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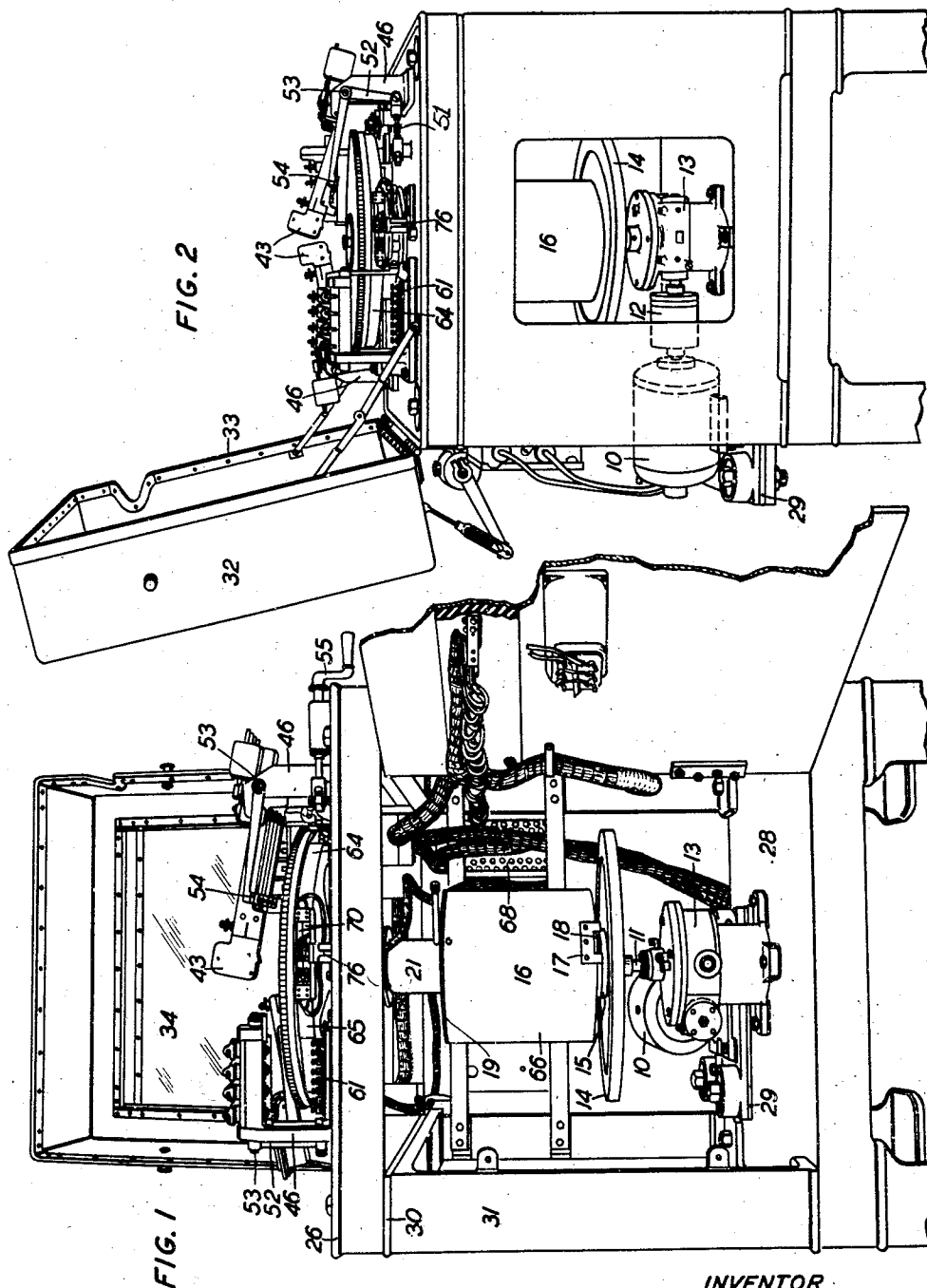
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1,938,706

