly, a toll connection is extended from a calling line by the automatic switching apparatus through an idle one of the toll line control circuits, such for example, as the toll line control circuit TLCC to a called line. Also the telephone system comprises a plurality of converters, including the converter indicated at C, a plurality of printer-control circuits, or printer-controllers, including the printer-controller indicated at PC, a date and time unit DTU, a ticket printer PT and a record printed PU. The toll line control circuit TLCC is provided with a hunting switch CF having access both to the converters C, etc., and to the printer-controllers PC, etc.; while the date and time unit DTU is commonly associated with the printer-controllers PC, etc. Finally, the individual ticket printer PT and the common record printer PU are commonly connected to a hunting switch PF having access to the printer-controllers PC, etc.

When a call is routed via the toll line control circuit TLCC, the hunting switch CF thereof operates first to find an idle one of the converters, such for example, as the converter C; whereby certain items of record information, transmitted over the toll line control circuit TLCC incident to extending the call, are transmitted through the hunting switch CF into the converter C and then converted into storage items and returned back over the hunting switch CF into the toll line control circuit TLCC, wherein the storage items mentioned are stored. Subsequently, and at the conclusion of the established connection routed via the toll line control circuit TLCC, the hunting switch CF is operated to find an idle one of the printer-controllers, such for example, as the printer-controller PC; whereupon the printer-controller PC seizes the date and time unit DTU receiving therefrom and storing date and time items; whereupon the date and time unit DTU is released. The items stored in the toll line control circuit TLCC are also transferred via the hunting switch CF into the printer-controller PC and stored therein. Also the hunting switch PF commonly associated with the ticket printer PT and the record printer PU operates to find the particular printer-controller PC; whereupon the printer-controller PC governs via the hunting switch PF the ticket printer PT and the record printed PU causing the ticket printer PT to produce a printed ticket individual to the connection and causing the record printer PU to produce on a common record a line of printing individual to the con-



nection. After the toll line control circuit TLCC has transferred all of the storage items into the printer-controller PC, it is released; and after the printer-controller PC has governed the ticket printer PT and the record printer PU it is released.

Considering now the date and time unit DTU in greater detail it is again noted that it is common to the printer-controllers PC, etc., and operates continuously, and is adapted to be connected for a period to any printer-controller PC, etc., to enable the time in hours and minutes and the date in day of the month and month of the year to be stored in the associated printer-controller. With regard to the time, this is given in the Continental manner, that is to say, the day commences at midnight and the hours are numbered from 0 to 24.

The whole circuit is operated by minute-impulses delivered from a master clock. These impulses are repeated by relay 1200 to the magnet of the switch MI which records the minutes. When 60 minutes have been recorded the switch HO which records the hours makes one step. When the 24th hour has been recorded the switch DA which records the day of the month makes one step. The switch MO which records the months makes one step after the switch DA has recorded the appropriate number of days. At all times markings are extended to the groups of conductors 1, 2, 3 and 4 of the tens groups T and 1, 2, 3 and 4 of the units groups U associated with each switch so that whenever a printer-controller is connected to the date and time unit, the markings are immediately extended over these conductors to the printer-controller and the date and time is recorded therein.

A detailed description will now be given of the operation of the unit and for convenience it will be assumed that the unit is started up from the position shown at midnight on December 31st January 1st, 1937. At the end of the first minute, relay 1200 is operated and at armature 1211 extends earth over key 1234 to the windings of the magnet 1207 of the switch MI. At the end of the impulse when relay 1200 releases, the wipers of the switch MI are stepped to position 2. The counting of the minutes as regards the units is controlled over wipers 1245 and 1246, both of which are earthed and the contacts in the banks are so connected to conductors 1, 2, 3, and 4 of the units group U that at any moment the units portion of the number of minutes is indicated by markings extended to the conductors in accordance with the so-called WXYZ marking code. In accordance with this marking code earth is applied to the conductors 1 and 2 to register the digit 1; earth is applied to the conductors 1 and 3 to register the digit 2; earth is applied to the conductors 1 and 4 to register the digit 3; earth is applied to the conductors 2 and 3 to register the digit 4; earth is applied to the conductors 2 and 4 to register the digit 5; earth is applied to the conductors 3 and 4 to register the digit 6; and earth is respectively applied to the conductors 1, 2, 3 and 4 in order to register the respective digits 7, 8, 9 and 0. Thus prior to the first minute pulse, wipers 1245 and 1246 will be on contacts 1 and contact 1 associated with wiper 1245 is connected to conductor 4 while contact 1 associated with wiper 1246 is disconnected to indicate the digit 0. After the first minute pulse wipers 1245 and 1246 will be on contacts 2. In this position wiper 1245 is connected to conductor 1 while wiper 1246 is connected to con-

