

Dec. 26, 1933.

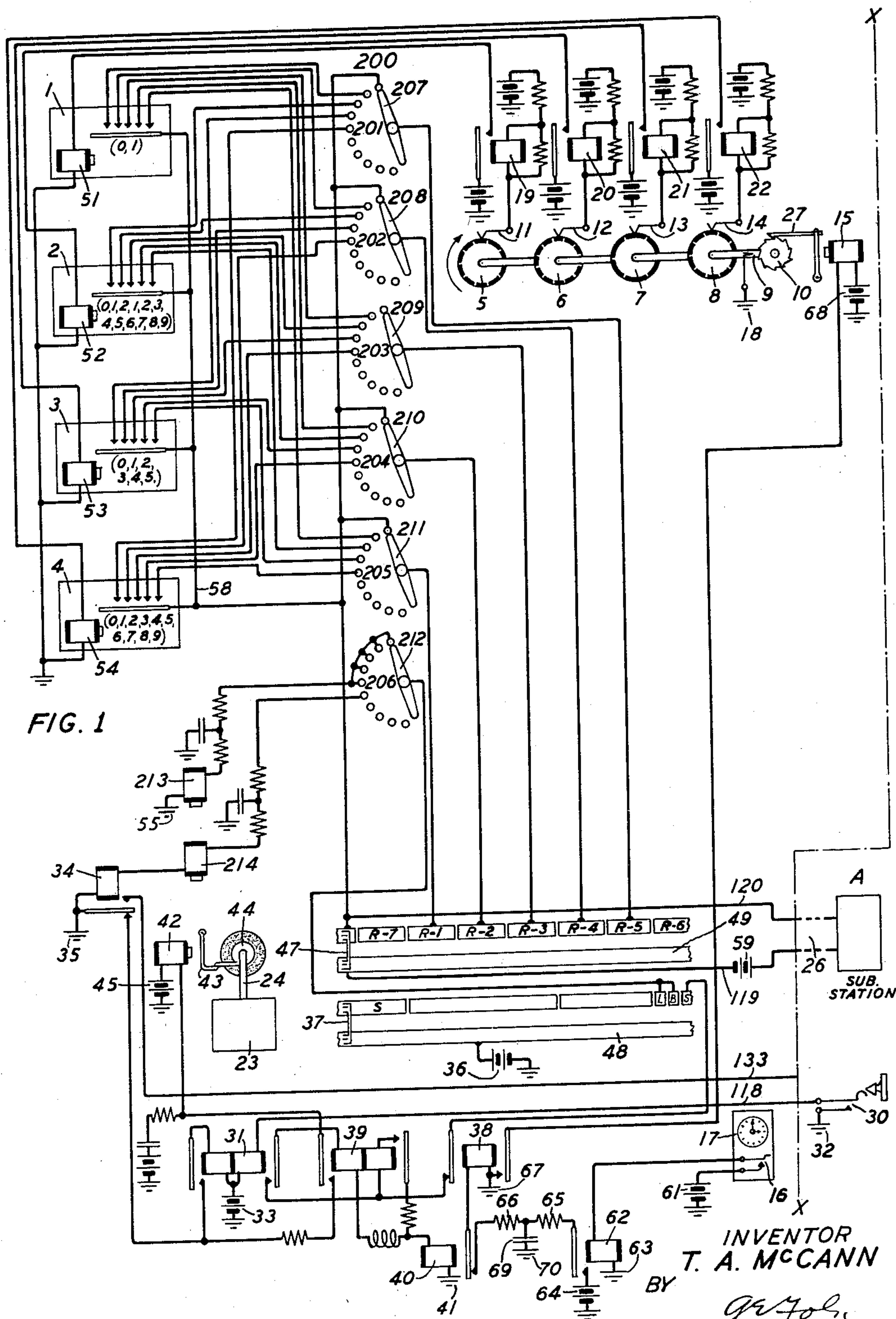
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1,940,764

