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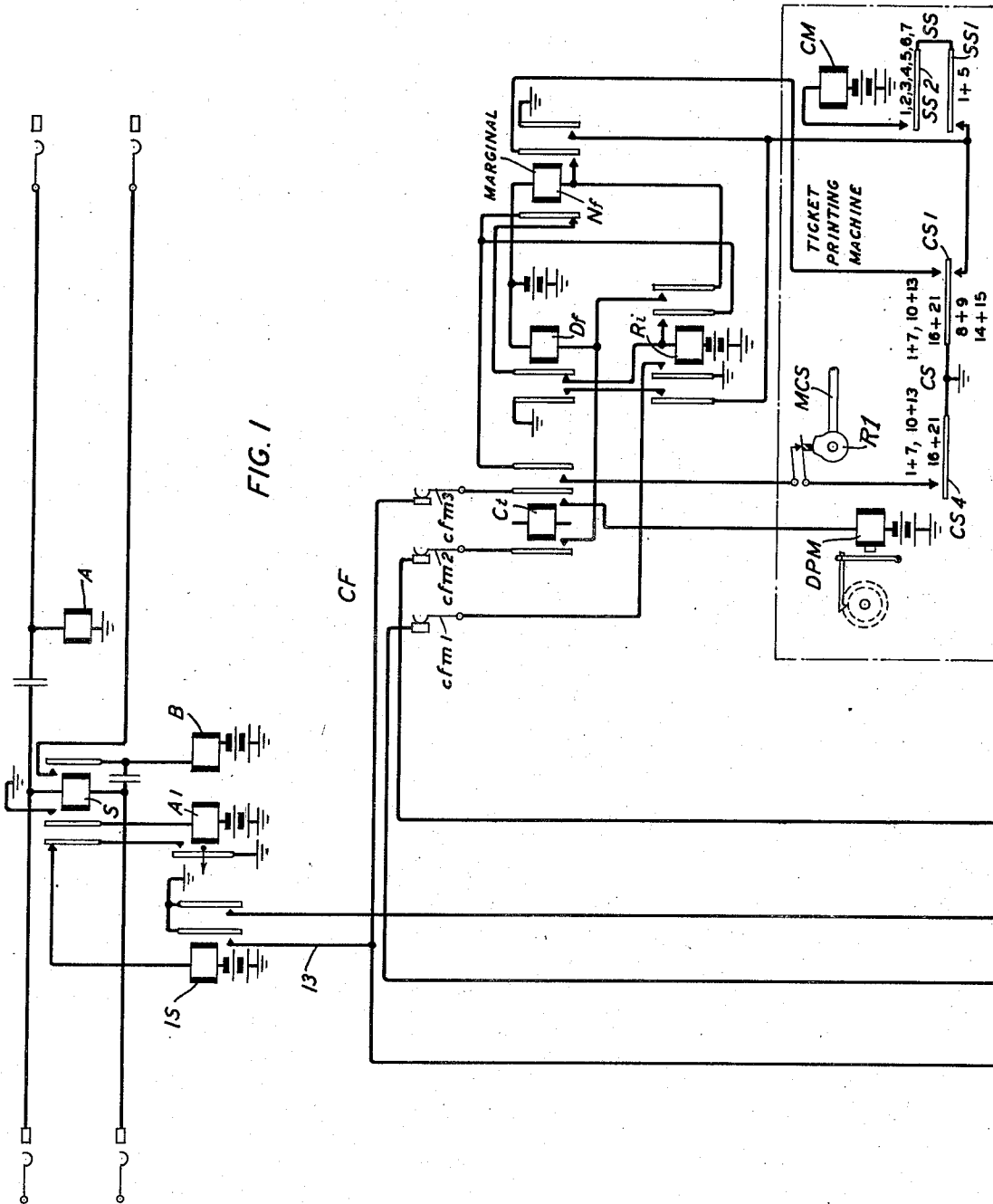
W. HATTON ET AL

