Dec. 3, 1946. F. H. OWENS 2,411,891

RADIO CONTROL APPARATUS

Filed Aug. 19, 1943 2 Sheets-Sheet 1

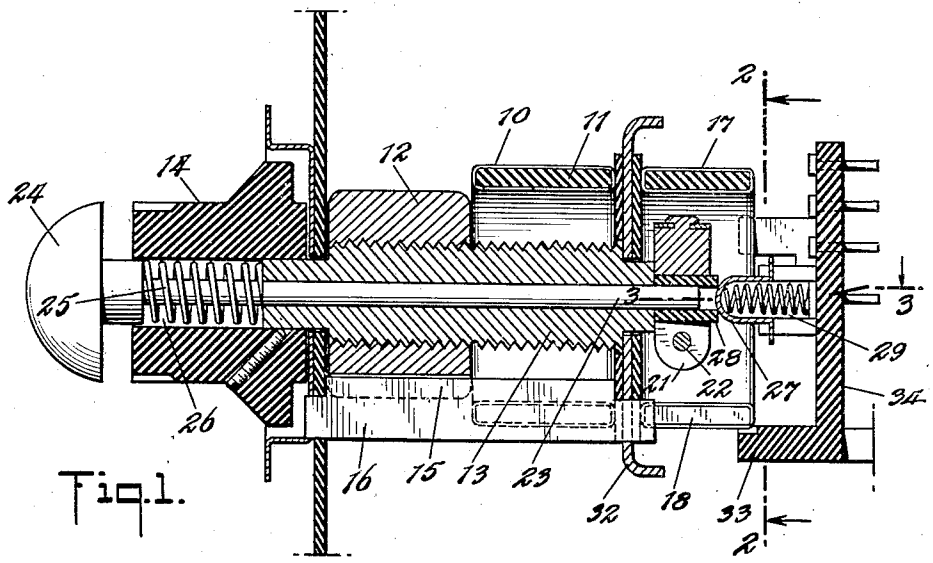


Fig. 1.

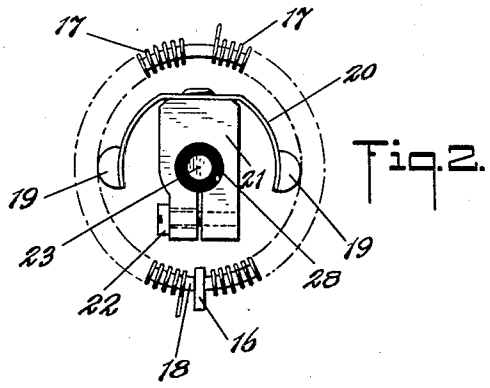


Fig. 2.

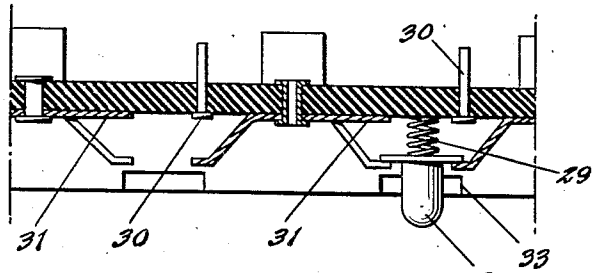


Fig. 3.

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Filed Aug. 19, 1943 2 Sheets-Sheet 2

Fig. 4.

