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G. K. THOMPSON

TIME ANNOUNCING SYSTEM

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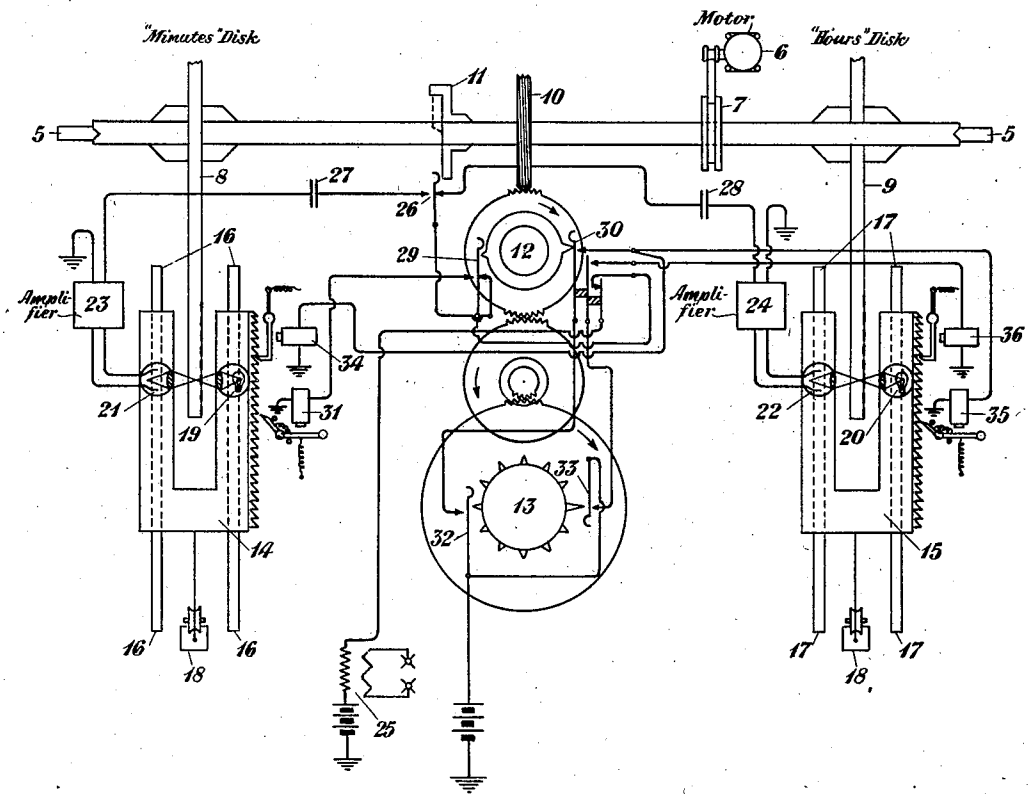


Fig. 1

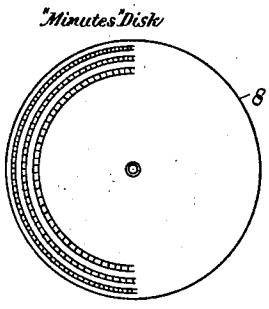


Fig. 2

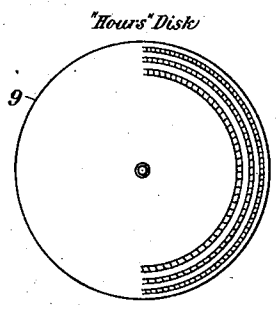


Fig. 3

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TIME-ANNOUNCING SYSTEM.

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This invention relates to time announcing systems, which are more particularly adapted for use in connection with telephone exchanges.

An object of the invention consists in the provision of a time announcing system for telephone exchanges whereby a subscriber connected with a manual exchange may obtain the time by calling an operator in the usual manner, or if connected with a machine switching exchange may call a given number. Other and further objects will be apparent from the following description, when considered in connection with the accompanying drawing, in which one embodiment of the invention is illustrated.

Referring to the drawing, Figure 1 represents diagrammatically a preferred embodiment of the invention; Fig. 2 is a front view of the "minutes" disk which carries concentric half circle light records of words "o'clock" and "one" to "fifty-nine"; and Fig. 3 is a view similar to Fig. 2 showing the "hours" disk which carries concentric half circle light records of words "one" to "twelve".

The improved announcing system consists of a main shaft 5 which may be driven by a suitable time-controlled motor 6 connected to said shaft by a pulley 7. The shaft carries two glass photographic plates or disks 8 and 9, together with a worm gear 10 and a switching cam 11. The worm gear 10 drives two commutators 12 and 13, which are connected by an intermediate gear, and the cam 11 controls switching mechanism for opening and closing an electrical circuit.

