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OPERATOR FOR TUNING UNITS OF RADIO APPARATUS

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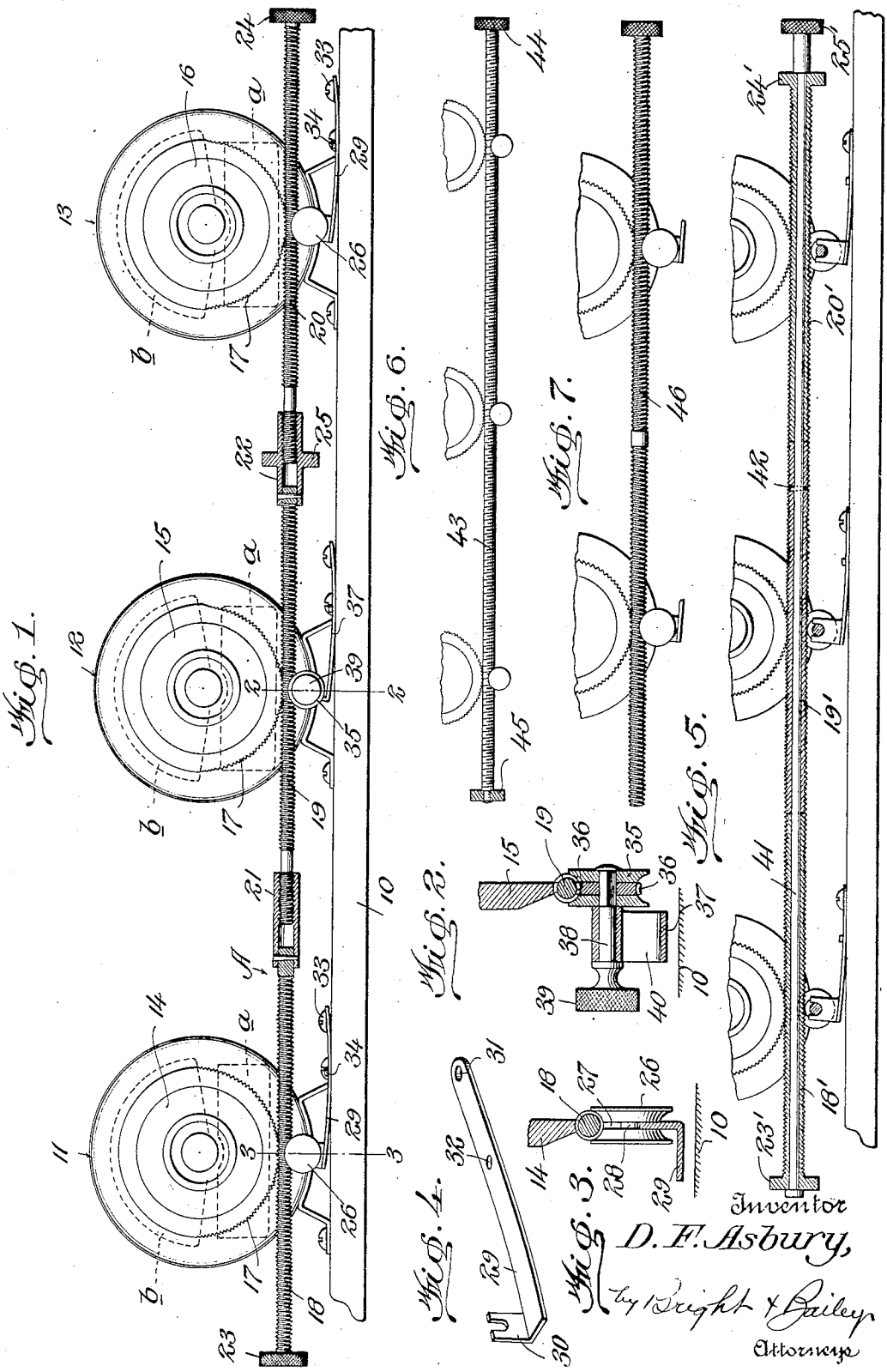


Fig. 1.

Fig. 6.

Fig. 7.

Fig. 5.

Fig. 2.

Fig. 4.

Fig. 3.

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OPERATOR FOR TUNING UNITS OF RADIO APPARATUS.

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My invention relates to operators for the movable parts of radio tuning units and my aim is to provide improvements in means for operating the movable parts of a plurality of tuning units simultaneously and individually for the purposes set forth in my prior applications serially numbered 683,756; 687,080 and 688,547, said improvements consisting primarily in simplifying the construction and mode of operation of said operating means, in providing positive driving connections between said means and the movable parts of said tuning units, and in providing a compact operating means of neat appearance that is inexpensive to produce and apply to radio apparatus of present well known commercial types, and that is thoroughly reliable and efficient in use.

