June 26, 1928. 1,674,738

C. A. PINKHAM

DRIVE FOR RADIO TUNING MECHANISM

Filed Jan. 8, 1927

Fig. 1.

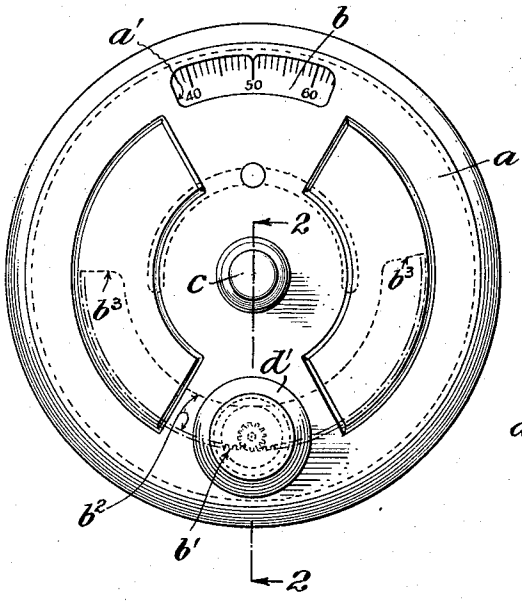


Fig. 2.

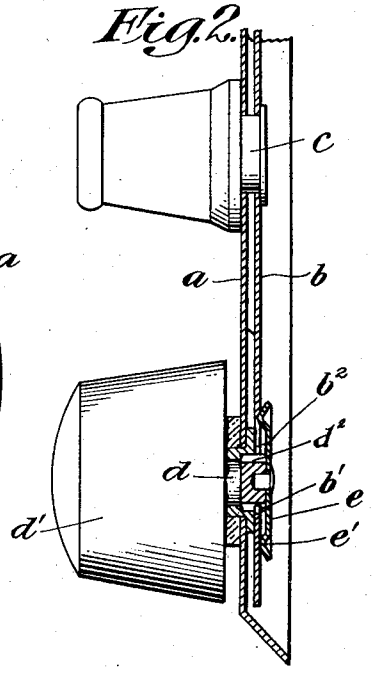


Fig. 3.

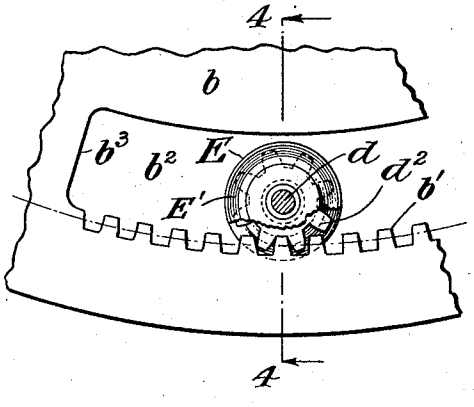
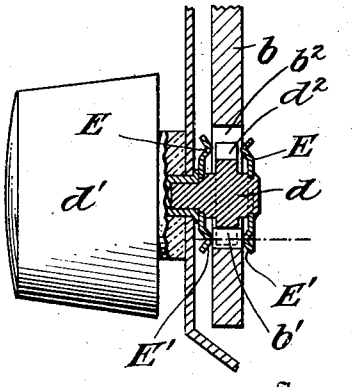


Fig. 4.



Inventor:
Clarence A. Pinkham

By his Attorneys
Redding, Ganley, O'Shea & Campbell

Patented June 26, 1928. 1,674,738

UNITED STATES PATENT OFFICE.

CLARENCE A. PINKHAM, OF JACKSON HEIGHTS, NEW YORK, ASSIGNOR TO ARTHUR DORSEY, OF NEW YORK, N. Y.

DRIVE FOR RADIO TUNING MECHANISM.

Application filed January 8, 1927. Serial No. 159,755.

This invention relates broadly to improved driving mechanism for effecting a nice adjustment of the tuning means employed in radio apparatus. More particularly, it relates to vernier drives for radio dials which in accordance with common practice are secured on the condenser shaft. Heretofore, such drives have generally comprised a driving pinion, the teeth of which are enmeshed with coacting teeth on the radio dial. The objection to such drives is found in the presence of lost motion and back lash in the meshing teeth, such lost motion and back lash preventing the nicest degree of adjustment as is desirable. This objection has become especially serious in present day production jobs in which the interengaging parts are made up as stampings. For the production of such parts in quantity and at a reasonable price tolerances cannot be close. On the other hand, it is recognized that positive inter-engagement between the driving shaft and the driven dial is essential in order to maintain at all times a predetermined fixed angular relationship between these elements. In accordance with the present invention it is proposed to retain this necessary relationship by providing for positive interconnection between the driving and driven elements whereby their predetermined fixed angular relationship will be preserved but it is further proposed to improve the driving mechanism therebetween whereby back lash and lost motion are eliminated. In the simplest embodiment of the invention a friction element carried by the driving shaft engages the driven dial operatively so that the slightest motion of the driving member imparts a corresponding motion to the driven member without liability of lost motion or back lash therebetween. This result is secured by employing a friction drive. The danger of slippage in a friction drive or the over-running of one member with respect to another is removed by the positive inter-engagement of the driving and driven parts hereinbefore referred to. Such a positive inter-engagement may be secured through enmeshing teeth.

