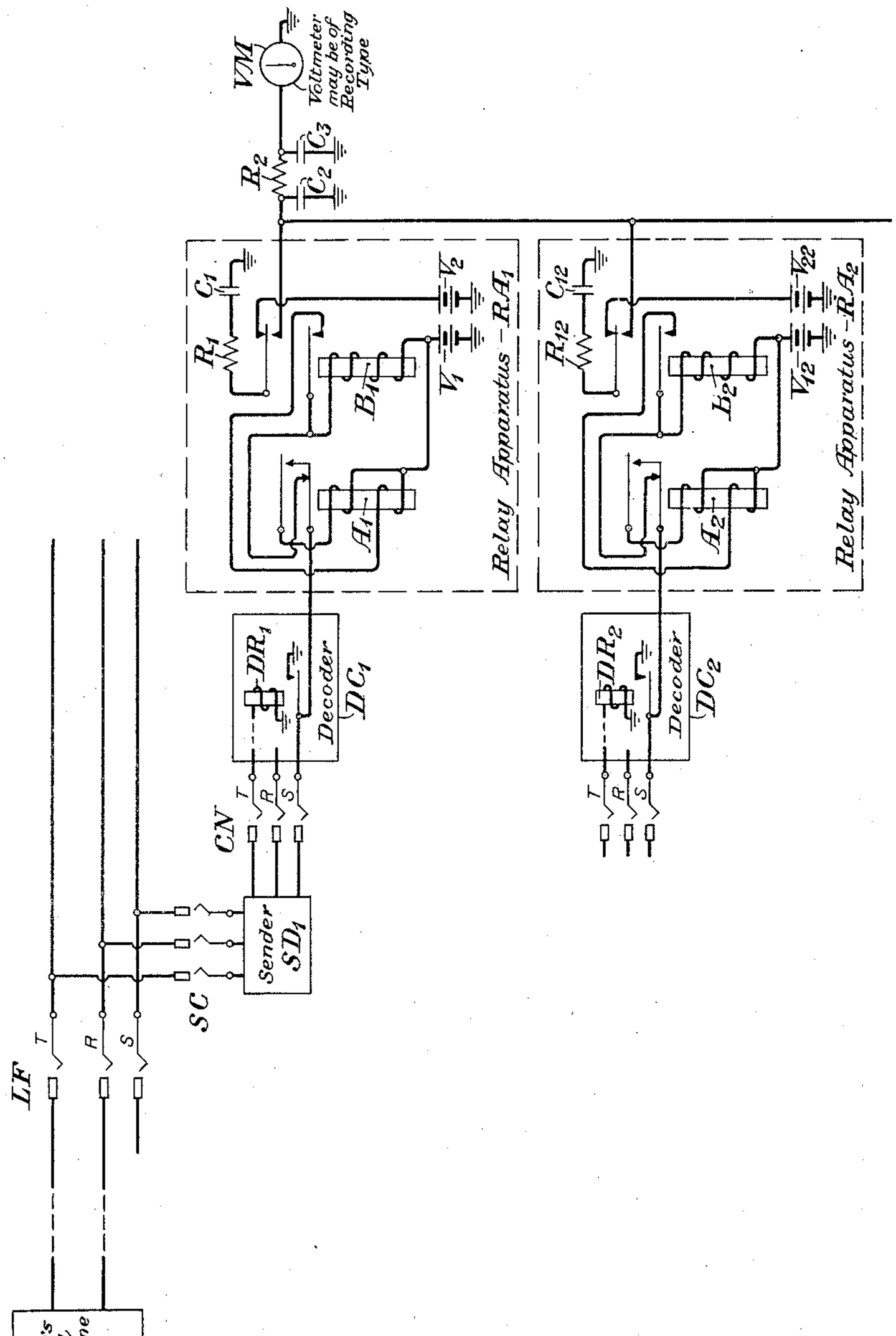
June 10, 1947. E. W. HILL 2,421,943

TELEPHONE TRAFFIC INDICATING APPARATUS

Filed Dec. 22, 1944



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Patented June 10, 1947

2,421,943

UNITED STATES PATENT OFFICE

2,421,943

TELEPHONE TRAFFIC INDICATING APPARATUS

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Application December 22, 1944, Serial No. 569,314

6 Claims. (Cl. 179—8.5)

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This invention relates to telephone systems and, more particularly, to apparatus for measuring or observing traffic in telephone offices.

