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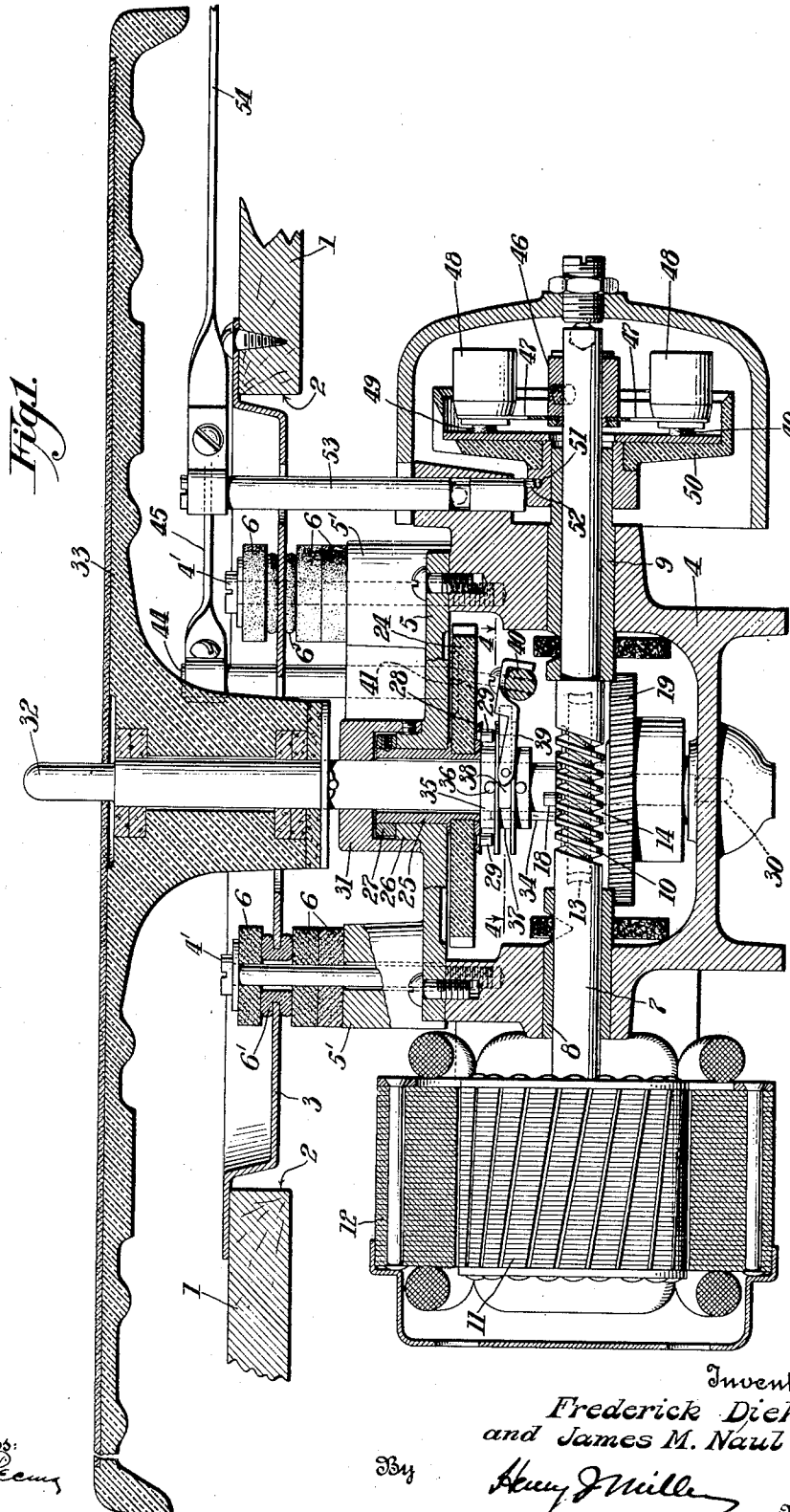
F. DIEHL ET AL