2,180,824

AUTOMATIC CALL TICKETING SYSTEM

Filed Feb. 24, 1938

2 Sheets-Sheet 1



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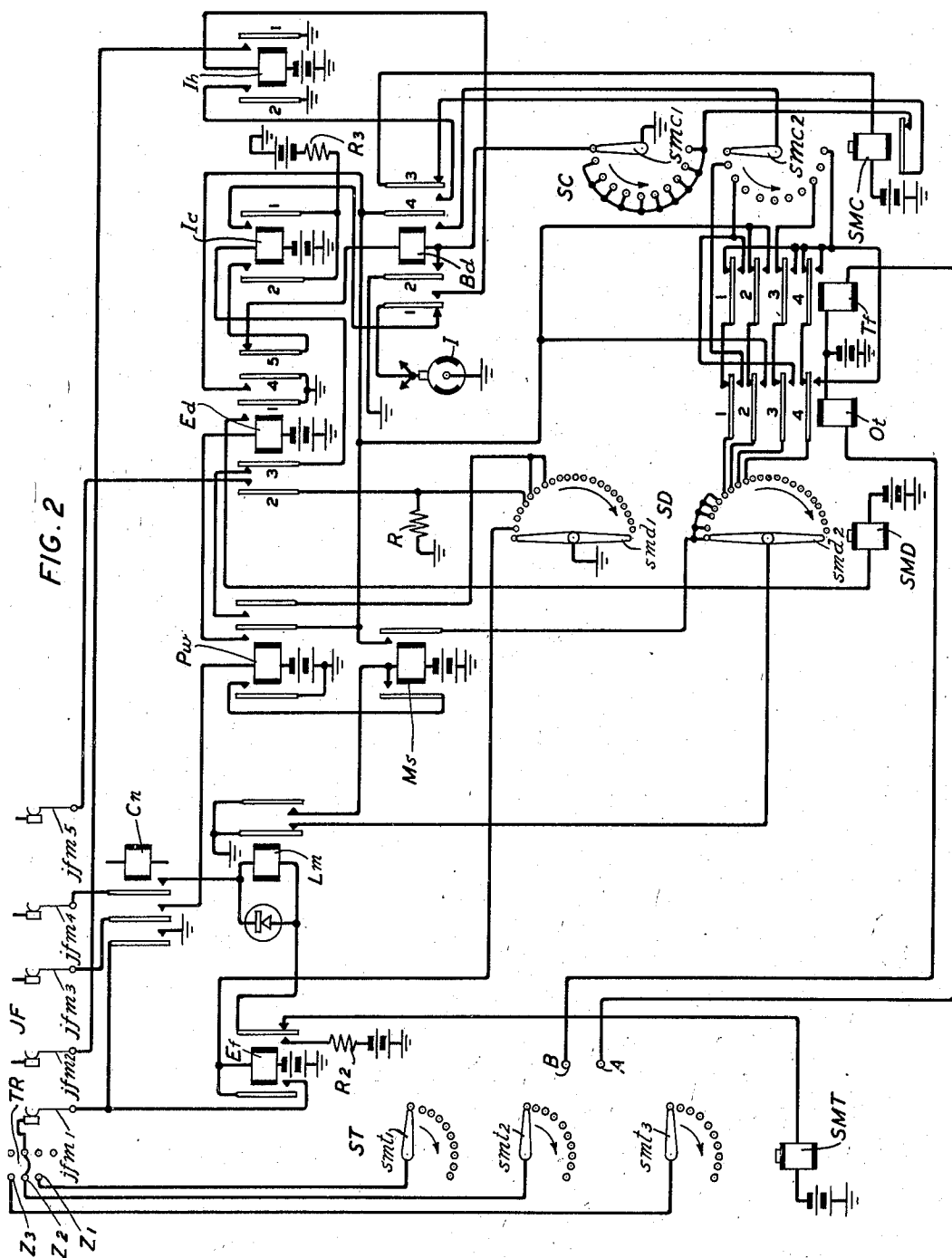
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UNITED STATES PATENT OFFICE

2,180,824

AUTOMATIC CALL TICKETING SYSTEM

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In Belgium March 10, 1937

12 Claims. (Cl. 179-7.1)

This invention relates to automatic call ticketing systems and more particularly to equipment for determining the tariff rate which shall be applicable for a completed connection.

5 It has heretofore been the practice to provide each subscriber's line with a message register for registering the number of charge units applicable for each call made from such line. In some instances the message register is operated once for
10 each completed call and in other cases one or more times for each unit period of conversation dependent upon the zones of the exchange area in which the calling and called lines terminate.

15 For long distance or toll calls it has been the practice to route such calls through a recording toll operator's position and to have the recording operator manually make out toll tickets for the use of the business department of the operating company giving such details of toll
20 calls as would be required for charging the proper subscribers for the toll service rendered, the tickets for each completed toll call indicating the directory numbers of both the calling and called subscribers, the date on which the call was made
25 and the starting and ending times of the conversation.

In order that both local and toll calls may be established completely by dial controlled switching equipment without the intervention of operators,
30 it has been proposed to automatically make a ticket for each completed call whether of a local or toll character, each such ticket giving the same full information as has heretofore been manually recorded by toll operators on toll calls.
35 Such a call ticketing system is disclosed in the applicants' application Serial No. 200,656, filed April 7, 1938. It has further been proposed to make a record of the tariff to be charged for each unit period of conversation or for a complete connection.
40

The tariff to be charged for any completed connection depends, of course, upon the location of the calling and called subscribers' lines with respect to each other, a low tariff being charged
45 if they are located in the same or neighboring zones of the dialing area and a higher tariff being charged if they are more widely separated.

If the tariff determining equipment is located in the office or exchange in which the
50 calling line terminates, the tariff can readily be determined from the called line number dialed by the calling subscriber. If, however, the tariff determining equipment is at another exchange, for example, at a toll office or at a tandem point
55 of the exchange network, the tariff must be de-

termined by the location of both the calling and called subscribers' lines.

It is, of course, possible to record the tariff merely as code digits each characteristic of a particular tariff, but it is the object of the present invention to provide equipment located at a
5 tandem point of the exchange network whereby the tariff to be charged for any call is recorded in direct monetary values determined automatically by the location of the called subscriber only,
10 or by the location of both the calling and called subscribers and whereby the recorded tariff rate is transferred to a ticket printer for printing such rate on a call ticket.