PHONOGRAPH MACHINE

Filed Jan. 28, 1931

3 Sheets-Sheet 1



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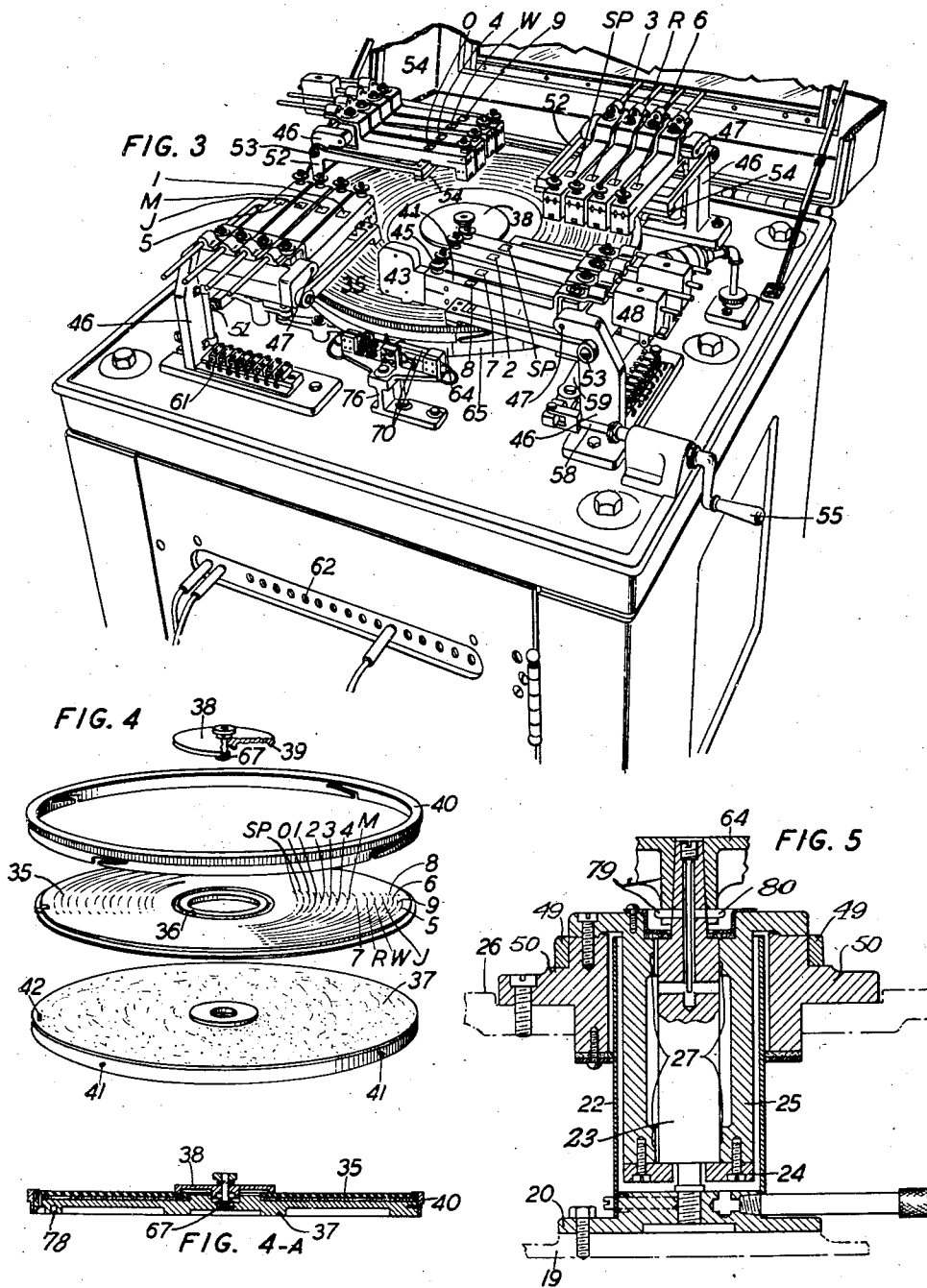
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3 Sheets-Sheet 2