TIME SENDER

Filed Oct. 20, 1932

2 Sheets-Sheet 1



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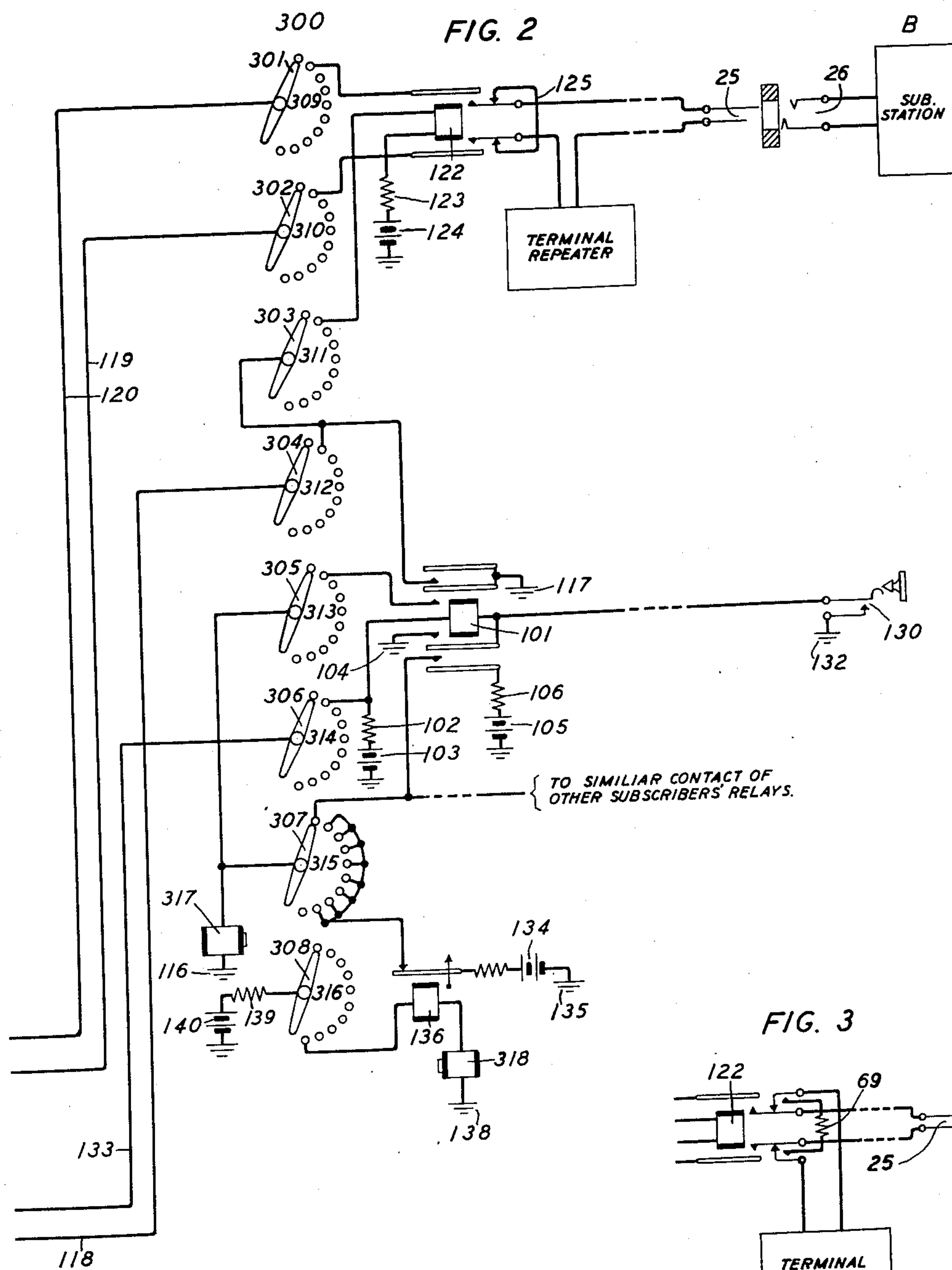


FIG. 3

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1,940,764

TIME SENDER

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pany, a corporation of New York

Application October 20, 1932. Serial No. 638,806

11 Claims. (Cl. 178—2)

This invention relates to a system for automati-
cally transmitting time-of-day information and
more particularly to a system for transmitting
such information from a printing telegraph cen-
tral exchange to the subscribers' printer stations.

An object of the invention is the efficient and
accurate transmission of such information from
the central exchange to such of the individual
stations as desire the information.

According to a feature of the invention the time
sending unit is automatically maintained in such
condition at all times that it is capable of send-
ing out the correct time information.

According to another feature of the invention
selecting means are provided whereby a plurality
of individual printer stations may be served by
one time-sending unit. This is an especially val-
uable feature as its provision results in a saving
of equipment and space and therefore lessens the
expense of the service.

Other important objects and valuable features
contributing toward the attainment thereof will
be apparent from the following description of the
invention.

The important part played by the modern tele-
phone exchange system in our daily lives is, of
course, well understood and it is known that each
subscriber may secure a connection with another
subscriber by signaling the exchange operator
and verbally giving her the code number of the
desired party. Other valuable services besides
the completion of connections between sub-
scribers for conversational purposes are also ren-
dered by the telephone exchange system. One
particularly valuable service is that known as
time-of-day service. Facilities are provided in
some of the larger communities whereby a tele-
phone subscriber may, by calling a designated
code number, be informed of the correct time.