My inventive idea is capable of embodiment in different mechanical structures, certain of which are illustrated in the accompanying drawings, but it is to be understood that the structures shown are merely intended as disclosures of the essential features and novel characteristics of my invention in certain preferred forms and that its scope is as defined in the appended claims.

In the drawings, wherein like characters of reference denote corresponding parts in the different views:

Figure 1 is an elevation of a portion of a radio receiving set showing a plurality of tuning units and a preferred form of my improved operating means associated therewith;

Fig. 2, a detail section on the line 2—2 of Fig. 1;

Fig. 3, a detail section on the line 3—3 of Fig. 1;

Fig. 4, a detail perspective of an element of the operating means shown in Fig. 1:

Fig. 5, a view similar to Fig. 1, partly in section, showing another form of my improved operating means;

Fig. 6, a view similar to Figures 1 and 5 showing a further form of my improved operating means; and

Fig. 7, a view similar to Figures 1, 5 and 6 showing still another form of my improved operating means.

Referring now to the drawings in detail, particularly to Figures 1 to 4 inclusive, it will be observed that I have illustrated in part a radio apparatus of well known commercial type including a base board 10 upon which is mounted a plurality of tuning units 11, 12 and 13, which latter may be of any preferred type, but which are herein illustrated, merely for the sake of convenience, as variable plate condensers each including a stator *a* and a rotor *b*, as shown and described in my aforementioned prior applications serially numbered 683,756; 687,080, and 688,547. Said tuning units are arranged abreast and their movable parts, rotors *b*, are provided, respectively, with dials or disks 14, 15 and 16, which dials or disks, in accordance with my invention, are provided either directly or indirectly with peripheral teeth 17 for a purpose that will presently appear.

My improved means for adjusting the rotors *b* collectively and individually through the instrumentality of the toothed dials or disks 14, 15 and 16 thereon consists, as shown in Figure 1, of an operator A composed of plural sections in the form of threaded rods 18, 19 and 20, connected together in end to end relation for relative longitudinal adjustment, and associated, respectively, with said dials or disks 14, 15 and 16 for driving the latter, the threads of said rods meshing with the teeth of said dials or disks whereby positive driving connections are provided between such parts.

The adjustable connection between rods 18 and 19 is produced in the present instance by affixing an internally threaded sleeve 21 to the inner end of rod 18 and engaging the adjacent externally threaded end portion of rod 19 therein, while a like connection is provided between the other end of rod 19 and the inner end of rod 20 by engaging the externally threaded inner end of rod 20 within a second internally threaded sleeve 22 affixed to the adjacent end of rod 19. This structural arrangement is preferred to provide threaded adjustable connections between the rods, but obviously such adjustable connections might be produced in various other ways.

Knobs or finger grip devices 23, 24 are provided on the outer ends of the rods 18 and 20, respectively, and a similar knob or hand grip device 25 is provided on sleeve 22, whereby, as will appear hereinafter, the sections 18, 19 and 20 may be longitudinally shifted collectively and rotated individually to impart, respectively, simultaneous and individual adjustments to the movable parts,

rotors *b* of the tuning units through the dials 14, 15 and 16.

For supporting the sections 18 and 20 in the operative relation shown with respect to dials or disks 14 and 16 and for guiding said sections and holding them against displacement with respect to said dials or disks during rotation of the sections and when they are collectively shifted, I have provided duplicate roller devices as illustrated in detail in Figures 3 and 4 of the drawings, while for similarly supporting and guiding sections 19 I have provided, as shown in Figure 2, a slightly different roller device which includes means for longitudinally shifting the sections 18, 19 and 20 collectively. In the premises, however, it is desired to point out that all of said section supports may be of the character illustrated in Figure 2 or of the character illustrated in Figure 3, or they may be any combination of the two different roller devices illustrated in said figures.

The device shown in Figures 3 and 4 consists of a roller 26 having a concave periphery providing a seat for the section of the rotatable and shiftable operator section that it is adapted to support, and beginning at the bottom of its concave periphery said roller is grooved to a considerable depth as at 22 parallel to and between its sides, which results in the formation of a short shaft 28 by means of which said roller is adapted to be supported from a plate 29.

Plate 29 is bowed and inherently resilient and at one end is provided with an upstanding lug 30 having a U-shaped recess formed in the top thereof within which the shaft 28 of roller 26 is adapted to rest, the lug being adapted to extend into the groove 27 of said roller to hold the latter against twisting and lateral movements with respect to said plate. Near its other end said plate is provided with a pair of openings 31, 32, the former of which is adapted to receive a fastening screw 33 that is passed into the base board 10 and the latter of which is adapted to receive a dowel pin 34 projecting upward from the base board.