The charge for certain connections is the same
15 irrespective of the length of the conversation and in this case, of course, the monetary value of the tariff to be charged is a record of the actual charge to be made for the entire conversational period. In most cases, however, when the tariff
20 is fairly high, the charges are made on a time basis and the tariff is usually the charge per unit period of conversation, for example, three minutes. It is, of course, possible to record the tariff and the duration of conversation separately,
25 or to automatically multiply the tariff by the number of unit periods of conversation during which a connection has endured and then to make a charge for the call, or to transmit the tariff a plurality of times to a recording device
30 which will add the plurality of charges before making a permanent record thereof.

In the embodiment of the invention to be hereinafter described, the tariff to be charged is determined from one digit of the called subscriber's
35 number together with the location of the calling subscriber, the tariff determining equipment being located at a tandem point of the dialing area. The location of the calling line is determined by the group of tandem trunks over which the call
40 has entered the tandem point, but might be determined by a signal or digit received from the originating exchange equipment or from the calling line.

It will be obvious that by the use of a plurality of digit registers and a translating switch
45 in the tariff determining equipment, the tariff may be determined from a plurality of digits of the called subscriber's number instead of from a single digit as in the embodiment of the invention disclosed. Further, the tariff may be determined solely from at least one digit of the called
50 subscriber's number only if the tariff determining equipment is located in the originating exchange.

By means of the present invention the tariff
55

is automatically determined in monetary values and is recorded on a recording or ticket printing machine whatever the data from which the tariff is determined.

- 5 For a more complete understanding of the invention reference may be had to the following description taken in connection with the accompanying drawings in which:

10 Fig. 1 shows a trunk incoming from an originating office and terminating in an incoming selector switch, the schematic disclosure of an automatic ticket printing machine and a schematic representation of a finder switch for associating the ticket printing machine with any

15 trunk of a group of incoming trunks; and

Fig. 2 shows the tariff determining equipment and a finder switch individual thereto for associating it with a calling trunk in any one of a plurality of groups of incoming trunks and with the ticket printing machine.

20 The drawings show only such parts of the circuits and apparatus as are deemed necessary for an understanding of the present invention. The ticket printing machine disclosed schematically in Fig. 1 is completely disclosed in the British patent to L. Devaux, No. 472,434.

25 When the incoming trunk of Fig. 1 is seized by a group selector of an originating office, relay S operates and in turn operates relay A1 and closes an out-pulsing loop through the windings of relays A and B for controlling the setting of the selector switch in which the incoming trunk terminates and other selector switches, not shown, over which a connection may be terminated on a desired subscriber's line. Relay A1 upon operating prepares an impulsing circuit for the impulsing relay Is.

30 The use of an automatic ticket printing machine for recording the data of a call may be required for every call set up over the incoming trunks in which case the tariff determining equipment of Fig. 2 and an automatic ticket printing machine are invariably connected to the incoming trunk when the trunk is seized, by finder switches Jf and Cf, respectively. It may be, however, that the use of an automatic ticket printing machine depends on the destination of the call, in which case a tariff determining equipment and an automatic ticket printing machine will only be connected to the incoming trunk if the trunk receives a signal from the sender of the originating office, for example, informing it that an automatic ticket record is required for the connection to be set up.

35 The circuits for causing the operation of the finder switches Jf and Cf upon the seizure of the incoming trunk, have been omitted in order to simplify the drawings, but they may be of any well-known type.

40 When the finder switch Cf has operated to find the incoming trunk circuit, relay Ct is operated and establishes an operating circuit for relay Ri extending from battery through the winding of relay Ri, back contacts of relays Df and Nf, outer right front contact of relay Ct, normal contacts of cam R1 operated by shaft MCS of the ticket printing machine to ground over the contacts of sequence switch cam CS4 which is closed in position 1 of the sequence switch CS.

45 Relay Ri locks independently of contacts of relays Df and Nf. When the finder switch Jf finds the calling trunk circuit, relay Cn also operates and establishes a circuit for relay Pw extending from battery through the winding of this relay, middle contact of relay Cn, wiper

5 jfm3 of finder Jf, wiper cfm1 of finder Cf to ground at the inner left front contact of relay Ri and relay Pw operates.

5 The first digit series of impulses transmitted by the sender of the originating office is received by relay S and is repeated to the control circuit associated with the incoming selector in which the trunk terminates and is also instrumental in operating the relay Is, relay Is operating each time that relay S releases in response to the reception of an impulse. On each operation relay Is closes an impulsing circuit over its inner contact, wiper cfm3, inner front contact of relay Ct, through the digit recording magnet DPM of the automatic ticket printing machine to battery which sets the digit printing wheel of the ticket printing machine in readiness to print the digit on a call ticket. Relay Is also establishes a second impulsing circuit over its outer contact, wiper jfm4 of finder Jf, contact of relay Cn, winding of slow-to-release relay Lm, back contact of relay Ef to battery through the stepping magnet SMT of the register switch ST. Register switch ST is thus advanced in response to the transmission of the first digit series of impulses from the sender of the originating office to register the value of such digit series.

