

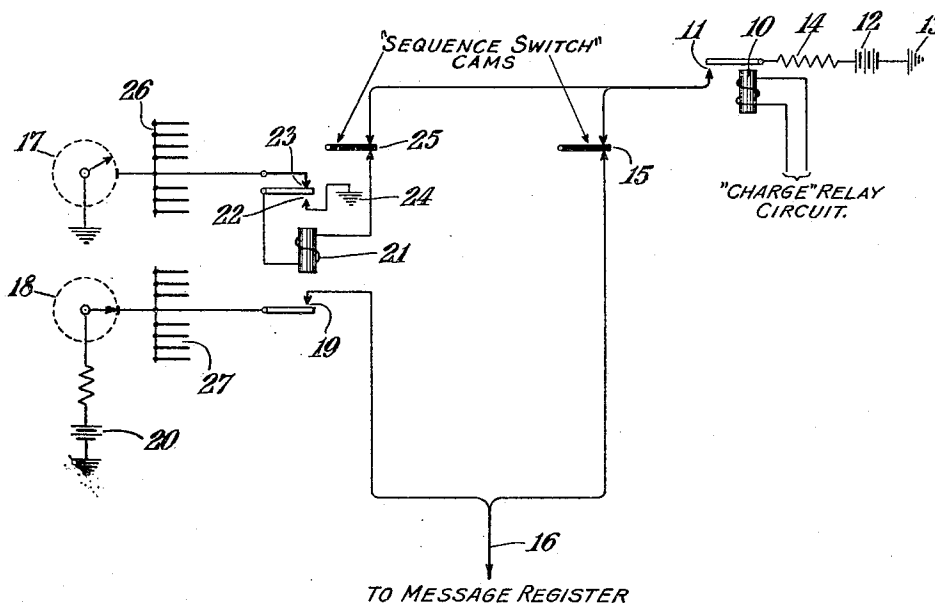
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TIMING APPARATUS

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UNITED STATES PATENT OFFICE

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TIMING APPARATUS

Application filed August 3, 1928. Serial No. 297,273.

This invention relates to methods and apparatus for automatically timing or approximately timing the use of electrical circuits, and one example of the invention as hereinafter described is particularly adaptable for controlling overtime payments for numerous telephone calls in telephone systems using so-called message registers. However, the invention in its broader aspects may be employed in connection with various other electrical systems and circuits.

charge to prevent the line from being disconnected.

The subject matter of this invention is particularly adaptable for use with various kinds of dial operated or machine switched telephone systems, thus if desired eliminating any necessity for manual attention to overtime payments.

Referring now to the details of the drawing: a "charge" relay circuit is indicated and has connected therein in a well known way a "charge" relay 10 for controlling a message register circuit contact 11. This contact may be arranged in series with a battery 12, ground 13 and a suitable resistance 14. Also in series with this circuit is a "sequence switch" cam 15 and the message register connecting wire 16. This portion of the circuit as thus far described is arranged to operate in a well known manner, whereby when the party called removes the receiver from the hook the "charge" relay will be operated, thus completing a circuit for operating the message register, except that such circuit will remain open at the sequence switch cam 15 until such time as the calling party "hangs up" his receiver. At this moment the sequence switch cam in restoring itself to normal position causes the message register circuit from battery 12 to be momentarily connected to operate the message register, thus recording a single charge. It will be observed therefore that this usual circuit makes no provision for overtime payments for prolonged use of the line.

In order to advance the message register to record additional charges whenever the line is used longer than a predetermined time period, I provide the following supplemental circuits.

In connection with each central office switchboard a pair of interrupter switches 17 and 18 may be provided and connected to the usual interrupter switch operating mechanism of the central office equipment so as to operate at a predetermined speed. The interrupter switch 17 for example may be arranged to make contact once during each successive period of 305 seconds, whereby

The invention includes among its objects the provision of a suitable method and apparatus of the class above indicated which will be simple, inexpensive and dependable in installation and operation, and which will relieve the telephone or other switchboard operatives from the duties of checking up overtime use of line wires, particularly for local calls under their control.

Further and more specific objects, features and advantages will more clearly appear from the detailed description given below taken in connection with the accompanying drawing, which forms a part of this specification.

In the drawing the figure is a schematic diagram showing the electrical circuit connections as applied to certain more or less standardized telephone circuits according to one example of my invention.

The invention is here described by way of example only, in the form according to which it may be used for numerous telephone lines connected to telephones such as household and office telephones, where a separate message register or other suitable call counting device is provided in the central office for each subscriber. It will be understood, however, that the invention according to certain of its broader aspects may also be used to automatically check up overtime payments on coin box telephone lines or other lines not equipped with message registers, the apparatus in such cases functioning to warn the subscriber of the termination of one or more predetermined allotted payment periods for use of the line, whereupon the user of the line must pay an additional

arbitrary 5-minute payment periods are provided, and in addition a 5-second leeway is given the subscriber in which to terminate his call if he does not desire to be charged for an additional period. The interrupter switch 18 is preferably arranged to operate at the same speed as switch 17, but makes contact say 1 second before interrupter switch 17 makes contact, and also opens the contact thus made, say $\frac{1}{2}$ second before interrupter switch 17 makes contact.

Interrupter switch 18 functions to connect a battery and ground as at 20 through a suitable resistance and through a relay switch 19, hereinafter described, to the message register wire 16. Interrupter switch 17 functions to control the relay contact 19 by way of a relay 21 having make and break switch contacts 22 and 23 respectively for controlling a "locking circuit" from ground 24. A "sequence switch cam" 25 is also arranged in series with the relay winding 21.

