Dec. 1, 1931. F. C. BARTON 1,834,886

PHONOGRAPH APPARATUS

Filed May 31, 1929

Fig. 1.

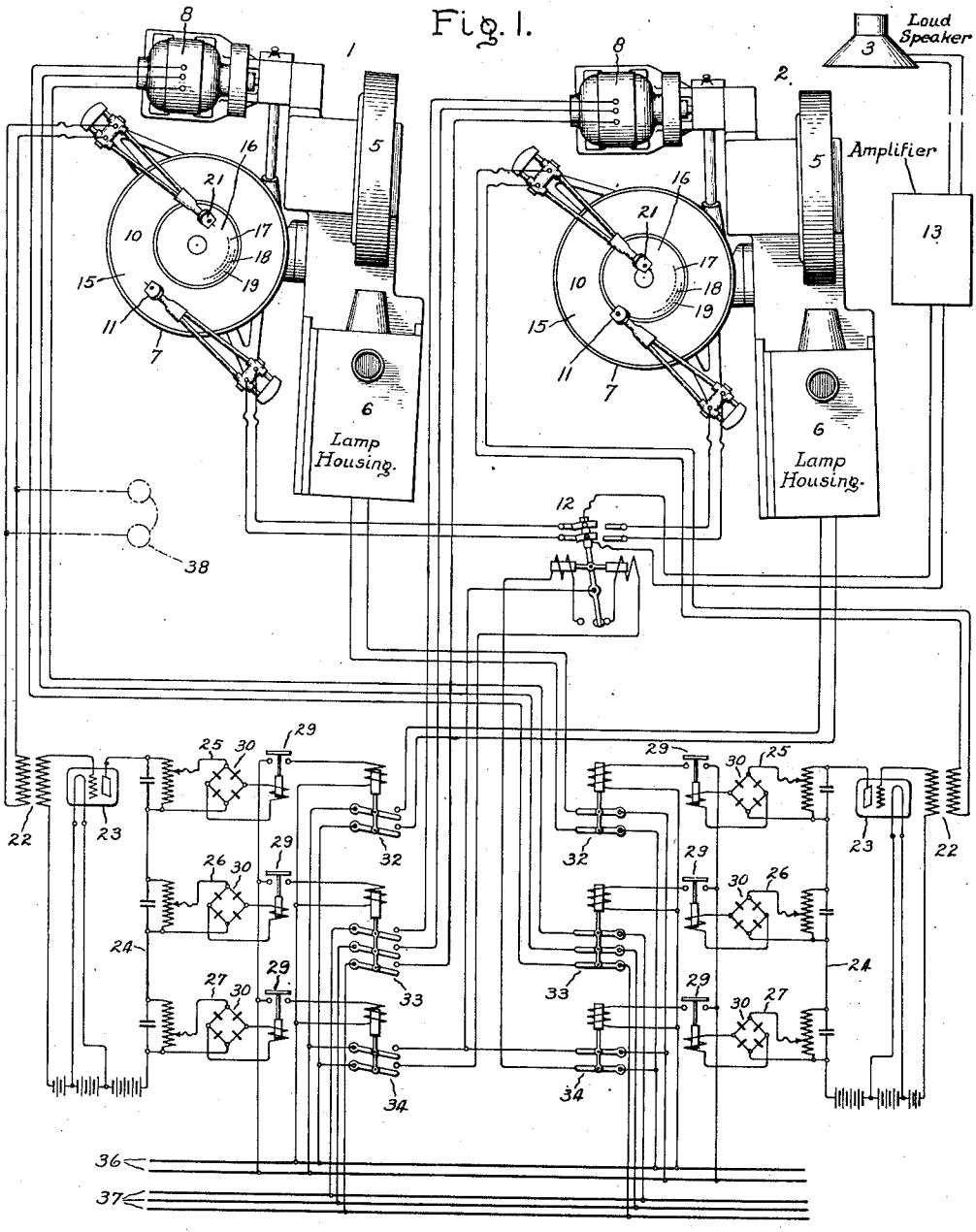
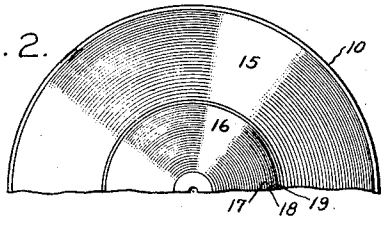


Fig. 2.



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UNITED STATES PATENT OFFICE

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PHONOGRAPH APPARATUS

Application filed May 31, 1929. Serial No. 367,595.