Relay Lm, which is rendered slow to release by a rectifier connected in parallel with its winding, operates upon the transmission of the first impulse through its winding and remains operated until the impulse circuit is opened upon the termination of the impulse series and upon operating closes an obvious circuit for relay Ms which operates and locks under the control of relay Pw. When relay Lm releases at the end of the impulse series, with relays Pw and Ms operated, a circuit is established from ground over its back contact, wiper smd2 of steering switch SD and the first position contact of the arc associated therewith, front contacts of relays Ms and Pw through the winding of relay Ed to battery.

45 Relay Ed upon operating establishes a circuit from ground through resistance R, left front contact of relay Ed, wiper jfm5 of finder Jf, wiper cfm2 of finder Cf, left contact of relay Ct, thence by parallel paths through the winding of relay Df to battery and over the outer right contact of relay Ri through the winding of relay Nf to battery. Relay Nf being marginally wound does not operate at this time, but relay Df operates opening the initial operating circuit of relay Ri and closing a circuit from ground over its front contact and the outer left contact of relay Ri and contacts of sequence switch cams SS1 and SS2 of sequence switch SS closed in position 1 to battery through the winding of magnet CM to cause shaft MCS of the ticket printing machine to make one revolution with the result that the digit recorded by the operation of magnet DPM is printed, the digit printing wheel controlled by magnet DPM is restored to normal and the ticket tape is advanced in the manner described in the patent hereinbefore referred to. The revolution of shaft MCS also causes the advance of sequence switch shaft CS one step thereby advancing the cams of this sequence switch into position 2. When the shaft MCS leaves its normal position the cam R1 opens the locking circuit of relay Ri and this relay releases.

50 Relay Ri upon releasing opens the previously traced circuit through the winding of relay Pw which thereupon releases in turn releasing relays Ms and Ed. Relay Ed upon releasing in turn releases relay Df. When relay Ed operated 75

it closed an obvious circuit for stepping magnet SMD of the steering switch SD and when it released, it released magnet SMD to advance the wipers of the steering switch one step into position 2. A circuit is now established from ground over wiper *smd1* and the second position contact of its associated arc, through the winding of relay *Ef* to battery and relay *Ef* thereupon operates, locks over its left contact and the front contact of relay *Cn* to ground, opens at its back contact the circuit through the winding of stepping magnet SMT to prevent the registration of further impulses in the register ST and connects battery through resistance R2 to the impulsing circuit previously traced through the winding of relay *Lm*.

As soon as the shaft MCS of the ticket printing machine completes one revolution, the cam R1 reestablishes the circuit of relay *Ri* which again operates, locks and reestablishes the circuit of relay *Pw*. In response to the next series of impulses transmitted from the sender of the originating exchange, relay *Is* repeats these impulses to magnet DPM of the ticket printing machine and to relay *Lm* of the tariff determining equipment, relay *Lm* again causing the operation of relays *Ms*, *Ed* and *Df* in the manner previously described to cause a second revolution of shaft MCS of the ticket printing machine to print the digit recorded by magnet DPM, to cause the advance of sequence switch CS another step and to cause steering switch SD of the tariff determining equipment to advance another step. In this manner succeeding digit series transmitted from the originating exchange are printed by the ticket printing machine and the steering switch SC thereof is advanced step by step so that following the transmission of the fourth digit series, sequence switch CS will be in position 5 and steering switch SD of the tariff determining equipment will be in position 5.

With steering switch SD in position 5 when relay *Ed* operates at the end of the reception of the fifth digit series, a circuit is established from direct ground over wiper *smd1* thereof, front contact of relay *Ed*, thence as traced through the windings of relays *Df* and *Nf* in parallel now causing the operation of both of these relays. Relay *Nf* locks to ground over the contacts of sequence switch cam CS1 closed in position 5 and closes an operating circuit for magnet CM over contacts of cams SS1 and SS2 whereby the shaft MCS rotates through one revolution to cause the printing of the fifth digit recorded by magnet DPM and to continuously rotate through two additional revolutions whereby the sequence switch CS is advanced from position 5 into position 6 and then through two other positions reserved for eventual additional digits of a called line number into position 8. Relay *Nf* remains locked over cam CS1 until the sequence switch has advanced out of position 7 into position 8. When the shaft MCS starts its rotation, cam R1 carried thereby opens the locking circuit of relay *Ri* which releases in turn releasing relays *Pw* and *Ed*. Relay *Ed* upon releasing advances steering switch SD into position 6 and releases relay *Df*.

As soon as the sequence switch CS of the ticket printing machine reaches position 8, the circuit of magnet CM is established over the lower contact of cam CS1 and the contacts of cams SS1 and SS2 whereby the shaft MCS is advanced through two revolutions to advance

the ticket tape for spacing purposes, the cams of sequence switch CS being advanced thereby into position 10. Relay *Ri* is now operated in a circuit extending over back contacts of relays *Df* and *Nf*, front contact of relay *Ct*, the contacts closed by cam R1 and the contact of sequence switch cam CS4 now closed in position 10. Relay *Ri* upon operating locks and establishes the previously traced circuit for relay *Pw*.