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TWO-SPEED PHONOGRAPH DRIVING DEVICE

Filed March 5, 1932

2 Sheets-Sheet 1



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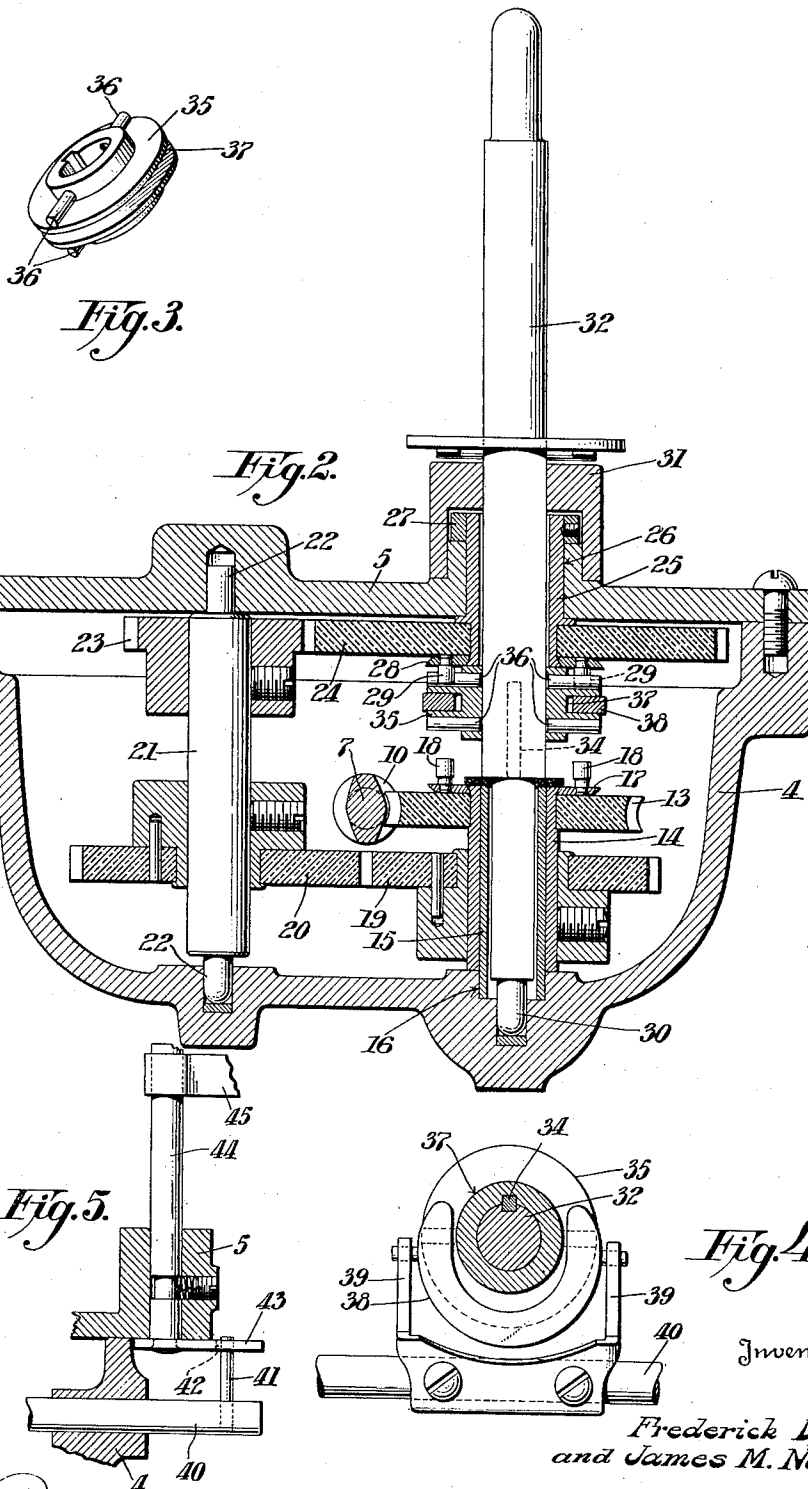
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TWO-SPEED PHONOGRAPH DRIVING DEVICE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