There have recently been developed printing
telegraph exchange systems which extend to
printing telegraph subscribers the same service
as is extended to telephone subscribers by the
telephone exchange system. That is, each tele-
graph subscriber may secure a connection with
another telegraph subscriber by signaling the
telegraph exchange operator and informing her
concerning the identity of the desired party.
The printing telegraph exchange system referred
to differs, however, from the telephone system in
that all communications are by printing tele-
graphy and this includes the transmittal by the
calling subscriber to the central operator of the
number of the desired party as well as any ac-
knowledgements, instructions or other informa-

tion which the operator may wish to transmit to
either calling or called subscriber. For a com-
plete description of such a printing telegraph ex-
change system reference may be made to the co-
pending application of George A. Locke and
Fullerton S. Kinkead, Serial No. 459,684, filed
June 7, 1930.

It is anticipated that as printing telegraph ex-
change systems come into more general use there
will be an increasing demand on the part of the
subscribers for special services and as stated
above it is a broad object of this invention to pro-
vide one such service, that is, time-of-day service.

The invention in its broad aspect contemplates
the provision at the central exchange of a time-
sending unit capable of being connected by vir-
tue of a selecting circuit, to any one of a plural-
ity of printer stations which may express a de-
sire by means, for example, of depressing a key,
to have the time-of-day information transmitted
thereto.

The time sending unit includes four automatic
tape controlled telegraph transmitters for trans-
mitting code signals for printing, respectively,
minutes, tens of minutes, hours and twelves of
hours. The controlling tapes of the transmitters
are periodically changed by means of a clock
actuated advancing mechanism whereby the cor-
rect time information is automatically "stored"
at all times in the sending unit. A distributor
arrangement is provided whereby the informa-
tion stored in the various transmitters is auto-
matically transmitted into the line in the proper
sequence and with the required separations in
order that the information will be properly re-
corded at the station to show the time-of-day in
hours and minutes.

A complete understanding of the invention and
its possible applications may be obtained from a
consideration of the following description in con-
nection with the appended drawings in which:

Figure 1 shows a time sending system for
transmitting time-of-day information to a sub-
scriber's station.

Fig. 2 shows a selective circuit whereby the
time sender of Fig. 1 may serve a plurality of
subscribers' stations and

Fig. 3 shows a modification of a portion of the
selective circuit of Fig. 2.

Referring now to Fig. 1 of the drawings, a
brief description of the apparatus represented
will first be given after which the operation of
the arrangement in actual transmission of time
of day information will be described in detail.

Four automatic tape controlled telegraph

transmitters 1, 2, 3 and 4 are shown which may be of the type described in G. R. Benjamin Patent 1,298,440, issued March 25, 1919. As this type of transmitter is well known in the art it will not be described in detail. It might be stated, however, that each transmitter is provided with five contacting elements which are traversed by a controlling tape so punched as to allow certain of the elements to contact with a second common element thus completing a circuit through a battery provided in the line loop while other of the elements are prevented by the tape from contacting with the second element and the circuit through the line battery is not completed. Thus by the use of tapes properly punched the transmitters originate respectively periods of "current" and periods of "no current" in the line loop as desired. Tape advancing magnets (51 to 54 inclusive) are included in the transmitters.

The controlling tape of transmitter 1 is so punched that the transmitter will send out code impulses corresponding to either one of the digits "0" or "1" according to the position of the tape. The tape of transmitter 2 is so punched that this transmitter will send code impulses corresponding to a digit in the group "0", "1", "2", "3", "4", "5", "6", "7", "8", "9", depending upon the position of the tape, the tape of transmitter 3 is punched to control the sending of code impulses corresponding to a digit in the group "0" to "5" inclusive and the tape of transmitter 4 is so punched that code signals corresponding to a digit of the group "0" to "9" inclusive are sent out. The operation of these transmitters will be better understood after considering the description of an actual transmission of time information which is to be given subsequently but it might be here stated that they operate to send out, over the line leading to the subscriber's station, impulses which cause the printer apparatus there provided to operate to type the time of day in hours and minutes, for example, 0-2-2-6 if the time be twenty-six minutes after two. In this instance transmitter 1 would send out impulses corresponding to "0", transmitter 2 would send impulses corresponding to "2", transmitter 3 would send impulses corresponding to "2" and transmitter 4 would send impulses corresponding to "6".

In order that the correct time information be "stored" in the transmitters 1, 2, 3 and 4, it is, of course, necessary that the controlling tapes be periodically advanced in step with actual time changes. Segmented wheels 5, 6, 7 and 8 are provided which together with the driving shaft and ratchet wheel 9 and 10 constitute a mechanism similar to the well known counting train used in mileage registers and the like, an adaptation of which is often used as an electric clock for switchboards as disclosed for example in B. F. Merritt Patent 740,889, issued October 6, 1903 or as a service meter as disclosed for example in C. E. Scribner et al. Patent 765,255, issued July 19, 1904. The wheels in the present instance, however, are not provided on their surfaces with figures as is done in the case of registers of clocks but are provided with alternate conducting and insulating segments so arranged that the associated brushes 11, 12, 13 and 14 rest on insulating segments when the wheels are in normal position but contact with a conducting segment each time the associated wheel is stepped forward. Through the operating, once each minute, of contact 16, which is controlled