With steering switch SD now in position 6, when relay *Pw* operates a circuit is established from ground over wiper *smd1*, outer right front contact of relay *Pw*, back contact of relay *Ed*, winding of relay *Ic* to battery. Relay *Ic* upon operating establishes an operating circuit for relay *Bd* extending from ground over wiper *smc1* of counting switch SC and the normal contact of its arc, winding of relay *Bd*, right back contact of relay *Ed*, left contact of relay *Ic*, through resistance R3 to battery and relay *Bd* operates as soon as interrupter I removes the short-circuiting ground from the circuit extending there-through. The short-circuit may be traced from ground at the interrupter over the left back contact of relay *Bd*, the front contacts of relay *Ic* and the back contact of relay *Ed* to the upper terminal of the winding of relay *Bd*. Relay *Bd* upon operating locks to ground over its inner left front contact, disconnects the interrupter I from the short-circuiting path previously traced to prevent further short-circuiting of its winding and, at its outer left front contact, connects the interrupter I to the winding of impulsing relay *Ih*. Relay *Ih* is now periodically operated under the control of interrupter I and transmits impulses over two paths, the first extending over its left front contact and the outer right front contact of relay *Bd* through the winding of stepping magnet SMC of the counting switch SC and the other extending from ground over its right front contact, wiper *jfm2* of finder JF, wiper *cjm3* of finder CF, front contact of relay *Ct*, through the winding of the digit recording magnet DPM of the ticket printing machine.

The series of digit impulses now being transmitted is the first of four possible series indicating the monetary value of the tariff rate to be charged for the connection in dollars and cents or in any other desired currency units. For example, for a charge less than ten dollars the first digit series indicates the number of dollars, the second digit series is a dash and the third and fourth digit series indicate the number of cents. All four digit series may be for tariff values of ten dollars or over and, of course, any series or combination of series may consist of a dash or dashes in place of digits as required.

As previously stated, the tariff to be charged depends upon the exchange zones in which the calling and called lines terminate, the zone of the calling line being identified by the position assumed by the finder switch JF in finding the group of trunk circuits over which the connection has been extended, while the position into which the register switch ST was set indicates the zone of the called line.

The circuits disclosed are arranged to function for three different calling zones. The incoming trunks of three different groups are connected to the banks of finder JF and the contacts of the bank to which wiper *jfm1* has access are therefore jumpered over the terminal rack TR to the three zone terminals Z1, Z2 and Z3 on the left side thereof which are connected

to the three wipers *smt1*, *smt2* and *smt3*, respectively, of the register switch ST whereby any combination of the calling and called zones is obtainable. As previously stated, if the called zone is identified by two or more digits the second and perhaps the third digits received by relay S of Fig. 1 would have to be registered in the tariff determining equipment which would require the addition of a translator switch. In principle, however, the arrangement will remain the same, one level of the translator switch being allocated to each calling zone and the position of the translator wipers would indicate the called zone.

The tariff determining equipment as disclosed is arranged for three different tariff rates only, the tariff being determined by the operated or unoperated condition of relays Tf and Ot. The windings of these relays are connected to cross-connecting terminals A and B which are jumpered as required to the terminals of the arcs to which wipers of the register switch ST have access in accordance with the tariff charges for different combinations of calling and called zones.

It will first be assumed that following the operation of finder switch JF and register switch ST, neither relay Tf nor Ot is operated. When, therefore, relay Ih has transmitted ten impulses to magnet DPM of the ticket printing machine and to the stepping magnet of counting switch SC, the wipers of switch SC will be positioned on the last or tenth position contacts of their arcs and a circuit will be established from battery, through the winding of relay Ed, inner right front contact of relay Pw, inner right contact of relay Bd, wiper *smt2* and the last contact of its associated arc, upper No. 1 back contacts of relays Tf and Ot, the sixth position contact and wiper *smd2* of steering switch SD to ground at the back contact of relay Lm. Relay Ed will therefore operate to open at its left back contact the circuit of relay Ic and to open at its right back contact the locking circuit of relay Bd which will immediately release to open the operating circuit of impulsing relay Ih to arrest impulsing and to close a restoring circuit for the counting switch SC. The restoring circuit may be traced from battery through the winding of stepping magnet SMC, right back contact of relay Bd, interrupter contacts of stepping magnet SMC, strapped contacts of the arc with which wiper *smt1* cooperates to ground over wiper *smt1* whereby the counting switch is restored to normal.

Relay Ed at its inner right front contact also establishes the operating circuit of stepping magnet SMD of steering switch SD and at its left front contact establishes the previously traced operating circuit for relay Df which upon operating causes the operation of magnet CM of the ticket printing machine to print the digit zero recorded by the setting of the digit recording magnet DPM and to advance sequence switch CS into position 11. When the shaft MCS of the ticket printing machine leaves normal during the printing operation, relays Ri, Pw, Ed and Df release and the circuit of magnet SMD is opened to advance the wipers of steering switch SD one step into position 1. As soon as the tariff digit has been printed and shaft MCS of the ticket printing machine again reaches its normal position, relays Ri and Pw reoperate.