, 1,929,092

TWO-SPEED PHONOGRAPH DRIVING
DEVICE

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3 Claims. (Cl. 74—59)

This invention relates to phonograph motors of the type having a vertical turntable-spindle driven from an electric motor through suitable speed-reduction gearing. There are now available on the market records of two different standard speeds; viz., 78 R. P. M. and 33 R. P. M., and the problem of providing a satisfactory motor outfit for driving the phonograph turntable-spindle at either of these standard speeds, at will, has for some time been engaging the attention of workers in this art.

The matter of providing the necessary speed-reduction gearings with a shiftable device for switching from one to the other has been comparatively easy of accomplishment but the results have been unsatisfactory due to a slight wavering or variation in the speed of the turntable-spindle, particularly when running at the lower standard speed, which wavering produces a corresponding fluctuation in the pitch of the reproduced tone. These fluctuations in a reproduced tone are known as "wows" and must be reduced to as insignificant a value as possible if a high standard excellence in reproduction is to be attained.

The object of the present invention is to provide a two-speed phonograph motor having steady running characteristics at either of its turntable speeds so that a high standard of excellence and faithfulness may be attained in the reproduction of sound from records of either of the two standard speeds available.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations, and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

Fig. 1 is a longitudinal vertical section through a phonograph motor embodying the invention. Fig. 2 is a transverse vertical section on an enlarged scale. Fig. 3 is a perspective view of the selectively shiftable clutch-element for determining at which of the two standard speeds the turntable-spindle is to be driven. Fig. 4 is a section on the line 4—4, Fig. 1, and Fig. 5 is a view showing the operating connections for the selective speed-shift means.

1 represents the usual top-board of the phonograph cabinet or enclosure having the opening 2 which receives the inset supporting plate 3 from which the phonograph motor-frame 4 is suspend-

ed by the screws 4' which pass through suitable top and bottom felt cushioning washers 6, and rubber bushings 6' to avoid rigid metallic contact between the screws 4' and the plate 3. The frame 4 is trough shaped and includes the top closure 60 or cover 5 which has upwardly extending lugs 5' freely receiving the screws 4' which are threaded into the trough-shaped frame-member 4.

Journalled horizontally in and longitudinally of the frame 4 in bearing bushings 8, 9 is the motor-shaft 7 having cut therein the two-thread worm 10. The outboard projection of the shaft 7 beyond the bearing 8 carries the usual squirrel-cage rotor-element 11 of an induction motor including a stator 12 of well known shaded pole construction, such as disclosed in the U. S. patents to H. L. Zabriskie, No. 1,838,047, of Dec. 22, 1931, and J. M. Naul, No. 1,823,555, of Sept. 15, 1931; the stator 12 being mounted on the frame 4.

Meshing with the worm 10, Fig. 2, is a gear 13 fixed to the sleeve-shaft 14 journalled on the stationary sleeve 15 the lower end of which is tightly press-fitted in the cylindrical recess 16 in the bottom of the trough of the frame 4. Fixed to rotate with the sleeve-shaft 14 and gear 13 is a disk 17 having two upstanding diametrically opposed coupling pins 18.

There is also fixed to the sleeve-shaft 14 a gear 19 which meshes with a gear 20 on the counter-shaft 21 journalled in bearings 22 in the trough 4 and cover 5. The counter-shaft 21 carries a small gear 23 which meshes with a large gear 24 having a tubular or sleeve-like hub 25 journalled in a bearing 26 in the cover 5. A collar 27 is secured to the upper end of the hub 25 to prevent the gear 24 from dropping from its working position. There is fixed to rotate with the gear 24 and its hub 25 a disk 28 from which two diametrically opposed coupling pins 29 project downwardly.

