

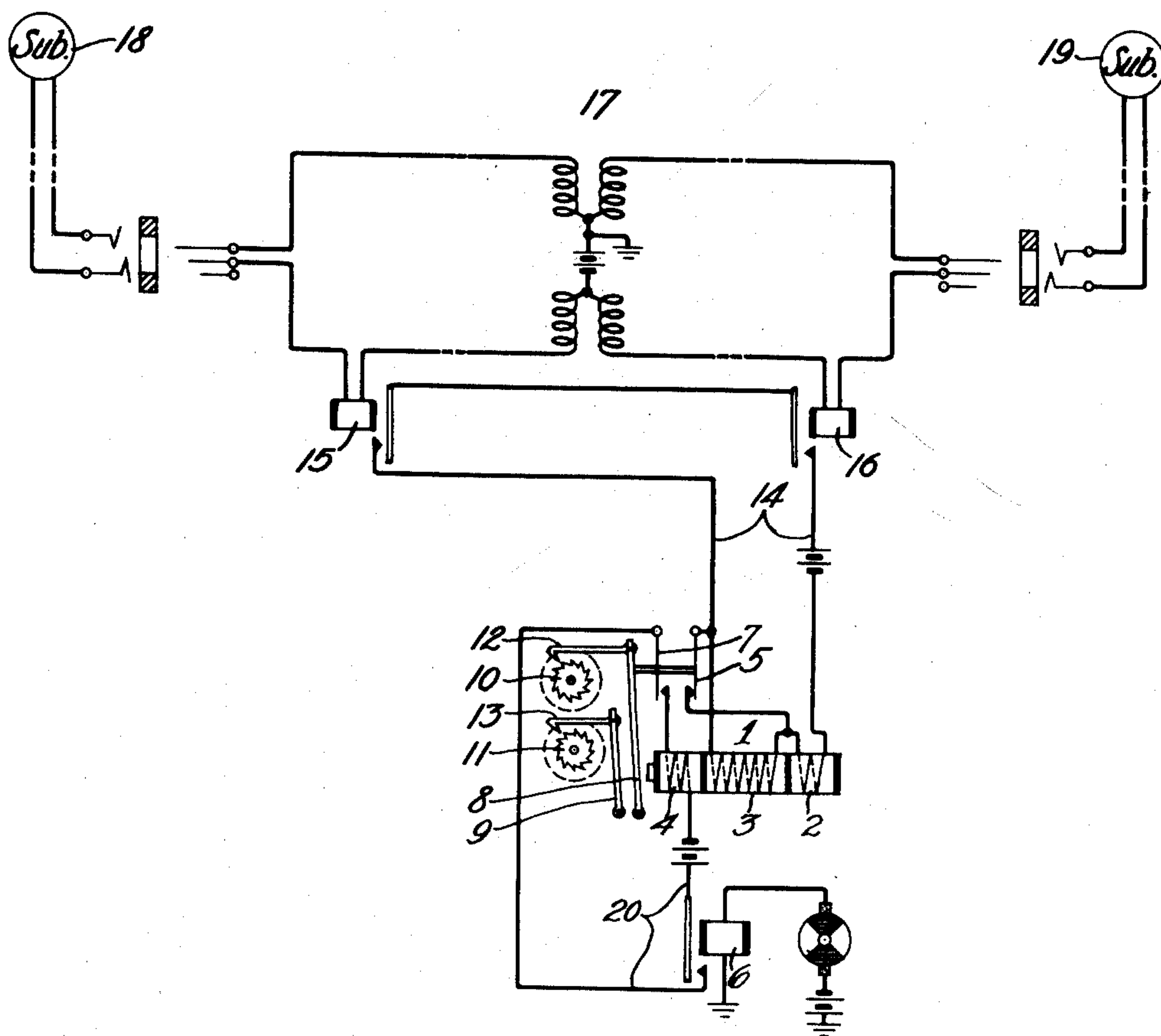
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W. H. HARVEY

TELEPHONE EXCHANGE SYSTEM

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Inventor:
William H. Harvey
by Joel C. Palmer
Attorney

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WILLIAM H. HARVEY, OF BROOKLYN, NEW YORK, ASSIGNOR TO BELL TELEPHONE LABORATORIES INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

TELEPHONE-EXCHANGE SYSTEM.

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This invention relates to metering systems for telephone exchanges and more particularly to means for recording the number of calls made and the duration of each call.

A system constructed in accordance with this invention consists of an electromagnet having two coacting armatures and control circuits therefor so arranged that when a call is made both armatures operate to cause the operation of two counting trains, one of said armatures thereafter repeatedly releasing and operating to cause the repeated actuation of one of said counting trains for measuring the duration of the call and one of said armatures operating but once to cause the single operation of the other of said counting trains to record the call.

The invention has been illustrated in the accompanying drawing by showing in diagrammatic form an electromagnetic structure and associated registering devices with suitable circuit arrangements for the control thereof.

