May 13, 1952 O. E. WAGENKNECHT 2,596,451

PUSH-BUTTON TUNER DRIVING MECHANISM

Filed Aug. 30, 1950

Fig.1

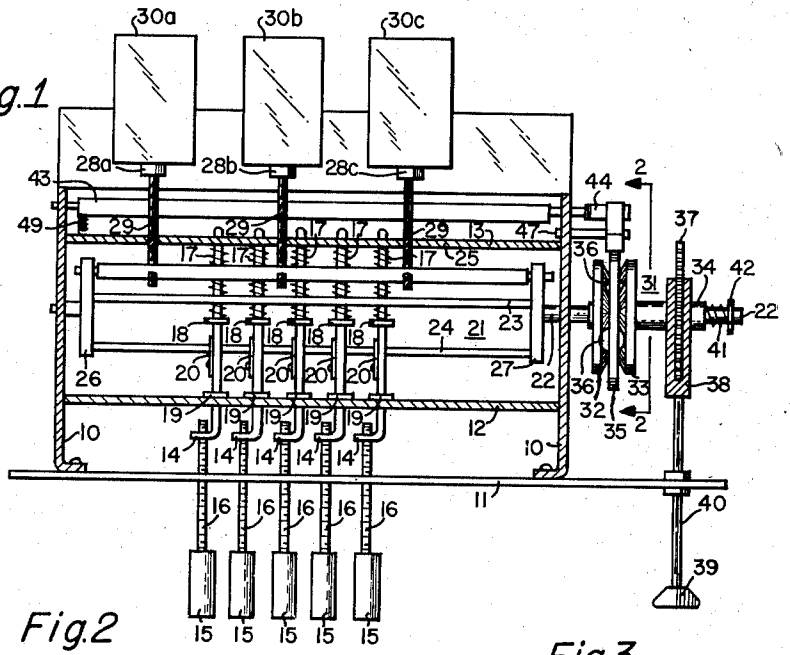


Fig.2

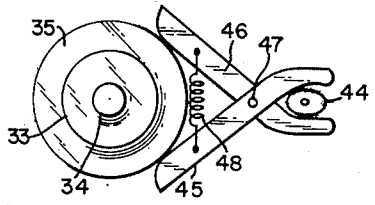


Fig.3

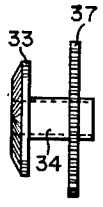


Fig.4

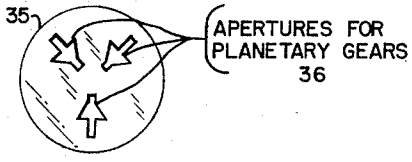


Fig.5



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PUSH-BUTTON TUNER DRIVING MECHANISM

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Application August 30, 1950, Serial No. 182,382

3 Claims. (Cl. 74—750)

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This invention relates to an improved driving mechanism which may be conveniently utilized for releasably coupling the manual control member of a push-button tuner to an actuating shaft in such a tuner.

Push-button tuners are well-known to the art, and it has been considered desirable that some type of manual control member be included therein to tune the receiver incorporating the tuner to signal frequencies other than those selected by the push-buttons. It has been usual practice to provide such a manual control member mechanically coupled to the actuating shaft of the tuner through a friction clutch arrangement. The friction clutch is so constructed that whenever the push button is depressed to actuate the tuner to a preselected frequency, the clutch automatically releases the manual control member. This type of tuner has proven quite satisfactory with the exception that in the past it has been found difficult and expensive to construct a friction clutch which, when in its operative condition, provides a positive drive between the manual control member and the actuating shaft of the tuner without undue slippage.

Copending application Serial No. 181,064, filed August 23, 1950, in the name of Clarence W. Wandrey, entitled "Driving Mechanism for Push Button Tuners" and assigned to the present assignee, discloses an improved driving mechanism that may be conveniently utilized for releasably coupling the manual control member of a push-button tuner to the actuating shaft thereof. The improved driving mechanism of the Wandrey application comprises a first bevel gear fixed to the actuating shaft of the tuner, a second bevel gear rotatably mounted on the actuating shaft, an apertured gear interposed between the bevel gears and having planetary gears rotatably mounted within its apertures and coacting with the bevel gears. The second bevel gear is rotated by the manual control member, and as long as the apertured gear is allowed to rotate freely no motion is translated to the first bevel gear and to the actuating shaft of the tuner. The mechanism also includes a latch so arranged that it is held out of engagement with the peripheral teeth of the apertured gear whenever a push-button is depressed, thus enabling the gear to rotate freely. However, when all the push buttons are in a released position, the latch engages the apertured gear preventing rotation thereof, and motion is translated from the manual control member to the actuating shaft of the tuner.