My invention relates to apparatus for reproducing sound from a previously made record thereof and particularly to such apparatus which includes a plurality of units adapted to be operated successively to produce an uninterrupted sound reproduction. These apparatus units may comprise in addition means for projecting motion pictures simultaneously with the reproduction of the recorded sound. One of the objects of my invention is the provision of improved apparatus of this character having means whereby at the expiration of the record carried by one unit another unit may be brought into service automatically and without interrupting the reproduction. Another object of my invention is the provision of an improved record carrier having thereon a sound record and a separate auxiliary record, the two records being adapted for simultaneous reproduction.

Referring to the drawings, Fig. 1 is a combined plan view of apparatus and circuit diagram involving my invention and Fig. 2 is an enlarged view of a phonograph record disk such as shown on the apparatus of Fig. 1.

As illustrative of my invention I have shown in Fig. 1 two motion picture-sound units 1 and 2 each adapted for the simultaneous projection of motion pictures and the reproduction of accompanying recorded sounds. The two units are arranged side by side and orientated to project the pictures on the same screen, not shown. A single loud speaker 3 or a bank of loud speakers arranged to be connected to either unit may be positioned adjacent the screen or elsewhere as desired. Since the two units illustrated are identical in all respects the description of unit 1 will suffice also for unit 2. The unit comprises the film reel 5, the lamp housing 6, the phonograph turntable 7 and the motor 8 connected to drive both the picture projector and the turntable. Resting an the turntable is the record disk 10 engaged by the electric pick-up device 11. The pick-ups of the two units are connected to the fixed contacts of the double throw switch 12, which is common to the two units, the movable contact being connected through the thermionic amplifier 13 to the loud speaker 3. The purpose of the two-unit arrangement shown and described it will be understood is to avoid any interruption in the exhibition when the ends of the picture and sound records are reached by transferring the reproduction from one machine to the other. By the means which I shall later describe I effect the transfer of the reproduction automatically and under the control of the record disk.

The disk here shown is of the general form of sound record disks in common use having a spiral sound record groove occupying the outer portion of the disk in the usual manner. Inasmuch as such disks usually are rotated at a constant speed, the record groove thereon forms an annular zone extending approximately only one half of the radial distance from the periphery of the disk to its center for in the circular area inside of this zone it has been found that the lineal speed differs too widely from the lineal speed near the periphery of the disk to give the desired results in the sound reproduction. The circular area within the sound record zone has therefore been waste space as far as the sound record is concerned and heretofore has been occupied by printing matter of a diversified character relative to the record. In accordance with one feature of my invention I form in this circular area and spaced within the outer sound record zone 15 a spiral groove forming an auxiliary record and comprising the inner record zone 16. The two records are cut simultaneously by separate cutters and are adapted for simultaneous reproduction. Each record starts at the inner limit of its respective zone and ends at the outer limit

thereof. In the form of my invention illustrated the auxiliary groove is for the most part a smooth groove. Near the outer portion thereof the groove contains at three spaced intervals the record respectively of three different constant frequencies 17, 18 and 19. These constant frequencies may, for example, be 500 cycles, 750 cycles and 1000 cycles. During the operation of the unit the pick-up 11 is in engagement with the sound record forming the outer zone in the usual manner. At the same time a separate and distinct electric pick-up 21 engages the groove of the auxiliary record. Toward the end of the record the pick-up 21 successively passes over the constant frequency impressions 17, 18 and 19. In response to the first of these the projector lamp of the other unit is started, a little later in response to the second the driving motor of the other unit is started, and finally just before the end of sound record is reached the last fixed frequency causes the connection to the amplifier and loud speaker to be switched to the other unit. The particular means by which these steps in the complete transfer from the one unit to the other may be effected in response to the fixed frequencies on the auxiliary record will now be described. In circuit with the pick-up 21 engaging the auxiliary record is the primary of the transformer 22 whose secondary connects through the thermionic amplifier 23 with the circuit 24 having the three tuned branches 25, 26 and 27. These branches are tuned in a manner well understood to pass respectively the 500, 750 and 1000 cycle frequencies recorded at 17, 18 and 19. In circuit with each tuned branch I have shown a relay 29 biased to open position and a rectifier 30 of the type shown and described in the Grondahl patent 1,640,335. The several relays 29 serve respectively to close the operating circuits of the three solenoid operated switches 32, 33 and 34. Switch 32 controls the projector lamp circuit of unit 2, switch 33 controls the motor circuit of unit 2 and switch 34 controls the solenoid operated double throw switch 12 by which the loud speaker connection is thrown from one unit to the other. Power for operating the projecting lamps and the throw-over switch 12 is shown obtained from the supply circuit 36 and for the driving motors from the supply circuit 37.

