

[54] **PLURAL BAND TUNER HAVING MEANS TO ROTATE RESISTOR SUPPORT PLATE FOR FINE TUNING**

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[58] **Field of Search** 334/1, 15, 47, 48, 334/88, 11, 14; 323/94, 96; 74/10.15, 10.2, 10.41, 10.45; 325/459

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[57] **ABSTRACT**

A broadcast channel selecting apparatus used for all channel electronic tuners is disclosed. It includes an annular resistor arrangement consisting of three resistor sections respectively responsible for VHF-L region, VHF-H region and UHF region of the broadcast band and a brush in sliding contact with said resistor arrangement. By rotating a station selecting knob, rotation is transmitted through a detent mechanism to the brush to move the brush step-wise. On the other hand, by rotating the knob while holding it in its depressed or advanced state, the resistor arrangement can be continuously rotated with respect to the brush, whereby a correct tuning voltage for each selected channel may be applied to a tuner circuit.

3 Claims, 2 Drawing Figures

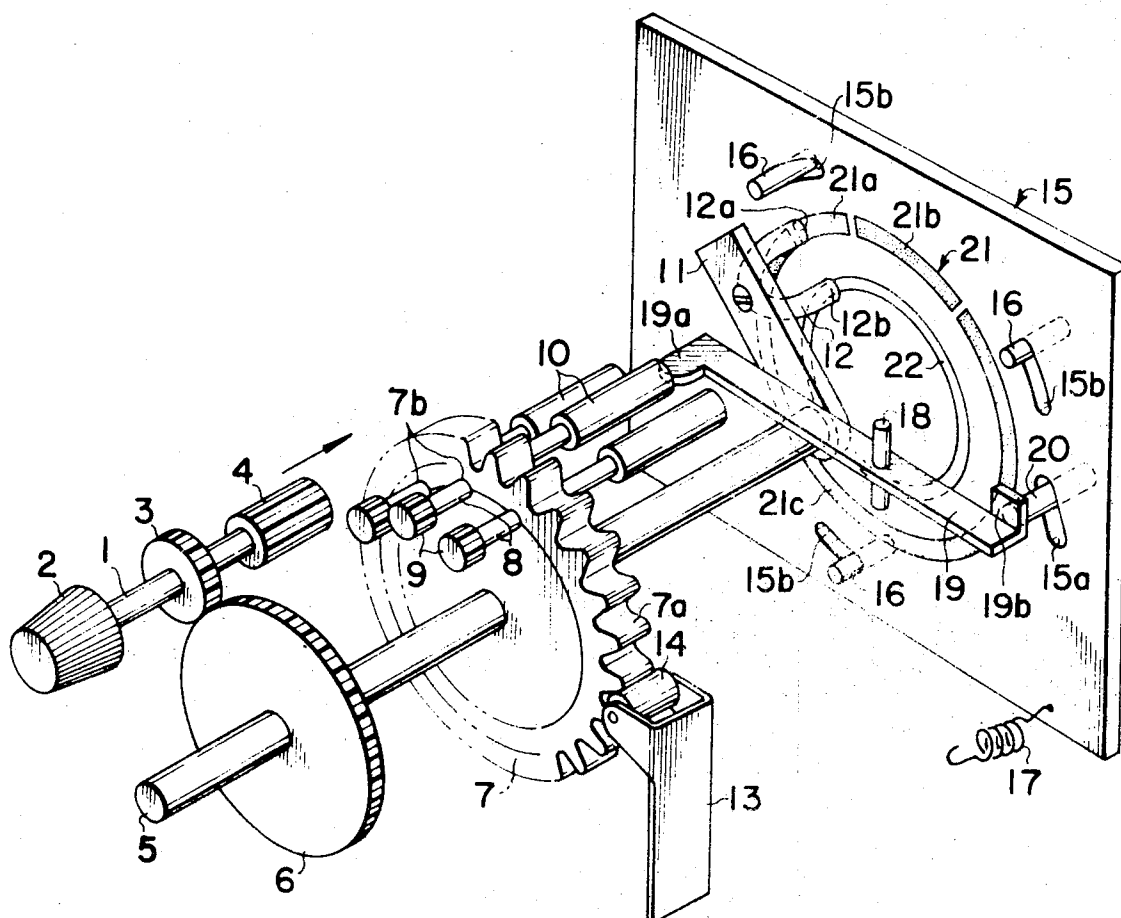


FIG. 1

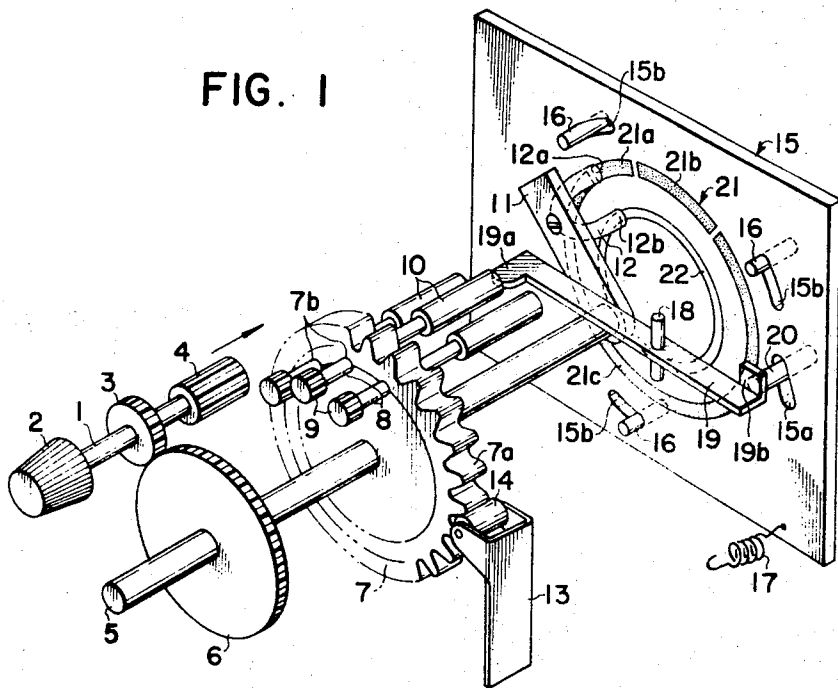
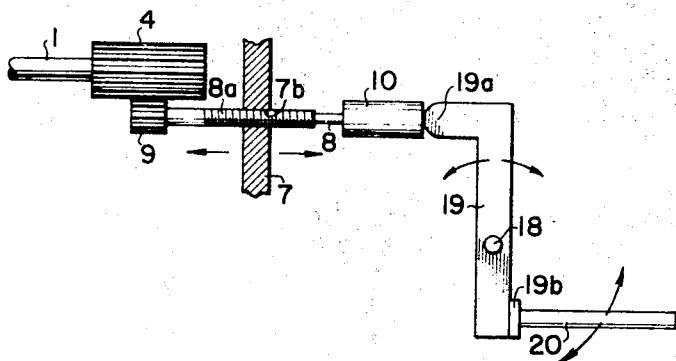


FIG. 2



PLURAL BAND TUNER HAVING MEANS TO ROTATE RESISTOR SUPPORT PLATE FOR FINE TUNING

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention is concerned with all channel electronic tuners and, more particularly, it relates to a broadcast channel selecting apparatus used for all channel VHF and UHF band regions in the same tuning system.

2. Description of the Prior Art

Electronic tuners have recently been extensively used since they enable readily selecting all broadcast channels in VHF and UHF band regions.