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The purpose of the present invention is to provide a new and improved releasable means for preventing rotation of the apertured member of the above-described device. It was found that the use of the latch arrangement in the Wandrey system sometimes gives rise to slight backlash when the manual control member is actuated. In the present system, the latch is replaced by a pair of cross-connected arms pivoted adjacent the apertured gear-carrying member and a resilient member urges one end of each of the arms against the peripheral surface of the disc in frictional engagement therewith. The invention also provides for an elliptical shaft coacting with the free ends of the cross-connected arms for rotating the arms in opposite directions against the tension of the resilient member and out of engagement with the apertured disc.

It is, accordingly, an object of this invention to provide an improved mechanism for releasably coupling apparatus to a driving means for actuation thereby.

A further object of this invention is to provide an improved driving mechanism for use in push-button tuners or the like for releasably coupling a manual control member to the actuating shaft of the tuner.

Yet another object of this invention is to provide such an improved driving mechanism which provides a positive drive from the manual control member to the actuating shaft, and in which backlash is eliminated for all practical purposes.

A still further object of this invention is to provide an improved driving mechanism that is simple and economical to construct, yet which operates with a degree of efficiency not present in usual prior-art devices.

The driving mechanism of this invention finds ready application in push-button tuners and for that reason is described herein in conjunction with such tuners. However, it will be evident as the description proceeds that the driving mechanism may have other independent applications corresponding to the various uses of prior-art clutch mechanism.

The features of this invention which are believed to be new are set forth with particularity in the appended claims. The invention itself, however, together with further objects and advantages thereof may best be understood by reference to the following description when taken in conjunction with the accompanying drawings, in which:

Figure 1 illustrates a push-button tuner in-

corporating the driving mechanism of the invention,

Figure 2 shows a portion of the driving mechanism as viewed from the section lines 2—2 of Figure 1, and,

Figures 3–5 represent various components of the driving mechanism.

The push-button tuner of Figure 1 includes a supporting frame 10 which may be secured to the chassis or panel 11 of a radio receiver or the like. Frame 10 includes a pair of cross brackets 12, 13 spaced one from the other, and serving to support various push-rods 14 which are actuated by push-buttons 15 mechanically coupled to the push-rods by threaded studs 16 extending through panel 11 in well-known fashion.

The push-rods 14 have circumscribing springs 17, bearing against cross brackets 13 at one extremity and against stops 18 at the other, for urging the rods into a disengaged position with stops 19 bearing against cross bracket 12. Rods 14 individually include an adjustable arm 20 rotatably secured thereto for purposes to be described.

The tuner further comprises a carriage 21 rotatably mounted on frame 10 by means of an actuating shaft 22. The carriage 21 includes a pair of cross bars 23, 24 and a strip 25 mounted in end portions 26, 27 of the carriage. The strip is rotatably mounted in the end portions and mechanically connected, by means of flexible elements 29, to tuning cores 28*a*, 28*b*, 28*c* associated with tuning elements 30*a*, 30*b*, 30*c* mounted on bracket 10. In this manner axial motion may be imparted to the tuning cores within the tuning elements.

The push-button tuner as thus far described is well-known to the art. When one of the push-buttons 15 is depressed, the corresponding adjustable arm 20 bears against one of the bars 23, 24 to rotate carriage 21 a preselected amount determined by the setting of the control arm. This causes the tuning cores 28*a*, 28*b*, 28*c*, to have a preselected tuning position within elements 30*a*, 30*b*, 30*c*, corresponding to a predetermined signal frequency. When the push-button is released it is returned to its original position by means of associated spring 17, but carriage 21 is maintained in its set position due to frictional engagement of the actuating shaft 22 with supporting frame 10. The various arms 20 may be adjusted so as to rotate carriage 21 selected amounts when the various push-buttons are depressed, causing the tuning cores to have various preselected positions within tuning elements 30*a*, 30*b*, 30*c*.

The present invention provides a driving mechanism 31 for enabling the various tuning cores to be manually adjusted throughout the tuning range of elements 30*a*, 30*b*, 30*c*. The mechanism comprises a bevel gear or disc 32 having radial serrations and fixed to actuating shaft 22 of the tuner, and a further bevel gear or disc 33 having radial serrations and fixed to a driving shaft 34 rotatably mounted coaxially with shaft 22. An apertured disc or locking plate 35 is rotatably mounted on shaft 22 interposed between gears 32 and 33, and has a plurality of planetary gears 36 rotatably mounted in its apertures and coacting with the serrations of the bevel gears.

A driving gear 37 is fixed to driving shaft 34 and engages a worm gear 38, the latter being actuated by a manual control knob 39 mechanically coupled thereto by means of a shaft 40. Driving shaft 34 and gear 33 are urged towards gear 32 by means of a spring 41 and retaining clip 42 so that there is positive engagement between planetary gears 36 and bevel gears 32, 33.