Referring now to the drawing the electromagnet 1 is provided with separate windings 2, 3 and 4. Winding 2 is of comparatively low resistance and winding 3 is of a high resistance. Winding 3 is normally short-circuited by a pair of contacts 5. Winding 4 is of low resistance and connected to a timing interrupter 6 through a pair of normally open contacts 7. Electromagnet 1 is provided with armatures 8 and 9, operating counting trains 10 and 11 through pawls 12 and 13 respectively. The armature 8 which operates counting train 10 is also adapted to operate the two pairs of contacts 5 and 7. It is evident that any well-known type of counting trains may be employed and for that reason only a diagrammatic showing has been made in the drawing. It is understood, that for each operation of armature 8, counting train 10 will be actuated once to register a call, and that for each operation of armature 9, counting train 11 will be operated once to register a unit of time.

The operation of this device when applied to the telephone system diagrammatically illustrated in the drawing is as follows: For example, the windings 2 and 3 may be connected to the energizing circuit 14 controlled by the two supervisory relays 15 and 16 of a cord circuit 17. This energizing circuit is closed when the cord circuit is used for con-

necting two subscribers' lines such as 18 and 19 and when the subscribers of these lines have their receivers off the hook. As noted, the winding 3 is normally short-circuited by contacts 5, hence this energizing circuit when closed will only be completed through the operating winding 2 and the current passing through this circuit under these circumstances will be sufficient to operate both armatures 8 and 9. Counting trains 10 and 11 will thereby each be actuated once.

As the armature 8 completes its stroke it operates contacts 5 and 7. Contacts 5 open the short circuit for the high resistance winding 3 which will thereby be inserted in series relation with the operating winding 2, while contacts 7 will close a circuit for winding 4 through the energizing circuit 20, controlled by the timing interrupter 6. The resistance added by winding 3 reduces the current in circuit 14 to a value which will provide sufficient ampere turns to hold the armature 8 in its operating position, but said value is not sufficient to hold armature 9 in its operated position which will therefore restore to normal. Armature 8 in its operated position maintains the circuit 20 closed to the interrupter 6 and on each operation of the interrupter 6 to complete the circuit, the magnet will operate to attract armature 9. Consequently, meter 11 will be operated repeatedly at stated intervals as determined by the interrupter 6 as long as the supervisory relays are operated to maintain armature 8 actuated. In other words, counting train 11 will measure the time of a conversational connection between two subscribers, while the counting train 10 will operate once to register this connection.

It is evident that the invention is not limited to the particular structural arrangement and circuit shown in the drawing but may be applied in different form and to different systems without departing from the spirit thereof.

What is claimed is:

1. The combination with an electromagnet of two counting trains, means controlled by said electromagnet to actuate said counting trains once and means for causing the repeated release and actuation of one of said counting trains while the other counting train is maintained actuated.

2. An electromagnet, two counting trains associated therewith, means for controlling said electromagnet to operate one counting train once and to simultaneously operate and release the other counting train a plurality of times.

3. An electromagnet, two counting trains associated therewith, means for controlling said electromagnet to actuate one counting train once and to operate and release the other counting train at predetermined intervals during the actuation of the first counting train.

4. An electromagnet, two counting trains controlled by said electromagnet, means for energizing said electromagnet to operate both of said counting trains and release one counting train, and means for causing thereafter the repeated actuation and release of the originally released counting train.

5. An electromagnet, two counting trains controlled by said electromagnet, means for energizing said electromagnet to operate both of said counting trains, means for thereafter releasing one of said counting trains and maintaining the other counting train operated for a certain period, and means for repeatedly actuating and releasing the originally released counting train at predetermined intervals during said period.

6. An electromagnet, two counting trains controlled by said electromagnet, means for energizing said electromagnet to operate both of said counting trains simultaneously, means for thereafter releasing one of said counting trains, and means for thereafter repeatedly actuating and releasing the originally released counting train and for permanently releasing both of said counting trains after a certain interval.

7. An electromagnet, two counting trains controlled by said electromagnet, means for energizing said electromagnet for actuating both of said counting trains, means for thereafter maintaining one of said count-

ing trains operated and for releasing the other, and means controlled by said first means for independently controlling the released counting train.

8. An electromagnet, two counting trains controlled by said electromagnet, means for energizing said electromagnet to actuate both of said counting trains and for thereafter maintaining one of said counting trains operated and for releasing the other, means controlled by said first means for independently actuating and releasing the released counting train at predetermined intervals, and means for releasing the originally actuated counting train and preventing further operation and release of the other counting train.

9. An electromagnet having two armatures, a counting train controlled by one armature and another counting train controlled by the other armature, a circuit for said electromagnet for causing the operation of both armatures, means controlled by one armature for changing said circuit to cause the release of the other armature, and another circuit closed through said electromagnet by the armature remaining operated for independent control of the released armature.

10. An electromagnet having two armatures, a counting train controlled by one armature and another counting train controlled by the other armature, a circuit for said electromagnet for the operation of both armatures, means controlled by the operation of one armature for changing said circuit to cause the release of the other armature, another circuit closed through said electromagnet by the armature remaining operated, and means for controlling said other circuit to repeatedly operate and release the originally released armature.

In witness whereof, I hereunto subscribe my name this 29th day of October, A. D. 1926.

WILLIAM H. HARVEY.