However, the known channel selecting apparatus used for electronic tuners uses a plurality of variable resistors for providing respective particular voltages for individual broadcast channels, and the individual variable resistors are provided with separate and independent adjusting mechanisms. Therefore, the adjusting operation for pre-adjusting voltages that are applied to a tuner circuit to be tuned in individual desired broadcasting channels is very troublesome. Also, the apparatus includes a great number of component parts, which is disadvantageous from the stand point of manufacturing cost.

SUMMARY OF THE INVENTION

A primary object of the present invention, therefore, is to provide a broadcast channel selecting apparatus for all channel electronic tuners, which is simple in construction and capable of manufacture at low cost, and with which the channel selecting operation is very simplified.

Another object of the present invention is to provide a broadcast channel selecting apparatus for all channel electronic tuners, which includes an annular resistor arrangement capable of providing particular tuning voltages corresponding to respective broadcast channels in VHF-L, VHF-H, and UHF band regions to a tuner circuit and a brush capable of sliding on said resistor arrangement. With this construction, at the time of channel selection the brush is moved step-wise on the resistor arrangement to obtain tuning voltages individually corresponding to respective broadcast channels and each in a particular range. At the time of fine adjustment of a tuning voltage obtained in the above manner, the resistor arrangement is moved with respect to the brush so as to obtain an exact tuning voltage for a corresponding channel.

