June 8, 1948. M. G. BEIER 2,443,020

CONTACTOR FOR INDUCTIVE TUNERS

Filed March 11, 1947

Fig. 1

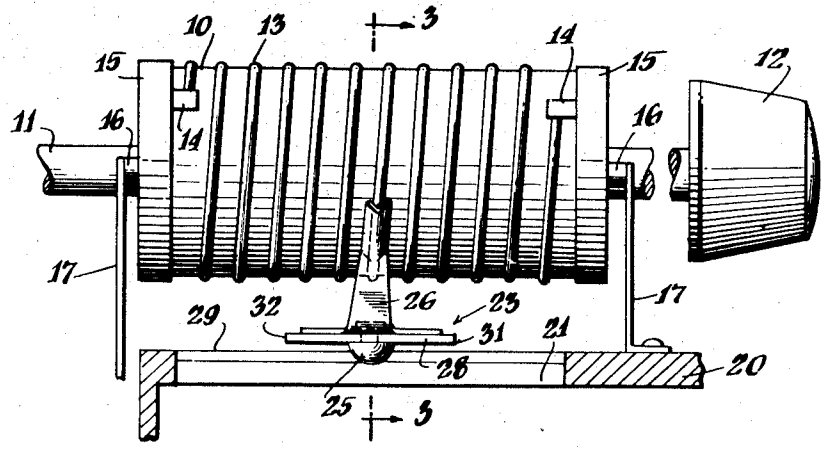


Fig. 2

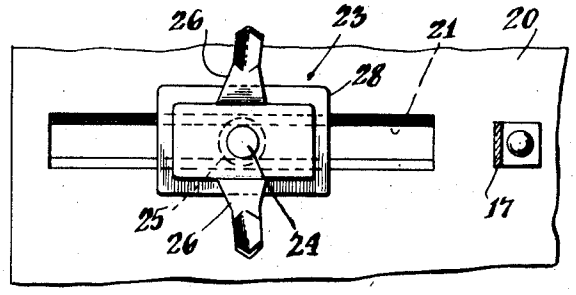
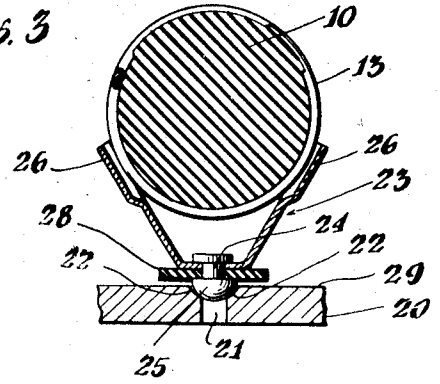


Fig. 3



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CONTACTOR FOR INDUCTIVE TUNERS

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7 Claims. (Cl. 171—777)

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This invention relates to inductance tuning devices and, more particularly, to a contactor assembly for such tuning devices.

Heretofore, inductance tuning devices have ordinarily comprised a helical coil or bare wire wound upon a rotatable coil form. This coil was engaged by a conductive nib on a contactor assembly which was slidable longitudinally in response to rotation of the coil. In this manner, the contact nib moved along the coil thereby changing the inductance thereof to vary the resonant frequency of a circuit with which the tuning device was associated. Considerable difficulty has been experienced in providing a suitable contactor for such tuning devices. It is necessary that such contactors be maintained in engagement, at all times, with the coil and that a uniform pressure be maintained on the coil by the contactor. Frequently, variations in contact pressure due to irregularities in the coil have caused momentary loss of contact with resultant noise and other disturbances in the set with which the tuner is utilized. Further difficulties have been experienced in providing an effective contact between the contactor assembly and the trolley rod or other guide along which the contactor assembly slides as the coil is rotated. Where an ordinary sliding contact is used, an accumulation of dust or dirt along the trolley surface frequently causes poor contact with resultant noise and instability.

It is an object of this invention to provide a contactor assembly which maintains a uniform pressure on the coil at all times despite irregularities in the construciton of the coil.

It is a further object of the invention to provide a single pressure contact between the contactor assembly and the trolley guide along which the contactor slides thereby effecting high contact pressure and quiet operation of the device.

It is a still further object of the invention to provide a contactor assembly which automatically compensates for slight changes in the pitch of the coil.

It is also within the contemplation of the invention to provide a contactor in which chatter is prevented with resultant elimination of audible noise in radio sets and visual noise in television receivers.

It is another object of the invention to provide an inductance tuner which is compact, easily constructed, reliable in operation, and economical to manufacture.

Other objects of the invention will be apparent from the following description and accompanying drawings taken in connection with the appended claims.

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The invention accordingly comprises the features of construction, combination of elements, arrangement of parts, and methods of manufacture referred to above or which will be brought out and exemplified in the disclosure hereinafter set forth, including the illustrations in the drawings, the scope of the invention being indicated in the appended claims.

