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Tennerstedt

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[54] **DISENGAGEABLE TUNER CONTROL APPARATUS**

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[52] **U.S. Cl.**.....**74/10.8,** 74/10.33

[51] **Int. Cl.**.....**F16h 35/18**

[58] **Field of Search**.....74/10.8, 10.33, 202, 206

[56] **References Cited**

UNITED STATES PATENTS

3,077,119 2/1963 Horton et al. 74/206

Primary Examiner—Milton Kaufman

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[57] **ABSTRACT**

There is provided for a radio tuner a disengageable friction drive apparatus which comprises a pair of frictionally engageable spherical-segment discs each having the same radius of curvature thereby being able to smoothly engage each other in an operative relationship irrespective of the angle at which the shafts intersect.

6 Claims, 4 Drawing Figures

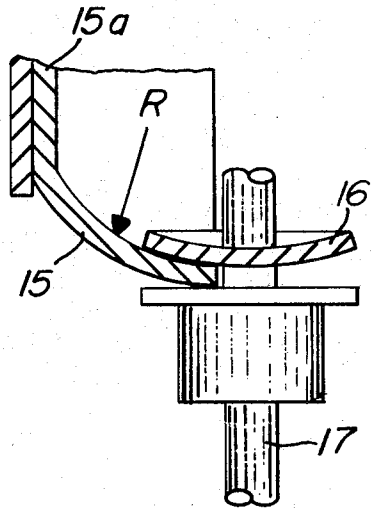
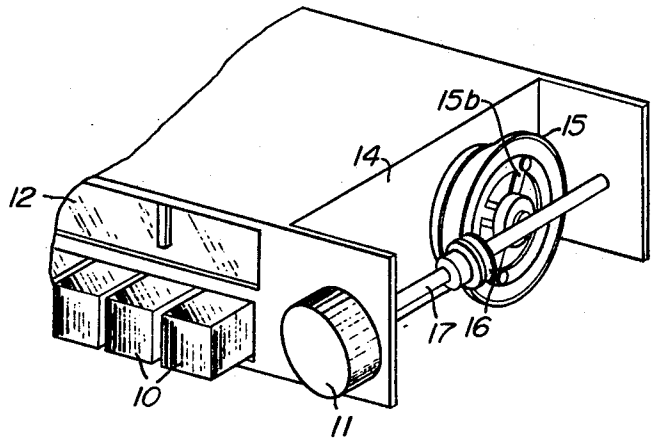


Fig. 1



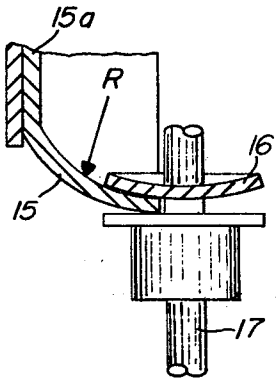
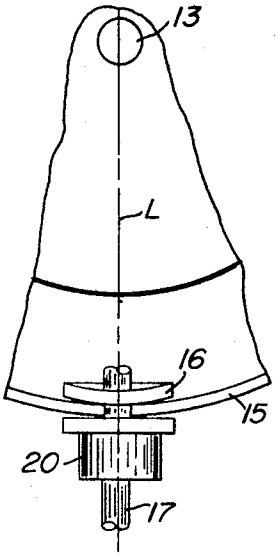


Fig. 3

Fig. 4



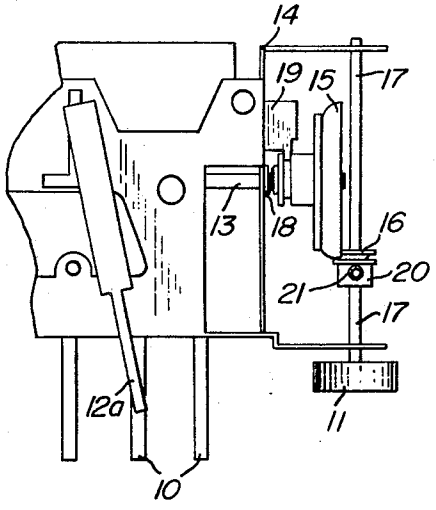


Fig. 2

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DISENGAGEABLE TUNER CONTROL APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to radio receivers and more particularly to a disengageable radio receiver tuner control apparatus.