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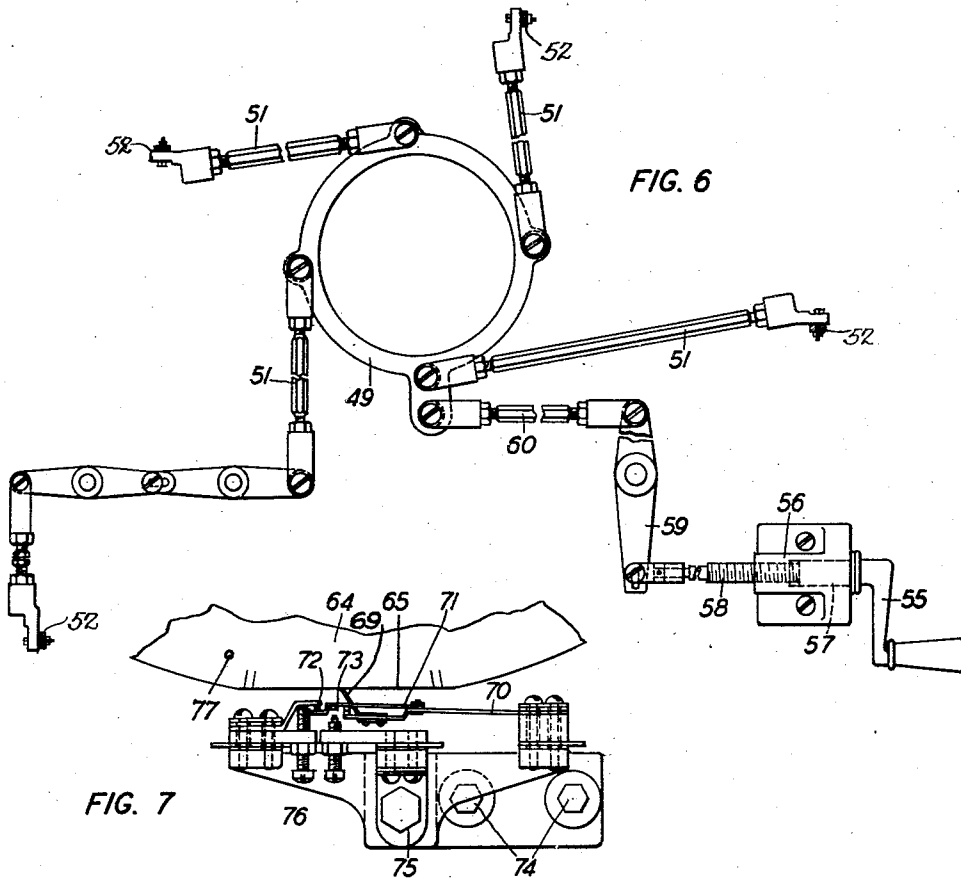
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PHONOGRAPH MACHINE

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3 Sheets-Sheet 3



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1,938,706

PHONOGRAPH MACHINE

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Application January 28, 1931. Serial No. 511,789

5 Claims. (Cl. 274—10)

This invention relates to sound reproducing machines and more particularly to machines of this kind which are suitable for call announcing in telephone systems.

5 In telephone exchange areas including both automatically and manually operated central offices, when a call is made from an automatic to a manual office, some convenient means must be provided for translating the dial impulses
10 into a form which can be readily understood by the manual operator who is to complete the connection to the called line. This means may take the form of sound reproducing apparatus actuated by relays controlled by the dialed im-
15 pulses, selectively to reproduce recorded numbers so that the manual operator hears the designation of the called line just as she would if the call had originated in a manual office. One form of such reproducing apparatus comprising a film
20 record of the digits and letters used in line designations, optical means for reproducing the record, and the necessary associated circuits is shown in Patent 1,645,573 to Bascom, October 18, 1927.