Journalled in a bearing 30 in the trough 4 and in the bearing-cap 31 secured to the cover 5 and enclosing but not touching the upper end of the sleeve 25 and the collar 27 is the turntable-spindle 32 carrying the turntable 33. The turntable-spindle 32 passes freely through the sleeves 25 and 15 without touching either of them.

Slidably mounted on the turntable-spindle 32 and splined at 34 to rotate with the latter is the coupling disk 35 having upper and lower pairs of radially disposed coupling pins 36 adapted to engage one or the other of the pairs of coupling pins 18, 29 to connect the gears 13 and 24, selectively, to the turntable-spindle 32.

The coupling disk 35 is formed with a periph-

eral groove 37 to receive the clutch-collar 38 pivotally carried by the clutch-shifting fork 39 fixed to the rock-shaft 40 which is journaled in the frame 4 transversely of the motor-shaft 7 and carries an upstanding pin 41 at its outer end which enters a slot 42 in the arm 43 of the vertical rock-shaft 44 having a suitable operating handle 45 fastened to its upper end.

By shifting the handle 45, which is accessible beyond the edge of the turntable 33, the operator may couple the turntable-spindle to either of the gears 13 and 24. The gear ratios are so worked out that the gear 13 rotates at 78 R. P. M. while the gear 24 rotates at 33 R. P. M. for a constant speed of the motor-shaft 7.

A feature of the invention is the coaxial arrangement of the high and low speed gears 13, 24 with the turntable-spindle 32 with no frictional drag of either gear on the spindle 32 while the spindle is being driven by the other gear. This feature is responsible in a large measure for the practical elimination of "wows" or minute speed fluctuations which have heretofore been a bane to workers upon the problem of a two-speed phonograph motor.

The motor-shaft runs at all times at a constant speed controlled by a centrifugal speed-governor preferably constructed substantially in accordance with the disclosure of the Naul patent hereinbefore referred to. Such a speed-governor comprises a collar 46 fixed to the motor-shaft 7 and carrying flat spring arms 47 having weights 48 and friction pads 49 at their outer ends.

The weights 48 are disposed mainly at one side of the plane of the arms 47 while the friction pads 49 are at the other side of such plane. As the shaft 7 comes up to speed the centrifugal force exerted by the weights 48 bows the outer ends of the arms 47 toward the stationary brake-disk 50 and causes the pads 49 to wipe circularly over the face of such brake-disk. The brake-disk 50 is slidably mounted on the bearing sleeve 9 and has a hole 51 in its hub entered by an ec-

centric pin 52 on the rock-shaft 53 which carries the speed-adjuster handle 54.

Having thus set forth the nature of the invention, what is claimed herein is:—

1. In a phonograph driving device, a frame, a sleeve-shaft journaled in said frame, a turntable, a turntable-spindle passing through said sleeve-shaft without touching the latter and journaled in said frame independently of said shaft, a constant speed motor-shaft, and selectively controlled means for driving said sleeve-shaft and said turntable shaft at the same or at different speeds.

2. In a phonograph driving device, a constant speed motor-shaft, a housing, a low speed gear connected to be driven by the motor-shaft and journaled in said housing, a high speed gear connected to be driven by the motor-shaft and journaled in said housing coaxially with and independently of said low speed gear, a turntable-spindle passing through said gears without touching either of them and journaled in said housing independently of said gears, and selectively controlled means for coupling either of said gears to the turntable-spindle.

3. In a phonograph driving device, a frame including a hollow trough-shaped member and a removable cover, a low speed gear in said hollow member and having a sleeve-like hub journaled in said cover, a cap-member on said cover enclosing the upper end of said hub, a turntable-spindle passing through said hub without touching the latter and journaled in said cap-member and in a bearing in the bottom of said trough-shaped member, a constant speed motor-shaft connected to drive said low-speed gear, and selectively controlled means for connecting said low speed gear to said turntable-spindle to drive the latter at a low speed or for connecting the motor-shaft to the turntable-spindle independently of said low speed gear to drive said spindle at a higher speed.

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