Nov. 2, 1926. 1,605,804

D. F. ASBURY

OPERATING MECHANISM FOR PLURAL TUNING UNIT RADIO APPARATUS

Filed Jan. 18 1924

Fig. 1.

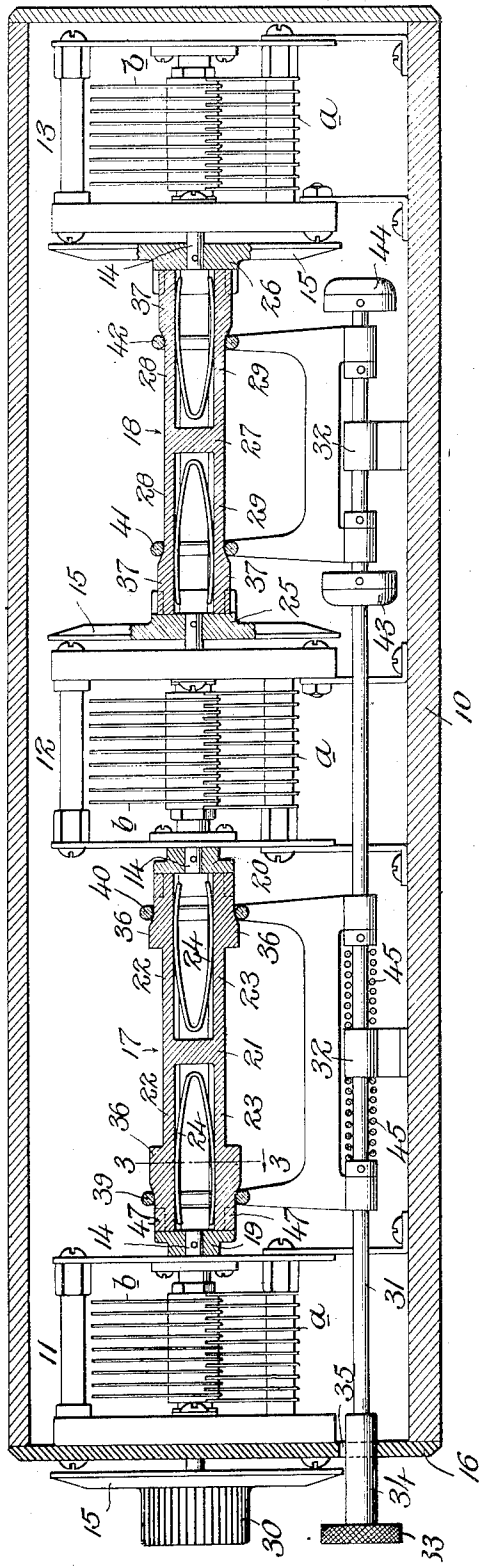


Fig. 4.

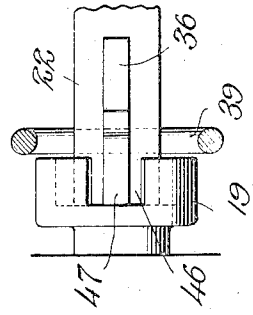


Fig. 3.

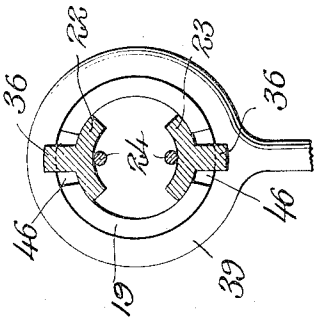
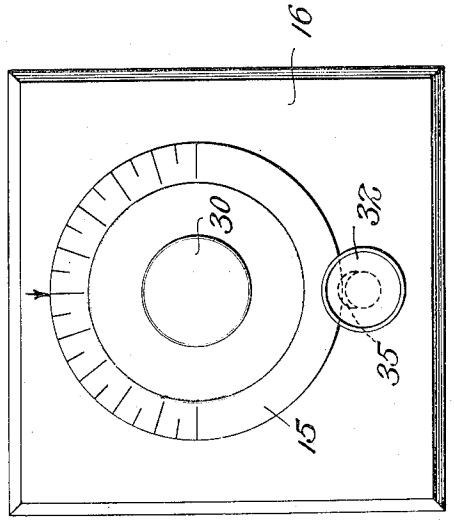


Fig. 2.