Still another object of the present invention is to provide a broadcast channel selecting apparatus for the type described, which functions accurately and is easy to make adjustments.

These and another objects as well as the advantages of the present invention will become apparent by reading the description of an embodiment of the invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view of part of an embodiment of the broadcast channel selecting apparatus according to the present invention; and

FIG. 2 is an explanatory illustration of the fine adjustment mechanism in the apparatus shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1 and 2, a manipulating knob 1 is suitably mounted on a frame not shown such that it is rotatable and axially movable in the direction of arrow. A knob 2 for tuning and fine adjustment is secured to the shaft 1. The shaft 1 also carries a tuning drive gear 3 and a fine adjustment drive gear 4 both secured to it. Numeral 5 represents a main shaft rotatably mounted in a frame not shown. The main shaft 5 carries a tuning gear 6 secured to it and meshing with the tuning drive gear 3. Also secured to the main shaft 5 is a pre-set wheel 7 formed with a peripheral tooth portion 7a and also with a plurality of threaded holes 7b along a peripheral portion. Numeral 8 represents pre-set pins, which each have an intermediate threaded portion 8a screwed into the associated threaded hole 7b. Each pre-set pin 8 has a fine adjustment gear 9 secured to its one end. Each fine adjustment gear 9 is capable of being brought into mesh with the fine adjustment drive gear 4. Each pre-set pin 8 also has an operating member 10 secured to its other end. Numeral 11 represents a brush lever, whose base portion is secured to the main shaft 5. A U-shaped brush 12 made of an elastic material is secured on the brush lever 11 and electrically insulated therefrom. Numeral 13 represents a positioning member of resilient material, and its base portion is supported by a frame not shown. The positioning member 13 carries a roller 14 engaged with the tooth portion 7a of the pre-set wheel 7. Numeral 15 represents a resistor supporting plate formed with a slot 15a inclined with respect to an arc concentric with the main shaft 5 and three equally spaced arcuate slots 15b concentric with the main shaft 5. Received in each arcuate slot 15b is a support pin 16 extending from a frame not shown. The resistor supporting plate 15 is biased in the clockwise direction in FIG. 1 by a tension spring stretched between the plate 15 and the frame. Numeral 19 represents a fine adjustment lever pivoted to a support pin 18 extending from the frame not shown. The fine adjustment lever 19 is provided at one end with a projection 19a which is capable of engaging with the end of one of the operating members 10. The fine adjustment lever 19 is also provided with an operating pin 20 extending from its other end 19b and received in the slot 15a formed in the resistor support plate 15. Numeral 21 generally represents an annular thermet type resistor arrangement concentric with the main shaft 5. The resistor arrangement 21 is in electric contact with a leg 12a of the brush 12, and it consists of three resistor sections 21a, 21b and 21c individually responsible for respective divisions of the broadcast band region; the section 21a is responsible for VHF-L band region (channels 1 to 3), the section 21b is responsible for VHF-H band region (channels 4 to 12), and the section 21c is responsible for UHF band region (channels 13 to 62). The other leg 12b of the brush 12 is in electric contact with an annular conductor foil 22 provided on the resistor supporting plate 15 and concentric with the resistor arrangement 21.

The above embodiment is based on the channel authorization practice in Japan, and the pre-set wheel 7 has 64 teeth 7a, although only some of them are shown, thus covering all the authorized channels and also two blank channels one between the VHF-L band region and VHF-H band region and the other between the

VHF-H band region and UHF band region. Also, the pre-set wheel 7 is formed with 64 threaded holes 7b and carries the same number of pre-set pins 8. These threaded holes 7b and pins 8 are arranged along a circle concentric with the main shaft 5. In practice, however, two adjacent channels in the same frequency band are not concurrently used, so the number of the pin 8 may be reduced to 32 for practical purposes. In other countries than Japan, the number of available channels may be different, and the number of the teeth 7a and pins 8 may be varied to correspond to the number of available channels.

Although not shown in the drawing, the sections 21a, 21b and 21c of the resistor arrangement 21 and the conductor foil 22 are provided with respective lead-wires leading through the resistor supporting plate 15 and connected to a tuner circuit.