Reference is now to be had to the accompanying drawings for an understanding of a simple and practical embodiment of the invention wherein:

Figure 1 is a view in elevation of the cover plate of a radio dial and indicating the provision of a vernier drive.

Figure 2 is a view in section on the dial shown in Figure 1 and taken on the plane indicated by the line 2—2 and looking in the direction of the arrows and of the improved friction drive with positive interconnection between the driving and driven elements.

Figure 3 is a fragmentary view on a larger scale and in front elevation showing the relation between the driving and driven elements, the cover plate being removed.

Figure 4 is a fragmentary sectional view on a larger scale taken through the parts shown in Figure 3 on the line 4—4 thereof and looking in the direction of the arrows.

As the description proceeds it will be understood that the improvements might be incorporated in other types of drives and apparatus than that illustrated herein but for a convenient understanding of the most practical present day use it has been elected to show a tuning mechanism comprising generally a cover plate *a*, revoluble dial *b* journaled on the cover plate through a sleeve *c* and adapted to be secured to the condenser shaft, and a vernier drive shaft *d* for the dial journaled in the cover plate and having an operating knob *d'* on the front thereof. In using a vernier drive it is desirable to have the finest possible nicety of adjustment of the dial *b*, the graduations thereon being observable through the windows *a'* in the cover plate. Where, as is usual, a rack such as *b'* is stamped along one edge of an arcuate opening b^2 in the dial, reliance is placed upon a driving pinion on the vernier drive shaft for rotation of the dial. Any such drive involves inherently back lash or lost motion so in tuning there may be appreciable angular variance between the driving and driven elements. It is the principal object of the present invention to provide an improved drive whereby such lost motion and back lash are eliminated. To this end, the driving vernier shaft *d* carries thereon a friction drive disk *e* which bears against one face of the tuning dial *b*. A practical form of driving disk *e* is illustrated wherein there is stamped a circumferential rib *e'* adapted to have a line contact with the dial *b*. Further, it will be desirable to provide for a slight spring pressure inherent

in the friction disk e so that the rib e' will be urged yieldingly into engagement with the dial. The drive thus obtained between the shaft d and the dial b is direct and eliminates all lost motion and back lash. A possible objection to such an improved drive is that there might be slippage and necessarily would tend to be slippage when the dial is revolved to one extreme position or the other so that one end or the other of the arcuate slot b^2 bears against the drive shaft d, in which case further rotation of the dial is positively prevented and continued rotation of the shaft d would change the angular relation between it and the dial. It is necessary to preserve the predetermined angular relationship between the driving and driven elements. Accordingly, there is incorporated in the improved mechanism a positive inter-engagement between the drive shaft d and the dial b which will prevent relative angular displacement of the disk e on the dial b. The simplest form of such positive interconnection is some type of gearing, either spur, bevel or worm. As shown in Figure 3 the arcuate slot b^2 in the dial b has along one edge thereof a rack b'. The driving shaft d carries a spur pinion d^2 the teeth of which mesh with the rack b'. When the shaft d is rotated for the purpose of driving the dial b through the engagement of the disk e with its face, the pinion d^2 will roll idly on the rack b' and positive inter-engagement between the shaft and dial thereby preserved and relative angular displacement therebetween positively prevented. Assume, for instance, that the dial has been revolved to an extreme angular position in which the end b^3 of the arcuate slot b^2 is brought into engagement with the shaft d. A further relative movement between the parts is thereafter prevented and relative angular displacement between the drive shaft d and the dial b is prevented by the engagement of the pinion teeth d^2 with the rack b'.

No mention has been made in connection with the description of the embodiment of the drive shown in Figure 2 of the driving radius of the disk e. It will be understood, however, that if this driving radius is not coincident with the pitch line of the pinion d^2 there will necessarily be differential motion as between the driving disk and the pinion d^2 and periodic slippage to accommodate such differential motion. Such a relationship is shown in Figure 2. This is not a desirable condition. In Figure 4 there is shown a relation of parts in which such a condition is corrected. As there shown friction driving disks E are mounted at opposite sides of the dial b and are of such form and dimensions as to bear against the faces of the dial at a line coincident with the pitch line of the pinion d^2. This relationship is indicated by the dotted line in Figures 3 and 4. The ribs E′ on the driving disks E in fact bear against the teeth of the rack b'. By means of such coincidence it will be evident that the pinion d^2 rolls on the rack b' with the same linear speed that the driving disks E revolve. Accordingly, there is no differential movement between the two and no unbalanced pressures tending to cause slippage.

Changes in details of the various elements and other adaptations of the principle employed may be made without departing from the spirit of the present invention.

What I claim is:

1. In radio adjusting mechanism in combination with driving and driven elements, gearing interconnecting the elements to maintain them in predetermined angular relation, the gearing on one of said elements being wider than the gearing of the other element and friction means carried on the thinner element and engaging the teeth of the other element on the pitch line.

2. In radio adjusting mechanism in combination with driving and driven elements, gearing interconnecting the elements to maintain them in a predetermined angular relation, the gearing on the driven means being wider than that on the driving means, friction discs mounted with the driving means and spaced on either side of the gear carried thereby, and circumferential ribs on the discs engaging the teeth of the driven means in a line contact at the pitch line.

This specification signed this 31 day of December A. D. 1926.

CLARENCE A. PINKHAM.