Inventor
D. F. Asbury,
by Bright & Bailey
Attorneys

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UNITED STATES PATENT OFFICE.

DORSEY F. ASBURY, OF WASHINGTON, DISTRICT OF COLUMBIA.

OPERATING MECHANISM FOR PLURAL TUNING UNIT RADIO APPARATUS.

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In certain types of radio apparatus employing plural tuning units, it is possible to cause all units to substantially tune with the same wave by imparting the same amount of movement to the movable part of each unit. On the other hand, it is necessary in every plural tuning unit radio apparatus with which I am familiar to impart slightly varying amounts of movement to the movable parts of the respective units to secure absolutely correct tuning of all units with the same wave length. My broad purpose, therefore, is to provide means for moving the movable parts of all tuning units simultaneously to secure quickly and expeditiously substantially correct tuning of all units with the same wave length, and in addition, to provide means whereby individual units may selectively be moved or adjusted to secure absolutely correct tuning of all units with the same wave length.

More specifically it is my purpose to provide an improved arrangement of tuning units consisting in mounting them in tandem relation, thereby to conserve space, reduce the size of the panel board usual in radio apparatus of the kind referred to, and to render it possible to provide an exceedingly simple means of operating them collectively and individually.

With the foregoing and other purposes in view, my invention consists in the novel features of construction, combination and arrangement of parts as will be hereinafter more fully described, illustrated in the accompanying drawings and defined in the appended claims.

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

Figure 1 is a longitudinal section, partly in elevation, showing a tandem arrangement of plural tuning units and my means for simultaneously and selectively adjusting the movable parts of the same;

Fig. 2, an end elevation;

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

Fig. 4, a plan, partly in section, of the parts shown in Fig. 3.

Referring to the drawings in detail, 10 designates a suitable base board upon which I mount in tandem relation plural tuning units 11, 12 and 13, herein illustrated solely for purposes of convenience as variable plate condensers of well known type, each including a stator *a* and a rotor *b*. It is to be understood, however, that said tuning units may be of any other desirable or well known type and that all of them may be of like or of different character, the type of the different tuning units and the number thereof being immaterial to my invention.

The rotor *b* of each tuning unit is mounted on a shaft 14 for rotation therewith and on each shaft 14 is fixed a dial or disk 15 by means of which rotation of the respective rotors *b* is effected.

At one end of the base board 10 is a panel board 16 through which the shaft 14 of unit 11 extends, whereby the dial 15 thereof is mounted exteriorly of said panel board for observation by the operator of the apparatus, while the dials or disks on the shafts of units 12 and 13, which dials or disks do not need to be observed by the operator, preferably are disposed on adjacent sides of said units 12 and 13 for convenience in associating my operating mechanism with the apparatus.

My operating mechanism includes means between the respective shafts 14 for releasably connecting them together, so that the rotors or movable parts of all tuning units may be rotated simultaneously or selectively, said connecting means in the present instance consisting of substantially duplicate clutch devices 17 and 18, the former between the units 11 and 12 and the latter beween the units 12 and 13.

Clutch device 17 is composed of a pair of female members 19 and 20 and a male member 21, the female member 19 being fixed to the inner end of shaft 14 of unit 11, the other female member 20 being fixed to the adjacent end of shaft 14 of unit 12 and the male member 21 extending between and at its ends into said female members as shown. Each end portion of the male member 21 consists of a pair of spaced arms 22, 23 that are urged apart in any desired manner as by means of their inherent resiliency or by means of springs 24 disposed between them, so that normally they engage the female members 19, 20, respectively, and establish a positive drive between the shafts 14, 14 of said units 11 and 12.