ductor 2 to indicate the digit 1. Similar connections are made from succeeding contacts associated with these wipers. At the end of the 10th impulse, the wipers of the switch MI will be stepped to position 11 and in this position a circuit is closed from earth at wiper 1246 on contact 11, bank multiplying, interrupter contacts 1230, windings of magnet 1207 to battery. Contacts 11, 12 and 13 associated with wiper 1246 are multiplied together so that the switch is automatically stepped by the above self-interrupting circuit to contact 14.

It will also be seen that earth is extended from armature 1219 of relay 1202 over armature 1214 to wiper 1242 and from armature 1220 of relay 1202 over armature 1215 to wiper 1239. Contacts 1 to 13 associated with these wipers are disconnected so that during the first 10 minutes no earth is extended to conductors 1, 2, 3 or 4 of the tens group T. When the wipers are stepped to position 14, i. e. at the end of the 10th minute, earth is extended over wiper 1239 to conductor 1 and over wiper 1242 to conductor 2 thereby indicating the digit 1 in accordance with the WXYZ marking code. Further, earth over wiper 1245 on contact 14 is extended to conductor 4 while contact 14 associated with wiper 1246 is disconnected thereby indicating the digit 0. Contacts 14 to 23 associated with wipers 1245 and 1246 are multiplied so that the same combination of conductors are earthed from the 10th to the 19th minute as from the 0th to the 9th minute. At the end of the 20th impulse, the wipers are stepped to position 24 where earth is extended over wiper 1246 on contact 24, interrupter contacts 1230, windings of magnet 1207 to battery. The wipers are now stepped to position 25 where a circuit is completed from earth at armature 1220, armature 1215, wiper 1239 on contact 25, upper winding of relay 1201 to battery. Relay 1201 at armature 1215 and its resting contact disconnects earth from wiper 1239 and at its operating contact connects earth to wiper 1240 at the same time opening its own energizing circuit. It now locks over armature 1213 to earth at armature 1218. Further at armature 1214 and its resting contact earth is removed from wiper 1242 and extended at its operating contact to wiper 1243. With the switch in the 25th position, a circuit is also completed from earth at wiper 1246 on contact 25, winding of relay 1204 to battery, relay 1204 being slow-to-operate but quick-to-release. Relay 1204 in operating at armature 1224 closes an obvious self-interrupting circuit to magnet 1207 so that the wipers are stepped to position 1 where the circuit of relay 1204 is opened. It will be seen that in this position, earth on wiper 1240 is extended to conductor 1 of the tens group T while earth on wiper 1243 is extended to conductor 3 to indicate the digit 2. As before a marking is extended over wiper 1245 to indicate the digit 0.

The markings extended over wipers 1240 and 1243 remain the same while the switch steps from contacts 1 to 10. From contacts 14 to 23 the markings are altered to indicate the digit 3.

At the end of the 40th minute the wipers are stepped on to position 24 where a self-interrupting circuit is again closed for magnet 1207 and the wipers are stepped to position 25. In this position earth is extended over wiper 1240 upper winding of relay 1202 to battery. Relay 1202 closes only its "X" armature 1217 in order to prepare a series circuit including its upper and lower windings. When wiper 1240 leaves the 25th po-



5

sition the series circuit is completed and relay 1202 operates fully from earth at armature 1221. At armature 1219 and its resting contact, relay 1202 removes earth from wiper 1243 and at armature 1219 and its operated contact, relay 1202 extends earth to wiper 1244. At armature 1220 and its resting contact relay 1202 removes earth from wiper 1240 and at armature 1220 and its operated contact relay 1202 connects earth to wiper 1241. In addition relay 1202 at armature 1218 opens the locking circuit of relay 1201 which releases. As before relay 1204 operates with the switch in the 25th position and closes a self-interrupting circuit for magnet 1207 to step the wipers on to position 1. Markings now extend over wipers 1241 and 1244 in positions 1 to 10 to conductors 2 and 3 of the tens group T to indicate the digit 4 and in positions 14 to 23 to conductors 2 and 4 to indicate the digit 5.