25 It is the object of this invention to provide phonographic apparatus for call announcing purposes which is very compact, relatively cheap, and so reliable in its operation that it will give satisfactory service without attention of any
30 kind for considerable periods of time.

In accordance with the general features of this invention, the announcing machine is provided with a motor driven turntable which carries a record of all the digits and letters used in the line
35 designation to be repeated. Individual reproducers, one for each letter and digit are all normally in contact with their respective grooves so that all of the recorded signals are repeatedly reproduced and transmitted to an external
40 selector circuit associated with the telephone system.

An important feature of the invention is the general arrangement of the parts of the machine for the purpose of preventing any vibrations, such as gear vibrations from the driving motor,
45 from reaching the turntable. This general arrangement consists of vibration damping material between the various parts of the machine frame, a flywheel on the turntable shaft, and
50 specially proportioned mechanical filters in both the motor and turntable shafts. The machine is kept very compact by using a record of only moderate size and choosing such small reproducers that they may be arranged in four groups
55 above the record to give a pronouncement for

every quarter revolution. A lever mechanism is provided for raising and lowering the reproducers simultaneously, as for instance when it is necessary to change the record and faulty operation due to slight variations in the lateral position of the reproducers as they are lowered into contact with the record is prevented by providing a group of concentric grooves instead of a single concentric groove for each pronouncement. In this way a reproducer may come in contact with a groove on either side of the groove intended without causing faulty operation of the machine. Due to the extremely low impedance of the reproducers and to the comparatively hard material used in the record, a record may be used for several days of continuous operation before being replaced.

A feature which contributes to the steady operation of this machine is a novel thrust bearing for the turntable by means of which the turntable may be driven from below through a suitable vibration filter without the use of a stuffing box to retain the oil in the bearing.

Further features of the invention are the removable turntable for facilitating the changing of records, means for clamping and centering the record on the turntable and contacts operated by the rotation of the turntable for controlling the operation of relays in the output circuit and for giving an alarm if the machine fails to function in the manner intended.

These and other features of the invention will be more clearly understood from the following detailed description and the accompanying drawings in which:

Figs. 1, 2 and 3 are a front view, a side view and a plan respectively of the preferred structure of the call announcing machine, according to this invention;

Fig. 4 is a detail view of the turntable and record showing particularly the manner in which the record is clamped to the turntable; Fig. 4—A is a sectional view of the parts of Fig. 4 in assembled relation;

Fig. 5 is an enlarged sectional view of the thrust bearing for the turntable;

Fig. 6 is a detail view of the linkages for raising and lowering the reproducers; and

Fig. 7 is a detail of the interrupter and alarm contacts operated by the turntable.

Referring now particularly to Figs. 1, 2 and 3, the constant speed motor 10 drives the main shaft 11 through the mechanical filter coupling 12 and the worm gear 13. The shaft 11 carries a flywheel 14 of the necessary mass to prevent ir-

regularities in speed, such as those due to unavoidable imperfections in the cutting of the teeth of the worm gear drive, and terminates in a flange 15 of a second mechanical filter 16. In order that these filters may successfully eliminate all undesired vibrations, it is essential that they be critically damped with respect to torsional vibrations as well as those of a vertical nature and also that they be such that a slight misalignment of the shafts will not cause disturbances at the turntable. One construction which has been found very satisfactory for this purpose consists of a plurality of layers of felt cemented together and forming the sole driving connection between the parts thereby connected. The coupling may be covered by a wood fibre or metal casing 66 which is preferably secured to the upper flange 19 and free to rotate with respect to flange 15. In order to prevent possible injury to the filter in case of a too great torsional deflection, a stop member 17 secured to the casing 66 engages the pin 18 on the flange 15 if the filter is deflected too far in either direction. A similar arrangement is also provided for the filter 12.