Clutch device 18 is, in substantially every respect, a duplicate of clutch device 17, being composed of a pair of female members 25, 26 and a male member 27, the female members being fixed respectively, to adjacent

ends of the shafts 14, 14 of units 12 and 13, in the present instance forming parts of the dials 15, 15 of said units, and the male member 27 extending between and at its ends into said female members, so that its two pairs of spaced arms 28, 29, that are urged apart similarly to the arms 22, 23 of member 21, engage said female members 25, 26 and normally establish a positive drive between the shafts 14, 14 of units 12 and 13.

From the foregoing it is apparent that normally the movable parts (rotors *b b b*) of each of the tuning units are connected together by said clutch devices 17, 18, so that by turning the dial 15 of unit 11, by means of the knob 30 thereon for example, all rotors are moved simultaneously, while on the other hand by releasing certain of the yieldable arms of the clutch devices from their associated female members, the rotors of the respective tuning units may be adjusted selectively.

The means for releasing the clutch devices so that individual adjustments of the respective tuning units may be effected consists in the present instance of a laterally flexible, rotatable and longitudinally movable rod 31 that is supported in bearings 32 rising from the base board 10 and that extends through the panel board 16 slightly beyond the front thereof where it is equipped with a suitable finger grip knob or other operating device 33. Said rod extends parallel to the axes of the shaft 14 and has an enlargement 34 at its forward end that is normally spaced slightly from the periphery of the dial 15 of unit 11, but that is adapted to be moved into contact with said dial by laterally flexing the shaft, so that upon rotation of the latter vernier adjustments of the movable part (rotor *b*) of unit 11 may be effected, which vernier adjustments under normal conditions will be imparted through the aforesaid clutch devices 17, 18 to the movable parts of units 12, 13 as is apparent. The opening 35 in the panel board 16 through which the rod 31 extends is slightly elongated to permit lateral flexing of said rod.

On each arm 22 and 23 of the male member 21 of clutch device 17 is formed an enlargement 36, and likewise, on each arm 28 and 29 of the male member 27 of clutch device 18 is formed an enlargement 37, while surrounding the two pairs of arms 22, 23 of clutch device 17 are rings 39, 40, respectively, and surrounding the two pairs of arms 28, 29 of clutch device 18 are rings 41, 42 respectively.

The rings 39, 40, 41 and 42 are connected in any suitable manner with the rod 31 for longitudinal movement therewith, and the arrangement of the aforesaid enlargements 36, 37 is such that when the rod 31 is moved a predetermined distance outward, ring 40 engages its related enlargements and forces the related pair of arms 22, 23 inward, releasing the driving connection of male member 21 from female member 20, while at the same time ring 41 engages its related enlargements 37 and in a like manner effects release of the driving connection of male member 27 from female member 25. Thus the unit 12 is disconnected from units 11 and 13, so that its movable part may be adjusted independently of the latter named units while at the same time said rings 40, 41, because of their engagement with the enlargements 36, 37 as just mentioned, act to hold the movable parts of units 11 and 13 against movement, it being observed that when the rod 31 is moved outward the rings 39, 42 do not operate to effect release of their related clutch arms from the respective female members 19, 26, and since the male members 21, 27 of the respective clutch devices are held by the rings 40, 41, it follows that the movable parts of units 11 and 13 must also be held.

Fixed on the rod 31 is a small disk 43 so positioned that upon outward movement of the rod to effect release of the movable part of unit 12 from the movable parts of units 11 and 13 it is moved into frictional contact with the dial or disk 15 of unit 12, so that upon rotating shaft 31 vernier adjustments of the rotor *b* of said unit 12 are effected.