By an arrangement as thus described it is manifest that the screw 33 and dowel pin 34 cooperate to hold the plate 29 against lateral movement and since the engagement of lug 30 within the groove 27 operates to hold the roller against lateral movement with respect to said plate, it is further apparent that the operator section supported within the concave periphery of the roller cannot move laterally and is therefore held in alinement with the toothed periphery of the dial or disk of the associated tuning unit. Furthermore, since the plate 29 is inherently resilient and bowed, it is apparent that the operator section is yieldably supported and that its yieldable supporting force may be varied by adjusting the screw 33, thereby to secure a smooth running engagement between the threads of the operator section and the toothed dial or disk of the associated tuning unit.

The device shown in Figure 2 for supporting, guiding and driving section 19 consists of a roller 35 having a concave periphery provided in any suitable manner with teeth 36 adapted to mesh with the threads of section 19 whereby said section is caused to be shifted longitudinally when the roller is rotated, the latter being supported yieldably by a bowed, inherently resilient plate 37 secured to the base board 10 by a dowel and screw arrangement as mentioned in connection with the roller device first described. For rotating said roller 35 I affix to its shaft 38, which latter extends beyond one side thereof, a knob or other hand grip device 39, and to support said roller from the plate 37 I journal the shaft 38 in an upward extension 40 of said plate. The roller device of Figure 2 thus serves not only as a vernier driver for the operator, but as a support to maintain the operator alined with the dials or disks of the tuning units as is apparent.

In the present instance the operator sections 18, 19 and 20 have left hand threads for engagement with the dials or disks 14, 15 and 16, respectively, while right hand threads serve to connect said sections together for relative longitudinal adjustment, and with such an arrangement the operation of my device is apparent and as follows: Assuming the tuning units 11, 12 and 13 to be tuned with a given wave length and that it is desired to tune them with another wave length, one of the devices 23, 24 or 25 is grasped and the operator A is bodily shifted longitudinally until the tuning units tune with the wave length desired, or knob 39 is rotated to accomplish the same result somewhat more definitely, the operator serving as a rack to simultaneously rotate the dials or disks 14, 15 and 16 and through said dials or disks serving to simultaneously adjust all rotors *b*. If the tuning units are synchronized, no further adjustments will be required, but if they are not synchronized and more or less rotation is required of their movable parts with respect to one another to cause all of them to tune correctly with the desired wave length, individual adjustments of said movable parts may be effected by rotating the devices 23, 24 and 25, it being apparent that if any individual rod is rotated it will react from the remaining rods and be moved longitudinally due to its threaded connection with one of the latter to rotate its associated dial and rotor. On the other hand by holding any one dial and rotating its associated operator section, said section will react from the held dial and because of its threaded connection therewith be moved longitudinally to rotate the re-

maining dials and their associated rotors. In this connection it will be observed that the only essentials to the complete operation of my device as set forth are that the threads between the sections be the same and that the threads between the dials and the respective sections differ from the threads between the latter, and, were it not desired to provide positive driving connections between the dials and operator sections, the latter might have frictional contact only with the dials and the operation of the device would remain the same except that under such conditions it would not be possible to hold one dial and react from that dial by rotating its associated operator section to simultaneously adjust the other dials. The arrangement shown is preferred; however, and when any operator section is individually rotated, its associated dial is rotated not only because of the longitudinal movement of such operator section, but because of the differential action of the threaded connections of the latter with its dial and the adjacent operator section.

In Figure 5 of the drawings my operating device and its mode of operation are substantially the same as described in connection with the preceding figures, differing from the device first described in that the externally threaded operator sections 18′, 19′ and 20′ are tubular and mounted on a rod 41 in end to end abutting relation, so that the sections are held against relative longitudinal movement and when any section is rotated individually it reacts from the remaining sections to rotate its associated dial through its threaded connection with the latter. The sections 18′ and 20′ are equipped with hand grip devices 23′, 24′, respectively, whereby they may be rotated and whereby all sections may be shifted longitudinally in unison to cause the sections to act as racks for adjusting the movable parts of all tuning units simultaneously, while intermediate section 19′ is affixed in any suitable manner to rod 41, by means of a pin 42 for example, and said rod is provided at one end with a hand grip device 25′ which may be used not only to rotate said intermediate section, but to shift the sections collectively as is apparent. In this form of my invention the support for the operator sections may be of any preferred type, but preferably it is the same as disclosed in Figure 1.

In Figure 6 the operator 43 is in the form of a one-piece continuously threaded rod, the threads of which mesh with toothed dials on the rotors of the tuning units, as in the preceding forms of my invention. On one end of said rod 43 is a hand grip device 44 and on its other end a swivel band grip device 45. By shifting said rod all dials will be rotated in unison and by holding the swivel grip device 45 and rotating said rod simultaneously vernier adjustments of the dials may be secured.