In operation, for switching channels the knob 2 is rotated in its position shown in FIG. 1. The rotation of the knob 2 is transmitted through the knob shaft 1, tuning drive gear 3, tuning gear 6, main shaft 5 and brush lever 11 to the brush 12, so that the brush 12 slides on the resistor arrangement 21 and conductor foil 22. A detent is provided by the engagement between the tooth portion 7a of the pre-set wheel 7 and the roller 14 carried by the positioning member 13, so that the wheel 7, and hence the brush 12, is intermittently brought to a halt, and at the position of each halt a corresponding voltage for applying to the tuner circuit to receive a corresponding channel is determined. In this manner, the selection of a desired channel can be done.

At each halt position, a corresponding voltage may sometimes be different from a predetermined tuning voltage due to various factors such as circuit fluctuations. In such case, the knob 2 is depressed in the direction of arrow in FIG. 1 to demesh the tuning drive gear 3 from the tuning gear 6 and at the same time bring the fine adjustment drive gear 4 into mesh with the fine adjustment gear 9 in each halt position, and then it is rotated in its depressed state. As a result, the associated pre-set pin 8 is advanced or retreated with respect to the pre-set wheel 7 in the direction of arrows in FIG. 2 while it is rotated, since its threaded portion 8a is screwed in the associated threaded hole 7b. With the advancement or retreatment of the pre-set pin 8, the fine adjustment lever 19, whose projection 19a is in forced engagement with the operating member 10 secured to the pre-set pin 8, is rotated about the pin 18. This has an effect of causing the rotation of the resistor supporting plate 15, that is, the movement of the annular resistor arrangement 21 with respect to the brush 12 because of the engagement of the operating pin 20 in the slot 15a. In this way, fine adjustment of the voltage applied to the tuner circuit may be done.

This fine adjustment is done when predetermined tuning voltages for corresponding channels are not obtained such as when using a television receiver for the first time.

In the channel selecting operation, when the projection 19a of the fine adjustment lever 19 is gotten out of engagement with an operating member 10 secured to

the associated pre-set pin 8 by the rotation of the pre-set wheel 7, the resistor supporting plate 15 is rotated in the clockwise direction in FIG. 1 by the force of the spring 17 until the support pins 16 strike an end of respective arcuate slots 15b, as shown in FIG. 1. Subsequently, as the projection 19a of the fine adjustment lever 19 is engaged by the next operating member 10, the resistor supporting plate 15 is rotated in the counterclockwise direction in FIG. 1 against the force of the spring 17 according to the position of the next operating member 10, so that it can occupy a previously adjusted position for the next channel.

The channel indication accompanying the channel selecting operation may be appropriately obtained, for instance from the rotation of the pre-set wheel 7 in a well-known manner. Also, while the resistor arrangement 21 may be of a coil type, although the thermet type one as in the preceding embodiment is advantageous from the standpoint of durability.

Further, the preceding embodiment has employed pin 20 and slot 15a as coupling means for bringing about the rotation of the resistor supporting plate 15 as a result of the rotation of the fine adjustment lever 19. However, to attain this end it is possible to utilize other coupling means, for instance, as a gear train.

We claim:

1. A broadcast channel selecting apparatus for all-channel electronic tuners comprising an operating shaft rotatable and slidable in the axial direction, a main shaft capable of being coupled to said operating shaft and rotatable by said operating shaft, a pre-set wheel secured to said main shaft, a brush mounted integrally with said main shaft, an annular resistor arrangement electrically contacted with an end of said brush, an annular conductor electrically contacted with another end of said brush and arranged concentric with said resistor arrangement, a resistor supporting plate carrying said resistor arrangement and said conductor and rotatable concentrically with said resistor arrangement, a plurality of pre-set pins movably screwed in said pre-set wheel and capable of being coupled to said operating shaft and rotated by said operating shaft, and a fine adjustment lever capable of being brought into engagement at its one end with an end of said pre-set pins and coupled at the other end to said resistor supporting plate, said annular resistor arrangement being moved with respect to said brush when said operating shaft is rotated in its depressed state.

2. The broadcast channel selecting apparatus according to claim 1, in which said pre-set wheel is formed with peripheral teeth, and which further comprises a positioning member capable of engagement with said teeth, said pre-set wheel being rotated step-wise when said operating shaft is rotated.

3. The broadcast channel selecting apparatus according to claim 1, wherein said annular resistor arrangement consists of three thermet type resistor sections respectively responsible for LOW-VHF region, HIGH-VHF region and UHF region of the broadcasting band.

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