Secured to the top flange 19 is the flange 20, Fig. 5, of the thrust bearing 21. This flange also serves as a closure for the casing 22 which is substantially filled with oil. Threaded into the flange 20 is the turntable shaft 23 which is supported by the thrust ring 24 carried by the lateral bearing 25 which is supported by the top plate 26 of the machine. The main shaft 11, which, as already stated, is driven by the motor 10, transmits its power through the felt layers of the coupling filter 16 to the top flange 19 and through the flange 20 to the shaft 23. As will be clearly seen from Fig. 5, the casing 22 rotates with the flange 20 and the shaft 23 and maintains a head of oil on the thrust surface of the ring 24 as well as on the lateral surfaces 27 of the bearing 25. Due to this arrangement it is possible to drive the shaft from below without the use of the conventional stuffing box to prevent the escape of oil from the thrust bearing.

As a further precaution against the transmission to the turntable of undesired vibrations, the motor 10 is mechanically insulated from the bottom plate 28 by a layer of felt 29 and a similar layer of felt 30 is interposed between the top plate 26 and the side walls 31 of the machine casing. The cover 32 of the machine is made dust-proof by means of a gasket 33 and the operation of the machine may be observed through the shatter-proof glass 34 without raising the cover.

The material of the record 35, Fig. 4, must be such that the record will give continuous reproduction comparatively free from surface noise for a considerable period of time. A pressing of cellulose acetate has been found quite satisfactory from this standpoint. The grooves of the record are all concentric and are arranged in sixteen groups of six grooves each. Only fourteen of these groups are required for the call designations which are 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, J, M, R and W and are located as shown in Fig. 4. The other two groups shown are blank grooves and serve no useful purpose in the present machine but reproducers are provided for them to give a symmetrical appearance to the reproducer arrangement. It should be noted, however, that these spare grooves might be used to advantage as for instance for recording signals which would perform the function of the interrupter and alarm contacts described below. All the grooves of each of the groups used have recorded in them the same digit or letter of the call designation, the recording being arranged to give four pronouncements per revolution with the necessary silent intervals between them for the operation of the telephone relays as will be more fully described. The record is preferably in annular form and contains a deep concentric groove 36, which corresponds to a groove cut into the master record when it is being made, and serves to center the record accurately on the removable turntable 37. The clamping member 38 is attached to the turntable 37 by a threaded connection 67 as indicated and the ring 39 engages the groove 36 to hold the record tightly in engagement with the turntable as well as to center it accurately thereon. The peripheral clamping ring 40 engages pins 41 on the turntable and holds the periphery of the record tightly in engagement with it. The record is keyed to the turntable by pin 42 and the turntable is also keyed to its supporting member 64 by a pin 77 on the member engaging a hole 78 in the turntable so that the pronouncements will occur in the correct time relation to the operation of the interrupter contact to be described below.

The reproducers 43, only one of which is shown in Fig. 3, are attached to the reproducer arms 44 by a plug and socket connection and may be clamped in place by the thumb screws 45. These arms are pivoted to the supporting brackets 46 by shafts 47 and the group of four reproducers is suitably counter-balanced by one or more weights 48 so that the reproducers engage the record with the proper bearing pressure. For convenience in changing the record there is provided a reproducer lifting mechanism which is shown more clearly in Fig. 6. A ring 49 surrounds the thrust bearing supporting member 50 of Fig. 5 and has attached thereto members 51 connecting at their other ends to the bell cranks 52 which turn about their pivots 53 to raise or lower the bars 54 supporting the groups of reproducers. The ring 49 is turned to raise or lower the reproducers by the crank 55 which is pivoted in the bearing 56 and terminates in a socket 57 threaded internally to engage the screw 58. If the crank 55 is rotated with a clockwise motion, the screw 58 will be drawn to the right and the crank 59 will be rotated to move the connecting bar 60 to the left thereby imparting a clockwise rotation to the ring 49 and to the connecting linkages already described. This motion will cause the bell cranks 52 to be rotated in a clockwise direction thereby raising the reproducers out of contact with the record. Similarly, by a reverse movement of the crank 55, the reproducers may be lowered into contact with the record grooves in a very gradual manner so that no injury to the grooves or reproducers is thereby sustained. As already pointed out, there is a reproducer for each digit and letter of the call designation and since each digit and letter is recorded in a number of grooves, any slight lateral displacement of the reproducers will not cause them to contact with a groove containing a designation other than the one intended.