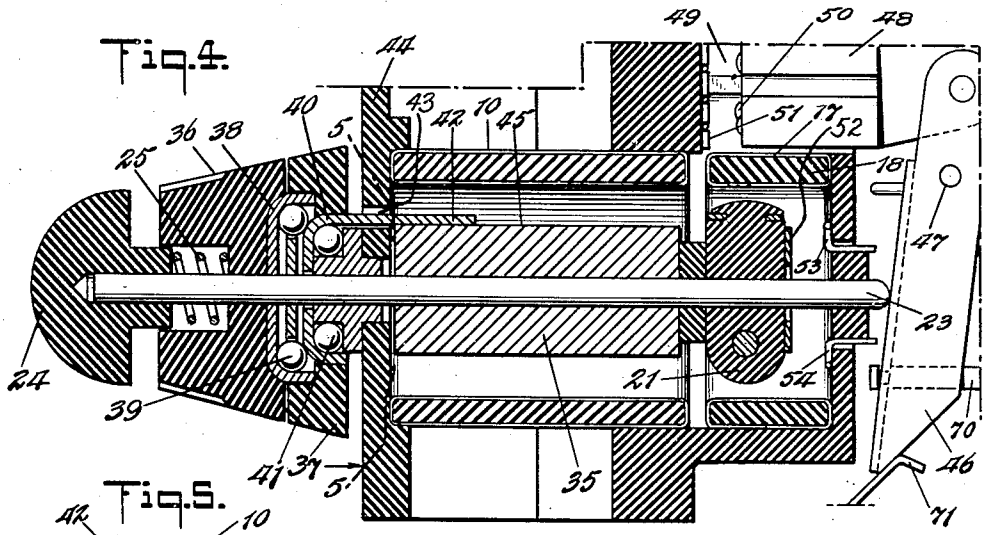
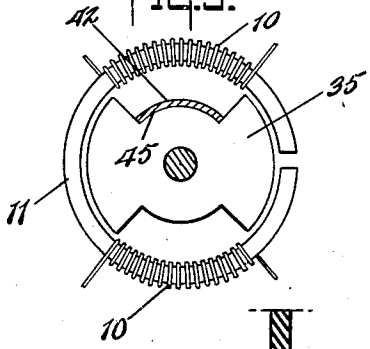


Fig. 5.



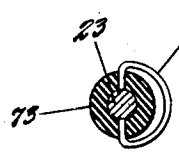


Fig. 2.

Fig. 6.

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UNITED STATES PATENT OFFICE

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RADIO CONTROL APPARATUS

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Application August 19, 1943, Serial No. 499,295

11 Claims. (Cl. 250—20)

1

The invention here disclosed relates to mechanism for adjusting and controlling radio apparatus. The several forms of the invention are divisions from inventions disclosed and claimed in co-pending patent applications, Serial No. 397,504, filed June 10, 1941, Patent No. 2,337,568, issued December 28, 1943, Serial No. 450,449, filed July 10, 1942, Serial No. 465,155, filed November 10, 1942, and Serial No. 484,934, filed April 28, 1943, Patent No. 2,353,186, issued July 11, 1944. This application is a continuation-in-part of each of said parent applications.

Objects of the invention are to provide a unit for tuning, volume control and other related purposes, which will occupy but small space, be inexpensive and practical from the commercial standpoint and be accurate, reliable and otherwise desirable for the user.

A special object of the invention is to combine the several control elements of the unit so that they may be quickly, easily and conveniently operated all by the fingers of one hand.

Other desirable objects attained by the invention will appear as the specification proceeds.

The novel features and combinations through which the purposes of the invention are realized are set forth in the specification, broadly covered in the claims and illustrated by way of practical example in the accompanying drawings. It is realized, however, that actual physical structure may be modified and changed in various ways, all within the true intent and broad scope of the invention. The illustration, therefore, is to be taken primarily by way of disclosure and not by way of limitation, actual scope of the invention being as hereinafter claimed.

Fig. 1 is a broken longitudinal sectional view of one of the combined tuning, volume control and switch units.

Fig. 2 is a transverse view, showing particularly the volume control, as on substantially the plane of line 2—2 of Fig. 1.

Fig. 3 is a broken horizontal sectional view of a portion of the manual switches as on substantially the plane of line 3—3 of Fig. 1.

Fig. 4 is a broken longitudinal sectional view of a micrometer form of tuner unit.

Fig. 5 is a cross sectional detail as on substantially the plane of line 5—5 of Fig. 4.

Fig. 6 is a broken longitudinal sectional view of another form of the tuner unit.

