

Sept. 12, 1933.

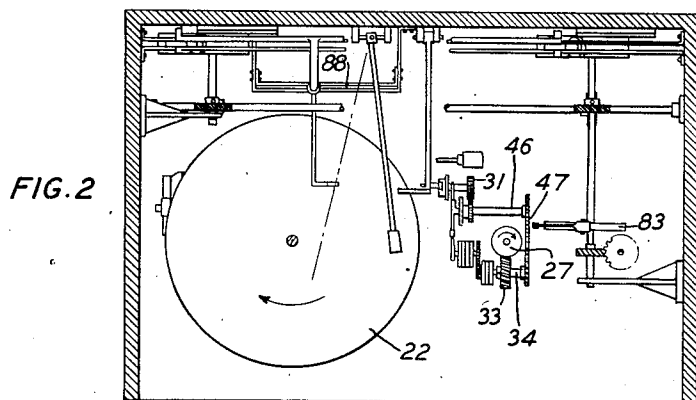
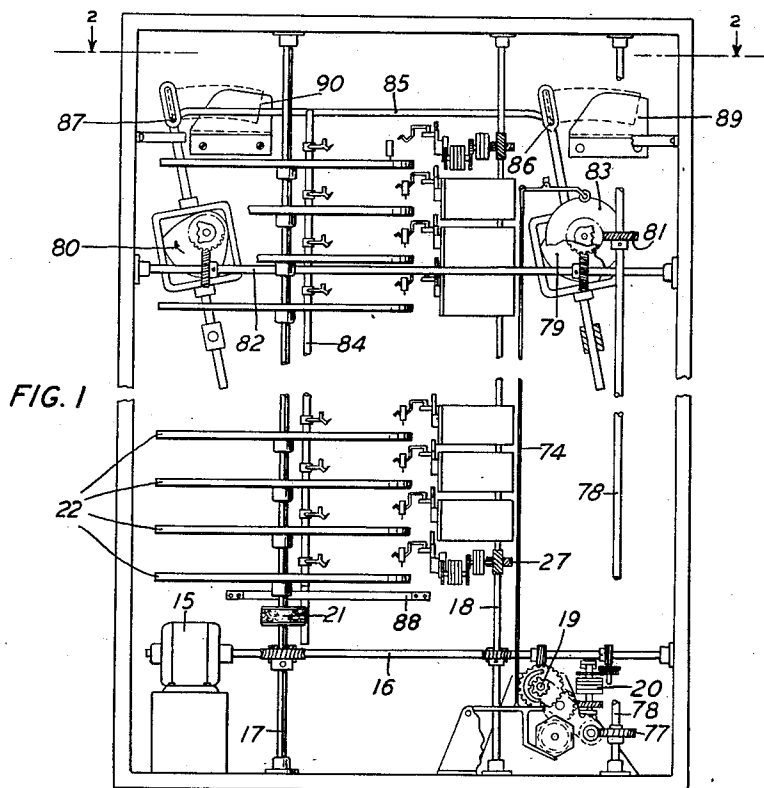
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1,926,876

TIME ANNOUNCING MACHINE

Filed Jan. 28, 1931

4 Sheets-Sheet 1



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Sept. 12, 1933.