For a fuller understanding of the nature and objects of the invention as well as for specific fulfillment thereof, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a front elevational view, partially in section, of a tuning device embodying the novel contactor;

Figure 2 is a plan view of the contactor assembly and the trolley guide; and

Figure 3 is a sectional view taken along the line 3—3 of Figure 1.

While a preferred embodiment of the invention is described herein, it is contemplated that considerable variation may be made in the method of procedure and the construction of parts without departing from the spirit of the invention. In the following description and in the claims, parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

Referring now to the drawings in detail, the tuning device may comprise a cylindrical coil form 10 mounted upon a shaft 11 which is journaled in suitable bearings, not shown, so that the coil form may be rotated, as by a control knob 12. A coil 13, preferably of bare wire and having a helical configuration, is wound on the form 10 and, at each end thereof, the coil is connected to a lug 14 which contacts an end cap 15. Each cap is formed of conductive material and is engaged by a contact member 16 which is mounted upon a finger 17. It will be understood that the contact fingers 17 constitute the terminals of the coil 13 and may be connected in an electrical circuit in any suitable manner.

A trolley guide 20 is spaced from the coil 13 and a longitudinal slot 21 is formed in the trolley guide for slidably receiving a contactor assembly in the manner hereinafter described. It will be seen that the upper portions of the slot are curved or rounded, as indicated at 22.

A contactor assembly 23 is slidable along the groove 21 and this contactor assembly comprises

a rivet type contact button 24 having a lower spherical portion 25 which is of slightly smaller radius than the arcuate surfaces 22 of the groove. Mounted on the shank of the contact button 24 is a generally U-shaped contactor member having a pair of resilient nibs 26, 26 which engage the coil 13 at two spaced positions thereon. It will be seen in Figure 1 that the nibs 26 are inclined with respect to the surface of the trolley guide at an angle determined by the pitch of the coil 13. Also mounted on the shank of contact button 24 is a flat plate 28 of insulating material which is closely spaced and parallel to the upper surface 29 of the trolley guide 20 and this insulating plate extends beyond the sides of the groove 21.

It will be observed that the contactor assembly 23 is slidable along the groove 21 and also that the engagement of the spherical portion 25 with the groove permits a rocking motion of the contactor assembly which is limited by the engagement of the insulating member 28 with the surface of the trolley guide. Accordingly, when the coil is rotated in a counterclockwise direction, Figure 1, as viewed from the right, to change the inductance of the tuning unit, the end portion 31 of plate 28 engages the trolley guide and remains in engagement therewith as the contactor assembly moves toward the right, Figure 1. When the coil is turned in a clockwise direction, Figure 1, the contactor assembly rocks longitudinally with the result that the end portion 32 of insulating plate 28 engages the surface of the trolley guide and remains in engagement therewith as the contactor assembly is moved toward the left, Figure 1. Accordingly, the contactor assembly is continuously maintained in a stable position by the engagement of the spherical portion 25 with the track and, when the plate 28 is rocked, one end thereof engages the upper surface 29 of the trolley guide.

In all positions of the contactor throughout the tuning range the spherical contact portion 25 is urged into engagement with the surfaces 22 by the downwardly directed pressure of the resilient nibs 26. Accordingly, there is only one point of electrical contact between the contactor and the trolley guide with the result that the noise produced by the engagement and disengagement of several sets of contact surfaces is avoided. Positive engagement of the contactor assembly is insured by the fact that the radius of the spherical portion 25 is less than that of the curved surfaces 22 so that these parts remain in engagement during the described rocking motion of the contactor assembly. Further, due to the spherical shape of the nib contact, the assembly may rotate to a limited extent to compensate for changes in the pitch of the coil in different parts of the tuning range. It will be understood that such motion does not affect the setting of the tuning device which is dependent only upon the position of the nibs 26 on the coil. Consequently, the tuner may be accurately reset to a given position in the tuning range regardless of the direction from which such position is approached. It will also be apparent that differences in contact pressure between the nibs 26 is compensated for by a transverse rocking movement of the contactor assembly about an axis approximately parallel to that of the groove 21 without either side of the insulating plate 28 touching the upper surface 29 of the trolley guide. This compensation also aids in effecting smooth noiseless operation of the tuner.

Highly successful results have been obtained when the coil 13 is formed from a silver base alloy containing more than 85% silver and optimum results have been noted when the silver base alloy contains about 7.5% copper. The contact button may be advantageously formed from an alloy containing 87% silver, 8% copper and 5% cadmium. Small amounts of impurities of the iron group metals appear to have no deleterious effect when used in the contact button.

While the present invention, as to its objects and advantages, has been described herein as carried out in specific embodiments thereof, it is not desired to be limited thereby but it is intended to cover the invention broadly within the spirit and scope of the appended claims. Thus, the contact button 24 may be located adjacent either end 31, 32 of the contactor rather than in the middle, as shown. If the contact button is disposed near the end portion 31, for example, the contactor assembly is at all times supported by the spherical portion 25 and the end portion 32 of plate 28 which engages the surface 29 of the trolley guide. This construction is advantageous in providing a tuner which may be accurately reset to a predetermined frequency.