With the steering switch SD now in position 1 and with relay Pw operated, relay Ed reoperates in a circuit from battery through its winding, inner right front contact of relay Pw, the No. 2

back contacts of relays Tf and Ot, the No. 1 position contact and wiper *smd2* of steering switch SD to ground at the back contact of relay Lm. The operation of relay Ed at this time prevents the reoperation of relays Ic and Bd so that the initiation of impulsing is prevented, establishes over its left front contact the operating circuit of relay Df and reestablishes the operating circuit of magnet SMD of the steering switch SD. Relay Df upon operating causes the operation of magnet CM of the ticket printing machine to rotate shaft MCS through one revolution, but since the digit recording magnet DPM has not advanced its associated digit printing wheel, a dash is now printed on the ticket. During the printing operation relays Ri, Pw, Ed and Df are released, the sequence switch CS of the ticket printing machine is advanced into position 12 and at the end of the printing operation relays Ri and Pw are reoperated. Relay Ed upon releasing also releases magnet SMD which now advances the wipers of the steering switch SD into position 8.

Relay Pw upon operating now establishes the operating circuit of relay Ic extending from battery through the winding of relay Ic, left back contact of relay Ed, outer front contact of relay Pw, eighth position contact and wiper *smd1* of steering switch SD to ground. With the counting switch in its normal position the previously traced circuit of relay Bd is now closed and relay Bd operates, locks and establishes the circuit of impulsing relay Ih. Relay Ih under the control of interrupter I now transmits a series of impulses to the magnet DPM of the ticket printing machine and correspondingly transmits impulses to the stepping magnet SMC of the counting switch SC.

At this time when wiper *smd2* has advanced eight steps an operating circuit for relay Ed is established from battery through its winding, the inner right front contact of relay Pw, inner right front contact of relay Bd, wiper *smt2*, No. 3 back contacts of relays Tf and Ot, the No. 8 contact and wiper *smd2* of steering switch SD to ground at the back contact of relay Lm and relay Ed thereupon operates to establish the operating circuits of stepping magnet SMD and relay Df and to open the circuit of relay Ic and the locking circuit of relay Bd. Relays Ic and Bd thereupon release, relay Bd opening the impulsing circuit through the winding of relay Ih to arrest impulsing and closing the restoring circuit of the counting switch SC. Relay Df upon operating causes the operation of magnet CM of the ticket printing machine to print the digit 8 recorded by the setting of the digit recording magnet DPM and to advance the sequence switch CS into position 13. When the shaft MCS of the ticket printing machine leaves normal during the printing operation, relays Ri, Pw, Ed and Df release and the circuit of magnet SMD is opened to advance the wipers of steering switch SD one step into position 9. As soon as the tariff digit has been printed and shaft MCS of the ticket printing machine again reaches its normal position, relays Ri and Pw reoperate.

When relay Pw reoperates, relays Ic and Bd reoperate and impulse relay Ih is again operated under the control of interrupter I to transmit another series of impulses to magnet DPM of the ticket printing machine and to correspondingly advance the wipers of the counting switch SC. With steering switch SD now in position 9 when the wipers of the counting switch reach the last

or tenth position contacts of their arcs, or after a series of ten impulses has been transmitted, the circuit of relay *Ed* is again established from battery through its winding, the inner right front contact of relay *Pw*, the inner right front contact of relay *Bd*, wiper *smc2* and the last terminal of its arc, the No. 4 back contacts of relays *Tf* and *Ot*, the No. 9 contact and wiper *smc2* of steering switch *SD* to ground at the back contact of relay *Lm*. Relay *Ed* now operates to release relays *Ic* and *Bd* to reenergize stepping magnet *SMD* of the steering switch *SD* and to reoperate relay *Df*. Relay *Bd* upon releasing stops the operation of relay *Ih* to arrest the transmission of further impulses and causes the restoration of the counting switch *SC*. Relay *Df* upon operating causes the operation of magnet *CM* of the ticket printing machine to print the digit zero recorded by the operation of magnet *DPM*, to advance the sequence switch *CS* into position 14 and to release relays *Ri*, *Pw*, *Ed* and *Df*. The ticket printing machine is now prepared to record and print digits indicating the number of the calling line. The tariff rate now printed on the ticket by the ticket printing machine indicates that the tariff to be charged is 0-80, or eighty cents for each unit period of conversation.

The tariff determining equipment may now be released from the established connection and restored to normal in any well-known manner. The ticket printing machine, however, is retained in connection with the established connection for printing other data relating to the connection such as the calling line number, the date and the number of elapsed unit periods during which the conversational circuit is maintained.

It will now be assumed that relay *Ot* is operated and that relay *Tf* is unoperated due to the joint settings of finder switch *JF* and register switch *ST*. In this case relay *Ed* will be operated when wiper *smc2* of the counting switch reaches its first position contact during the transmission of the first tariff digit series of impulses at which time steering switch *SD* will be in position 6, over a circuit extending from battery through the winding of relay *Ed*, thence as traced over wiper *smc2*, the No. 1 front contact of relay *Ot*, wiper *smc2* to ground at the back contact of relay *Lm* and the digit 1 will be printed by the ticket printing machine; a dash will be printed by the ticket printing machine with steering switch *SD* in position 7; relay *Ed* will be again operated when the wiper *smc2* of the counting switch reaches its second position contact during the transmission of the next digit series of impulses with steering switch *SD* in position 8, over a circuit extending from battery through the winding of relay *Ed*, thence as traced over wiper *smc2*, in position 2, the No. 3 front contact of relay *Ot*, wiper *smc2* to ground at the back contact of relay *Lm* and the digit 2 will be printed by the ticket printing machine; and relay *Ed* will be again operated when wiper *smc2* of the counting switch reaches its tenth position contact during the transmission of the last digit series of impulses with steering switch *SD* in position 9, over a circuit extending from battery, through the winding of relay *Ed*, thence as traced over wiper *smc2* in position 10, the No. 4 front contact of relay *Ot*, wiper *smc2* to ground at the back contact of relay *Lm* and the digit zero will be printed by the ticket printing machine. Thus, the tariff rate printed will be \$1.20.

