April 13, 1943. F. E. BAUM ET AL 2,316,547

TUNING DEVICE FOR RADIO APPARATUS

Filed Jan. 11, 1941 2 Sheets-Sheet 1

Fig. 1

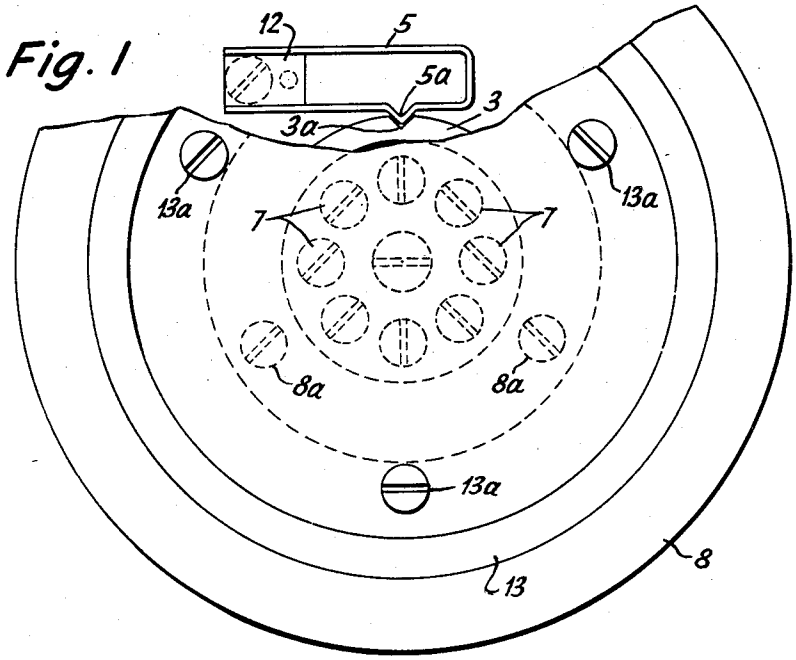
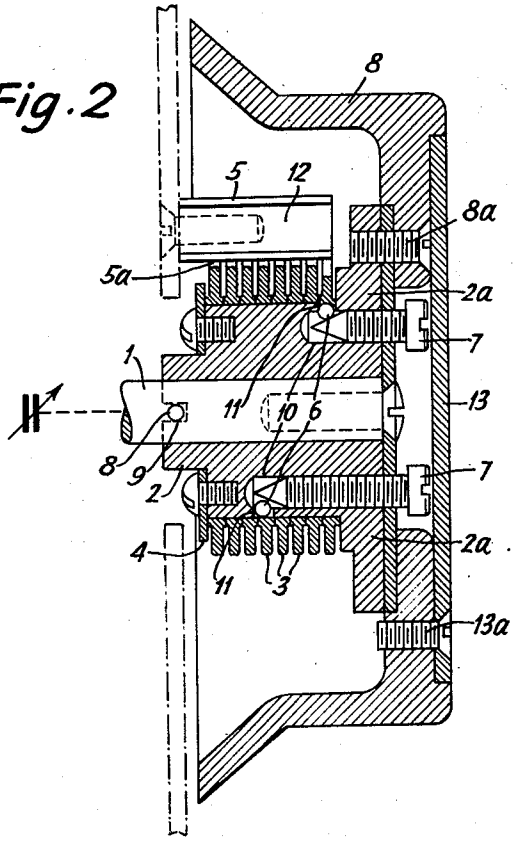