In the panel type of telephone system, for example, a calling subscriber's telephone set may be connected to a called subscriber's telephone set usually under the control of a sender and a decoder located at the calling subscriber's central office. In general, the decoder serves to select the office trunk (or office trunks) over which the call is to be completed to the called party. After the calling party's set is connected to a sender and the called number dialed, a decoder is then seized by the sender to perform the function just stated. Thereafter the sender retains control of the switching apparatus until the called subscriber's line is reached. The decoder is released by the sender immediately after its trunk selecting function has been completed and, as often happens, the decoder will also be released when it is found to be busy or in trouble.

The decoder is a complex apparatus and quite expensive. There are generally many fewer decoders than senders, the ratio being something like seventy to one. It is important, therefore, to determine how many of the decoders in any central office are busy at any instant or during any brief interval of time, such as five seconds, or ten seconds, etc., during a period, for example, when traffic through the central office may be heavy.

It is one of the objects of this invention to provide a simple and relatively inexpensive arrangement for measuring or observing the rate at which the decoders (or other devices) of the central office are operated within a predetermined time interval. This object may be accomplished by connecting a voltmeter through a timing or discharge control circuit of resistance and capacitance to a plurality of condensers each of which is associated with one of the decoders. Each condenser is normally charged to a predetermined voltage and when the associated decoder is seized, the corresponding condenser will be connected to the voltmeter through the timing or discharge control circuit. The deflection of the voltmeter may serve to indicate the rate at which decoders are operated within any predetermined time interval.

This invention will be better understood from the more detailed description hereinafter following when read in connection with the accompanying drawing illustrating one embodiment of the invention given merely for illustrative purposes.

Referring to the drawing, the dial telephone

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subscriber's set DS is shown connected to the line finder LF, the tip, ring and sleeve terminals of which may be connected through a selector SC to a sender SD_1. The called subscriber's number is dialed by the calling party's telephone set DS in the usual way and the dialed number is registered by the sender SD_1. The sender SD_1 is then connected by a connector switch CN to a decoder DC_1 which serves to route the call to the proper office or offices, after which the decoder DC_1 will be disconnected from the sender SD_1, but the sender SD_1 will operate the switches (not shown) which are required to complete the connection of the calling party's set DS to the called party's set (not shown). The decoder DC_1 is similar to decoder DC_2 and to other decoders to which any sender such as SD_1 may have access. The decoders DC_1, DC_2, etc., and the other apparatus above referred to are of well-known type and are present in the usual panel dial central office.

As soon as the decoder DC_1 is seized by the sender SD_1, a relay such as DR_1 will become operated to supply ground to the sleeve terminal S of the decoder DC_1 so as to make it appear busy to other senders that may seek access to it at the time when it is routing a call for sender SD_1. The ground placed on the armature of relay DR_1 will cause relay B_1 of apparatus RA_1 to become operated over a path including the make contact and armature of relay DR_1, the make-before-break contact of relay A_1, the winding of relay B_1, battery V_1, and ground. The operation of relay B_1 causes relay A_1 to operate, the operating path for which includes battery V_1, the lower or operating winding of relay A_1, the lower make contact and armature of relay B_1, the make-before-break contact of relay A_1, the armature and make contact of relay DR_1 and ground. Relay A_1 is then locked in its operated position, the locking path including battery V_1, the upper or locking winding of relay A_1, the armature and make contact of relay A_1, the armature and make contact of relay DR_1 and ground. Relay A_1 will remain locked in its operated position as long as the decoder is busy. Moreover, relay B_1 will be released immediately after relay A_1 becomes operated by virtue of the opening of the operating path of relay B_1 at the make-before-break contact of relay A_1.

It is to be observed that while relay B_1 is released, battery V_2 will be connected to condenser C_1 over a path completed through the upper back contact and armature of relay B_1 and resistor R_1. Condenser C_1 is thus normally charged to the voltage of battery V_2. However, as soon as relay

B_1 becomes operated, the condenser C_1 is connected to the voltmeter VM over a path comprising condenser C_1, resistor R_1, the upper armature and make contact of relay B_1, resistor R_2, voltmeter VM and ground. Condensers C_2 and C_3 are bridged between opposite terminals of resistor R_2 and ground, as shown, and hence these condensers become charged immediately upon their connection to condenser C_1. As relay B_1 is operated only momentarily, the high voltage to which condenser C_1 is normally charged by battery V_2 will be transferred momentarily to condensers C_2 and C_3 and at the same time the pointer of the voltmeter VM will be deflected. The deflection of the pointer of meter VM will be reduced as the charges on condensers C_2 and C_3 become lowered and the deflection will be zero in due course.