Fig. 7 is a transverse sectional detail on substantially the plane of line 7—7 of Fig. 6.

In Fig. 1 a compact tuner of the inductance or permeabiilty type is illustrated, comprising one

2

or more windings 10 wrapped about a strip of insulating material 11, bent or otherwise formed into a ring, for receiving a magnetic core 12. The latter is shown as engaged on and adjusted by a tubular screw 13 having a tuning knob 14 on the outer end of the same.

The magnetic core is shown as held against rotation by having a slotted portion 15 slidingly engaged over a guide strip 16 which also enters between the ends of and serves to hold the coil supporting strip 11 in place.

The volume control is shown as a pair of oppositely wound resistance coils 17 on a flat strip of insulating material 18 formed into the shape of a ring and supported at the back of the tuning coil in position for engagement at the inside by a pair of rubbing contacts 19 carried by an arched spring 20 on a split block 21 adjustably clamped at 22 on the inner end of a spindle 23 rotatably and slidably supported in the tubular screw 13.

A knob or button 24 on the outer end provides means for turning and pushing the spindle 23 and a spring 25 in the center cavity 26 of tuning knob 14 and between the back of center knob 24 and forward end of screw sleeve 13 serves to thrust the rotary push button assembly outwardly into the position shown in Fig. 1.

The mechanism to be actuated by the push button operation of spindle 23 is shown as a switch made up of a contact button 27 in line with and engaged by the insulating bushing 28 of the volume control, said contact being pressed forward by spring 29 and adapted when forced inward to bridge contacts 30, 31 for closing a circuit or circuits.

The unit described occupies but small space and a number of these units can be supported in close side by side relation to provide for a plurality of pre-tuned and pre-set volume controlled radio circuits, which can be selectively cut into operation automatically through a program selector such as disclosed in the applications above identified, or be selectively chosen at any time by simply pressing in one of the push buttons 24.

The coaxial, in-line disposition of the tuner, volume control and switch provides a particularly compact, space saving and sturdy form of construction and one which is readily understood and easily and conveniently operated by the user. The parts are simple and few and inexpensive to manufacture and assemble.

The core guiding and coil supporting strip 16 is shown as extending through the supporting partition 32, into position to enter between the

ends of the volume control supporting ring 18, thus to hold and either partly or wholly support the volume control coils. In addition, these coils may be supported by resting on a shelf portion 33 of the insulating back plate 34 carrying the switch contacts.

The switch 27, 30, 31, etc., may control one or a number of circuits. In the patent applications (Serial Nos. 397,504 and 450,449), in which the first forms of the invention originated, the manually closed switch was utilized to effect operation of a magnet for closing the several circuits necessary for actuation of a radio receiver tuned to a selected broadcasting or transmitting station.

In the form of the invention illustrated in Figs. 4 and 5, tuning is effected by rocking a segmental or H-form of core 35 one way or the other within the winding or windings 10.

For purposes of fine adjustment, a micrometer type of control is illustrated in the form of a vernier knob 36 in front of the direct acting knob 37 and carrying an outer ball race 38 containing balls 39 bearing on an innner race member 40 supported on an inside row of balls 41 and having a tongue 42 extending through an arcuate slot 43 in the front panel 44 into engagement over the reduced diameter portion 45 of the core.

The inner knob 37 being fixed to the inner race member 40, enables quick and more or less coarse adjustments of the core while the outer knob 39 through the ball race reduction provides for finer tuning adjustments.

The core 35 is shown as freely supported on spindle 23 so as not to interfere with the rotary volume control or longitudinal switch operating movements of such spindle.

In the form of the invention last described and in the one following, the push button operation of the spindle is utilized to directly close a switch, as in the first form, and in addition, to actuate a rocker for other switch closing purposes.

The rocker is shown in the form of a lever 46 pivoted at 47 in position to be engaged by spindle 23 and pivotally connected with a switch block 48 slidingly guided at 49 and carrying contacts 50 for cooperation with stationary switch contacts 51. These switch contacts may be sufficient to control all necessary radio circuits for which the unit is tuned and volume controlled.