The operation of these circuits is as follows. As soon as the called party removes the receiver from the hook and thus operates the relay 10 to close its "make" switch 11, a circuit is prepared from the ground 13, through battery 12, resistance 14, relay switch 11, sequence switch cam 25 (this cam is in circuit closing position while the call is maintained), through relay winding 21, "break" switch 23, to the interrupter switch 17. As soon as the interrupter switch makes contact, this circuit is completed to ground. Thereupon the relay 21 is energized and "picks up" and establishes a "locking circuit" for itself, through its "make" switch 22 to ground 24. This stick circuit continues to be maintained until the calling party "hangs up" his receiver, whereupon the sequence switch cam 25 when being restored to normal disconnects this circuit in preparation for the next call. Meanwhile whenever the relay 21 is energized, the circuit through relay contact 19 to the message register is also prepared and is completed at intervals when the interrupter switch 18 makes contact for connecting the battery and ground 20.

Assuming that the call is initially established during the middle portion of an arbitrary 5-minute time interval, the circuits will operate as follows:

Just before the termination of the remaining portion of the arbitrary interval the interrupter switch 18 will make contact, but this will be ineffective to complete the circuit from battery 20 to the message register, because at this moment the relay switch 19 will be open. Therefore the subscriber will not be charged extra for this initial fractional time period. However, at the end of this fractional period the interrupter switch 17 will make contact, thus causing the relay 21 to "pick up" and to close the switch 19 in preparation for recording a charge on the message register if the subscriber maintains the line throughout the next arbitrary 5-minute period. If the calling party "hangs up" his receiver before this full period expires, then he will be charged for one time period or one call in the usual way by the operation of the circuit of sequence switch cam 15. On the other hand, if the call is continued into the next succeeding time period, then the interrupter switch 18 will come into operation and the battery 20 will apply an impulse through switch 19 to the message register and an overtime charge will thus be recorded. Likewise, if the called party continues the conversation for a succeeding number of arbitrary time periods, a corresponding number of overtime charges will be recorded by the continued operation of the interrupter switch 18.

Assuming that the subscriber's call is initially established at a time just after the interrupter switches 17 and 18 have made contact, the operation of the circuits will be the same as above described. Similarly, if the call is initially established just at the moment when either of the interrupter switches is making contact, no charge will be recorded until the end of the ensuing 5-minute or other arbitrary interval. This insures against the subscriber being charged overtime for any call which is continued for a period less than the predetermined charging period or less than such period plus 5 seconds if the 5-second leeway is made available as above described.

Overtime payments will therefore be recorded according to the broad principles set forth in the patent to J. L. Boynton, No. 1,664,873, issued April 3, 1928, and entitled "Method and apparatus for timing the use of electrical circuits", the present invention being particularly adaptable to dial operated telephone lines or lines where the operatives may be too busy to manually attend to overtime payments.

It will be observed that these circuits, although providing a means for automatically checking overtime payments on a multitude of lines, may be provided at substantially a minimum expense, it being merely necessary to provide a single relay 21 and a sequence switch cam as at 25 to each so-called "district selector circuit". A single pair of interrupter switches 17 and 18 may be provided in common for all of the lines controlled at the central office, additional lead wires being indicated at 26 and 27 for running to the relay switches of other "district selector circuits".

It is not desired to limit the invention to the details or specific examples herein described, since it will be apparent to those skilled in the art, after understanding the

invention, that it is susceptible to various other adaptations and modifications, such as may be made without departing from the scope of the invention, and I aim therefore in the appended claims to cover all such adaptations and modifications.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. Apparatus for recording overtime charges, for telephone calls, comprising message registers for each subscriber, "district selector circuits" and "charge" relay circuits cooperating therewith for operating said message registers at the termination of each call, and additional circuits cooperating with the "charge" relays to additionally operate the message registers at the termination of predetermined arbitrary overtime payment periods.

2. Apparatus for recording overtime charges, for telephone calls, comprising message registers for each subscriber, "district selector circuits" and "charge" relay circuits cooperating therewith for operating said message registers at the termination of each call, and additional circuits cooperating with the "charge" relays to additionally operate the message registers at the termination of predetermined arbitrary payment periods, said additional circuits including means for preventing additional operation of the message register at the termination of the first arbitrary period after the call is established but permitting operation of the message register at the termination of succeeding arbitrary periods while the call is maintained.

3. In apparatus for controlling payments for the use of electrical circuits, in combination, message registers individual to the circuits, means for operating said registers to register a charge at the termination of each successive predetermined arbitrary full payment period during which the circuits are in use, and means for operating the registers to indicate additional charges for use of the circuits during final fractional payment periods.

4. In apparatus for controlling payments for the use of electrical circuits, in combination, indicating means individual to the said circuits, means for energizing said indicating means to operate the same at predetermined regular arbitrary intervals comprising payment periods, and means for preventing the operation of said energizing means until the terminations of the first full arbitrary periods during which use of the circuits is maintained, and means for additionally energizing the indicating means when the use of the circuits is discontinued.

5. In apparatus for controlling payments for the use of electrical circuits, in combination, message registers individual to the circuits, means for operating said registers to register a charge at the termination of each

successive predetermined arbitrary full payment period during which the circuits are in use, and means for operating the registers to indicate additional charges for use of the circuits during one fractional payment period in addition to said full payment periods.

In testimony whereof I have signed my name to this specification.

RAYMOND M. HICKS.

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