by clock-work mechanism 17, an operating circuit for magnet 15 is normally completed once each minute and magnet 15 in turn causes the driving wheel 10 to move one step each minute. As wheel 8 is directly connected to shaft 9, this wheel is also moved forward one step each minute. Wheel 7 is operatively controlled by wheel 8, in the manner commonly utilized in counting trains, so that it is driven forward one step as wheel 8 completes one revolution, that is, one step for each tenth step of wheel 8. Wheel 6 is in turn so controlled by wheel 7 that it is driven one step as wheel 7 completes one revolution, that is, one step for each sixth step of wheel 7. Wheel 5 is advanced two steps during a revolution of wheel 6, one step occurring after the first three steps of wheel 5 and the second step occurring after the next nine steps of the wheel, that is, at the completion of a revolution.

Ground 18 is connected to the conducting segments of each wheel through the shaft 9 so that each time one of the brushes 11, 12, 13 or 14 contacts with a conducting segment of the associated wheel, a circuit will be momentarily completed through the winding of the associated relay 19, 20, 21 or 22. The operation of one of these relays in turn completes a circuit through the winding of the tape advancing magnet of the respective transmitter 1, 2, 3 or 4 with which the relay is associated.

In order that a better understanding may be had of the method of keeping the information "stored" in the transmitters up to date with respect to actual changes in time it appears desirable to consider a few examples. Let us assume therefore that the time of day is fifty-eight minutes after twelve, that is, the tape of transmitter 1 is in position to send out impulses corresponding to "1", that of transmitter 2 to send out "2", transmitter 3 to send "5" and transmitter 4 to send "8". Now at the end of the minute period, the operating circuit of relay 15 is momentarily completed (controlled by contact 16 over circuit to be subsequently described in detail) and shaft 9 and wheel 8, directly connected thereto, are moved one step. As wheel 8 is moved one step brush 14 momentarily contacts with a conducting segment and relay 22 is momentarily operated. The operation of this relay in turn completes a circuit through tape feed magnet 54 of transmitter 4 and the tape thereof is advanced one step into position to send out impulses corresponding to the next digit, i. e. "9". As wheels 5, 6 and 7 were not advanced the tapes of transmitters 1, 2 and 3 are in original position and the time information now "stored" is 1-2-5-9. At the next movement of wheel 8, however, wheels 5, 6 and 7 are also advanced and by means of the resulting operation of the associated relays the tapes of all four transmitters are advanced one step and into such position that the digits "0", "1", "0" and "0" will be transmitted. At the end of the next minute, the digits "0", "1", "0" and "1" will be transmitted, at the end of the next the digits "0", "1", "0" and "2" and so forth. After "0", "9", "5" and "9" have been transmitted it is necessary, at the end of the next minute period, that is, at ten o'clock that the tape of transmitter 1 be advanced in order that the digit "1" may be transmitted instead of "0" (i. e. "1", "0", "0" and "0") which makes apparent the reason why wheel 5 must be advanced twice during a revolution of wheel 6 instead of only once. (As pointed out above

transmitter 2 controls the sending of the series 0—1—2—1—2—3—4—5—6—7—8—9 and the tape of transmitter 1 must change once after transmission of "0", "1" and "2" in the above series and must change again after "9" has been transmitted.)

In order that the impulses sent out by the transmitters may be transmitted out along the line in proper sequence and with the necessary separation, a distributor mechanism is provided which may be of the so-called "start-stop" type disclosed, for example, in P. M. Rainey Patent 1,311,915, issued August 5, 1919. This mechanism includes a driving motor 23 and a shaft 24 driven thereby. Rotating brush carrier 44 is frictionally coupled to shaft 24 but is normally held inoperative by latch 43. Upon the energization of distributor magnet 42, however, latch 43 is withdrawn and allows brush carrier 44 to rotate carrying with it brushes 37 and 47 which traverse their respectively associated sets of commutator rings which are here shown developed for purposes of illustration. Each set of commutator rings includes a common ring (48 and 49 respectively) and a segmented ring.

There are also included in the equipment various relays, the functions of which will be explained subsequently as well as a selector switch 200 which may be of the type described in O. F. Forsberg et al. Patent 1,472,465, issued October 30, 1923. This selector switch includes six banks, (201 to 206 inclusive) each provided with six contacts, six rotatable brushes (207 to 212 inclusive), one associated with each bank, a stepping magnet 213 which when energized serves to rotate the brushes around the associated banks and a restoring magnet 214 which when energized restores the brushes to normal position, i. e. contacting with the first contact of the associated bank.

The time sending equipment is preferably located at a central office and for purposes of illustration is shown connected by lines 119 and 120 to a subscriber's station A. The subscriber's station is preferably provided with printing apparatus for example of the type described in Patent 1,745,633 issued February 4, 1930 to S. Morton et al. A "time request" key 30 is also provided at the subscriber's station which when actuated serves to set the time sender equipment into operation.