At the end of the 60th minute, the wipers are stepped to position 24 where a self-interrupting circuit is closed to step the wipers to position 25 where a circuit is closed for relay 1203 over wiper 1241 and for relay 1204 over wiper 1246. The operation of relay 1204 also causes the wipers of the switch MI to be stepped to position 1. Relay 1203 operates its "X" armature 1222 and when wiper 1241 of the switch MI leaves position 25 it operates fully. Earth is now extended from armature 1216 over armature 1223, windings of magnet 1208 to battery. The magnet is thereby energized. Further relay 1202 is released at armature 1221 of relay 1203. Relay 1204 also releases when the wipers are stepped to position 1 whereupon earth is removed from magnet 1208 whereby the magnet deenergizes and the wipers of the switch HO are stepped from contact 1 to contact 2. Relay 1202 at armature 1218 opens the locking circuit to relay 1203 which also releases. The switch MI together with relays 1201 to 1204 are now in a position to commence recording the second hour.

Referring now to the switch HO, the units digit of the hours is indicated by earth extended over wipers 1249 and 1250 to conductors 1, 2, 3 or 4 of the units group U while the tens digit is indicated by earth extended over wipers 1247 and 1248 to conductors, 1, 2 and 3 of the tens group T. It will be appreciated that three conductors only are provided in the tens group since this digit will be zero, 1 or 2. The connections between the contacts associated with wipers 1249 and 1250 and the conductors 1, 2, 3 and 4 are the same as those between the contacts of wipers 1245 and 1246 of the switch MI and the four units conductors, with the exception that since the switch HO counts from 1 to 24 instead of in groups of 10, the contacts representing the last hour of the first ten and the first hour of the second ten are consecutive and so are the last hour of the second ten and the first hour of the third ten.

With the wipers on position 1, conductor 4 is earthed over wiper 1249 thereby indicating the digit 0. With the wipers on position 2, conductors 1 and 2 are earthed over wipers 1249 and 1250 respectively. In succeeding positions the appropriate conductors are earthed in accordance with the WXYZ marking code mentioned. After the 10th hour or at the end of the hour during which the digit 9 has been registered, the wipers are stepped to position 11 whereby conductors 1 and 2 of the tens group T are earthed over wipers 1247 and 1248 respectively to indicate the digit 1, while conductor 4 is earthed over wiper 1249 to indicate the digit 0. Further at the end of the

6

20th hour, the wipers are stepped to position 21 where conductors 1 and 3 of the tens group are earthed over wipers 1247 and 1248 respectively to indicate the digit 2, while conductor 4 of the units group is again earthed over wiper 1249. At the end of the 24th hour the wipers are stepped to position 25 where earth is extended over wiper 1250 on contact 25, winding of relay 1205 to battery. Relay 1205 in operating at armature 1225 closes an obvious self-interrupting circuit for magnet 1208 over interrupter contacts 1231 to step the wipers of the switch HO on to contact 1 and at armature 1226 closes an energizing circuit for magnet 1209 of the switch DA on which the days of the month are recorded. When the wipers of switch HO are in position 1, relay 1205 releases, magnet 1209 deenergizes and the wipers of switch DA are stepped from position 1 to position 2.

The switch DA which records the day of the month has to be arranged to have a minimum of 28 settings and a maximum of 31 according to the least and greatest number of days in the month. In order to cope with this the markings for the conductors of the tens group are extended over the four wipers 1251 and 1254, all the wipers being single ended with wipers 1251 and 1252 being spaced 180° apart from wipers 1253 and 1254. The connections to the conductors of the units group are again extended over two wipers, 1255 and 1256, the wipers being double-ended. The connections from these wipers to the conductors of the units group are again the same as for wipers 1245 and 1246 of the switch MI and since the days are counted in groups of 10, the two sets of contacts in each bank which count successive groups of 10 are spaced apart by two contacts.