Fig. 2



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Fig. 3

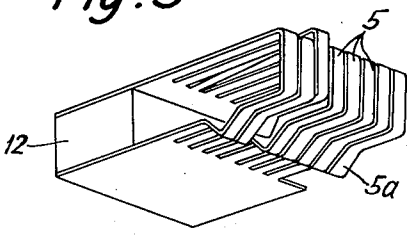


Fig. 4

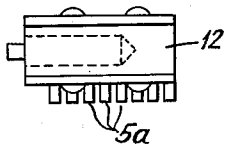


Fig. 5

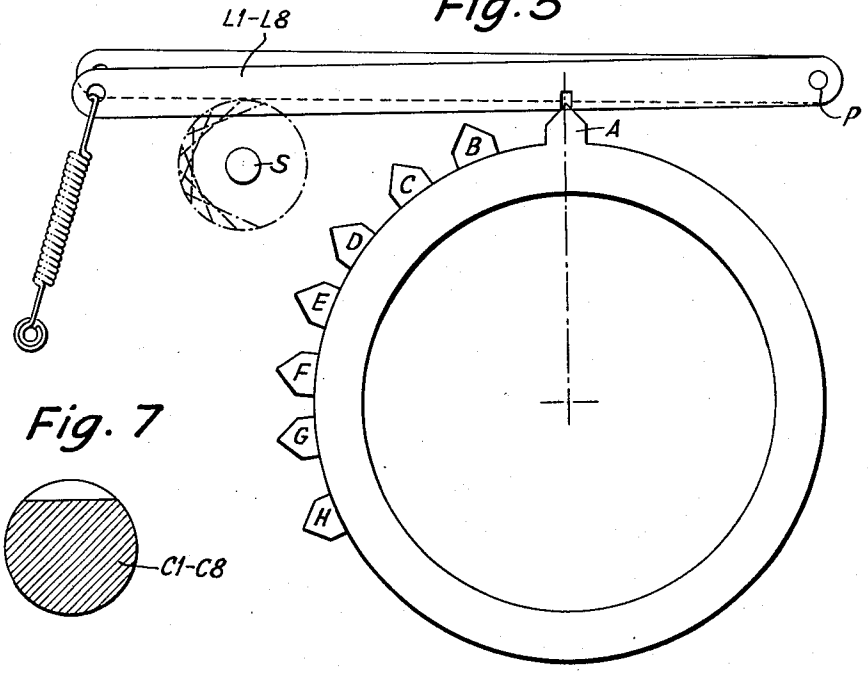


Fig. 7

Fig. 6

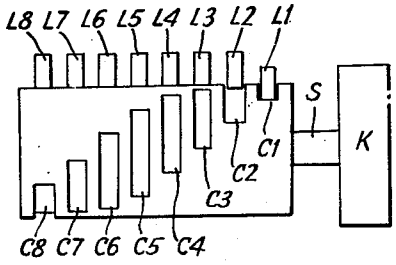
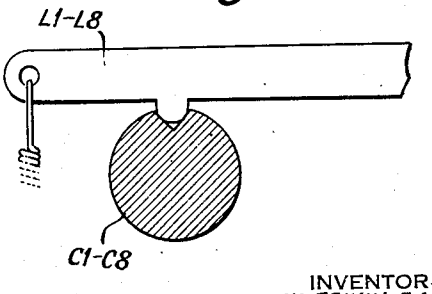


Fig. 8



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TUNING DEVICE FOR RADIO APPARATUS

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Application January 11, 1941, Serial No. 374,048
In Great Britain January 30, 1940

10 Claims. (Cl. 74—10)

This invention relates to click stop devices particularly, though not exclusively, for spot-wave selection in radio transmitters or receivers.

As is known it is often desired to adjust an adjustable member to any one of a plurality of predetermined positions and to vary from time to time the predetermined positions. An example of such an arrangement is a so-called spot-wave selector for a radio transmitter or receiver. The invention provides a compact apparatus of this nature, which is also simple to adjust and operate.

In the accompanying drawings, Figs. 1 to 4 show one modification of the invention, Fig. 1 being a front view, Fig. 2 a cross-sectional view and Figs. 3 and 4 detail views of the stop mechanism. Figs. 5 to 8 show a second modification, Fig. 6 showing the general arrangement, Fig. 5 showing on an enlarged scale a side view of the device shown in Fig. 6, and Figs. 7 and 8 disclosing details.

According to the invention, a click stop device comprises a member to be adjusted, an adjusting knob, a rotatable shaft connecting said member to said knob, a plurality of disc or ring members mounted for rotation about said shaft and each having in the periphery thereof a stop (e. g. a notch or projection), at least one fixed lever member adapted to engage the stop in the periphery of one disc or ring member, and a plurality of means associated with the adjusting knob, each associated with a disc or ring member and adapted to fix relatively to the shaft and against rotation independently thereof, the disc or ring member with which it is associated.

According to one feature of the invention there are a plurality of levers one lever associated with each disc or ring member, each lever being normally in engagement with its associated disc or ring member and adapted to engage with the stop on its associated disc or ring member whereby to arrest rotary movement of said rotatable shaft.

According to an alternative feature of the invention there are a plurality of levers, one lever associated with each disc or ring member, each lever being normally out of engagement with its associated disc or ring member and selecting means for selecting a desired one of said levers whereby to cause said selected lever to engage with the stop on its associated disc or ring member whereby to arrest rotary movement of said rotatable shaft.