In Figure 7 the operator 46 also is in the form of a one-piece rod, but the threads thereon for engagement with the toothed dials of the tuning units are right and left hand respectively, so that by holding one dial and rotating said rod vernier adjustments of the other dial may be secured, while both dials shown may be rotated in unison by longitudinally shifting the rod.

I claim:—

1. In radio apparatus, a plurality of tuning units a part of each of which is movable, an operator for said movable parts composed of connected sections movable longitudinally in unison to impart collective movement to said parts, and means whereby said sections are rotatable individually in the same direction to move the movable parts of individual tuning units in the same direction.

2. In radio apparatus, a plurality of tuning units a part of each of which is movable, and a sectional operator for said movable parts the sections of which are rotatable with respect to one another and have threaded connection, respectively, with said movable parts and with each other whereby they are movable collectively and individually to move said movable parts collectively and individually, the threads connecting said sections together differing with respect to the threads that connect said sections with said movable parts whereby the movable parts are moved individually when said sections are individually rotated.

3. In radio apparatus, a tuning unit a part of which is movable, a threaded rod having threaded engagement with a peripheral portion of said movable part, said rod being longitudinally movable to move said movable part, a roller supporting said rod, and means whereby said roller holds said rod against movement in all directions from its operative position in threaded engagement with the peripheral portion of said movable part.

4. In radio apparatus, a tuning unit a part of which is movable, a threaded rod having threaded engagement with a peripheral portion of said movable part, means whereby the latter is moved when said rod is rotated, a roller supporting said rod and holding the same against movement in all directions from its operative position in threaded engagement with said movable part, and a pinion included in said roller for moving said rod longitudinally to cause the same to move said movable part.

5. In radio apparatus, means for supporting an operator in driving relation with the movable part of a tuning unit comprising a roller grooved in the plane in which it is adapted to rotate to provide a shaft

centrally thereof by which it is adapted to be supported in operative relation to said operator.

6. In radio apparatus, a tuning unit a part of which is movable, a rod for moving said movable part, and a rod supporting roller having a single central supporting bearing between its sides.

7. In radio apparatus, a tuning unit a part of which is movable, a rod for moving said movable part, a roller for supporting said rod, said roller being grooved to provide a bearing between its sides, and a resilient member for supporting said roller having a lug provided with a U-shaped recess adapted to receive the bearing of said roller.

8. In radio apparatus, a plurality of tuning units a part of each of which is movable, and a member in rolling driving engagement with said movable parts for moving them collectively, said member being composed of connected sections movable with respect to one another to move said movable parts individually.

9. In radio apparatus, a plurality of tuning units a part of each of which is movable, and a bodily movable operator composed of a plurality of rotatable sections having threaded connection with each other and, respectively, having toothed engagement with said movable parts, whereby said movable parts are moved collectively when said operator is moved bodily, and whereby rotary movement of any given section reacts from the other sections to move its associated movable part individually.

10. In radio apparatus, a plurality of tuning units a part of each of which is movable, and a bodily movable operator composed of a plurality of sections rotatably connected to one another and, respectively, having threaded connections with said movable parts whereby the latter are moved collectively when said operator is moved bodily and whereby rotary movement of any given section reacts from the other sections to move its associated movable part individually.

11. In radio apparatus, a tuning unit a part of which is movable, a rotatable operator having driving connection with said movable part, said operator being bodily movable to transmit through said driving connection rough adjustments to said movable part, and means with which said operator has threaded engagement and from which it reacts, when rotated, in any bodily moved position thereof, to transmit through said driving connection fine adjustments to said movable part.

12. In radio apparatus, a pair of tuning units a part of each of which is rotatable, an operator for said movable parts composed of a pair of sections with which said rotatable parts have rolling engagement, respectively, whereby they are rotated by longitudinal movement of said sections, and means connecting said sections together for collective longitudinal movement to rotate said parts collectively to secure rough adjustments thereof, said connecting means consisting of a threaded joint the parts of which are rotatable with respect to one another to secure longitudinal movement of the individual sections thereby to secure fine adjustments of the rotatable parts of the individual tuning units.

13. In radio apparatus, a plurality of tuning units a part of each of which is movable, a rod composed of a plurality of connected sections disposed, respectively, in driving relation to said movable parts whereby the latter are movable collectively by longitudinal movement of said rod, said sections being rotatable with respect to one another, and means whereby rotation of an individual section moves the movable part of an individual tuning unit.

14. In a radio apparatus, a plurality of tuning units a part of each of which is movable, an operator including different portions each having two different forms of movement, connections between said portions and said movable parts, respectively, responsive to either form of movement of said portions independently of the other to move their associated movable parts, and connections between the different portions of said operator for causing them to partake collectively of one of their forms of movement and permitting them to partake individually of their other form of movement.

In testimony whereof I hereunto affix my signature.

DORSEY F. ASBURY.