With the wipers in position 1, no earth is extended to the conductors of the tens group while earth is extended over wiper 1255 to conductor 4 of the units group to indicate the digit 0. As the wipers are stepped from positions 1 to 11, earth will be extended over wipers 1255 and 1256 to the appropriate conductors as explained previously in connection with switches MI and HO. At the end of the 10th day, the wipers are stepped on to contact 11 and a self-interrupting circuit is completed over wiper 1256 and interrupted contacts 1232 for magnet 1209. The wipers are now stepped to position 14 where earth is extended over wipers 1251 and 1252 to conductors 1 and 2 of the tens groups respectively to indicate the tens digit 1 while earth is extended over wiper 1255 to conductor 4 of the units group to indicate the units digit 0. At the end of the 19th day the wipers are stepped to position 24 where a further self-interrupting circuit is completed for the magnet 1209 and the wipers 1255 and 1256 are stepped to position 1. Further wipers 1251 and 1252 are stepped out of contact and wipers 1253 and 1254 are stepped into contact with their banks. In this position conductors 1 and 3 of the tens group are earthed over wipers 1253 and 1254 respectively to indicate the tens digit 2 and conductor 4 of the units group is earthed over wiper 1255 to indicate the units digit 0. The wipers continue to step to give the appropriate indications in a manner which it is believed will now be easily understood.

The stepping of the switch MO on which the months are recorded is effected under the control of wiper 1257 of the switch DA in conjunction with wipers 1263 and 1264 of the switch MO, these two wipers being single-ended and spaced apart by 180°. The units digit in the month number is



determined by earth extended over wiper 1261 and 1262 while the tens digit is determined by earth extended over wipers 1259 and 1260. With the present assumption that the apparatus is started up at midnight on December 31st-January 1st, the wipers of the switch MO will be on position 1 and earth will be extended to conductors 1 and 2 of the units group over wipers 1261 and 1262 respectively. Now the wipers of the switch MO should be stepped to position 2 after the switch DA has made 31 steps, January having 31 days. At the end of the 31st day the wipers of the switch DA will be on position 16 and in this position a circuit is closed from earth at wiper 1263 on contact 1, bank multiplying, contact 16 associated with wiper 1257 of the switch DA, winding of relay 1206 to battery. Relay 1206 in operating locks at armature 1228 to earth over wiper 1258 and bank multiplying; at armature 1229 closes an energizing circuit for the magnet 1210; at armature 1227 closes a self-interrupting circuit for magnet 1209 which thereupon rotates its wipers into the position shown where the energizing and locking circuits of relay 1206 are opened. The relay releases and at armature 1229 opens the circuit for magnet 1210 which deenergizes and steps the wipers on to position 2 where earth is extended to the appropriate conductors of the units group to indicate the units digit 2.

The switch DA continues to be stepped from position 1 and at the end of the 28th day the wipers are stepped on to position 10 whereupon a circuit is again closed for relay 1206 over wiper 1263 on contact 2, contact 10 and wiper 1257. Relay 1206 operates with results as previously described. Thus it will be seen that the connections between wipers 1257 and the wipers 1263 and 1264 are so arranged that the switch MO is only stepped after the lapse of the number of days contained in the particular month.

It has been assumed that the unit was set in operation at the beginning of 1937. The next leap year therefore occurs in 1940. During this year wiper 1264 of the switch MO will be stepping over contacts 13 to 24 of the associated bank. In order to take care of the fact that February of this year will have 29 days, contact 14 associated with wiper 1264 is connected to contact 14 associated with wiper 1257 of the switch DA. The wipers of the switch DA step to position 14 at the end of the 29th day so that the stepping of the wipers of switch MO from contacts 14 to 15 is delayed for one day.

At the end of the fourth year the wipers of the switch MO will be stepped to position 25 and a self-interrupting circuit is completed from earth at wiper 1262, interrupter contacts 1233 to magnet 1210 to step the wipers to the position shown.