The direct operating switch comprises in this instance, a bridging contact 52 on the back of the volume control block 21 arranged to connect switch contacts 53, 54, which latter in the particular disclosure (patent application, Serial No. 465,155) in which this form of the invention originated, are connected with an "On" magnet for closing a necessary power circuit or circuits each time the manual is operated.

Instead of a separate tuner and volume control for each station, the tuning mechanism may be employed for determining the adjustment of a single tuner for all stations, with separate volume control and manual switch mechanism for each station, substantially as illustrated in Figs. 6 and 7.

In Fig. 6 the tuning adjustment is generally similar to that first disclosed in that the knob 14 turns a screw sleeve 13, but in this case the member shifted by the screw is a nut block 55 nonrotatably confined between the sides of a yoke 56 mounted for rocking adjustment on a pivot tube 57 and carrying an upstanding catch 58 for engagement by a stop lug 59 on the tuning yoke 60. The latter, as fully disclosed in the parent case, Serial No. 484,934, is in the nature of a universal bar pivotally mounted at its ends on the supporting tube 57 and carrying a series of lugs 59 for engagement by the catches 58 of yokes 56 which thus serve to stop the bar in different positions. The universal bar being connected with the movable element of the tuner, thus serves to set the tuner in the position desired for receiving a station selected by angular adjustment of a particular catch. In the patent application referred to, the universal bar 60 is swung forwardly by a magnet energized through switch contacts 59, 51 and is returned by spring power to the tuning position determined by the setting of the catch carrying yoke 56.

The nut block 55 is shown coupled to yoke 56 by having a notch 61 in the lower edge of the same engaged over a cross pin 62 connecting the lower side portions of such yoke.

The catch 58 which stops the tuning yoke is pivoted at 63 so that it may be swung up into an active position, as shown in Fig. 6, or lowered clear of the corresponding stop 59 on the tuning yoke and this positioning of the catch is determined in the illustration by a lever 64 pivoted at 65, having an upwardly angled forward end 66 disposed between rearwardly struck lugs 67 of the pivoted catch and having a cam slot 68 in its rearward end engaged by a pin 69 on the sliding switch block 48.

Thus, with the construction described, each time the magnet for operating the tuning yoke is energized and switch block 48 is advanced to close the circuit or circuits for bringing in a selected station, the lever 64 will be rocked by the cam action 68, 69 to raise the catch 58 into place where the cooperating stop lug 59 on the tuning yoke will engage that catch on the return movement of such yoke to leave the receiver tuned for that particular selected station.

The switch closing lever 46 is indicated as having a connection at 70 with the core of a station selecting solenoid and a yielding retainer bar is indicated at 71 which will hold such lever, whether it be actuated by a station selecting magnet or by direct push of spindle 23 and release any previously held lever.

The Fig. 6 form of tuning unit has incorporated in it additional switch means shown as a disc 72 on the front end of an insulating sleeve 73 slidingly engaged on spindle 23 and arranged to connect the terminals 74, 75 of the volume control windings 17, thus to serve as a muter switch when the manual is operated.

To cause the muter switch, at 72, 74, 75, to close ahead of the station selecting or "On" magnet switch at 52, 53, 54, the insulating sleeve 73 carrying the outer switch contact 72, is slidingly confined on the spindle 23 between the fixed support 21 and the inner end of screw sleeve 13 and a frictional drag is provided in the form of a C-shaped wire spring 76, Fig. 7, having inturned ends projecting through oppositely disposed openings in the sleeve 73 into frictional sliding engagement with the spindle.

Upon inward pressure on knob 24, the switch disc 72, traveling with spindle 23, will engage the volume control contacts 74, 75 before switch element 52 will engage contacts 53, 54 and with continued pressure on the knob, the spindle 23 will slide through sleeve 73 to carry the fixed support 21 the necessary further inward movement to close the inner switch 52, 53, 54.