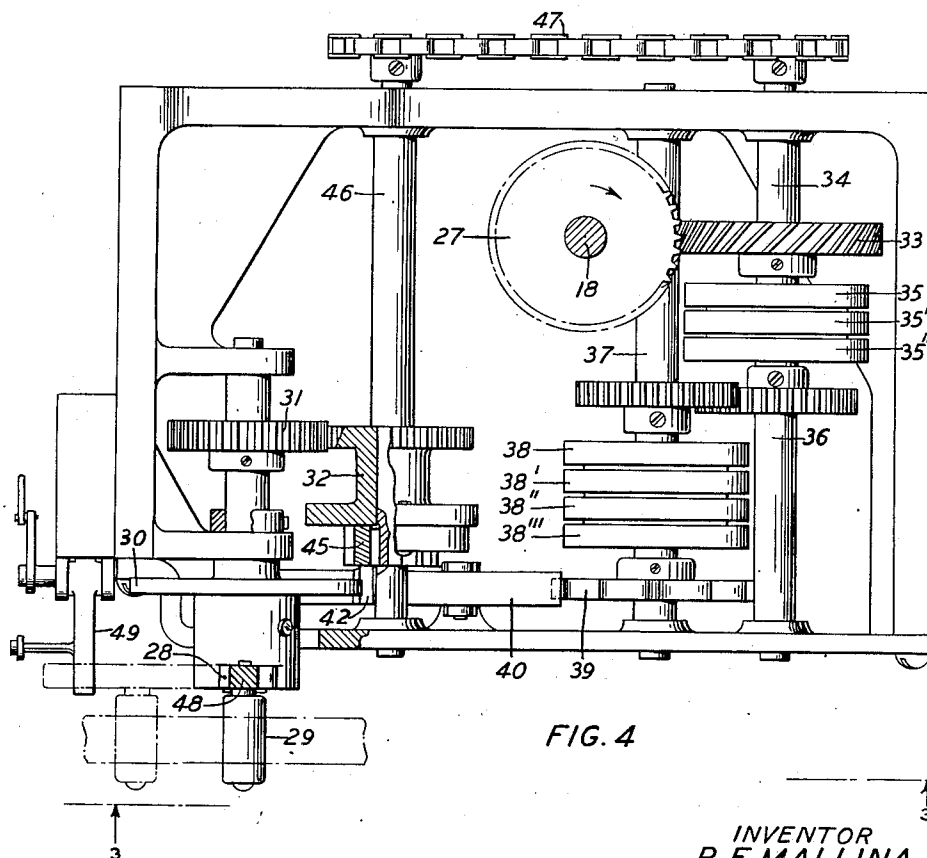
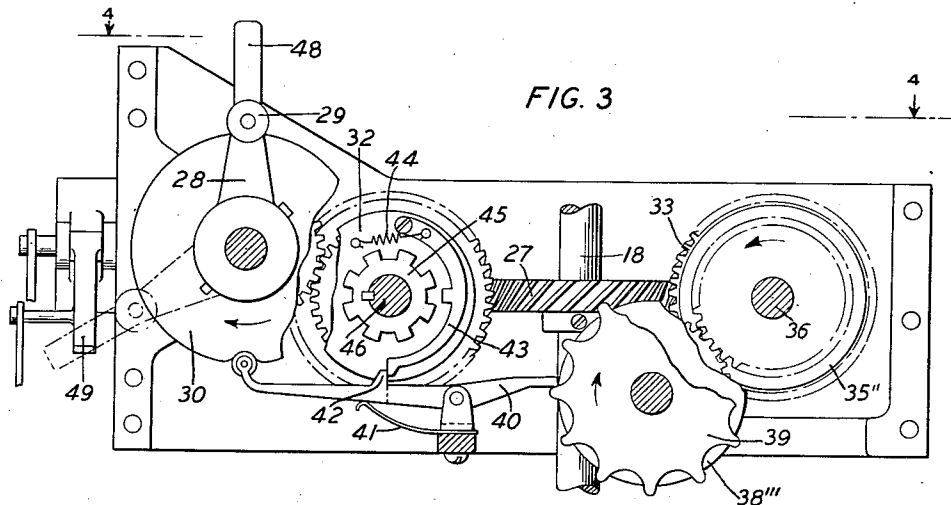
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4 Sheets-Sheet 2