Let us now assume that subscriber A wishing to have time information transmitted to his station, operates his "time request" key 30 which completes an operating circuit for relay 31 traced from ground 32, make contact of key 30, right hand winding of relay 31 to battery 33 and relay 31 operates. Relay 31 locks up on a circuit traced from battery 33, left winding of relay 31, left make contact of relay 31, break contact of relay 34 to ground 35. Relay 31 by its operation also completes a circuit from battery 36, brush 37 and start segment S of distributor, break contact of relay 38, right make contact of relay 31, left winding of relay 39, winding of relay 40 to ground 41, relays 39 and 40 operating over this circuit. Relay 39 upon operation locks up on a circuit traced from battery 36 and brush and segments previously referred to through the right winding and right make contact of relay 39 through winding of relay 40 to ground 41. Relay 39 therefore remains operated over this locking circuit so long as brush 37 is on the start segment.

The distributor magnet 42 is energized upon the operation of relay 39 over a circuit traced from

battery 45, winding of magnet 42, left make contact of relay 39, break contact of relay 34 to ground 35. Magnet 42 being energized attracts latch 43 thereby releasing brush carrier 44 which, due to its frictional coupling to rotating shaft 24, rotates carrying brushes 37 and 47 through one revolution contacting with their respectively associated commutator rings.

Assuming that the printer provided at station A is of the type capable of printing either figures or letters, it is desirable that a series of impulses first be transmitted to the printer to set its typing mechanism into position to print figures, such a series of impulses being commonly termed a "figures shift" signal. In the case of the five-unit code which we are assuming is being used in the present system, this signal consists of two intervals of current, one interval of no current and two intervals of current. It will be seen that as brush 47 passes over its associated set of commutator rings such a signal will be sent out over the subscriber's line loop. As brush 47 contacts with segment R—1 a circuit is completed from common ring 49, brush 47, segment R—1, brush 211 and first contact of selector bank 205, line 120 through printer at station A, battery 59, line 119, thus completing a circuit through the line loop battery 59 for one interval of current. A second interval of current results from a similar circuit as brush 47 contacts with segment R—2. As the brush contacts with segment R—3, however, an interval of no current results as brush 209 is normally associated with an insulated contact of switch bank 203 and the circuit is not completed through the line loop battery. Two impulses of current follow, however, as brush 47 contacts segments R—4 and R—5, the circuit being completed through the loop battery in a manner similar to that described in connection with segment R—1. By this series of impulses the printer at station A is set into position to record the time in figures as the impulses are subsequently received.

As brush 37 contacts with segments L and B of its associated distributor commutator ring a circuit is completed from battery 36, common ring 48, brush 37, segments L and B, brush 212 of selector switch, first contact of bank 206, through the winding of selector switch stepping magnet 213 to ground 55. Stepping magnet 213 is energized over this circuit and operates to step the selector switch brushes 207 to 212 inclusive forward one step to the next contact of each bank.

Since relay 31, as previously explained, remains locked up on a circuit from battery 33, left winding and left make contact of relay 31 to break contact of relay 34 and ground 35, relay 39 again operates (brush 37 being in normal position, i. e. contacting with segment S), and in turn causes the energization of distributor magnet 42 which releases brushes 37 and 47 for a second revolution.

As brush 47 progresses through the second revolution of its associated commutator rings impulses to print the first digit of the time information are sent out over the line. As brush 47 contacts with segment R—1 a circuit is completed (or remains open depending upon the condition of the tape controlled tongue of the transmitter, i. e., whether it is to be a "current" or "no current" interval) from common ring 49, brush 47, segment R—1, brush 211 and second contact of switch bank 205, tape controlled tongue of transmitter 1, common return lead 58, line

lead 120 through printer at station A and battery 59 back to ring 49 through line lead 119.

The other four tape controlled tongues of transmitter 1 are in turn connected into the loop circuit in a similar manner as brush 47 contacts with segments R—2, R—3, R—4 and R—5 in turn four intervals of "current" or "no current" resulting according to the position of the tongues. It will be evident that before the transmission of each set of impulses, i. e. when brush 47 contacts with segment R—7, an interval of "no current" results and that at the end of the series, i. e. when brush 47 contacts with segment R—6, an interval of "current" results. These signal impulses serve respectively to start the selecting mechanism of the printer and to stop it and hence are usually referred to as "start" and "stop" signal impulses.

As the brushes complete their second revolution therefore the first digit of the time, i. e., either "0" or "1" depending upon the position of the controlling tape of transmitter 1 is typed at station A. Also the brushes 207, 208, 209, 210, 211 and 212 of the selector switch are stepped forward to the third contact of their associated banks through the circuit previously described, which is completed when brush 37 contacts with segments L and B.