The disks 8 and 9 are centrally positioned between the arms of carriages 14 and 15, respectively. These carriages are reciprocally mounted on respective pairs of parallel rods 16, 16 and 17, 17 and are held in normal position by means of weights 18 which are suitably secured to their lower portions. The disks 8 and 9 each carry half circle concentric photographic voice records. For instance, the first record on disk 8 or the "minute" record would be the word "o'clock", the second the word "one" and the third the word "two" and so on to the sixtieth record on which would be the words "fifty-nine".

The disk 9 or "hour" record carries twelve half circle concentric records, the first record being that of the word "one" and the last of the word "twelve". These voice records are made in any well known manner upon a photographic film which forms a part of the transparent disks as more clearly shown in Figs. 2 and 3. The carriages 14 and 15 have light projectors 19 and 20, fixedly mounted upon one of their arms at one side of the rods, and on the other arms of the carriages opposite the projectors are fixedly mounted photoelectric cells 21 and 22. The cells are equipped with appropriate lenses for concentrating or focusing the light rays from the projectors on to and through the photographic records to the sensitive areas in said light cells, and these cells are connected by suitable circuits to the amplifiers 23 and 24. The output circuits of the amplifiers are connected by means of a switching circuit to the secondary of a repeating coil 25, and the primary of this coil may be connected to a common time circuit in the telephone exchange.

If the optical system, say on carriage 14, is properly adjusted so that a beam of light passes from projector 19 through one of the photographic records on disk 8, and if disk 8 is rotated at the proper speed the word or words originally impressed photographically upon the disk will be reproduced over the announcing circuit by means of the light cell 21 and the amplifier 23. This is also true, of course, with regard to the operation of the optical system in connection with disk 9. It is evident, therefore, that with the two disks 8 and 9 in operation combined with the optical systems, a constant repetition of words impressed on the disks may be obtained at each revolution, and if carriages 14 and 15 be moved forward the width of one record a new announcement may be obtained.

In order to announce the time properly, it is necessary to so arrange the apparatus that the announcement of the hour will always precede that of the minute. To accomplish this, the disks are staggered with respect to each other; that is, they are so placed on the shaft 5 that one is reproducing while the other is silent. In order to arrange for the proper sequence of the announcements the cam 11 is so set with relation to the two disks that the hour announcement always precedes the "o'clock" or "minutes" announcement. This is accomplished by the switch 26 under control

of the cam 11. It will be noted that during one-half of the revolution of cam 11, contact is made with the output circuit of amplifier 24 and during the other half of the revolution, contact is made with the output circuit of amplifier 23. A condenser 27 is inserted in the circuit connected with the amplifier 23, and an additional condenser 28 is connected in the circuit of amplifier 24 to prevent direct current flow.

The commutator 12 revolves once a minute, and projections on this commutator operate switches 29 and 30 once per minute. The projections are offset as regards each other and are individual to the switches 29 and 30. The function of switch 29 when operated is, first, to open the output of either amplifier and second, to close momentarily a circuit through the stepping magnet 31 which moves carriage 14 forward one notch, bringing a new record into place. The return of switch 29 to normal reconnects the output of the two amplifiers under control of cam 11 to the common repeating coil 25, the primary of which is connected to a common announcing circuit throughout the exchange.

In the operation of the system it is necessary of course to return the carriage 14 to its normal position once an hour, and the carriage 15 to its normal position once in twelve hours. This is accomplished by switch 30 in combination with switches 32 and 33 on commutator 13, which makes one revolution in twelve hours and is provided with twelve projecting points, one of the points being longer than the others. The return of the "minute" carriage 14 is accomplished as follows: During the last part of the announcement of the fifty-ninth minute one of the points on cam 13 makes contact with switch 32, and closes a circuit therethrough from battery, inner make contact of switch 30, winding of stepping magnet 35 to ground. The closure of this circuit operates relay 35 which causes the pawl mechanism associated therewith to engage the teeth of the carriage 15 and step the carriage forward one tooth in order that a new record of a new hour may be announced. A parallel circuit is closed simultaneously with that just described for operating the stepping magnet 35 associated with the carriage 15, which extends from the inner make contact of switch 30 through the winding of release magnet 34, associated with carriage 14 to ground. The closure of this circuit causes the operation of magnet 34 which disengages its pawl from the teeth provided upon said carriage, whereupon it is returned to normal by the weight 18. The switch 30 releases after making the momentary contact just described, and immediate contact is made with switches 29, and a circuit is closed through the left contact of said switch from battery, secondary winding of repeating coil 25, to ground through the winding of stepping magnet 31 associated with carriage 14. The closure of this circuit operates stepping magnet 31 which causes the carriage to be moved along its rods to again start off with a new "minute" announcement.

