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VARIABLE SPIRAL INDUCTANCE COIL

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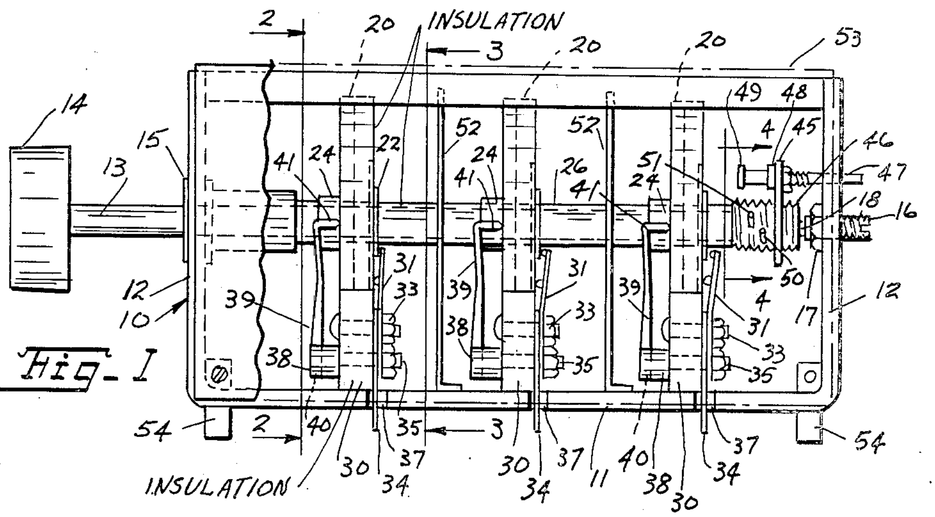

Fig. 1

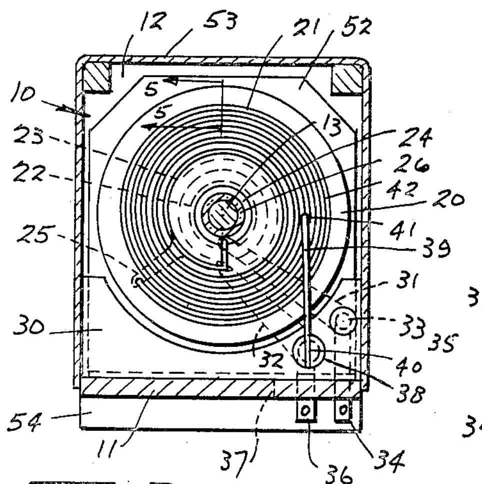

Fig. 2

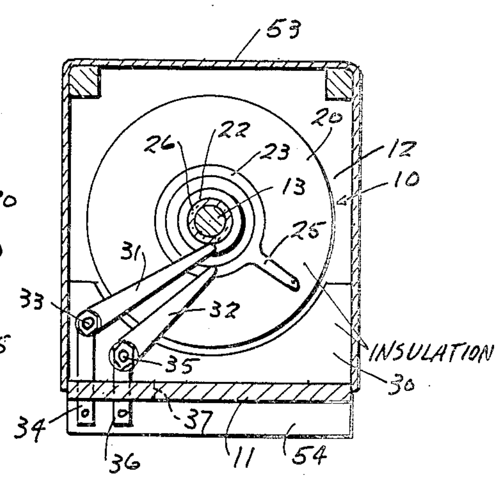

Fig. 3

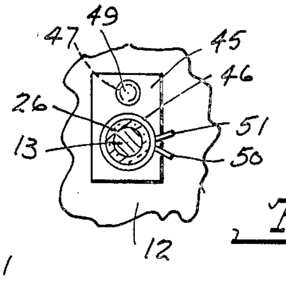

Fig. 4

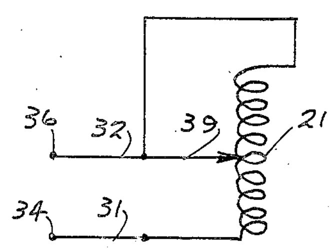

Fig. 6

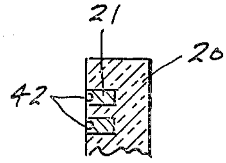

Fig. 5

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VARIABLE SPIRAL INDUCTANCE COIL

Hyman Ginsburg, Brooklyn, N. Y.

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2 Claims. (Cl. 171—242)

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This invention relates to new and useful improvements in variable inductance tuners, and has more particular reference to a tuner of this type having a spiral inductance coil.

In order to secure maximum noise free operation from a variable inductance tuner it is necessary to reduce to a minimum the number of moving parts which make contact with each other. This invention particularly proposes to provide a contact arm fixedly mounted and flexible in order to flex when a follower contact element on the contact arm moves to different positions along the spiral contact coil of the tuner. This construction avoids the use of telescopic contact arms, rack type of contact arms, and other similar contact arms which have more moving parts than the tuner herein proposed.