It has been found preferable to use records of the hill and dale type and the reproducers 43 are preferably of the general type disclosed in an application of A. C. Keller, Serial No. 402,128, filed October 24, 1929. Reproducers of this type are particularly suitable for this purpose in that they may be designed to operate with very small record pressures and to have such low mechanical impedance that they have very little tendency to wear the record grooves. For convenience,

the leads of the reproducers are brought out to individual terminals 61 as shown in Fig. 3 and from these terminals, leads are run to a main terminal block 68 on the rear of the machine casing from which connections are readily made to the telephone system. Multiple connections are also run from terminals 61 to the test jacks 62 on the front of the machine whereby the operation of any given reproducer may be quickly tested by means of earphones.

The turntable supporting member 64 which is keyed to the shaft 23 by pins 79 and 80 (Fig. 5) and upon which the removable turntable 37 is placed has four cam surfaces 65 on its periphery midway between the positions of the pronouncements on the record 35. Cooperating with the periphery of the member 64 at 90° intervals are cam followers such as 69 of Fig. 7 secured to the main spring 70 of the interrupter 76. The main spring carries a feather spring 71 which has a forward alarm contact 72 and a back speech contact 73. In each of the four positions this structure is used to provide two alarm and two speech contacts one above the other which operate simultaneously. The assembled interrupters are secured to the top plate 26 by screws 74, 74 and may be adjusted laterally to the correct position by screws 75. While the cam followers are in contact with the curved portions of the periphery, that is during the speech intervals, the main springs 70 will be deflected so that the speech contacts will be closed and the alarm contacts open but when a flat cam surface 65 comes into position the spring 70 will return to normal thereby opening the speech contacts and closing the alarm contacts.

The speech contacts are associated with the relays of the telephone system so that the stepping of the telephone selector switches can occur only during silent intervals thereby preventing the mutilation of a pronouncement. The particular circuits for accomplishing this result form no part of the present invention and hence need not be described but one arrangement for this purpose is fully disclosed in the Bascom patent referred to above. The alarm contacts may

be used in various ways as a check on the operation of the machine; for example, they may be arranged to send a current through the reproducer windings during the silent intervals as a test of their continuity so that if one of them should cease functioning by reason of an open circuit, this fact would be indicated by the operation of an alarm signal.

What is claimed is:

1. In a phonograph machine the combination with a turntable carrying a record containing a plurality of groups of concentric grooves, and a reproducer engaging one of the grooves of each group, of contacts operated by the rotation of the turntable for controlling the effectiveness of the reproducers.

2. In a phonograph machine the combination with a turntable, driving means therefor, a cam rotated by said driving means and contacts operated by the cam, of a record on the turntable containing a plurality of groups of concentric grooves and a reproducer engaging one of the grooves of each group and electrically connected to the contacts.

3. In a phonograph machine the combination with a turntable carrying a record containing a plurality of groups of concentric grooves, driving means therefor and a plurality of reproducers disposed in groups around the record, of a driven member comprising a cam for each group of reproducers and contacts operated by the cams and electrically connected to the reproducers.

4. In a phonograph machine the combination with a record within a dust-proof casing and driving means therefor of a plurality of groups of reproducers engaging the record and means operable externally of the casing for simultaneously raising and lowering all the reproducers.

5. In a phonograph machine a shaft carrying a record, a plurality of pivotally supported reproducers cooperating with the record, a ring member surrounding the shaft, connecting members between the ring and the reproducer supports and means for rotating the ring to move the reproducers about their pivots.

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