If it be assumed that relay *Tf* is operated and that relay *Ot* is unoperated, the tariff rate

printed by the ticket printing machine will be \$2.00. In this case relay *Ed* will be operated in positions 6, 8 and 9 of steering switch *SD* over back contacts of relay *Ot* and the Nos. 1, 3 and 4 front contacts of relay *Tf* when the counting switch *SC* reaches positions 2, 10 and 10 respectively, during the transmission of digit series of impulses.

What is claimed is:

1. In a telephone exchange system divided into zones, subscribers' switching means including trunk circuits for establishing connections between said lines, a tariff determining equipment common to said trunk circuits, and means responsive to the seizure of a trunk circuit for associating said equipment therewith, said equipment comprising means for registering the zones in which both the calling and the called lines are located, and means controllable jointly by said registering means for determining the monetary value of the tariff rate to be applied for said connection.

2. In a telephone exchange system divided into zones, subscribers' lines, switching means including interzone trunk circuits for establishing connections between said lines, a tariff determining equipment common to said trunk circuits, and means responsive to the seizure of a trunk circuit for associating said equipment therewith, said equipment comprising a register operable in accordance with the setting of said associating means for registering the zone of the calling line, a register operable in response to impulses transmitted in establishing a connection to a called line for registering the zone of the called line, and means controlled jointly by said registers for determining the monetary value of the tariff rate to be applied for said connection.

3. In a telephone exchange system divided into zones, subscribers' lines, switching means including groups of interzone trunk circuits for establishing connections between said lines, a tariff determining equipment common to said trunk circuits, and means responsive to the seizure of a trunk circuit of any one of said groups for associating said equipment therewith, said equipment comprising a register operable in accordance with the group of trunk circuits selected by said associating means for registering the zone of the calling line, a register operable in response to impulses transmitted over the seized trunk circuit in establishing a connection to a called line for registering the zone of the called line, and means controlled jointly by said registers for determining the monetary value of the tariff rate to be applied for said connection.

4. In a telephone exchange system divided into zones, subscribers' lines, switching means including groups of interzone trunk circuits for establishing connections between said lines a tariff determining equipment located at a tandem point of said exchange system and common to said trunk circuits, a finder switch individual to said equipment and responsive to the seizure of a trunk circuit of any one of said groups for associating said equipment therewith, said finder switch having a wiper and associated group of bank contacts serving to register the group in which the seized trunk circuit is located to thereby register the zone of the calling line, a register operable in response to impulses transmitted over the seized trunk circuit in establishing a connection to a called line for registering the zone of the called line, and means controlled jointly by said registers for determining the monetary

value of the tariff rate to be applied for said connection.

5. In a telephone exchange system divided into zones, subscribers' lines, switching means including groups of interzone trunk circuits for establishing connections between said lines, a tariff determining equipment located at a tandem point of said exchange system and common to said trunk circuits, a finder switch individual to said equipment and responsive to the seizure of a trunk circuit of any one of said groups for associating said equipment therewith, said finder switch having a wiper and associated group of bank contacts serving to register the group in which the seized trunk is located to thereby register the zone of the calling line, a register switch having a wiper corresponding to each calling line zone and operable in response to impulses transmitted over the seized trunk circuit in establishing a connection to a called line for registering the zone of the called line, and a group of relays connected to the banks of said register switch and selectively operable in accordance with the joint settings of said finder switch and said register switch for determining the monetary value of the tariff rate to be applied for said connection.

6. In a telephone exchange system divided into zones, subscribers' lines, switching means including interzone trunk circuits for establishing connections between said lines, a ticket printing mechanism and a tariff determining equipment common to said trunk circuits, means responsive to the seizure of a trunk circuit for associating said equipment therewith, and means for associating said printing mechanism with said seized trunk circuit and with said equipment, said equipment comprising a register operable in accordance with the setting of said equipment associating means for registering the zone of the calling line, a register operable in response to impulses transmitted over said trunk circuit in establishing a connection to a called line for registering the zone of the called line, means controlled jointly by said registers for determining the monetary value of the tariff rate to be applied for said connection, and means controlled by said latter means for causing said printing mechanism to print said tariff rate on a ticket.

7. In a telephone exchange system divided into zones, subscribers' lines, switching means including interzone trunk circuits for establishing connections between said lines, a ticket printing mechanism and a tariff determining equipment common to said trunk circuits, means responsive to the seizure of a trunk circuit for associating said equipment therewith, and means for associating said printing mechanism with said seized trunk circuit and with said equipment, said equipment comprising a register operable in accordance with the setting of said equipment associating means for registering the zone of the calling line, a register operable in response to impulses transmitted over said trunk circuit in establishing a connection to a called line for registering the zone of the called line, means controlled jointly by said registers for determining the monetary value of the tariff rate to be applied for said connection, and means controlled by said latter means for transmitting series of impulses to said printing mechanism for causing said mechanism to print said tariff rate in monetary values on a ticket.