U.S. Pat. No. 3,073,171—Winkler points out one need for greater flexibility in the design for the manual volume and tuning adjustment controls for auto radio receivers. In receivers of this type, tuning is effected by positioning of tuning cores by means including a treadle bar arrangement. The treadle bar provides for push-button tuning of the tuner to preselected locations and a tuning knob is provided for manual tuning to random locations. The manual knob for random locating of stations is operably connected to the treadle bar by drive means including some type of friction clutch device and gearing. When the individual push-buttons are operated to tune the receiver, cam means is provided for disengaging the clutch included in the drive train for the tuning knob.

As indicated in the foregoing patent, rotation of the tuning knob rotates an idler pinch washer assembly which in turn drives a pinion gear to drive a crown gear. Thus the friction drive of the pinch washer is primarily used in a parallel shaft arrangement and is merely used as an intermediate gear to drive the gearing of the tuner structure. While it has been previously suggested to use friction or pinch washer type of drives in non-parallel shaft arrangements such suggestions have not been completely satisfactory because slippage between the friction pair effected a nonuniform motion. Also, because of the need for a friction fit between the pinch washer pair the pair has not been made disengageable. Thus, the clutch arrangement required to disconnect the manual tuning knob when using the push-button has been accomplished in some other part of the drive train.

SUMMARY OF THE INVENTION

It is an object of this invention to provide an improved friction drive means for radio tuners.

It is another object of the invention to provide a friction drive means particularly adapted for radio tuners which operates smoothly without undesirable slippage.

It is still a further object of this invention to provide a friction drive means of the pinch washer type particularly adapted for radio tuners which is mountable at various shaft angles to permit flexibility in location of the tuning knobs.

A still further object of the invention is to provide a pinch washer drive unit particularly adapted for a radio tuner which can eliminate many of the gear type units used in the tuner drives of the prior art.

Yet another object of the invention is to provide such a drive unit which is readily engageable and disengageable to provide the clutching action necessary in a radio tuner unit.

In accordance with the foregoing objects there is provided a friction drive unit which comprises first and second spherical-segment washer units mounted on rotatable shafts which shafts have intersecting axes, and wherein each of the washer units has the same radius of curvature.

Further objects and advantages of the invention will be understood from the following complete description thereof and from the drawings wherein:

FIG. 1 is a perspective view of a portion of an auto radio depicting a preferred embodiment of the invention;

FIG. 2 is a top plan view thereof;

FIG. 3 is an enlarged view of the friction drive embodying the invention; and

FIG. 4 is a side view thereof.

DETAILED DESCRIPTION

FIG. 1 shows a typical automobile radio receiver apparatus which includes a plurality of push-buttons **10** for preset tuning control and a manual random tuning control knob **11**. As either the push-button **10** or the manual tuning control **11** tunes the radio, a dial **12** indicates the frequency to which the tuner is adjusted. The receiver controlling apparatus includes adjustable tuning cores operatively connected to a carriage which is reciprocated in order to position the cores for tuning purposes. The carriage may be properly positioned for selected channel operation by the push-buttons **10**. Since the carriage mechanism is shown in U.S. Pat. No. 3,073,171, this portion of the apparatus is not illustrated in detail. However, it will be understood that rotation of a driving shaft **13** which is supported in the tuner frame **14** will also drive the carriage through linking mechanism for tuning purposes. An indicator arm **14** is driven by the carriage in order to indicate on the dial **12** the frequency to which the tuner is adjusted.

A clutch drive disc **15** is fixed to the shaft **13** to be rotatable therewith. A disc **16** fixed to a tuning knob shaft **17** is engageable by the clutch disc **15**. The discs **15** and **16** are of relatively thin sheet metal formed into spherical segments. The shaft **13** driving the carriage is biased by spring **18** toward the disc on the tuning knob shaft. A declutch bar **19** effects movement of the shaft **13** in the opposite direction when a push-button is actuated. The tuning knob shaft is mounted in the frame **14** in suitable bearing structures at the front and rear. Thus, when the random control knob **11** is turned, the torque therefrom is transitted to the driving shaft by the discs **15** and **16**. The mounting for the tuning knob shaft is shown somewhat schematically in FIG. **2** and it will be understood that the shaft will be ordinarily housed in a locking nut structure for mounting in a car dashboard in a manner well known in the prior art.