What is claimed as new and desired to be secured by Letters Patent is:

1. In an inductance tuning device, a rotatable coil form, a coil wound on said form, a trolley guide having a longitudinal groove therein with arcuate sides, and a contactor comprising a pair of nibs for engaging spaced portions of said coil together with a contact button having a rounded portion which is adapted to slide against the arcuate sides of said groove whereby the contactor is adapted for rocking motion with respect to said trolley guide, and means including a member mounted on said contactor and engageable with said trolley guide upon rocking motion of the contactor for limiting the rocking motion of said contactor.

2. In an inductance tuning device, a rotatable coil form, a coil wound on said form, a trolley guide having a longitudinal groove therein with arcuate sides, and a contactor comprising a pair of nibs for engaging spaced portions of said coil together with a contact button having a rounded portion which is adapted to slide against the arcuate sides of said groove whereby the contactor is adapted for rocking motion with respect to said trolley guide, and means for limiting the rocking motion of said contactor including a flat insulating member closely spaced and parallel to the surface of said trolley guide.

3. In an inductance tuning device, a rotatable coil form, a bare wire helical coil wound on said form, a rivet type contact button having a spherical head portion and a shank portion, a flat insulating member and a contactor member secured on said shank, said contactor member having a pair of resilient nibs for engaging said coil at two spaced positions thereon, a trolley guide having a longitudinal groove therein for receiving the spherical portion of said contact button, said groove having arcuate sides of slightly greater radius than said spherical portion whereby the resiliency of said nibs forces said spherical portion into positive engagement with said groove.

4. In an inductance tuning device, a rotatable coil form, a bare wire helical coil wound on said form, a trolley guide of conductive material having a longitudinal groove formed therein which has arcuate side portions, and a contactor com-

prising a contact button which is adapted to slide in said groove, a member having a pair of nibs for engaging said coil at two spaced positions thereon, and a flat insulating member which is normally parallel to said trolley guide, said nib member and said insulating member being secured on the shank of said contact button whereby, when the contactor is moved in one direction, the trolley guide is engaged by the contact button and one end of the insulating member and, when the contactor is moved in the opposite direction, the trolley guide is engaged by the contact button and the other end of said insulating member.

5. In an inductance tuning device, a rotatable coil form, a bare wire helical coil wound on said form, a trolley guide having a longitudinal groove therein with rounded surfaces at the upper part of the groove, and a contactor comprising a pair of resilient nibs for engaging portions of said coil together with a contact button having a spherical portion which is adapted to slide against the rounded surfaces of said groove, said rounded surfaces being of slightly greater radius than the radius of said spherical portion whereby, as the spherical portion slides along said groove, it is, at all times, forced into positive engagement with said rounded surfaces by the resiliency of said nibs, said contactor thereby being adapted for rocking motion with respect to said trolley guide, and means for limiting the rocking movement of said contactor including a flat insulating member closely spaced and parallel to the surface of said trolley guide.

6. In an inductance tuning device, a rotatable coil form, a bare wire helical coil wound on said form, a trolley guide of conductive material having a longitudinal groove formed therein which has arcuate side portions, and a contactor comprising a pair of nibs which are adapted to engage said coil at two spaced positions thereon, a contact button having a spherical portion which is adapted to slide along the arcuate sides of said groove whereby the contactor is adapted for rocking movement with respect to the trolley guide, and a flat plate of insulating material

closely spaced and parallel to the surface of said trolley guide, one end of said plate engaging the trolley guide surface when the contactor is moved in one direction, and the other end of said plate engaging the trolley guide surface when the contactor is moved in the opposite direction thereby to limit the endwise rocking movement of said contactor, the sides of said insulating member extending beyond said groove thereby to permit the contact to rock transversely to a limited extent responsive to irregularities in the winding of said coil.

7. In an inductance tuning device, a rotatable coil form, a bare wire helical coil wound on said form, a trolley guide having a longitudinal groove therein with rounded surfaces at the upper part of said groove, and a contactor comprising a pair of resilient nibs for engaging spaced portions of said coil, said nibs being inclined with respect to the surface of said trolley guide at an angle determined by the pitch of said coil, a contact button having a spherical portion which is adapted to slide along the rounded surfaces of said groove, the radius of said rounded surfaces being slightly greater than the radius of said spherical portion, whereby the spherical portion slides along the groove and is forced into positive engagement with the rounded surface by the resiliency of said nibs, said contactor being adapted for rocking motion with respect to said trolley guide, and means for limiting the rocking movement of said contactor including a flat insulating member closely spaced and parallel to the surface of said trolley guide.

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The following references are of record in the file of this patent:

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