The long point on cam 13 which makes contact with switch 33 once in twelve hours is slightly offset with respect to the shorter tooth on the opposite side of said cam so that contact will be first made by the long tooth to close switch 33 and immediately thereafter contact will be made with switch 32 by the oppositely positioned shorter tooth. The closure of switch 33 establishes a circuit through the make contact of this switch from battery, middle make contact of switch 30, winding of release magnet 36 associated with carriage 15 to ground. The closure of this circuit energizes release magnet 36 which withdraws its pawl from the teeth of said carriage and allows it to be returned by means of the weight 18 to its normal position. Immediately after carriage 15 is restored to normal, the circuit previously described for operating stepping magnet 35 is closed through switches 30 and 32, whereupon said carriage is again stepped upward to announce the hour "one", and upon the breaking of contact of switch 30, a circuit is closed through the make contact of switch 29, as above described, for operating stepping magnet 31 associated with carriage 14 to cause it to step upward to announce the minute "one". The function of the lower or back contact of switch 30 is to open the output circuit of either amplifier while carriages 14 or 15 are in motion, thus preventing imperfect or partial announcements being made.

The carriages 14 and 15 are thus successively advanced with their optical systems in respective synchronism with their photographic disks so that it is possible to make a constant announcement of the time throughout each minute except for a few seconds at the close of each minute and hour when it is necessary to open the announcing circuit to allow the switches to set the apparatus for a new minute or for a new minute and hour as the case may be.

During the periods the amplifier 23 is connected with the optical system of carriage 14, a circuit is closed from ground through the output of said amplifier, condenser 27, left make contact of switch 26, right make contact of switch 29, lower make contact of switch 30, secondary winding of repeating coil 25 to battery. During the alternate periods of connection of the amplifier 24 with the optical system of carriage 15, a circuit is closed from ground, through the output of amplifier 24, condenser 28, right make contact of switch 24, and thence along

the same path as that just outlined in connection with the output circuit of amplifier 23. In this manner time announcements will be made according to well known principles through the repeating coil 25.

While time records occupying one-half of a concentric circle upon a record plate have been herein described, it will be understood that the invention is not so limited. If it should be desired to utilize records occupying practically a complete circle this may be accomplished by arranging the cam so that it will revolve only once in two revolutions of the main shaft. This may be accomplished by suitable gearing, and by this means each record would be alternately silent one full revolution. The invention is not confined to flat glass disks for mounting the light record, as it is evident that these records could be made on a flexible film and the film mounted upon the outside of a glass cylinder, the same elements for reproducing the speech and controlling the carriage being employed as previously described.

By means of this invention, an arrangement is provided which will be more durable and give more useful results as regards quality of articulation and volume than previous arrangements in this line. It is also pointed out that one such device could be employed as a master announcer, and the announcements trunked to a plurality of exchanges.

What is claimed is:

1. In a time announcing system comprising movable transparent disks having concentric sound waves photographically produced thereon, means for projecting a beam of light through said disks, detecting means associated with each disk responsive to said light for producing sound in accordance with the variations of the sound waves, means associated with the detecting means for amplifying said sound, and means for impressing the amplified sound upon a time announcing circuit.

2. In a time announcing system comprising movable transparent disks having photographic sound records produced thereon, means for projecting a beam of light through said records, a photoelectric cell associated with each disk responsive to said light for producing sound in accordance with the variations of the photographic records, means associated with each photoelectric cell for amplifying said sound, switching means for producing the amplified sound upon a time announcing circuit, and driving mechanism for properly rotating said disks.

3. In a time announcing system comprising rotatable transparent disks having successive concentric photographic sound records produced thereon, means for projecting a beam of light through said disks to produce sound in accordance with the undulations of the photographic records, means associated with each disk for amplifying said sound, means for impressing the amplified sound upon a time announcing circuit, and driving mechanism for properly rotating said disks.

4. In a time announcing arrangement, movable transparent disks having photographically produced thereon undulations for words desired to be reproduced, a light directing and detecting system associated with each disk for producing sound in accordance with the undulations on said disks, means in circuit with the detecting part of each system for amplifying the sound, means for impressing the amplified sound upon an announcing circuit, and driving mechanism for properly rotating said disks.