The construction of the pinch washer structure is shown in greater detail in FIGS. **3** and **4**. One of the problems with the pinch washer structures of the prior art was that the shape of the pinch washer discs effected a circumferential contact between the discs. A circumferential contact is a two or three point contact unless the pinch washers are flexible enough to continuously conform to each other. When the washers are flexible, a greater amount of contact is effected instantaneously as the washer structure is rotated. Such continuous flexing of the pinch washers is believed to have effected the discontinuous nature of operation of pinch washers operated in pairs which were not mounted on parallel axes.

In accordance with the invention the pinch washer discs of the preferred embodiment disclosed herein as indicated in FIG. **3** are spherical segments having identical radii. The disc **16** on the tuning shaft **17** is but a small segment of the total sphere and the disc **15** on the tuning drive shaft **13** is a larger segment which for convenience has been terminated in a planar portion

15*a* to make more compact the overall size of the part required. Thus, the contact between the two spherical segments is a line contact in the plane defined by the axes of the intersecting shafts, (the plane of the drawing — FIG. 3) which line if extended would intersect the axes of the tuning knob shaft **17** and of the tuning drive shaft **13** or in other words a circular line L (FIG. 4) extending from the center of rotation of the tuning shaft disc **16** to the center of rotation of the driving shaft disc **15**. Being a line contact of this type there is no warping of the discs as the members are rotated and the line contact remains a firm even pressure for continuous smooth operation.

While the pair of discs will operate in the manner above described without other coacting parts, it is preferred that they be biased into engagement with each other to assure firm even contact. Thus, the tuning shaft is provided with a back up locking or washer wedging member **20** which serves as a wedging mechanism operating in conjunction with the spring **18** bias on the carriage driving shaft **13** to assure engagement of the driving shaft disc **15** with the tuning shaft disc **16**. The disc **15** may provide all or some portion of the necessary bias force by removal of the center thereof and mounting on flexible members **15***b*. The back up washer **20** may be suitably locked on the tuning knob shaft **17** by any convenient fastener such as a lock screw **21**. The washer **20** also serves to guide the disc **15** into proper re-engagement after operation of a push-button.

From the foregoing it will be seen that there is provided a friction drive means for a tuner control apparatus which is reliable in operation and economic to produce since it eliminates many of the pinion and crown gears required by the prior art structures. It also overcomes the difficulties encountered with previous pinch washer friction gears wherein uneven operation was realized because of the point contact nature of the engaging components of the driving pair.

Further objects and advantages of the invention will be apparent to one skilled in the art and suitable modifications may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. Torque transmitting means for rotating a driven shaft from a driving shaft positioned at any angle with respect thereto comprising a first annular spherical segment member having a predetermined radius of curvature rigidly secured to one of said shafts to rotate therewith, a second annular spherical segment member having a radius of curvature substantially equal to that of said first mentioned annular spherical segment member and rigidly secured to the other shaft to rotate therewith; said members being positioned relative to each other such that predetermined surfaces of each of said members frictionally engage each other in a line contact which line contact lies in the plane defined by the axes of the two shafts.

2. Torque transmitting means as recited in claim **1** wherein said members are relatively thin sheet metal discs.

3. Torque transmitting means as recited in claim **2** and further including means for biasing said discs into engagement.

4. Torque transmitting means as provided in claim **3** and further including means for disengaging the disc on the driven shaft from the disc on the driving shaft to provide a clutch.

5. In a radio receiver having push-buttons for preset tuning of said receiver and a manual random selection tuning knob for random selection, the improvement which comprises torque transmitting means for rotating a random tuning drive shaft from a driving shaft coupled to said tuning knob and positioned at an angle with respect to said drive shaft including a first annular spherical segment member having a predetermined radius of curvature rigidly secured to one of said shafts to rotate therewith, a second annular spherical segment member having a radius of curvature equal to that of said first annular spherical segment member rigidly secured to the other shaft to rotate therewith, said members being positioned relative to each other such that predetermined surfaces of each of said members frictionally engage each other in a line contact which line contact lies in the plane defined by the axes of the two shafts.

6. A radio receiver as recited in claim **5** wherein the circumference of the spherical segment member on the driven shaft is much larger than the circumference of the spherical-segment member on the driving shaft to provide a mechanical step down ratio.

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