As relay 31 remains locked up over the locking circuit previously described, relay 39 again operates when brush 37 contacts with segment S (circuit previously described) and magnet 42 is energized to release brushes 37 and 47 for a third revolution. As the brushes of the selector switch are now in contact with the third contacts of their associated banks and as said third contacts are connected with the tongues of transmitter 2, it will be evident that the signals stored in transmitter 2 are sent out over the line during the third revolution of brush 47 and that the second digit of the time information is thereby printed at station A.

As the continuing operation of the arrangement in transmitting the information stored in transmitters 3 and 4 is the same as described in connection with transmitters 1 and 2 the detailed description will not be repeated.

As the fifth revolution of the brushes is completed and the time information stored in the four transmitters has been transmitted, brushes of selector switch 200 are stepped to the sixth contact of their respective banks. The sixth contact of bank 206 is connected to return magnet 214 the circuit of which is thereby completed from battery 36, common ring 48, brush 37, segments L and B, brush 212, sixth contact of bank 206 through the winding of restoring magnet 214 and relay 34 to ground 35. The energization of restoring magnet 214 causes brushes 207, 208, 209, 210, 211 and 212 to restore to normal position, i. e. contacting with the first contact of their associated banks while the operation of relay 34 opens the holding circuit of relay 31 which therefore restores to normal position.

As stated above a circuit is completed once each minute which is effective to energize magnet 15 which in turn operates pawl 27. This circuit is completed as follows: Assuming that contacts 16 are momentarily closed through the action of clockwork mechanism 17, a circuit is completed from battery 61, contact 16 through the winding of relay 62 to ground 63 thereby causing relay 62 to operate. Relay 62 by its operation completes a circuit from battery 64, make contact of relay 62, through resistances

65 and 66, break contact of relay 40, through the winding of relay 38 to ground 67, thereby causing relay 38 to operate. A circuit is completed by the operation of relay 38 from ground 67, make contact of relay 38, through the winding of magnet 15 to battery 68 and magnet 15 is energized and attracts pawl 27 thereby stepping ratchet wheel 10 forward one step.

It is evident of course that the operating circuit of magnet 15 should not be completed during transmission of time signals into the line, i. e. during the time brush 47 is traversing segments R—1 to R—5 of the distributor for the resulting movement of the tapes in the transmitters would result in errors in transmission. It will be remembered that relay 40 operates as the brushes start their movement and it will be evident that such operation opens the circuit over which magnet 15 is energized. Should contact 16 be completed during the time relay 40 is operated condenser 69 is charged over a circuit from battery 64, make contact of relay 62, resistance 65, condenser 69 to ground 70. That is to say, the impulse is stored momentarily in the condenser. Now when brushes 37 and 47 complete their rotation and relay 40 drops back to normal position condenser 69 discharges through relay 38 causing it to operate and complete a circuit to operate magnet 15.

In the embodiment of the invention discussed above it has been assumed that the time sending arrangement is directly connected over a line to a particular subscriber's station. As pointed out above, however, it is in accordance with one feature of the invention to provide a selective circuit whereby one time sender may serve a plurality of subscribers' stations. For example, it may be desirable, with respect to a printing telegraph exchange system of the type disclosed in the copending application of George A. Locke and Fullerton S. Kinkead, Serial No. 459,684, filed June 7, 1930 to provide at the central exchange office several of the time senders each of which will serve a plurality of subscribers say, for example, nine.

Accordingly there is illustrated in Fig. 2 of the annexed drawings a selective circuit whereby the time sending arrangement disclosed in Fig. 1 may serve a plurality of telegraph exchange subscribers. It will be necessary in the subsequent description of Fig. 2 to consider it in connection with Fig. 1 and while so doing it should be assumed that the apparatus to the right of the line X—X' of Fig. 1 has been replaced by Fig. 2, the correspondingly numbered leads of the two figures (i. e. 119, 120, 118 and 133) being of course joined.

Referring now to Fig. 2, a selector switch 300 which may be of the type described in O. F. Forsberg et al. Patent 1,472,465, issued October 30, 1923 is shown and includes eight rotatable brushes (301 to 308 inclusive), each brush being associated with a contact bank (309 to 316 inclusive), a stepping magnet 317 and a restoring magnet 318. As stated above we are assuming that by use of the selective circuit each time sender is enabled to serve nine subscribers and the contact banks of the selector are therefore shown with ten contacts, one "normal" contact and one contact for each subscriber to be served by the time sender. Relays 101 and 122 which are individual to subscriber's station B are shown connected to the second contacts of banks 311 and 314 and it will be understood that similar relays associated with the other stations will be

connected to the other eight contacts of the same banks. The lower outer make contacts of all the subscribers' relays corresponding to relay 101 of subscriber B are connected to the first contact of bank 315, that is, the same contact to which the lower outer make contact of relay 101 is connected.

