

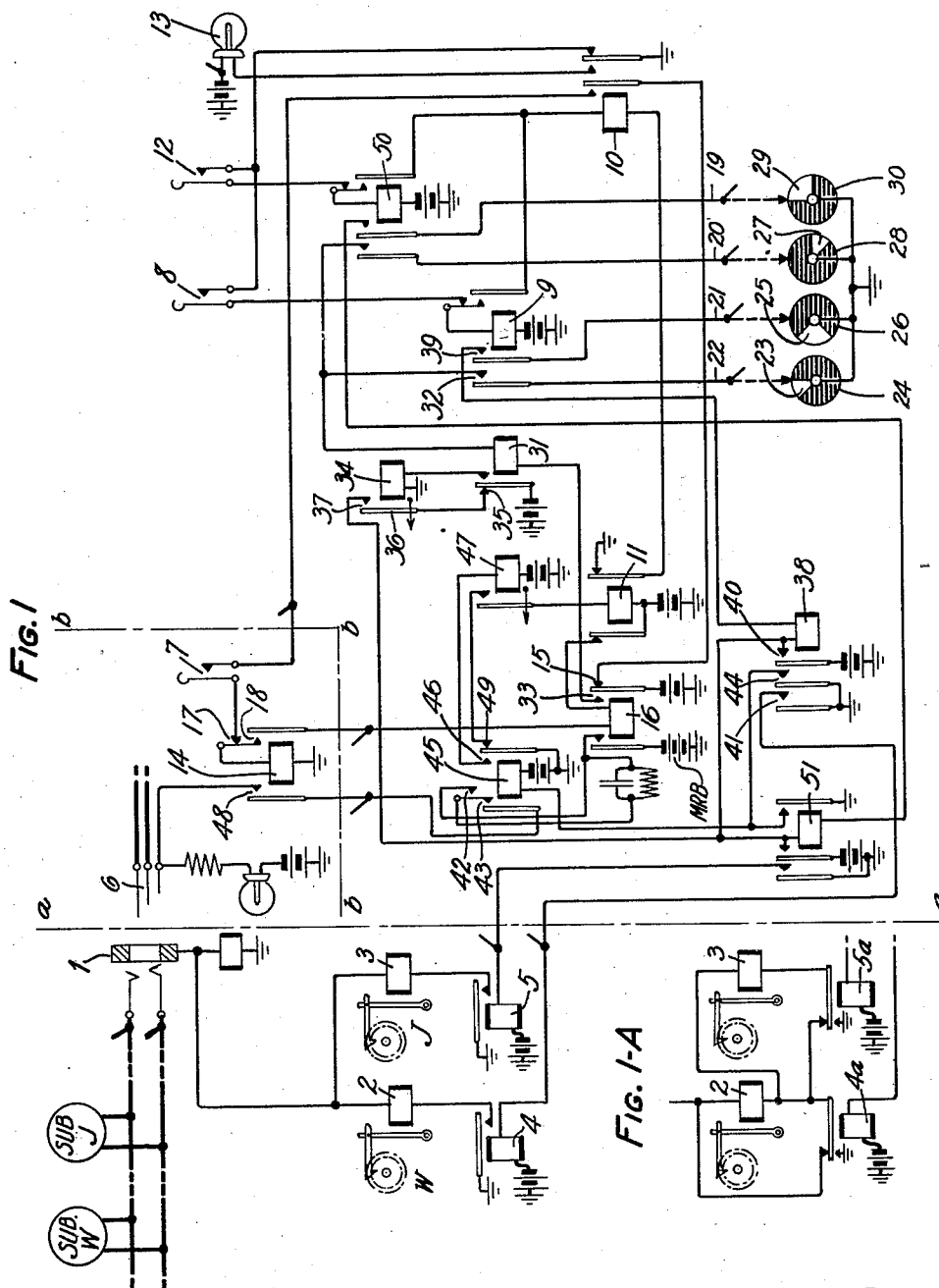
Nov. 17, 1931.

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1,832,453

TELEPHONE METERING SYSTEM

Filed Feb. 12, 1930



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TELEPHONE METERING SYSTEM

Application filed February 12, 1930. Serial No. 427,678.

This invention relates to metering of telephone calls, and more particularly to the selective registration of calls originating with any one of a number of subscribers' stations connected to a single line.

An object of the invention is to effect such selective registration in an improved manner and at minimum expense.

In accordance with the invention, each station of a party line has a corresponding meter connected to the sleeve of the line in multiple with the cut-off relay which is normally disabled by contacts of an associated relay which is controlled by a selective key arrangement common to the operator's position at which the line terminates. The operation of the proper selective key at the position prepares a circuit for removing the disabling condition from the desired meter.

When the usual message register key, individual to the cord circuit, is operated, metering potential is applied to the sleeve of the line in synchronism with the operation of the proper disabling relay whereupon the desired meter circuit is completed and its operation effected.

The invention will be understood from the following description when read in connection with the accompanying drawings, Fig. 1 of which represents a circuit arrangement for practicing the invention and Fig. 1a an alternative connection arrangement for the call meters.