5. In a time announcing circuit for telephone exchanges, movable transparent disks having photographically produced thereon undulations for words desired to be reproduced, a light directing system for each disk having rays focused on said disks, a detecting system for each disk responsive to said rays for producing sound in accordance with the undulations on said disks, means in circuit with each detecting system for impressing said sound in amplified form upon the announcing circuit, and driving mechanism for properly rotating said disks.

6. In a time announcing system comprising rotatable disks having concentric photographic voice records produced thereon, means associated with each disk for projecting a beam of light successively through said records, means responsive to said light for producing sound in accordance with the variations of the photographic records, means for amplifying said sound, means for producing the amplified sound upon a time announcing circuit, driving mechanism for properly rotating said disks, and means for vertically shifting said light and its responsive means through successive voice records on said disks.

7. In a time announcing system comprising rotatable disks having successive concentric photographic sound records produced thereon, means associated with each disk for projecting a beam of light through said disks to produce sound in accordance with the undulations of the photographic records, means for amplifying said sound, means associated with each disk for impressing the amplified sound upon a time announcing circuit, driving mechanism for properly rotating said disks, and means for vertically shifting said light in synchronism with said disks to produce successive records on said disks.

8. In a time announcing arrangement, rotatable disks having photographically produced thereon successive undulations for words desired to be reproduced, a light directing and detecting system for each disk

for producing sound in accordance with the undulations on said disks, means in circuit with the detecting part of said system for amplifying the sound, means for impressing the amplified sound upon an announcing circuit, driving mechanism for properly rotating said disks and means for vertically shifting said light directing and detecting system in synchronism with said disks to produce successive undulations on said disks.

9. In a time annoucing circuit, rotatable disks having photographically produced thereon concentric undulations for words desired to be reproduced, a light directing system for each disk having rays focused on said disks, a detecting system for each disk responsive to said rays for producing sound in accordance with the undulations on said disks, means in circuit with the detecting system for impressing said sound in amplified form upon the announcing circuit, driving mechanism for properly rotating said disks, and means for vertically shifting said light directing system and detecting system in synchronism with said disks to produce successive undulations on said disks.

10. In a time announcing system comprising a shaft, disks mounted thereon, said disks having successive sound waves photographically produced thereon, a vertically movable carriage associated with each disk, means on one side of said carriages for projecting a beam of light through its associated disk, means mounted on the opposite sides of said carriages responsive to said light for producing sound in accordance with the variations of the sound waves, means for amplifying said sound, and means for impressing the amplified sound upon a time announcing circuit.

11. In a time annoucing system comprising a shaft, disks mounted on said shaft, said disks having successive photographic sound records produced thereon, a vertically movable carriage associated with each disk, means mounted on one side of each carriage for projecting a beam of light through the records on its associated disk, means mounted on the opposite sides of said carriages responsive to said light for producing sound in accordance with the variations of the photographic records, means associated with each disk resposive to the production of sound for amplifying said sound, means for impressing the amplified sound upon a time announcing circuit, driving mechanism for properly rotating said shaft and disks, and means for vertically shifting said carriages to project beams of light through successive records on said disks.

12. In a time announcing system comprising a shaft, transparent disks mounted on the shaft, said disks having successive photographic sound records produced thereon, a vertically movable carriage associated with each disk, means mounted on one side of each carriage for projecting a beam of light through the records on its associated disk to produce sound in accordance with the undulations of said records, means associated with each disk for amplifying the sound produced by its records, switching means associated with said shaft for alternately impressing the amplified sound produced by the records of each disk upon a time announcing circuit, driving mechanism for properly rotating said shaft and disks.

13. In a time announcing arrangement, a shaft, a pair of transparent disks mounted on the shaft, said disks having successive concentric photographically produced thereon undulations for words desired to be reproduced, a carriage associated with each disk, a light directing and detecting system associated with each carriage for producing sound in accordance with the undulations on each disk, means in circuit with the detecting part of said system for each carriage for amplifying the sound, and means for alternately and successively impressing the amplified sound produced by the undulations of each disk upon an announcing circuit.

14. In a time announcing circuit, a shaft, a pair of transparent disks mounted on the shaft, said disks having photographically produced thereon successive records of undulations for words desired to be reproduced, a carriage associated with each disk, a light directing system for each carriage having rays focused on its associated disk, a detecting system for each carriage responsive to said rays for producing sound in accordance with the undulations on said disks, means in circuit with each detecting system for alternately impressing the sound produced by the undulations on each disk in amplified form upon the announcing circuit, and means for shifting the carriages to successively move the light directing and light detecting systems associated therewith in synchronism with successive undulations on said disks.

In testimony whereof, I have signed my name to this specification this 5th day of February 1925.

GEORGE K. THOMPSON.