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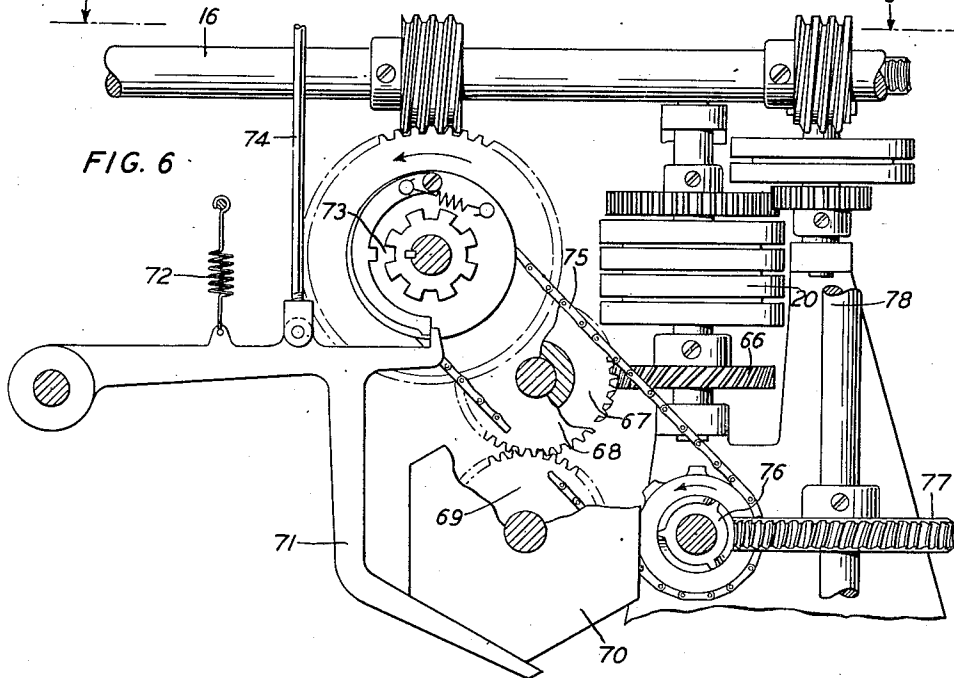
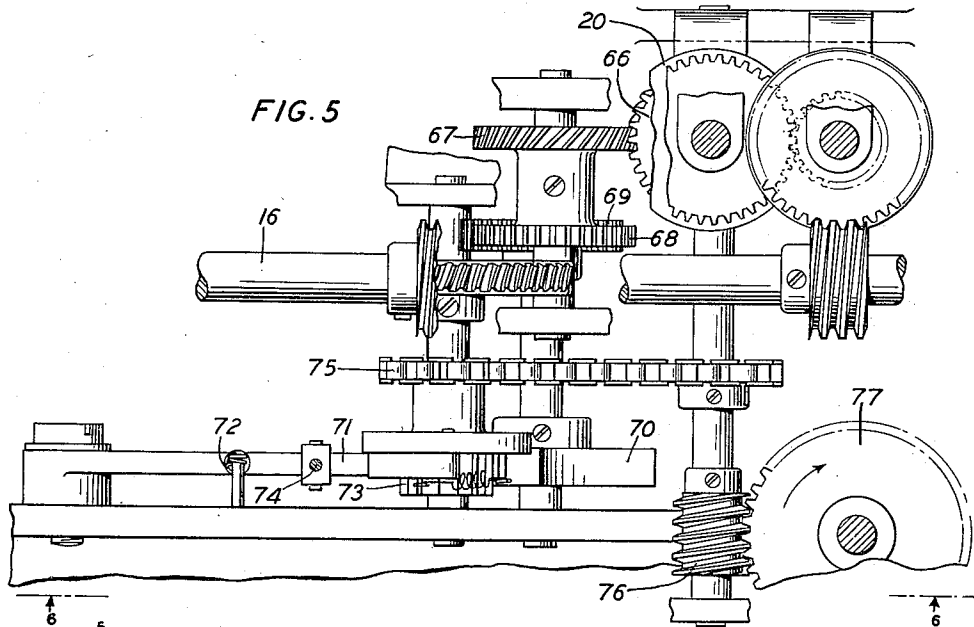
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TIME ANNOUNCING MACHINE