It will of course be appreciated that while for convenience of description the unit has been assumed to be set in operation at a particular time and on a particular date, it can in practice be set in operation at any time on any date, the keys 1235 to 1238 being provided for giving the appropriate settings to the various switches manually while key 1234 is provided for preventing operation by the minute pulses during this setting operation. In addition the keys 1235 to 1238 enable corrections to be made in the settings of the various switches during the operation of the unit.

It will be understood that it is undesirable for the stepping of any of the switches to occur while the unit is connected to a printer-controller. To avoid this earth is fed over conductor 1265 from

the printer-controller so that if relay 1200 is operated during the association of the two units, it locks over armature 1212 to conductor 1265. Since the various switches are stepped on release of relay 1200, stepping is delayed until the printer-controller is disconnected from the date and time unit.

It will be remembered that when discussing the operation of the toll line control circuit it was pointed out that the rate digit was susceptible to alteration during the period from 19 to 7 o'clock. This alteration in the rate is effected under the control of wiper 1266 of the switch HO. This wiper is directly earthed and this earth is extended to conductor 1267 when the wiper is on contacts 1 to 8 and 20 to 25, i. e. between the hours of 19 and 7. Conductor 1267 is connected to a conductor in a toll line control circuit TLCC, etc; and when earthed serves to operate a relay therein with the results previously described.

In view of the foregoing it is apparent that a date and time unit has been provided incorporating improved date and time facility.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. In a signaling system, a clock, a fractional hour register operable step-by-step in response to impulses transmitted by said clock, a register for registering the units digits of the hours of the day operable step-by-step at the end of each hour, a register for registering the tens digits of the hours of a day operable step-by-step at the end of the ninth, nineteenth and twenty-fourth hours of each day, a register for registering the units digits of the days of each month operable step-by-step at the end of each day, a register for registering the tens digits of the days of each month operable step-by-step at the end of the ninth and nineteenth days of each month and at the end of the twenty-ninth day or at the end of each month, a register for registering the months of the year and means controlled jointly by the setting of the month, day-tens and day-units registers for determining whether said month register shall be advanced at the elapse of twenty-eight, thirty or thirty-one days.

2. In a signaling system, a clock, a fractional hour registering mechanism operable step-by-step in response to impulses transmitted by said clock, second registering mechanism for registering the units digits and the tens digits of the hours of the day operable step-by-step at the end of each hour to register the said units digit and at the end of the 9th, 19th and 24th hour of each day to register the said tens digit, third registering mechanism for registering the units digit of the days of each month and the tens digit of the days of each month operable step-by-step at the end of each day to register the said units digit and at the end of the 9th day and 19th day to register said tens digit, and in the event the month contains more than twenty-nine days said registering mechanism is also operable to register an additional tens digit said third registering mechanism also operable at the end of the month, fourth registering mechanism for registering the months of the year, and means controlled jointly by the setting of the fourth registering mechanism and the third registering



mechanism for determining whether said fourth registering mechanism shall be advanced at the elapse of 28, 29, 30 or 31 days.

3. In a signaling system, an impulsing device, a fractional hour register operable step-by-step in response to impulses transmitted by said device, a register for registering the units and tens digits of the hour of a day operable step-by-step at the end of each hour, a register for registering the units and tens digits of the days of each month operable step-by-step at the end of each day, a register for registering the units and tens digits of the months of a year operable step-by-step at the end of each month, and means controlled jointly by the setting of the month and day registers for determining whether said month register shall be advanced at the elapse of twenty-eight, twenty-nine, thirty or thirty-one days.

4. In a signaling system, a periodically operating relay, a fractional hour register operable step-by-step in response to the operation of said relay, a register for registering the units and tens digits of the hours of a day operable step-by-step at the end of each hour under the control of said fractional hour register, a second relay operable under the control of said hour register at the end of each day, a register for registering the units and tens digits of the days of each month operable step-by-step under the control of said second relay at the end of each day, a register for registering the months of a year, a third relay operable under the control of said month and day registers at the end of each month, and means controlled by said third relay for controlling the step-by-step advance of said month register.