Let it now be assumed that subscriber's station B is connected through plug 25 and jack 26 to the central office and through the terminal repeater there provided to a second subscriber. As details of the apparatus and circuits utilized in obtaining such a connection are fully described in the application of Locke and Kinkead referred to above they will not be again described herein. Let it be further assumed that subscriber B wishes to have the time-of-day recorded on his printer and therefore operates "time request" key 130.

Operation of "time request" key 130 completes a circuit to operate relay 101, traced from ground 132, make contact of key 130, through the winding of relay 101 and resistance 102 to battery 103. Relay 101, upon operation, locks up on a holding circuit traced from ground 104, bottom inner make contact of relay 101 and through its winding and resistance 102 to battery 103. Relay 101 by its operation also completes a circuit from battery 105, resistance 106, lower outer make contact of relay 101, first contact of bank 315, selector switch brush 307, through the winding of selector stepping magnet 317 to ground 116. Stepping magnet 317 is energized by this circuit and acts to step each of the selector switch brushes, 301 to 308 inclusive, forward one step to the second contacts of their associated banks. As brush 305 reaches the second contact of its bank it acts to short-circuit the stepping magnet and remove the energizing current, the short-circuit path being to ground 117 reached through the upper inner make contact of relay 101. Ground is also applied to the winding of relay 31 at this time, the circuit being traced from ground 117, upper outer make contact of relay 101, second contact of bank 312, brush 304, lead 118 through the right winding of relay 31 to battery 33. It will be recalled that, with respect to my description of the first embodiment, ground was applied to this relay by the operation of key 30 (Fig. 1) and that the resulting energization of relay 31 was instrumental in setting the time sender into operation to transmit the signals into the line. Relay 31 operates in the same way and with the same results now upon application of ground 117 to the winding as just described and the resulting starting and operation of the tape transmitters and distributors will not be again described.

At this same time, i. e. as the selector brushes are stepped to the second contacts of their associated banks the time sender loop leads 119 and 120 are connected through to the subscriber's set by the operation of relay 122 on a circuit traced from ground 117, upper outer make contact of relay 101, brush 303, second contact of bank 311, through the winding of relay 122 and resistance 123 to battery 124. Operation of relay 122 removes the short-circuiting loop 125 from its make contacts and substitutes loop leads 119 and 120.

The time sender having been started as previously stated (by operation of relay 31) the time signals are transmitted into the subscriber's loop and recorded on his printer.

Upon completion of the time information transmission, relay 34 operates as previously described and ground 35 is applied to lead 133 (through

make contact of relay 34) whereupon a short-circuiting path is presented to battery 103 and relay 101 therefore restores to normal. Relay 101 upon restoring to normal removes the short-circuiting path from stepping magnet 317 and an energizing circuit for the latter is now completed, traced from battery 134, break contact of relay 136, strapped contacts of bank 315, brush 307, through the winding of magnet 317 to ground 116.

Now it will be understood that if, during transmission of time signals to subscriber B, a second subscriber, for example, subscriber C associated with the third contacts of the various selector banks, operated his time request key, his associated control relay (corresponding to relay 101) would operate and apply ground to the third contact of bank 313. The relay would remain operated on a locking circuit similar to that of relay 101 previously described.

Now as the brushes are stepped forward (stepping magnet 317 being energized as just described) ground will be found on the third contact of bank 312 and the arrangement will again function to send the time information to station C.

It will be evident, of course, that the loop circuit of subscriber B is no longer associated with the time sender as brushes 301, 302 and 303 no longer contact with the second contacts of the associated banks.

Assuming now that transmission to station C has been completed and that no other subscriber has operated his time request key the brushes of the selector switches will continue stepping until the final contacts of the associated banks have been reached. A circuit is then completed from ground 138 through the windings of selector return magnet 318 and slow-to-release relay 136, tenth contact of bank 316, brush 308, resistance 139 to battery 140. By virtue of this circuit, magnet 318 operates to restore the selector brushes 301 to 308 inclusive to normal position and slow-release relay 136 operates and holds the energizing circuit of stepping magnet 317 open while brush 307 is being returned to its normal position. The arrangement is now restored to normal position to await subsequent operation by a subscriber of his time request key.

It will be apparent that during transmission of time information to station B as described above (or to the other subscribers' stations associated with the selector banks) the information will be transmitted also to any other stations which happen to be connected to the terminal repeater. In cases where it is wished that such information be transmitted only to the station requesting it, the circuit of relay 122 may be modified as shown in Fig. 3. In accordance with this modification as relay 122 operates and connects the line leads 119 and 120 through to the substation, the terminal repeater is temporarily disconnected from the substation circuit and resistance 69 is connected to the terminal repeater leads.