In Fig. 1 of the drawings a two-party subscriber's line is shown at the left which terminates before the operator in the usual switchboard jack 1 to the sleeve terminal of which call meters or message registers 2 and 3 are connected in multiple, the circuit of each meter being adapted to be completed to ground at the normally open contacts of disabling relays 4 and 5, respectively.

We will assume that meter 2 registers calls for the so-called W party and that meter 3 registers calls for the J party.

Between the vertical broken line *aa* and the horizontal and vertical line *bbb* is shown the answering end of one of the operators' cord circuits and at the right of and below the line *bbb* is shown positional equipment

common to the operators' position, the function of which will be later explained.

A description of the operation of the circuit for practicing the invention will now be given:

Let it first be assumed that the W subscriber calls in the usual manner and is answered by the operator inserting the answering plug 6 of one of her cord circuits in the jack 1. Due to the fact that jack 1, or the line lamp associated therewith, has some characteristic or appropriate marking to indicate the so-called "class" of the line the operator is immediately apprized of the fact that the calling line is a party line and that it is equipped with a message register or call meter for each party on the line and she therefore requests the subscriber's letter designation (W or J) before completing the desired connection. When the operator ascertains the designation of the calling party which we have already assumed to be W, she may slip a small fibre or rubber cap, which is available for this purpose, over the button of message register key 7 in order that when the called subscriber finally hangs up his receiver the operator will know which party on the calling line to charge for the call. It is, of course, understood that this information may be recorded in other ways, as for example, the method described in applicant's copending application, Ser. No. 420,662, filed Jan. 14, 1930.

As soon as the foregoing recording operation has been completed the operator proceeds to complete the connection to the called line and ring the desired subscriber in the usual manner.

When the the operator is apprized of the completion of the conversation by the lighting of the usual supervisory lamps she will glance at the message register key 7, previously referred to, and noting that it has been in some manner marked to indicate that the W subscriber was the calling party she will momentarily press the common key 8 associated with her position whose function is to prepare a circuit for operating the W register 2 associated with the line on which the call originated. Operation of key 8 com-

pletes an obvious operating circuit for relay 9, which relay in operating locks up in series with relay 10 to ground at the right hand back contact of relay 11. Relay 10 operates in this circuit and by attracting its outer right hand armature removes ground from keys 8 and 12, thereby preventing the registration of another call until the present operation is completed. When the outer right hand armature of relay 10 is attracted, it also closes an obvious circuit for lighting pilot lamp 13, which serves to indicate to the operator that a call is in process of being registered.

Following or simultaneous with the operation of key 8 the operator depresses the message register or charge key 7 in the usual manner for the purpose of causing the operation of the calling subscriber's meter, whereupon relay 14 operates in a circuit which may be traced from battery, contacts 15 of relay 16, inner contacts of relay 10, contacts of key 7 and contacts 17 and winding of relay 14 to ground. Relay 14 operates in this circuit and locks up at its contacts 18 in series with the winding of relay 16, under control of the cut-off relay 11.

Relay 16 operates in series with relay 14 and prepares, at its right hand contacts 33, a circuit for relay 31, the completion of which will be later described. By opening its contacts 15 the operation of relay 16 removes battery from all other message register keys corresponding to key 7 at the position and by closing its left hand contacts it partially prepares a circuit for applying message register battery MRB to the sleeve of the calling line.

The metering arrangement of the present invention has been arranged to make use of existing facilities in the plant and, therefore, leads 19, 20, 21 and 22 extend from the regular exchange interrupter machines to each operator's position. This interrupter mechanism is well known equipment generally and extensively used for controlling the exchange ringing and needs no further description in this specification other than to mention that the segment 23 of interrupter 24 is arranged to connect ground to lead 22 for one second and that segment 25 of interrupter 26 is adapted to immediately follow with a two-second ground pulse to lead 21, that segment 27 of interrupter 28 is arranged to connect a one-second impulse to lead 20 two seconds after the end of the pulse on lead 21 and that segment 29 of interrupter 30 immediately follows the one-second impulse on lead 20 with a two-second impulse on lead 19.

With the foregoing arrangement in mind when the brush of interrupter 24 contacts with segment 23 an energizing circuit is completed for relay 31, which may be traced from ground, segment 23 and brush of interrupter 24, conductor 22, contacts 32 of relay