5. In a signaling system, a periodically operating relay, a fractional hour register operable step-by-step in response to the operation of said relay, a register for registering the units and tens digits of the hours of a day operable step-by-step at the end of each hour under the joint control of said relay and said fractional hour register, a second relay operable under the control of said hour register at the end of each day, a register for registering the units and tens digits of the days of each month operable step-by-step under the control of said second relay at the end of each day, a register for registering the months of a year, a third relay operable under the control of said month and day registers at the end of each month, means controlled by said third relay for controlling the step-by-step advance of said month register, means controlled by said second relay for operating said hour register an additional step at the end of each day, and additional means controlled by said third relay for operating said day register a variable number of steps at the end of each month depending upon the number of calendar days in the registered month.

6. In a signaling system, a plurality of printer-controllers, a month, day and hour circuit, means for temporarily associating any one of said printer-controllers with said circuit, a plurality of registers for registering the fractional hour and the units and tens digits of the hour of the day, the units and tens digits of the day of the month and the month of the year, a periodically operating relay for controlling the step-by-step advance of said registers, and means for preventing said registers from being advanced in response to the operation of said relay when any one of said printer-controllers is temporarily associated with said circuit.

7. In a signaling system, a periodically operating relay, a signal transmitting circuit comprising a plurality of step-by-step registers operable by said relay to register various calendar and time periods including the hour and fraction thereof, the day and the month, means individual to each of said registers operable to advance its associated register step-by-step in order to reset the register in accordance with the correct calendar and time periods, and means for disconnecting said relay from said registers during the period of time said registers are being reset under control of said last-mentioned means.

8. In a signaling system, an impulse sender, fractional hour register means operated in response to impulses transmitted by said sender for registering the fractions of an hour, hour register means operated at the end of each hour under control of said fractional hour register, day register means operated at the end of each day under control of said hour register means, month register means operated at the end of each month under control of said day register means, marking conductors associated with said hour, day and month register means, and means controlled by said hour, day and month register means for marking said conductors in accordance with the tens and units digits of the registered hour, day and month.

9. In a signaling system, an impulse sender, fractional hour register means operated in response to impulses transmitted by said sender for registering the fractions of an hour, hour register means operated at the end of each hour under control of said fractional hour register, day register means operated at the end of each day under control of said hour register means, month register means operated at the end of each month under the control of said day register means, marking conductors associated with said registers, and means controlled by said register means for marking said conductors in accordance with the registered date and time.

10. In a signaling system, an impulse sender, fractional hour register means operated in response to impulses transmitted by said sender for registering the fractions of an hour, hour register means operated at the end of each hour under control of said fractional hour register, day register means operated at the end of each day under control of said hour register means, month register means operated at the end of each month under the control of said day register means, marking conductors individual to each of said registers, and means controlled by said registers for marking the conductors individual thereto in accordance with the tens and units digits of the registered date and time.

11. In a signaling system, an impulse sender, a minute register operated step-by-step in response to impulses transmitted by said sender, a plurality of tens and units marking conductors adapted to be marked in accordance with the time registered, said register altering the marking of said units marking conductors at the end of each minute in accordance with the units digit of each minute registered therein, and means including said register for altering the marking of said tens marking conductors at the end of the ninth, nineteenth, twenty-ninth, thirty-ninth, forty-ninth and fifty-ninth minute of an hour.

12. In a signaling system, an impulse sender, a register having a plurality of wipers operable step-by-step at the end of each minute by impulses transmitted by said sender, a plurality of



11

tens and units marking conductors, contacts associated with certain wipers of said register terminating said units digits conductors whereby said conductors are marked in accordance with the units digit of the minutes of an hour registered during the step-by-step advancement of said wipers, contacts associated with the remaining wipers of said register terminating said tens digits conductors, and means including said remaining wipers operated under control of certain of the said remaining wipers for marking said tens digits marking conductors in accordance with the tens digit of the minutes of an hour registered during the step-by-step advancement of the said remaining wipers.

13. In a signaling system, an impulsing device, means operable step-by-step in response to impulses transmitted by said device for registering the minutes of an hour, means operable step-by-step at the end of each hour for registering the hours of a day, means operable step-by-step at the end of each day for registering the days of a month, means operable step-by-step at the end of each month for registering the months

12

of a year, and means controlled jointly by the setting of said month and day registering means for advancing said month registering means at the end of twenty-eight days in the month of February in the calendar years not divisible by four and for advancing said month registering means at the end of twenty-nine days in the month of February in the calendar years divisible by four.

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