Referring to one embodiment of the invention, in accordance with the first feature thereof, as applied to a spot-wave selector for a radio receiver as illustrated in Figures 1 to 4, the shaft 1, by which drive is effected from an adjusting knob 8 to, for example, an adjustable condenser shown schematically at 1', has fixedly attached thereto, as by means of a pin 8', a housing 2 having a slightly tapered slot 9 for engagement with said pin, the said housing 2 serving as a carrier or hub for a plurality of discs 3 which are mounted side by side on said hub and are adapted, unless fixed as hereinafter described, for separate rotation about the said hub. The housing 2 is provided at one end with an abutment 2a against which the pack of discs abut and at the other end with a washer 4 which abuts against the pack at its other end, the discs being thus prevented from moving laterally. A number of screw holes are drilled into one face of the housing, these holes 10 being of differing depths inter se and preferably being symmetrically arranged (as is best seen with reference to screws 7 in Figure 1) about the center of rotation of the spindle and housing. Also drilled into the housing on the hub surface are a like number of radially directed holes 11, these holes extending from the hub surface of the housing about which the discs rotate and being each situated under a different disc and extending as far as the screw holes. Each of these holes 11 in the hub surface accommodates a ball 6, and each of the screw holes accommodates a screw 7 having a tapered end. These screws are of different length inter se. The arrangement of the screws, balls, and discs is such that when a screw is screwed home it wedges the disc with which it is associated in any angular position relative to the spindle which it happens to occupy. Each disc is provided with a V-shaped notch 3a in its periphery.

Mounted on the front panel of the receiver, through which the shaft extends, is a multiple, parallel movement, spring click arrangement 5. This consists of a mounting block 12 extending at a right angle to the panel to which block along the length thereof are attached a plurality of substantially U-shaped springs each spring being provided, in one leg of the U, with a V-shaped kink 5a. The springs are mounted one over each disc, and in such position relatively to their respective associated discs that the kink in a spring can engage a notch in the periphery of its associated disc.

The adjusting knob 8 is fixed to the housing by means of, for example, three screws 8a which are, preferably, unequally spaced so that the knob can occupy only a unique position relatively to

the spindle. The knob may have a scale engraven on its angular face.

The method of determining the positions for click-stopping the shaft 1 is to assemble the unit as a whole on the spindle with the notches 3a in all the discs 3 engaging with their V-shaped kinks 5a in the U-shaped spring 5, the discs all being free to rotate on the housing. When a desired wave length or frequency is obtained by rotating the condenser by means of the adjusting knob 8 one of the pointed screws 7 is tightened up, so locking to the housing 2 one of the discs, the notch in this disc being still in engagement with the kink in the parallel motion spring. As the housing is fixed to the spindle the locked disc will ensure that the condenser will always cease its rotation at exactly the same point when the groove in the disc contacts with the spring.

The foregoing procedure is followed until the requisite number of spot wave positions is obtained. No particular order of use of the discs is necessary although it may be desirable to number the screw heads and work from the first upwards for general convenience.

Any preset position may be varied by releasing the appropriate screw and resetting the corresponding disc, tightening the screw again after the new position has been obtained.

The springs being U-shaped the springs are constituted as "parallel motion" springs and this parallel motion ensures a high degree of accuracy. Moreover by making the angle of the V-shaped kinks in the springs larger, as shown in Figure 1, than that of the V-shaped notches in the disc, positive contact is ensured.

A cover plate 13 is screwed to the knob, as by screws 13a which, while preventing unauthorised access to screws 7, is easily removed for authorised adjustments to be made.

An alternative embodiment of the invention is illustrated in Figures 5 to 8 of the accompanying drawings. This embodiment is particularly suitable for use in connection with transmitters to provide for micrometer adjustment. The multiple spring arrangement of the first embodiment is replaced by a bank of notched, spring-loaded levers L1 to L8 pivoted at P. The adjustment of the levers is effected by a hand-operated cam member having a plurality of cam faces C1 to C8. In the figures illustrating this embodiment the levers L1 to L8, which of course, correspond functionally with springs 5 of the earlier mentioned embodiment, are shown notched and the disc or ring members 3 are shown as being provided with projections A to H though the alternative arrangement could be employed. The cam member is mounted on a shaft S, controlled by a knob K, in such a manner, that all of the levers L1 to L8 except the one that is required to locate the position chosen, are lifted clear of the locating projections A—H of the annular rings. This renders all except the required lever inoperative. The cams are so arranged that an "off" position is provided. In this position all levers are lifted so that the device is rendered inoperative, leaving the main control free to be moved to any position not pre-selected. The cams and the spindle can be constructed in one piece, the cams merely being slots or flats milled in a solid rod, in the appropriate angular positions. The cams are made in the shape of a D see Figure 7 and thereby form their own positioning device.