The arrangement of the enlargements 36, 27 and the rings 39, 40, 41 and 42 also is such that upon inward movement of the rod 31, rings 39, 42 operate through their related enlargements to force their related clutch arms 22, 23 and 28, 29 inward thereby to release the movable parts of units 11 and 13 from the movable part of unit 12 and at the same time hold the movable part of the last named unit against movement, it being observed that the clutching engagements with unit 12 are undisturbed when the rod 31 is moved inward. Under these conditions the movable part of unit 11 may be individually adjusted either by means of the knob 30 or by laterally flexing the rod 31 to move its enlargement 34 into contact with the dial 15 of said unit and then rotating said rod, while the movable part of unit 13 may be individually adjusted by exerting inward pressure on the rod 31 to frictionally engage a second small disk 44 thereon with the dial or disk 15 of said unit and then rotating said rod. Surrounding rod 31 is a pair of coil springs 45, 45 that react from one of the bearings 32 against suitable stops on said rod, so that whenever the rod is shifted longitudinally, it is automatically returned to its normal position illustrated in Figure 1.

In order to limit minor individual adjustments of the movable parts of the respective tuning units with respect to one another, thereby to maintain constantly a substan-

tially tuned relation between said movable parts, the female clutch members 19, 20, 25 and 26 are recessed as at 46 and the arms 22, 23, 28 and 29 are provided with lugs 47 for engagement in said recesses, respectively, the latter being somewhat wider than the lugs, so as to permit relative movement between the male and female members only within the limits of the differences in width between said lugs and recesses.

I claim:—

1. In radio apparatus, a plurality of tuning units a part of each of which is movable, connections between the movable parts of adjacent units whereby they may be moved collectively, said connections being selectively releasable whereby said movable parts may be moved individually, a member associated with each connection to release the same, and a single operator for a plurality of said members.

2. In radio apparatus, a plurality of tuning units a part of each of which is movable, connections between the movable parts of said units whereby they may be moved collectively, said connections being releasable, and a single operator movable to effect release of said connections and to operate the movable parts of said tuning units individually.

3. In radio apparatus, a plurality of tuning units a part of each of which is movable, connections between said movable parts whereby they may be moved collectively, said connections being releasable whereby said movable parts may be moved individually, and a single operator movable in one direction to effect release of said connections selectively and in another direction to move the movable parts of said tuning units selectively.

4. In radio apparatus, a plurality of tuning units a part of each of which is movable, a driver associated with the movable part of each unit, and a shaft movable longitudinally to selectively engage and disengage certain of said drivers with and from their associated movable parts, said shaft being laterally movable to move one of said drivers to and from an engaged position with respect to the movable part of one of said tuning units.

5. In radio apparatus, a plurality of tuning units, a part of each of which is movable, a driver associated with each of said movable parts, and an operator for said drivers movable longitudinally to move one of said drivers into and out of driving engagement with the movable part of its associated tuning unit and laterally to move another driver into and out of engagement with the movable part of its associated tuning unit; said drivers being rotatable to drive said movable parts, and said operator being rotatable to rotate said drivers.

6. In radio apparatus, a pair of tuning units a part of each of which is movable, a driver between said movable parts for moving them collectively, said driver having a releasable connection with each movable part whereby adjustments may be imparted to the latter individually, and a single operating means to release the connection of said driver with the movable part of one unit whereby that movable part may be individually adjusted and to hold said driver and thereby the movable part of the other unit against movement during individual adjustment of said first mentioned movable part.

7. In radio apparatus, a plurality of tuning units a part of each of which is movable, releasable connections between said movable parts, and a single operator including means to release the movable parts of a plurality of units from the movable part of another unit and to hold the movable parts of the first named unit against movement, said operator also including a device effective to move the movable part of said last named unit when the connections of the same with the movable parts of the first named units are released.

8. In radio apparatus, a pair of tuning units a part of each of which is movable, a releasable rotatable connection between the movable parts of said units whereby said movable parts may be adjusted collectively and individually, and means included in said connection limiting individual adjustable movement of the movable part of one unit with respect to the movable part of the other unit.