This invention also has for an object the provision of means for limiting turning of the spiral inductance contact coil in one direction and the other in order to avoid flexing the flexible contact arm too far which may cause injury by passing its elastic limit.

Another object of the invention is the construction of a device as described which is simple and durable and which may be manufactured and sold at a reasonable cost.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawing, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawing forming a material part of this disclosure:

Fig. 1 is an elevational view of a variable inductance tuner having a group of spiral inductance contact coils and constructed in accordance with this invention.

Fig. 2 is a transverse vertical sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a fragmentary sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is a fragmentary enlarged vertical sectional view taken on the line 5—5 of Fig. 2.

Fig. 6 is a schematic wiring diagram of the device.

The new variable inductance tuner having one or more spiral inductance contact coils, in accordance with this invention, includes a support 10 formed from a sheet of aluminum and having a base wall 11 and end walls 12. A shaft 13 is turnably mounted on said support 10, particular-

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ly, between the end walls 12. The outer end of the shaft 13 is provided with a knob 14 by which it may be turned. The shaft 13 passes through a bearing 15 mounted on one of the end walls 12. The other end wall 12 is provided with an adjustment screw 16 threadedly engaged therethrough and held in fixed positions by a locking nut 17. A small ball bearing 18 is interposed between the end of the shaft 13 and the adjustment screw 16.

A plurality of insulation elements 20 are mounted on and about the shaft 13 and each is provided with and supports a spiral inductance contact coil 21 coaxially of said shaft 13. Specifically, these insulation elements 20 are in the nature of "Lucite" discs, or discs formed of other insulation material. Each insulation element 20 is provided with a pair of contact rings 22 and 23 coaxially of said shaft 13 and mounted on said insulation element 20 and respectively connected with the ends of said spiral inductance contact coil 21.

In the particular design of these parts illustrated, the inductance contact coil 21 is in the form of a wire strip bent into spiral form and embedded in a corresponding groove formed in one face of the insulation element 20, see Fig. 5. The pair of contact rings 22 and 23 are mounted on the other face of said insulation element 20. The inner end of the inductance contact coil 21 connects with a metal collar 24 which connects with the ring 22. The outer end of the inductance contact coil 21 engages through the insulation element 20 and connects with an arm 25 which in turn is connected with the ring 23. The shaft 13 is provided with an insulation tube 26 which extends through the collars 24 for insulating them and the rings 22.

For each insulation element 20 there is an insulation member 30 mounted upon the base wall 11 of the support 10. Each insulation member 30 is in the nature of a "Lucite" block or a block of other insulation material. Each insulation member 30 extends beneath and closely adjacent to one of the insulation elements 20. A pair of contact arms 31 and 32 is fixedly mounted on each insulation member 30 and respectively engage said pair of contact rings 22 and 23 of the cooperating insulation element 20. The contact arms 31 are held in position by bolts 33 which also support terminals 34. The contact arms 32 are held in position by bolts 35 which support terminals 36. The terminals 34 and 36 pass through slots 37 formed in the base wall 11. Each bolt 35 is provided with an enlarged head 38. A shunt contact arm 39 is fixedly mounted on each of the enlarged heads 38. These shunt contact arms 39 electrically connect with the contact arms 32. The enlarged heads 38 are formed with slots 40 through which the inner ends of the contact arms 39 engage.

Follower elements 41 and 42 are respectively provided upon the outer ends of the shunt contact arms 39 and inductance contact coils 21 and are cooperative with each other for maintaining the contact of said shunt contact arms 39 with said spiral inductance contact coils 21. The follower elements 41 are merely in the form of pointed ends engaging the follower elements 42 which are in the form of grooves formed in the edges of the strips forming the inductance contact coils 21, see Fig. 5. Said shunt contact arms 39 are formed of flexible material in order that they may flex when said follower elements 41 and 42 maintain contact for all turned positions of the shaft 13.

The shunt contact arms 39 are substantially tangential to the points of contact of the shunt contact arms 39 with said spiral inductance contact coils 21, for example, see Fig. 2. The inner ends of the shunt contact arms 39 are located approximately midway between the outer and inner turns of said spiral inductance contact coils 21.

Means is provided for limiting turning of said shaft 13 in order to limit flexing of said shunt contact arms 39. This means includes a follower member 45 threadedly engaging upon a threaded section 46 on said shaft 13. A pin 47 is fixedly mounted on the follower member 45 and is disposed parallel to the axis of said shaft 13 and slidably engages in and through an opening formed in the end wall 12 of said support 10. Said pin 47 is provided with a pair of spaced flanges 48 and 49. Stop pins 50 and 51 are radially mounted on the threaded portion 46 of the shaft 13 and are engageable respectively with said spaced flanges 48 and 49 to limit turning of said shaft 13. These stop pins 50 and 51 may be bent laterally so as to engage sooner or later with the flanges 48 and 49 in order to control the number of turns which the shaft 13 may make before it is stopped.