While certain particular embodiments of the invention have been described in detail above these, and only these have been selected for description as it is believed that a full understanding of the invention may be gained from a consideration of them. The invention is not limited however, to such embodiments as specifically described but is intended to be limited only as indicated by the claims attached hereto.

What is claimed is:

1. An information transmitting system comprising a central office and a plurality of indi-

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vidual stations, an information sending unit at the central office including means for storing the information, means for automatically changing the information stored, selective means for connecting the sending unit to one of the stations, and means for transmitting the stored information in proper sequence and with proper separation and means at the stations for controlling the starting of the selective and transmitting means and printers at the stations for recording the information transmitted.

2. A time-of-day transmitting system comprising a central office and a plurality of individual stations, lines for connecting the stations to the central office, a time-sending unit at the central office including means for storing the time information, means for automatically changing the stored information in accordance with changes in time, means for transmitting the stored information in proper sequence and with proper separation, means at the individual stations for controlling the starting of the transmitting means and printers at the stations for recording the information transmitted.

3. A time-of-day transmitting system comprising a central office and a plurality of individual stations, lines for connecting the stations to the central office, a time-sending unit at the central office including means for storing the time information, means for automatically changing the stored information in accordance with changes in time, means for transmitting the stored information in proper sequence and with proper separation, selective means whereby the time-sending unit may be connected to any one of the individual stations, means at the individual stations for controlling the starting of the transmitting and selective means and printers at the stations for recording the information transmitted.

4. In a time-sending system, a time-transmitting unit including an automatic tape controlled impulse transmitter and automatic means for changing the position of the controlling tape in accordance with changes in time, a time-receiving unit including a printer for recording in accordance with the impulses transmitted by the transmitting unit, and a line for connecting the transmitting and receiving unit.

5. In a time-sending system, a time-transmitting unit including an automatic tape controlled impulse transmitter and automatic means for changing the position of the controlling tape in accordance with changes in time, a time receiving unit including a printer for recording in accordance with the impulses transmitted by the transmitting unit and means for setting the transmitting unit into operation, and a line for connecting the transmitting and receiving unit.

6. In a time-sending system, a time-transmitting unit including a plurality of automatic tape controlled impulse transmitters and means for changing the position of the controlling tapes in accordance with changes in time, a time receiving unit, a line for connecting the transmitting unit and the receiving unit, and means for rendering each of the impulse transmitters effective in turn to transmit impulses over the line to the receiving unit, said receiving unit including a printer for recording in accordance with the impulses transmitted.

7. In a time-sending system, a time-transmitting unit including a plurality of automatic tape controlled impulse transmitters and means for

changing the position of the controlling tapes in accordance with changes in time, a plurality of time-receiving units, a line, selective means whereby any one of the receiving units may be connected over the line to the transmitting unit, and means for rendering each of the impulse transmitters effective in turn to transmit impulses over the line to the receiving unit, said time-receiving units including printers for recording in accordance with the impulses transmitted.

8. In a telegraph exchange system comprising a central office, a subscriber's telegraph printer station, a line for the subscriber's station terminating at the central office, a plurality of other subscribers' stations, lines for the other stations also terminating at the central office and an interconnecting circuit for interchangeably connecting the subscriber's station line with certain of the other lines, a time-sending unit at the central office whereby time-of-day information may be transmitted to the subscriber's stations and means at the subscriber's station for recording the time information.

9. In a telegraph exchange system comprising a central office, a subscriber's telegraph printer station, a line for the subscriber's station terminating at the central office, a plurality of other subscribers' stations, lines for the other stations also terminating at the central office and an interconnecting circuit for interchangeably connecting the subscriber's station line with certain of the lines, a time-sending unit at the central office whereby time-of-day information may be transmitted to the subscribers' stations, the time-sending unit including an automatic tape controlled transmitter and automatic means for changing the position of the tape in accordance with changes in time and means at the subscribers' stations for recording the time information.

10. In a telegraph exchange system comprising a central office, a subscriber's telegraph printer station, a line for the subscriber's station terminating at the central office, a plurality of other subscribers' stations, lines for the other stations also terminating at the central office and an interconnecting circuit for interchangeably connecting the subscriber's station line with certain of the other lines, a time-sending unit at the central office and selective means whereby the time-sending unit may be connected to any one of the subscribers' station lines to transmit time-of-day information thereover and means at the subscribers' stations for recording the time information.

11. In a telegraph exchange system comprising a central office, a subscriber's telegraph printer station, a line for the subscriber's station terminating at the central office, a plurality of other subscribers' stations, lines for the other stations also terminating at the central office and an interconnecting circuit for interchangeably connecting the subscriber's station line with certain of the other lines, a time-sending unit at the central office including a plurality of automatic tape controlled impulse transmitters, means for changing the positions of the controlling tapes in accordance with changes in time, selective means whereby the sending unit may be connected to any one of the station lines and means whereby each of the impulse transmitters is rendered effective in turn to send impulses over the connected station line.

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