9. In radio apparatus, a plurality of tuning units a part of each of which is movable, a plurality of drivers one associated with the movable part of each unit for moving the same, said drivers being disposed normally out of driving engagement with their associated movable parts, and a single operator movable in one direction to move a given driver into driving engagement with its associated movable part and in another direction to move another driver into driving engagement with its associated movable part.

10. In radio apparatus, a plurality of tuning units a part of each of which is movable, connections between said movable parts whereby they may be moved collectively, said connections being releasable whereby said movable parts may be adjusted individually, a plurality of drivers one associated with each movable part and normally disengaged therefrom, and a single member operable to selectively release said connections and to operate said drivers, said member being movable longitudinally in opposite directions to move different drivers into engagement with the movable parts

of their associated units, and laterally to move another driver into engagement with the movable part of another unit.

11. In radio apparatus, a plurality of tuning units a part of each of which is movable, a plurality of drivers one associated with each movable part and normally disengaged therefrom, and a driver operator movable longitudinally to move one of said drivers into and out of engagement with the movable part of one of said tuning units and laterally to move another driver into and out of engagement with the movable part of another tuning unit, said operator being rotatable to operate each of said drivers to cause them to move their associated movable parts when they are engaged therewith.

12. In radio apparatus, a plurality of tuning units a part of each of which is movable, connections between said movable parts whereby they may be moved collectively, said connections being releasable, means to selectively release said connections, means to selectively drive said movable parts, and a single operator for all of said means.

13. In radio apparatus, a plurality of tuning units a part of each of which is movable, connections between said movable parts whereby they may be moved collectively, said connections being releasable, a single shaft, and means operable by different movements of said shaft to selectively release said connections and to drive said movable parts individually.

14. In radio apparatus, a pair of tuning units a part of each of which is movable, a member between said movable parts for transmitting movement of one to the other, releasable connections between said member and said movable parts whereby the latter may be moved individually, and means to selectively release said connections and to hold said member against movement when either connection is released, whereby the movable part of one unit is held against movement during individual movement of the movable part of the other unit.

15. In radio apparatus, a pair of tuning units a part of each of which is movable, a member between said movable parts for transmitting movement of one to the other, releasable connections between said member and said movable parts whereby the latter may be moved individually, means to selectively release said connections and to hold said member against movement when either connection is released, whereby the movable part of one unit is held against movement during individual movement of the movable part of the other unit, and drivers included in said means operable to move said movable parts individually.

16. In radio apparatus, a plurality of tandemly arranged tuning units a part of each of which is movable, members connecting the movable parts of said tuning units whereby said movable parts may be moved collectively, releasable connections between said members and said movable parts whereby the latter may be moved individually, an elongated shaft arranged adjacent to each tuning unit, and means carried by and movable with said shaft to selectively release said connections and to move said movable parts individually.

17. In radio apparatus, a pair of tuning units a part of each of which is movable, a connection between said movable parts whereby they may be moved collectively, said connection being releasable whereby said movable parts may be moved individually, and means limiting individual movement of the movable part of one unit with respect to the movable part of the other unit to maintain the units at all times substantially synchronized.

18. In radio apparatus, a pair of individually adjustable tuning units, and means limiting the amount of adjusting movement of one unit in all directions with respect to the other unit to maintain the units at all times in approximate synchronized tuning relation.

19. In radio apparatus, a pair of adjustable tuning units, a connection between said units whereby they are adjustable collectively, said connection permitting individual adjustments of the units and including stop devices maintaining the units at all times in approximate synchronized tuning relation.

20. In radio apparatus, a plurality of tuning units, and a single member movable to connect said units for collective operation and also movable to positions in which it is effective to operate said units individually.

21. In radio apparatus, a plurality of tuning units a part of each of which is movable, and a single operator rotatable to move said movable parts collectively, said operator being movable to positions in which it is rotatable to move any one of said movable parts individually.

In testimony whereof I hereunto affix my signature.

DORSEY F. ASBURY.