As has already been stated above the two records are cut simultaneously, the beginning of each being suitably marked, for example, by a cross line to enable the operator when a new record disk is put on the machine to position the disk so that each pick-up stylus will rest on the record at the marked point therefor. As the record disk rotates, one pick-up follows the groove of the sound record while the other pick-up follows the groove of the auxiliary record. It may be found desirable in some cases to construct the groove of the auxiliary record in part or entirely with a finer pitch in order to reduce the area occupied by this record. If desired the auxiliary record may contain verbal instructions to the operator relative to the manipulation of the apparatus. These he may receive through his head set 38 which I have shown, for example, by dotted lines connected to the circuit of the pick-up 21. Since this sound reproduction is for the operator only it is immaterial if the quality is somewhat defective due to the low lineal speed of the record. In some cases it may be found desirable to rely entirely upon verbal instructions to the operator recorded on the auxiliary record for the shifting from one unit to the other in which case the operator will be told, for example, when to start the lamp of the other unit, when to start the motor thereof, when to transfer the loud speaker circuit and fade from the one unit to the other and how to manipulate the gain controls. The sound record and motion picture film will be constructed to operate for the same length of time. After unit 2 has been started and thrown into service, unit 1 may be shut down by manually opening the switches 32, 33 and 34 which were previously closed. A new picture film and a new record disk are then put in place with each pick-up stylus at the marked starting point and with a correspondingly marked portion of the picture film placed in a predetermined position in the projector. In a manner similar to that already described and by the duplicate apparatus shown, unit 2 will when the end of its record is approached start the projecting lamp and the driving motor of unit 1 and finally transfer the loud speaker connection back to unit 1.

I have chosen the particular embodiment described above as illustrative of my invention and it will be apparent that various modifications may be made without departing from the spirit and scope of my invention which modifications I aim to cover by the appended claims.

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

1. A phonograph disk having a plurality of simultaneously cut record grooves comprising spirals having a substantially equal number of turns and forming inner and outer record zones, the groove of the outer record zone having variations corresponding to sound waves and the groove of the inner record zone having variations corresponding to a predetermined control frequency and limited to the last end portion of the groove.

2. A phonograph record disk having a sound record groove forming an annular zone thereon and having a second record groove in the space within said zone, said second record groove being substantially smooth to a region adjacent the terminus thereof and

having control frequency variations in said region.

3. In combination a plurality of phonograph machines each having a turntable adapted to support a record disk having a sound record and an auxiliary record, and means controlled by the auxiliary record of the disk rotated by one of said machines for starting another of said machines.

4. In combination a plurality of phonograph machines each having a turntable adapted to support a record disk bearing a sound record and an auxiliary record, electric pick-up means arranged to engage each record of a disk supported by one of said machines, and means responsive to a predetermined recorded frequency in the auxiliary record of said disk for causing the starting of another of said machines.

5. In combination a pair of phonograph machines each having a turntable supporting a record disk, the record disk of one of said machines having a sound record thereon and a separate auxiliary record thereon in the space within the sound record, separate electric pick-up devices on said one machine arranged to engage the respective sound and auxiliary records, an electric pick-up device on the other of said machines and means responsive to a predetermined recorded frequency in said auxiliary record for controlling the circuit of the pick-up device of said other machine.

6. In combination a pair of phonograph machines each having a turntable, a record disk supported thereby, and a motor arranged to drive the turntable, the disk on one of said machines being provided with an outer sound record and a separate inner auxiliary record, said first machine having a separate electric pick-up for each of said records, and means connected with the pick-up for said auxiliary record and responsive to a predetermined recorded frequency for closing the circuit of the motor of the second machine of said pair.

7. In combination a pair of phonograph machines each having a turntable and a separate driving motor therefor, a record disk supported by the turntable provided with separate sound and auxiliary records and separate electric pick-up devices for the respective records, said auxiliary records each having a plurality of constant frequencies recorded thereon at predetermined points, circuits tuned to said frequencies connected to the pick-ups for the auxiliary records, and switches responsive to said frequencies and associated with each machine for controlling the motor and the sound record pick-up of the other machine.

8. In combination a pair of sound-picture machines each having a picture projecting lamp, a turntable supporting a sound record disk and an electric pick-up for said record, the disk of one of said machines having an auxiliary record including predetermined frequencies formed in the space within the sound record thereof, an electric pick-up for said auxiliary record, circuits tuned to the respective frequencies connected to said last mentioned pick-up and switching means connected with said circuits for controlling the projecting lamp of said other machine and the circuit of the pick-up for the sound record thereof.

In witness whereof, I have hereunto set my hand this 29th day of May, 1929.

FREDERICK C. BARTON.