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4 Sheets-Sheet 3



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4 Sheets-Sheet 4

FIG. 7

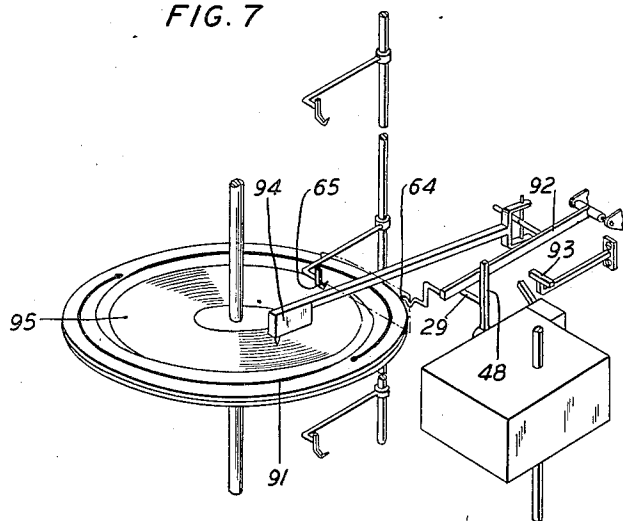


FIG. 8

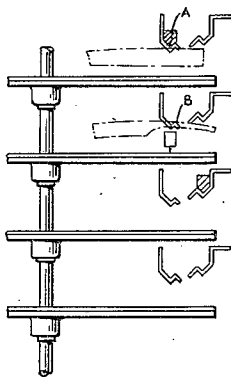


FIG. 9

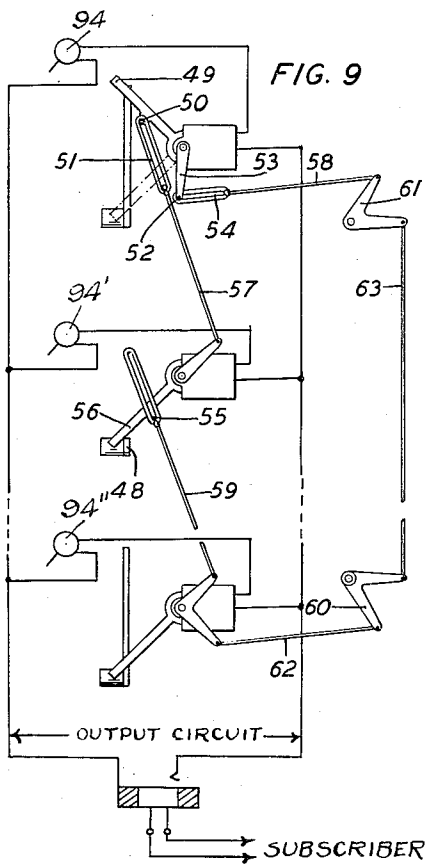
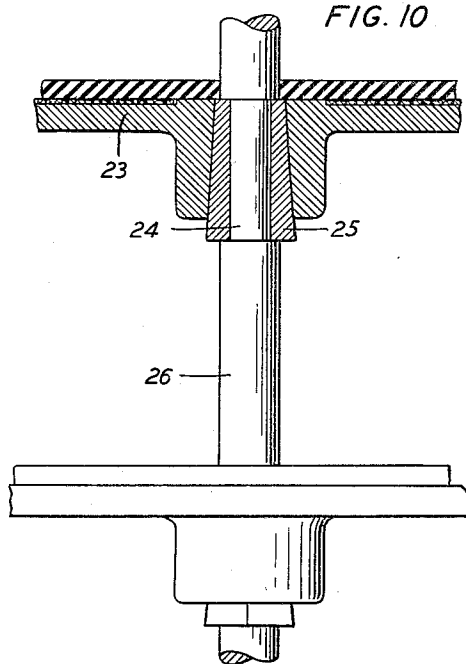


FIG. 10



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TIME ANNOUNCING MACHINE

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Application January 28, 1931. Serial No. 511,790

8 Claims. (Cl. 179—6)

This invention relates to time announcing machines which may be used in telephone exchanges to supply subscribers with the time of day.

An object of this invention is to supply continuous, single-voiced time announcements which will simulate closely those given by the present day manual operator.

With the above and further objects in view the continuous sound record method is used and in its preferred form this invention consists of a multiplicity of records with suitable rotating means, reproducers and their engaging, disengaging, and returning mechanisms. With properly timed engaging devices this form does not impair the continuity of the announcements and has the advantage of single-voiced reproduction.

Referring to the drawings, Figs. 1 and 2 are an elevation and plan respectively of the machine; Figs. 3 and 4 are a detailed elevation and plan respectively of the mechanism for setting the reproducer down on the record; Figs. 5 and 6 show a detailed plan and elevation respectively of the initiating means for the reproducer returning mechanism; Fig. 7 is a perspective of a single record with the parts necessary for its operation; Fig. 8 shows the paths of points A of the reproducer arm and B of the return hook; Fig. 9 is a schematic diagram of the linkages employed to switch the record into and out of the output circuit at the proper instants, and Fig. 10 is a section through two adjacent turntables showing the method used to thread them on the shaft.

The announcements for the entire twelve hours are contained on twelve disc records about 16 inches in diameter and rotated at 15 R. P. M. Each record is operated for one hour every twelve hours and contains 900 grooves spaced 200 to the inch, occupying a band $4\frac{1}{2}$ inches wide, the innermost groove of which has a radius of approximately $3\frac{3}{4}$ inches.