The decoder DC_2 is shown connected through relay apparatus RA_2—which is similar to relay apparatus RA_1—to resistor R_2 and its bridging condensers C_2 and C_3 and then to the voltmeter VM. As decoders DC_1, DC_2, etc., may be seized in rapid succession during periods of heavy traffic, the condenser such as C_1 of apparatus RA_1 and the corresponding condensers of the other apparatus RA_2, etc., which are fully charged, will be successfully connected to the measuring instrument VM through the common resistor R_2 and its bridging condensers C_2 and C_3. The charges on condensers C_2 and C_3 will be rapidly replenished during the interval when decoders are rapidly seized and the pointer of meter VM will be held, within certain limits, at or near this maximum deflection. The attendant may therefore quickly observe whether the call rate is "peaking up" in the central office.

The meter VM may be of any type of recording or non-recording voltmeter. The recording type of voltmeter would be employed whenever permanent records of service conditions are required.

Whenever only one decoder such as DC_1 is seized within any predetermined time interval, such as five seconds, or ten seconds, or 60 seconds, etc., the deflection of the voltmeter will reach a certain relatively high value and drop to successively lower values at a predetermined rate. Should other decoders be seized, either at regular periods or irregular periods thereafter, the voltmeter deflection will be temporarily increased each time a decoder is seized and thus the average indication over a given period will be higher. The rate of change of the voltmeter indications will be determined by the constants of the circuit connected to the voltmeter VM. The rate of discharge through the voltmeter may be changed, for example, by modifying the magnitude of resistor R_2 or of the condensers C_2 and C_3. The voltmeter VM will serve to integrate the calling rate, i. e., the rate at which decoders are seized in the central office.

The invention has been shown and described as applied to apparatus for determining the calling rate of decoders in a panel type automatic telephone central office. The invention is equally applicable to observe the calling rate of senders, markers, and other equipment of any type of dial central office. The invention is in general applicable to any electrical or mechanical apparatus employing a plurality of translating devices that may be operated intermittently.

While this invention has been shown and described in certain particular embodiments merely for illustrative purposes, it will be understood that it is equally applicable to other and widely varied organizations without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. Traffic indicating apparatus for roughly registering the number of translating devices that have operated in a brief time interval, comprising a plurality of normally charged condensers each corresponding to and controlled by one of said devices, a common discharge circuit having resistance and capacitance of predetermined magnitudes, a measuring element connected to said discharge circuit, and means for operating said devices and transiently connecting the corresponding condensers controlled by said devices to said discharge circuit immediately upon the operation of said devices.

2. Traffic measuring apparatus for registering the approximate number of independent translating devices operated within a brief time interval, comprising a plurality of equal condensers each associated with one of said devices, means for normally charging all of said condensers to a predetermined voltage, a discharge control circuit having resistance and capacitance, a meter connected to said control circuit, and means responsive to the operation of each translating device to momentarily connect the associated condenser to said control circuit immediately upon the operation of said translating device.

3. Telephone traffic measuring apparatus for a central office having a plurality of independent decoders, comprising a plurality of normally charged condensers each controlled by one of said decoders, a discharge control circuit having predetermined resistance and capacitance, a recording meter connected to said discharge control circuit, and means controlled by each decoder to transiently connect its associated condenser to said discharge control circuit immediately upon the operation of said decoder.

4. The combination of a plurality of independent, intermittently operated devices, a plurality of sources of voltage each associated with one of said devices, a timing circuit comprising a series resistor and shunt condenser, a voltmeter connected in series with said resistor, and means responsive to each operated device to immediately connect its associated source of voltage to said timing circuit, whereby said voltmeter will indicate the approximate number of said devices that have become operated in a predetermined time interval.

5. The combination of a plurality of independent devices that are operated intermittently, a timing circuit comprising a resistor and condenser in shunt therewith, a voltmeter connected to said timing circuit, a plurality of condensers each individual to one of said devices and normally charged to a predetermined voltage, and means controlled by each device for momentarily connecting the condenser individual thereto to said timing circuit immediately upon the operation of said device, whereby said voltmeter will be deflected in proportion to the approximate number of said devices operated in a predetermined time interval.

6. Apparatus for registering the approximate number of independent devices operated within a brief time interval, comprising a plurality of normally charged condensers one corresponding to each of said devices, a timing circuit of resistance and capacitance, a meter connected to said timing circuit, and means responsive to the operation of any of said devices to imme-

diately connect the condensers corresponding to the operated devices momentarily to said timing circuit.

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