9, winding of relay 31, and contacts 33 of relay 16 to battery. Relay 31 operates in this circuit and completes an obvious circuit to operate slow-release relay 34. When segment 23 moves out from under the brush of interrupter 24 the energizing circuit for relay 31 is opened and this relay, therefore, releases thereby reconnecting battery over its back contacts 35 to the armature 36 of relay 34, which relay, due to its slow-to-release characteristics, will not at this time have opened its contacts 37 and, therefore, a circuit for energizing relay 38 is established which may be traced from battery, contacts 35 of relay 31, contacts 37 of relay 34, winding of relay 38, contacts 39 of relay 9 to ground at interrupter 26 due to the fact that segment 25 of this interrupter contacts with its associated brush immediately following the breaking of the contact between segment 23 and its associated brush. Relay 38 operates in this circuit, thereby completing a locking circuit for itself at its contacts 40 to ground at interrupter 26 for the two-second interval that segment 25 is in contact with the brush. When relay 38 operates it completes at its contacts 41 an obvious energizing circuit for relay 4 associated with the subscriber's line, which closes at its armature contacts a ground connection for relay 2. Relay 38 in operating also closes its contacts 44, thereby energizing relay 45, which closes its contacts 46 to complete an obvious energizing circuit for slow-to-release relay 47. When relay 45 operates it also closes its contacts 42 and 43, thereby completing a circuit from message register battery MRB over the left hand contacts of relay 16 and contacts 48 of relay 14 to the sleeve of the calling subscriber's line, which extends through the winding of meter 2 to the previously described ground connection at the armature of relay 4. The magnet of meter 2 is energized in this circuit and attracts its armature, thereby actuating the well known mechanism and causing the call to be recorded. At the end of the predetermined two-second interval segment 25 of interrupter 26 passes out from under its associated brush and ground is removed from conductor 21, thereby permitting relay 38 to release, which disconnects ground from relays 4 and 45 thereby permitting them to release. The release of relay 45 connects ground at its contacts 49 and opens the previously mentioned energizing circuit for slow-to-release relay 47. Relay 47 remains energized for a short interval following the release of relay 45 sufficient to permit the operation of relay 11, which in operating removes the holding potential for relays 14 and 16 and the holding ground for relays 9 and 10, whereupon all relays are released and the pilot lamp 13 is extinguished, which indicates to the operator that she may register another call if she so desires.

In case subscriber J calls instead of subscriber W the operation will be identical with that described for party W, except that common key 12 will be operated instead of key 8, which will cause relay 50 to operate, thereby bringing into play interrupters 28 and 30, which control the operation of relay 51 instead of relay 38 to operate relay 5 instead of relay 4 as previously described.

Fig. 1a represents an alternative arrangement for disabling meters 2 and 3. In this arrangement it will be noted that relays 4a and 5a correspond to relays 4 and 5 of Fig. 1 and are controlled by relays 38 and 51, respectively. In this arrangement relays 4a and 5a normally maintain a shunt path around the windings of meters 2 and 3. Operation of either relay 4a or 5a removes the shunt from its associated meter and provides an operating ground therefor. By this arrangement the meters 2 and 3 are more positively disabled pending the joint operation of one of the common keys 8 or 12 and the individual register key 7.

What is claimed is:

1. In a party line metering system, an exchange, a multi-station line terminating thereat, a meter for each station associated with said line at said exchange, a plurality of cord circuits at said exchange adapted to answer said line, and selective means common to said cord circuits for preparing a circuit to operate a desired one of said meters to the exclusion of the others.

2. In a party line metering system, an exchange, a multi-station line terminating thereat, a meter for each station associated with said line at said exchange, a plurality of cord circuits at said exchange adapted to answer said line, and selective means common to said cord circuits for conditioning a desired one of said meters for operation.

3. In a party line metering system, an exchange, a multi-station line terminating thereat, a meter for each station associated with said line at said exchange, a source of metering potential for operating said meters, a plurality of cord circuits at said exchange adapted to answer said line, means individual to said cord circuits for applying said metering potential to said line, and selective means common to said cord circuits for conditioning a desired one of said meters for operation in response to application of said metering current to said line.

4. In a party line metering system, an exchange, a multi-station line terminating thereat, a meter for each station associated with said line at said exchange, a source of metering potential for operating said meters, a plurality of cord circuits at said exchange adapted to be connected to said line, means individual to said cord circuits for applying said metering potential to said line, and means common to said cord circuits for pre-

paring a circuit to operate a desired one of said meters to the exclusion of the others effective upon the actuation of said individual means.

5. In a party line metering system, an exchange, a multi-station line terminating thereat, a meter for each station associated with said line at said exchange, a source of metering potential for operating said meters, a plurality of cord circuits at said exchange adapted to answer said line, means individual to said cord circuits for supplying said metering potential to said line, and means common to said cord circuit comprising periodically operating circuit closers for preparing a circuit to operate a desired one of said meters to the exclusion of the others.

6. In a party line metering system, an exchange, a multi-station line terminating thereat, a meter for each station associated with said line at said exchange, a plurality of cord circuits at said exchange adapted to be connected to said line, a circuit individual to each of said meters normally open at two points, and means common to said cord circuits for closing at one point the circuit for a desired one of said meters.

7. In a party line metering system, an exchange, a multi-station line terminating thereat, a normally disabled meter for each station associated with said line at said exchange, a plurality of cord circuits at said exchange adapted to answer said line, and means common to said cord circuits for conditioning a desired one of said meters for operation.

8. In a party line metering system, an exchange, a multi-station line terminating thereat, a normally disabled meter for each station associated with said line at said exchange, a source of metering potential for operating said meters, a plurality of cord circuits adapted to be connected to said line, means individual to said cord circuits for applying said metering potential to said line, and means common to said cord circuits for removing the disabling condition from a desired one of said meters to permit its operation in response to application of said metering current to said line.

In witness whereof, I hereunto subscribe my name this 10th day of February, 1930.

CLARENCE B. FOWLER.