In general, continuous time announcements are obtained by playing the records successively with no noticeable lapses during the changeover from one record to the next. This is accomplished by means of the individual counter mechanisms which are constructed to operate every twelve hours and adjusted to begin their operation an hour apart, so that the reproducer of each record engages with its record once every twelve hours and one hour after the previous reproducer has begun to operate. The return mechanism is designed to operate once every hour and adjusted to begin its operation just as a reproducer reaches the end of its track. A counter mechanism is

relied upon to initiate its operation at the proper time. Each reproducer is also provided with a switch which is used to connect it into an output circuit controlled by the telephone operator who completes the circuit with the subscriber in the usual manner.

The following detailed specification will make clear the operations outlined above.

In Fig. 1, 15 is a 1200 R. P. M. synchronous electric motor supplying the power for the entire machine. From the motor the power is transmitted through drive shaft 16 and suitable worms and worm-wheels to the turntable shaft 17, reproducer set-down mechanism shaft 18, reproducer return mechanism 19, and reproducer return mechanism counter 20.

The turntable shaft rotates continuously at 15 R. P. M. and through a vibration absorbing medium 21 drives the bank of turntables 22. The inertia of the twelve turntables together with the damping effect of the vibration absorbing means is sufficient to remove any irregularities imparted to the shaft. The means used for holding the turntables in place on the shaft is shown in Fig. 10. The turntable 23 has a conical hub which fits over a split sleeve 25 located in a recessed portion 24 of the shaft 26. The split sleeve rests upon the shoulder of the recessed portion and is thereby held in place.

The reproducer set-down mechanism shaft 18 (Fig. 1) is rotated at 20 R. P. M. and drives the twelve set-down mechanisms through a helical gear as shown at 27. Referring now to Figs. 3 and 4 in which the set-down mechanism is shown in detail, 28 is the set-down crank and 29 is the portion upon which the reproducer arm rests when not in use. On the same shaft with the crank is the cycle cam 30 and a spur gear 31 which is driven from clutch 32. The operation of the mechanism is as follows:

The helical gear 27 rotates continuously driving a one to one ratio gear train 33, and the shaft 34 to which is attached the counter mechanism 35, 35', 35''. This counter operates on the same principle as an ordinary revolution or stroke counter and for the purpose of this invention is so designed that when the first unit 35 of the counter has made one hundred revolutions the second unit 35' has made ten revolutions and the third unit 35'' has made one revolution. The shaft 36, then, makes one revolution for every one hundred revolutions of shaft 34. Its motion, however, is not uniform but intermittent. It revolves one-tenth of a revolution at a time and

during that time rotates at the same speed as shaft 34.

The shaft 37 is driven from shaft 36 through a pair of spur gears having a one to one ratio. It operates counter 38 which is similar in construction to the counter just described with the exception that each unit divides by twelve (instead of ten) the number of revolutions of the preceding unit so that the last unit makes one-twelfth of a revolution while the first makes 144. The total reduction, then, from the shaft 34 to the trip-wheel 39 is 14,400 to one-twelfth. Since shaft 34 revolves at 20 R. P. M. the trip-wheel will make one-twelfth of a revolution every 720 minutes or twelve hours.

The trip-wheel has twelve teeth with one arm of trip-lever 40 (shown clearly in Fig. 3) resting on one of them and the other arm containing a roller follower resting in the notch of cycle cam 30. The action is made positive by the spring 41. Attached to the trip-lever is a catch 42 normally engaging with clutch arm 43 which is held against it by springs 44. The toothed wheel 45 is keyed to shaft 46 but the clutch 32 is free to rotate on the shaft. The shaft 46 is driven through a chain drive 47 from shaft 34 and at the same speed as shaft 34.

When shaft 34 has made 14,400 revolutions, the trip-wheel 39 is rotated clockwise one-twelfth of a revolution, lowering catch 42. Clutch lever 43 is released and drawn inward by spring 44 and engaged with the rotating toothed wheel causing the clutch to be rotated with it. The clutch, being in mesh with gear 31, rotates the set-down crank and cycle cam clockwise and continues to do so until the roller follower of trip-lever 40 enters the notch of the cycle cam. At this point clutch lever 43 is again in contact with catch 42 and is forced outward until free of the toothed wheel 45. The set-down crank makes but one revolution and comes to rest in a vertical position, a condition necessary to insure having the reproducer clear of the record when the reproducer is supported by the crank.