When pressure on the knob is released, spindle 23 will be retracted by spring 25 to substantially simultaneously open both switches 52, 72 and the

loose, frictionally carried sleeve 73 will be restored to its original position by engagement with the inner end of screw sleeve 13, the spindle continuing its outward movement until the fixed switch block 21 comes against the inner end of sleeve 73. Thus, by the combined action of the fixed and loose switch members, the spindle is stopped at the outward limit of its movement, after restoring the movable switch plate 72 to the position where it will close the muter circuit in advance of the closing of the magnet circuit or circuits.

What is claimed is:

1. Radio control apparatus comprising a tubular support, a control spindle rotatable and slidable through said support, a sleeve slidably engaged on said spindle at the inner end of said support, a switch block fixed on said spindle at the inner end of said sleeve, control switch contact means engageable by said switch block upon inward thrust of said spindle, a switch member on said slidable sleeve, cooperable muting switch elements engageable by said member on inward movement of said spindle in advance of cooperation of said switch block with said first-mentioned switch contact means, said sleeve being engageable by said switch block upon outward movement of said spindle and engageable at its outer end with the inner end of said tubular support and spring means for yieldingly holding said spindle in outward position with the end of said sleeve so engaged with the inner end of said tubular support.

2. Radio control apparatus comprising a tubular support, a control spindle rotatable and slidable through said support, a sleeve slidably engaged on said spindle at the inner end of said support, a switch block fixed on said spindle at the inner end of said sleeve, control switch contact means engageable by said switch block upon inward thrust of said spindle, a switch member on said slidable sleeve, cooperable muting switch elements engageable by said member on inward movement of said spindle in advance of cooperation of said switch block with said first-mentioned switch contact means, said sleeve being engageable by said switch block upon outward movement of said spindle and engageable at its outer end with the inner end of said tubular support, spring means for yieldingly holding said spindle in outward position with the end of said sleeve so engaged with the inner end of said tubular support and a yielding frictional coupling between said sleeve and spindle.

3. In combination, a tuner having tubular screw and nut elements, a knob for rotatably adjusting said tubular screw, a spindle slidably and rotatably operable in said tubular screw, a knob for turning and pushing said spindle, a contact member carried by said spindle, a volume control winding engageable by said contact member, switch means operable by said spindle in the longitudinal movements of the same and including a relatively stationary contact and a cooperating contact carried by said spindle, said knobs being disposed in adjoining relation and a spring between said knobs for shifting said spindle in a direction to hold the switch contacts normally separated.

4. Radio control apparatus comprising a rotatably and slidably mounted control spindle, a switch closing member slidably engaged on said spindle, a switch element fixedly mounted on the spindle at the inner end of the slidably mounted switch member, control switch contact means engageable by said fixedly mounted switch element upon inward thrust of said spindle, stationary muting switch elements engageable by said slidably mounted switch member on inward movement of said spindle in advance of cooperation of said fixedly mounted switch element with said first-mentioned switch contact means, said spindle with said fixedly mounted switch element continuing its inward movement after the engagement and stopping of said slidably mounted switch member by said stationary switch elements, spring means for shifting said spindle in the reverse direction and a stop engageable by said slidably mounted switch element in the outward spring movement of said spindle to return said slidably mounted member back into its original relation with respect to said fixedly mounted switch element at the inner end of the same.

5. Radio control apparatus comprising a rotatably and slidably mounted control spindle, a switch closing member slidably engaged on said spindle, a switch element fixedly mounted on the spindle at the inner end of the slidably mounted switch member, control switch contact means engageable by said fixedly mounted switch element upon inward thrust of said spindle, stationary muting switch elements engageable by said slidably mounted switch member on inward movement of said spindle in advance of cooperation of said fixedly mounted switch element with said first-mentioned switch contact means, said spindle with said fixedly mounted switch element continuing its inward movement after the engagement and stopping of said slidably mounted switch member by said stationary switch elements, spring means for shifting said spindle in the reverse direction, a stop engageable by said slidably mounted switch element in the outward spring movement of said spindle to return said slidably mounted member back into its original relation with respect to said fixedly mounted switch element at the inner end of the same and a frictional drag connection between said spindle and slidably mounted switch member.