Aluminum shields 52 are mounted between adjacent spiral inductance coils 21 to shield them. An aluminum cover 53 is mounted around the support 10. The base wall 11 is provided with a pair of end strips 54 to hold it in an elevated position when rested upon a flat surface so as to make room for the terminals 34 and 36.

In Fig. 6 a schematic wiring diagram has been shown of one of the spiral inductance coil tuners. From this diagram it should be noted that the contact arms 31 and 32 are connected in series with the spiral inductance contact coil 21 and the shunt contact arm 39 connects with one of said contact arms, namely, the contact arm 32 and works across the inductance contact coil 21 so as to short a section thereof.

The operation and use of the variable inductance tuner may be understood from the following:

The knob 14 may be turned so as to rotate the insulation elements 20 and cause the shunt contact arms 39 to engage different points along the spiral inductance contact coils 21. The shaft 13 may be turned in one direction so that the shunt contact arms 39 travel to the inner ends of the spiral inductance contact coils 21, or in the other direction so that the shunt contact arms 39 travel to the outer ends of said spiral inductance contact coils 21.

When the shaft 13 is turned in one direction or the other the follower member 45 will move in one direction or the other along the threaded section 46 of the shaft 13. This moves the pin 47 to a position in which either the stop pin 50 or the stop pin 51 strikes the flange 48 or the flange 49, respectively, to limit turning of the shaft 13. This stop is necessary so that the shunt contact arms 39 are not flexed too far. However, the parts are so designed that the shunt contact arms 39 may reach short distances from the inner and outer ends of the spiral inductance contact coils 21.

The new variable inductance tuner is particularly intended for television tuning, though it may be used for other purposes. The device exhibits a substantially straight line frequency characteristic when varied. When used for television it is useful in spreading the spacing of the television stations at one end or the other end of the transmitting bands so as to avoid congestion. With other types of variable inductance coils the stations of channels 7 to 13 are very close together. This new variable inductance coil device can be used to spread them.

While I have illustrated and described the preferred embodiment of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. In a variable inductance tuner having a spiral inductance contact coil, a support, a shaft turnably mounted on said support, an insulation element mounted on and about said shaft and having a face at right angles to the axis of said shaft, said insulation element being provided with and supporting said spiral inductance contact coil coaxially of said shaft and upon said face, a pair of contact rings coaxially of said shaft and mounted on said insulation element and respectively connected with the ends of said spiral inductance contact coil, an insulation member mounted on said support, a pair of contact arms fixedly mounted on said insulation member and respectively engaging said pair of contact rings, a shunt contact arm fixedly mounted and insulated at its inner end and positioned slightly spaced from said face of said insulation element and electrically connected with one of said contact arms, follower elements on the end of said shunt contact arm and on said inductance contact coil and extending towards each other and cooperative with each other for maintaining the contact of said shunt contact arm with said spiral inductance contact coil for all turned positions of said shaft, and said shunt contact arm being flexible in a plane parallel to said face of said insulation element in order to flex when said follower elements maintain contact for all turned positions of said shaft.

2. In a variable inductance tuner having a spiral inductance contact coil, a support, a shaft turnably mounted on said support, an insulation element mounted on and about said shaft and having a face at right angles to the axis of said shaft, said insulation element being provided with and supporting said spiral inductance contact coil coaxially of said shaft and upon said face, a pair

of contact rings coaxially of said shaft and mounted on said insulation element and respectively connected with the ends of said spiral inductance contact coil, an insulation member mounted on said support, a pair of contact arms fixedly mounted on said insulation member and respectively engaging said pair of contact rings, a shunt contact arm fixedly mounted and insulated at its inner end and positioned slightly spaced from said face of said insulation element and electrically connected with one of said contact arms, follower elements on the end of said shunt contact arm and on said inductance contact coil and extending towards each other and cooperative with each other for maintaining the contact of said shunt contact arm with said spiral inductance contact coil for all turned positions of said shaft, said shunt contact arm being flexible in a plane parallel to said face of said insulation element in order to flex when said follower elements maintain contact for all turned positions of said shaft, and means for limiting turning of

said shaft in order to limit flexing of said shunt contact arm, comprising a follower member threadedly engaging a threaded section of said shaft, a pin fixedly mounted on said follower member parallel to the axis of said shaft and slidably engaging in an opening in said support, said pin having longitudinally spaced flanges, and stop pins radially mounted on said shaft and engageable with said spaced flanges at the limits of turning of said shaft.

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