As the set-down crank rotates and reaches some position such as the dotted position shown in Figs. 3 and 4, the extension 48 strikes the switch arm 49 and moves it upward, thus connecting into the output circuit the reproducer just set down by the crank. By means of the linkage shown in Fig. 9 the same movement pulls down the switch-lever of the preceding unit and thereby disconnects it from the output circuit so that but one record is heard at any instant. In Fig. 9 the first two switches shown are for the two uppermost records and the third is for the bottom record, the intermediate switches being identical with the second and omitted for the sake of simplicity. The second switch is shown about to be moved upward by the extension 48. The first switch is on, and pin 50 is at the upper extremity of the slot 51. Pin 52 of the arm 53 which is rigidly fastened to the main switch arm 49 is at the extreme left position in slot 54 while pin 55 of the switch arm about to be moved upward is at the bottom of its slot. As the crank rotates it pushes switch arm 55 up and at the same time pulls switch arm 49 down by means of the link 57. Neither link 58 nor link 59 is displaced along its center line since pins 52 and 55 merely slide in their respective slots. The length of the slots, however, is such that when the arm has come to rest pins 52 and 55 are in contact with the opposite extremities of their slots. This process is continued down to the twelfth switch

from which the motion is transferred to the first switch by bell-cranks 60 and 61 and links 62, 63 and 58.

The mechanism employed to return the reproducer to its starting position is shown in Fig. 1 with detailed drawings of the initiating mechanism shown in Figs. 5 and 6. Referring to the latter two figures, 16 is the drive shaft from which counter 20 and the return mechanism proper are driven. Counter 20 is designed to reduce the number of revolutions from 1200 at the wormwheels to $\frac{1}{6}$ at the helical gear 66. It also is similar in construction to the set-down counter with the exception that in the first step the reduction is from 1200 to 120 and in the second, through a two to one gear reduction, from 60 to $\frac{1}{6}$. The helical gear 66 meshes with gear 67 and drives the one to one ratio gears 68 and 69. The hexagonal cam 70 is rigidly attached to the shaft of gear 69. The worm-wheel of the counter rotates at a speed of 20 R. P. M. and after 1200 revolutions, which corresponds to one hour, cam 70 is rotated $\frac{1}{6}$ of a revolution, lowering trip-lever 71 against the tension of the spring 72. This causes the clutch 73 to operate, and cycle cam rod 74 to be depressed. The clutch, through chain 75, drives the worm 76 and worm-wheel 77 on shaft 78, and continues to do so until cycle cam rod 74 is raised.

Referring again to Fig. 1 the shaft 78 is shown driving two Lovell square motion cams 79 and 80 through gear 81 and shaft 82. Cycle cam 83 which operates cycle cam rod 74 is clearly shown in this figure. The vertical member 84 supports the twelve hooks which engage with the reproducers to return them to their starting positions. It is rigidly attached to cross member 85. The structure is supported by the pins 86 and 87 and by the guide 88. The pins 86 and 87 extend toward the rear of the machine and act as roller followers for plate cams 89 and 90 respectively. These cams are used to raise the hooks over the portion of a record likely to contain a reproducer in its playing position.

The relation of the switch and reproducer set-down and return mechanism to the record will now be described.

In Fig. 7, 29 is the set-down crank for the reproducer, 65 the reproducer return hook and 94 the reproducer itself shown engaged with the record 95. The cycle of operation is as follows:

Let us assume that the reproducer has just been placed on hook 64. The set-down mechanism drive shaft and the record are rotating. After 14,400 revolutions of the set-down mechanism drive shaft the crank 29 is rotated, dropping the hook 64 and reproducer with it until the reproducer strikes one of the concentric deep grooves 91 which extend almost half way around the record. The grooves are made deep and about $\frac{3}{4}$ of an inch wide to obviate the necessity of using a precision mechanism to set the reproducer down on the record. The arm 92 continues to drop with the crank after it is relieved of its reproducer until it is stopped by the support 93. By the time the crank is half way through its upward journey the reproducer has entered a coarse spiral groove designed to move it rapidly toward the center of the record and out of the way of the supporting hook 64 which is about to be raised by the crank. At the same time extension 48 will be engaging the switch lever and pushing it up to snap the switch on and the preceding switch off. The crank finally comes to

rest in a vertical position with hook 64 ready to receive the reproducer. When the latter reaches the end of its track the return mechanism begins to operate and raises it off the record, carries it over the record and pushes it up and on to the hook 64. This action is illustrated clearly in Fig. 8. Three successive reproducers are shown in this figure, the first resting on its return hook and about to be placed on its set-down hook, the second just beginning to operate and the third ready to begin its operation. As the reproducer continues its lateral motion it engages the slanting face of the set-down hook and is raised thereby until it falls to rest on it. The distance it is raised is sufficient to enable point B, the highest point of the return hook, to pass under it without interference. In the meantime the succeeding reproducer is started and switched into the output circuit while the first is being lifted off the record. The heavy dotted lines are the paths followed by points A and B.

The announcements contained on the records may be of any desired frequency, duration or form. They may be made by one person or by several, but each individual announcement is complete and natural.

It is understood that the machine as described can be modified to some extent without departing from the spirit of the invention. For example, the number of records required may be reduced by increasing their size and the number of grooves per inch, or the turntables may be arranged in two banks instead of a single bank.

What is claimed is:

1. In a time announcing system, the combination of a plurality of continuous records of time announcements, driving means therefor, individual reproducers cooperating with the records, a common output circuit, means for selectively switching the reproducers into the common output circuit, means individual to the reproducers for initiating their operation, and means common to the reproducers for returning them to their starting positions.

2. In a time announcing system, the combination of a plurality of continuous records of time announcements, driving means therefor, individual reproducers cooperating with the records, a common output circuit, switches individual to the reproducers linked together for singly and successively connecting the reproducers into the output circuit, means individual to the reproducers for initiating their operation, and means common to the reproducers for returning them to their starting positions.

3. In a time announcing system, the combination of a plurality of continuous disc records of time announcements, individual turntables for the records and driving means therefor, a common output circuit, individual reproducers cooperating with the records and means for singly and successively switching the reproducers to the common output circuit, means individual to the reproducers for engaging them with their respec-

tive records and a return mechanism comprising a framework containing protruding members accessible to the reproducers at predetermined intervals of time, the entire framework moving as a whole to return the reproducers to their respective starting positions.

4. In a time announcing machine the combination with a reproducer and a mechanism for lowering the reproducer comprising an arm to which is rigidly attached a hook-shaped member adapted to hold the reproducer, and a crank supporting said arm and hook-shaped member, of a disc record containing thereon a segment of a wide concentric groove leading into a coarse spiral groove, to obviate the necessity of using a precision mechanism for lowering the reproducer on said record.

5. In a time announcing machine, the combination with a reproducer and a mechanism intermittently engaging the reproducer to move the reproducer in a vertical plane, of a record with a spiral groove which moves the reproducer rapidly across a portion of the record to prevent premature contact of said reproducer with said mechanism.

6. In a time announcing machine, the combination of a plurality of continuous disc records of time announcements, individual reproducers cooperating therewith, a return mechanism common to all reproducers, said mechanism engaging with the reproducers at predetermined intervals of time and a counter mechanism for initiating the operation of the return mechanism at such time intervals.

7. In a time announcing machine, the combination of a plurality of disc records of time announcements, individual reproducers cooperating therewith, an output circuit and individual switches for connecting the reproducers into said output circuit, the switches being linked together with links having one end pivoted and the other slidably mounted such that one switch of the series so linked is always in opposition to the remaining switches in the series.

8. In a time announcing machine, a continuous record of time announcements, a reproducer cooperating therewith, a crank operated mechanism for setting the reproducer down upon the record at predetermined intervals of time, a counter mechanism for initiating the operation of said crank, a wide concentric groove on the record to receive said reproducer as it is being set down, a coarse spiral connecting said groove with the recorded announcements, a return mechanism for returning the reproducer to said set-down mechanism at predetermined intervals of time, a counter mechanism for initiating the operation of the mechanism, an output circuit, a switch operated by the set-down mechanism for connecting the reproducer into said output circuit and a constant speed driving means for the record, set-down mechanism and return mechanism.

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