The complete operation of the device is as follows:

Spindle S is rotated to the desired position, as indicated by a scale or pointer with which the spindle is provided, by means of its knob or handle, then the main control of the device is rotated until the locating slot (A1—H1) in the lever selected drops onto the appropriate locating projection (A—H) of one of the annular discs or rings.

No error in the setting of the device can exist, as only the selected position can be located.

Instead of having D shaped cams and flat levers, the levers can be made with any desired shape of projections, the cam having slots or grooves of the correct shape to receive the projections, with results as before. Such a cam is illustrated in Figure 8.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:

1. A click stop device comprising a member to be adjusted, an adjusting element, a rotatable shaft connecting said member to said element, a plurality of ring members mounted for rotation about said shaft and each having in the periphery thereof one part of a stop means, separate means each carrying the other part of said stop means adapted to engage the stop means in the periphery of one ring member, and a plurality of means associated with the adjusting knob, each associated with a ring member and adapted to fix relatively to the shaft and against rotation independently thereof, the ring member with which it is associated.

2. A device as claimed in claim 1 wherein the cooperating parts of the stop means associated with each ring member comprises a detent and a notch which upon coming into engagement one with the other arrests the rotary movement of said rotatable shaft at different angular positions which are determined by the respective ring members.

3. A device as claimed in claim 1 wherein said ring members are mounted for free rotation side by side upon a hub carried by the shaft, means being provided whereby to fix said ring members in desired positions relatively to said hub.

4. A device as claimed in claim 1 wherein said other part of the stop means comprises a multiple, parallel movement, spring click arrangement which consists of a mounting block to which are attached a plurality of substantially U-shaped springs, each spring being provided, in one leg of the U adjacent the disc periphery, with a V-shaped kink.

5. A device as claimed in claim 1 wherein said other part of the stop means comprises a multiple-parallel movement, spring click arrangement which consists of a mounting block to which are attached a plurality of substantially U-shaped springs, the springs being mounted one over each disc and in such position relatively to their respective associated discs and being provided with a detent which is adapted to engage a notch in the periphery of its associated disc.

6. A device as claimed in claim 1 wherein each ring member is mounted for free rotation on a rotatable hub and over a radially disposed hole extending for a suitable distance into said hub and accommodating a locking member, there being associated with each locking member manually adjustable means for forcing said member outwardly of said hole into locking engagement with the disc situated over the accommodating hole.

7. Tuning control mechanism for adjusting to predetermined positions the tuning member of radio apparatus, comprising a shaft connected to the tuning member, a hub carried by the shaft, a plurality of ring members carried on the periphery of the hub each capable of independent rotary adjustment to a position corresponding to one of the predetermined positions of the tuning member, separate means associated with each of the ring members adapted to lock the respective ring members to the hub in adjusted position, stop means, and means provided at the periphery of each disc for cooperation with the stop means upon rotation of the shaft for arresting the tuning member at said predetermined positions.

8. Tuning control mechanism for adjusting to predetermined positions the tuning member of radio apparatus, comprising a shaft connected at one end to the tuning member, a hub carried by the shaft at the other end, a plurality of ring members loosely mounted on the periphery of the hub each capable of independent rotary adjustment to a position corresponding to one of the predetermined positions of the tuning member, separate locking means associated with each of the ring members adapted to affix the respective ring members to the hub in adjusted position, stop means, and means provided at the periphery of each disc for cooperation with the stop means upon rotation of the shaft for arresting the tuning member at said predetermined positions.

9. Tuning control mechanism for adjusting to predetermined positions the tuning member of radio apparatus, comprising a shaft connected at one end to the tuning member, the other end of said shaft extending through a panel of the apparatus, a hub carried by said other end of the shaft, a plurality of ring members loosely mounted on the periphery of the hub each capable of independent rotary adjustment to a position corresponding to one of the predetermined positions of the tuning member, separate locking means associated with each of the ring members adapted to affix the respective ring members to the hub in adjusted position, a manual control member affixed to the hub and serving also as an enclosure for the ring members, stop means, and means provided at the periphery of each disc for cooperation with the stop means upon rotation of the shaft for arresting the tuning member at said predetermined positions.

10. Tuning control mechanism as defined in claim 9 wherein the hub is provided with a plurality of tapped bores of varying depth, extending in the direction of the shaft and circularly arranged around the shaft, the hub also being provided directly underneath the inner periphery of each ring member with an opening which communicates with one of the tapped bores at its closed end, a member adapted to be set in each of the latter openings, and a screw adapted to be received in each of the bores and when screwed home is adapted to lock the individual ring members to the hub.

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