The push-button tuner includes a plate 43 pivoted to frame 10 and mechanically coupled to an elliptical shaft 44. A pair of cross-connected arms 45, 46 are pivoted to frame 10 by means of a pivot rod 47. The elliptical shaft 44 is positioned to engage one end of the cross-connected arms as indicated in Figure 2, with the other ends of these arms urged into frictional engagement with the peripheral surface of disc 35 by means of a resilient spring 48. A spring 49 is secured to plate 43 and cross bracket 13 so that elliptical shaft 44 is normally maintained in the position shown in Figure 2, out of contact with the ends of the cross-connected arms so that these arms are urged into frictional engagement with disc 35 by spring 48 to prevent rotation of the disc. Moreover, plate 43 is so disposed that whenever one of the push-buttons 15 is depressed, the corresponding push-rod 14 bears against the plate and causes elliptical shaft 44 to rotate urging the cross arms in opposite directions against the tension of spring 48 and out of engagement with disc 35.

Figures 3–5 show in greater detail the various components of driving mechanism 31.

When all the push-buttons are in a released position as shown in Figure 1, cross arms 45, 46 are urged into frictional engagement with the periphery of apertured disc 35. Rotation of knob 39 causes driving gear 37 and, therefore, driving shaft 34 to rotate. Rotation of driving shaft 34 causes bevel gear 33 to rotate driving the planetary gears 36. In the above-described released condition of the push-buttons, cross arms 45, 46 prevent rotation of disc 35, and rotation of the planetary gears causes bevel gear 32, and, thus, actuating shaft 22 to rotate. In this manner, rotation of knob 39 causes carriage 21 to be rotated and cores 28*a*, 28*b*, 28*c* to be varied within tuning elements 30*a*, 30*b*, 30*c*. Whenever a push-button 15 is depressed its corresponding push-rod 14 bears against plate 43 rotating elliptical shaft 44 and releasing disc 35 for free rotation. Carriage 21 is now free to rotate under the control of the push buttons alone, since rotation of bevel gear 33 merely rotates planetary gears 36 and disc 35, while bevel gear 32 remains stationary. In other words, in this condition the free rotating of disc 35 effectively prevents a driving force from being transferred from either one of the bevel gears to the other. Therefore, carriage 21 may be freely rotated to a preselected position corresponding to the adjustment of arm 20 of a depressed push rod 14.

With the present invention, a positive drive is obtained between driving shaft 34 and actuating shaft 22 whenever cross arms 45, 46 engage disc 35, and the slippage effect of usual prior-art friction clutches is obviated for all practical purposes. Yet the system of this invention retains all the advantages of the usual prior art friction clutches in that the effect of backlash, sometimes present in gear drives, is eliminated in a simple and expedient manner.

This invention provides, therefore, an improved driving mechanism for push-button tuners or for other purposes that may be simply and conveniently constructed and yet which operates in a highly satisfactory and efficient manner.

While a particular embodiment of the invention has been shown and described modifications

may be made and it is intended in the appended claims to cover all such modifications as may fall within the true spirit and scope of the invention.

I claim:

1. In a selectively operable driving mechanism comprising: a driven shaft; a first bevel gear affixed to said shaft; a second bevel gear spaced from and supported coaxially with said first bevel gear for rotation relative to said shaft; a locking plate interposed between said bevel gears for rotation relative to said shaft and having at least one aperture for receiving a planetary gear; a planetary gear rotatably supported in each aperture of said locking plate in mechanical driving engagement with said bevel gears; and driving means for rotating said second bevel gear; a pair of cross-connected arms pivotally mounted adjacent said locking plate; a resilient member urging one end of said arms into frictional engagement with said locking plate to prevent rotation thereof; and means for rotating said arms in opposite directions against the tension of said resilient member and out of engagement with said locking plate.

2. In a selectively operable driving mechanism comprising: a driven shaft; a first bevel gear affixed to said shaft; a second bevel gear spaced from and supported coaxially with said first bevel gear for rotation relative to said shaft; a locking disc interposed between said bevel gears for rotation relative to said shaft and having at least one aperture for receiving a planetary gear; a planetary gear rotatably supported in each aperture of said locking disc in mechanical driving engagement with said bevel gears; and driving means for rotating said second bevel gear; a pair of cross-connected arms pivotally mounted adjacent said locking disc; a resilient member urging one end of said arms into frictional engagement with the peripheral surface of said locking disc to prevent rotation thereof; and means for rotating said arms in opposite directions against the tension of said resilient member and out of engagement with said locking disc.

3. In a selectively operable driving mechanism comprising; a driven shaft; a bevel gear disc affixed to said shaft; a second bevel gear spaced from and supported coaxially with said first bevel gear for rotation relative to said shaft; a locking disc interposed between said bevel gears for rotation relative to said shaft and having at least one aperture for receiving a planetary gear; a planetary gear rotatably supported in each aperture of said locking disc in mechanical driving engagement with said bevel gears; and driving means for rotating said second bevel gear; a pair of cross-connected arms pivotally mounted adjacent said locking disc; a resilient member urging one end of said arms into frictional engagement with the peripheral surface of said locking disc to prevent rotation thereof; and an elliptical shaft engaging the opposite ends of said arms for rotating said arms in opposite directions against the tension of said resilient member and out of engagement with said locking disc.

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No references cited.