6. Radio control apparatus comprising a tuner having tubular screw and nut elements, a knob for rotatably adjusting said tubular screw, a spindle slidably and rotatably operable in said tubular screw, a knob for turning and pushing said spindle, a contact member carried by said spindle, a volume control winding engageable by said contact member, switch means operable by said spindle in the longitudinal movements of the same and including a movable switch element carried by the spindle and a relatively stationary element cooperable therewith, said knobs on the tubular screw and spindle being disposed in adjoining relation and a spring between the knobs for holding said spindle normally in position with the switch elements in separated relation.

7. Radio control apparatus comprising a rotatably and slidably mounted control spindle, a switch closing member slidably mounted on said spindle, a second switch closing member mounted on said spindle, control switch contact means engageable by said second switch closing member upon inward thrust of said spindle, stationary muting switch elements engageable by said slidably mounted switch closing member on inward movement of said spindle in advance of cooperation of said second switch closing member with the control switch contact means engageable thereby, said spindle with said second

switch closing member having continued inward movement after engagement of said slidably mounted switch closing member with said stationary muting switch elements, spring means for shifting said spindle in the reverse, outward direction and a stop engageable by said slidably mounted switch element in said outward spring movement of said spindle to return said slidably mounted member back into its original relation with respect to said second switch closing member.

8. Radio control apparatus comprising a tuner having a tubular element and a knob for rotatably adjusting the same, a spindle rotatably and slidably operable in said tubular element and provided with a knob for turning and pushing the same, a ring of insulating material supported about the inner end of said spindle, oppositely disposed resistance coils wound on said ring, a brush mounted on said spindle in position to bridge said resistance windings and to thereby cut resistance in and out with rotation of the spindle in opposite directions, companion switch elements at the end of said spindle and operable by the longitudinal movements of said spindle and a spring interposed between the knobs aforesaid for normally holding said spindle thrust outwardly in position for push actuation.

9. Radio control apparatus comprising a plunger, relatively stationary muter switch and power switch elements spaced longitudinally of said plunger, companion switch operating members on said plunger cooperative, respectively, with said muter switch and power switch elements and said members normally spaced on said plunger to effect operation of the muter switch in advance of the power switch in the movement of the plunger in one direction, spring means for thrusting the plunger in the opposite direction, means yieldingly mounting said muter switch member on said plunger to permit the

further movement of the plunger necessary to operate the power switch after operation first of the muter switch and means for automatically returning said muter switch member to its initial relation on the plunger in the movement of said plunger by said spring means.

10. Radio control apparatus of the character disclosed comprising a plunger, relatively stationary switch elements spaced longitudinally of said plunger, cooperating switch actuating members on said plunger and normally positioned to engage said relatively stationary switch elements, one in advance of the other, in the movement of the plunger in one direction said first engaging switch member being yieldingly mounted on said plunger to permit the further movement of the plunger necessary to effect the subsequent engagement of the other switch member with the other switch element, spring means for thrusting the plunger in the opposite direction and means for automatically restoring the yieldingly mounted switch member to its normal position on the plunger in the movement of the plunger effected by said spring means.

11. Radio control apparatus of the character disclosed comprising a rotary adjusting member of tubular construction, adjustable control means operable by said rotary adjusting member, a plunger rotatably and slidably operable in said rotary adjusting member, a volume control winding about the inner end of said plunger, a contact carried by said plunger in engagement with said volume control winding and adjustable over said winding in the rotary adjustment of said plunger, a switch closing lever pivotally mounted at the inner end of said plunger in back of said volume control winding and operably engageable by the end of said plunger in the inward sliding movements of the same and spring means for yieldingly thrusting the plunger in the opposite direction.

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