8. In a telephone exchange system divided into zones, subscribers' lines, switching means includ-

ing interzone trunk circuits for establishing connections between said lines, a ticket printing mechanism and a tariff determining equipment common to said trunk circuits, means responsive to the seizure of a trunk circuit for associating said equipment therewith, and means for associating said printing mechanism with said seized trunk circuit and with said equipment, said ticket printing mechanism being responsive to series of impulses transmitted for setting up a connection to a called line for printing digits on a ticket indicative of the number of said called line, and said equipment comprising a register operable in accordance with the setting of said equipment associating means for registering the zone of the calling line, a register operable in response to impulses transmitted in establishing a connection for registering the zone of the called line, means controlled jointly by said registers for determining the value of the tariff rate to be applied for said connection, and means controlled by said latter means for transmitting series of impulses to said printing mechanism for causing said mechanism to print said tariff rate on said ticket.

9. In a telephone exchange system divided into zones, subscribers' lines, switching means including interzone trunk circuits for establishing connections between said lines, a ticket printing mechanism and a tariff determining equipment common to said trunk circuits, means responsive to the seizure of a trunk circuit for associating said equipment therewith, and means for associating said printing mechanism with said seized trunk circuit and with said equipment, said equipment comprising a register operable in accordance with the setting of said equipment associating means for registering the zone of the calling line, a register operable in response to impulses transmitted in establishing a connection to a called line for registering the zone of the called line, means controlled jointly by said registers for determining the tariff rate to be applied for said connection, impulse transmitting means, impulse counting means and means controlled by said tariff rate determining means for controlling said impulse transmitting and counting means to successively transmit series of impulses to said printing mechanism to cause said mechanism to print digits on a ticket indicative of the tariff rate.

10. In a telephone exchange system divided into zones, subscribers' lines, switching means including interzone trunk circuits for establishing connections between said lines, a ticket printing mechanism and a tariff determining equipment common to said trunk circuits, means responsive to the seizure of a trunk circuit for associating said equipment therewith, and means for associating said printing mechanism with said seized trunk circuit and with said equipment, said equipment comprising a register operable in accordance with the setting of said equipment associating means for registering the zone of the calling line, a register operable in response to impulses transmitted in establishing a connection to a called line for registering the zone of the called line, means controlled jointly by said registers for determining the tariff rate to be applied for said connection, impulse transmitting means, impulse counting means, a steering switch, means controlled by said tariff rate determining means in successive positions of said steering switch for controlling said impulse transmitting and counting means to transmit series of impulses to said printing mechanism to

print digits on a ticket indicative of the tariff rate, and means controlled by said printing mechanism following the printing of each digit to advance said steering switch.

- 5 11. In a telephone exchange system divided into zones, subscribers' lines, switching means including interzone trunk circuits for establishing connections between said lines, a ticket printing mechanism and a tariff determining equipment
10 common to said trunk circuits, means responsive to the seizure of a trunk circuit for associating said mechanism and said equipment with each other and with said trunk circuit, said ticket printing mechanism being responsive to series of
15 impulses transmitted for setting up a connection to a called line and to series of impulses transmitted from said equipment for printing digits of the number of the called line and of the tariff rate, said equipment comprising a register for
20 registering the calling line zone, a steering switch, a register controllable in one position of said steering switch by impulses transmitted to said printing mechanism for registering the called line zone, means controlled jointly by said
25 registers for determining the tariff rate to be applied for said connection, impulse transmitting means, impulse counting means, means controlled by said tariff rate determining means in other positions of said steering switch for controlling said impulse transmitting and counting
30 means to transmit series of impulses to said printing mechanism to print digits on a ticket indicative of the tariff rate, and means controlled by said printing mechanism following the printing of each digit to advance said steering switch.
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12. In a telephone exchange system divided

into zones, subscribers' lines, switching means including interzone trunk circuits for establishing connections between said lines, a ticket printing mechanism and a tariff determining equipment common to said trunk circuits, means responsive to the seizure of a trunk circuit for associating said mechanism and said equipment with each other and with said trunk circuit, means in said printing mechanism and in said equipment responsive to series of connection establishing impulses transmitted over said trunk circuit, said equipment comprising a register responsive to the seizure of said trunk circuit for registering the calling line zone, a steering switch, a registering means responsive to certain of said series of impulses for registering the called line zone, means controlled jointly by said register and said registering means for determining the tariff rate to be applied for said connection, impulse transmitting means, impulse counting means, and means controlled by said tariff determining means in certain positions of said steering switch for controlling said impulse transmitting and counting means to transmit series of impulses to the responsive means of said printing mechanism, means in said mechanism responsive to the responsive means thereof and controlled from said equipment for successively printing the digits of the called line number and the digits of the tariff rate on a ticket, and means controlled by said printing mechanism following the printing of each digit to advance said steering switch.

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