Jan. 29, 1929. 1,700,361

D. F. ASBURY

RADIO APPARATUS

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Fig. 1.

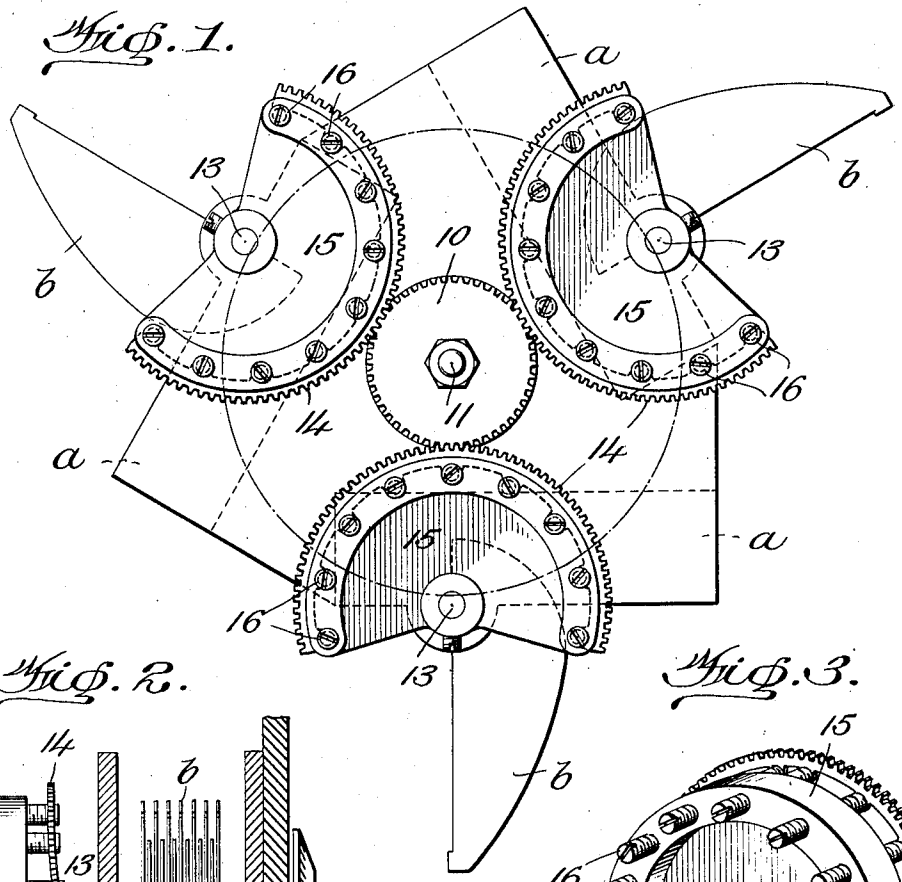


Fig. 2.

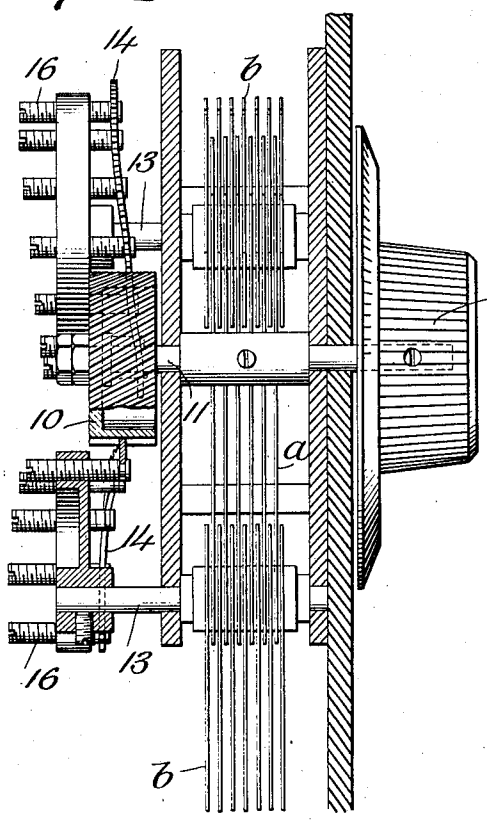


Fig. 3.

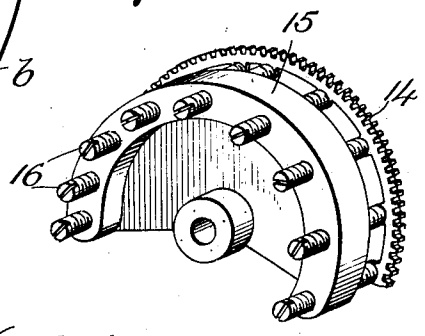
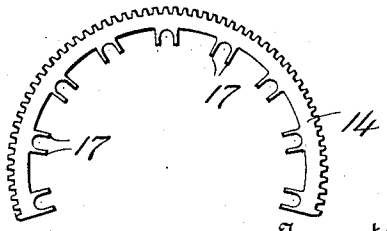


Fig. 4.



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Fig. 6.

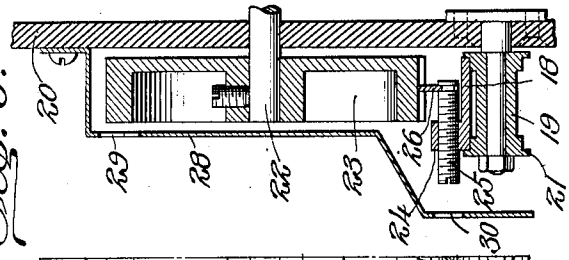


Fig. 5.

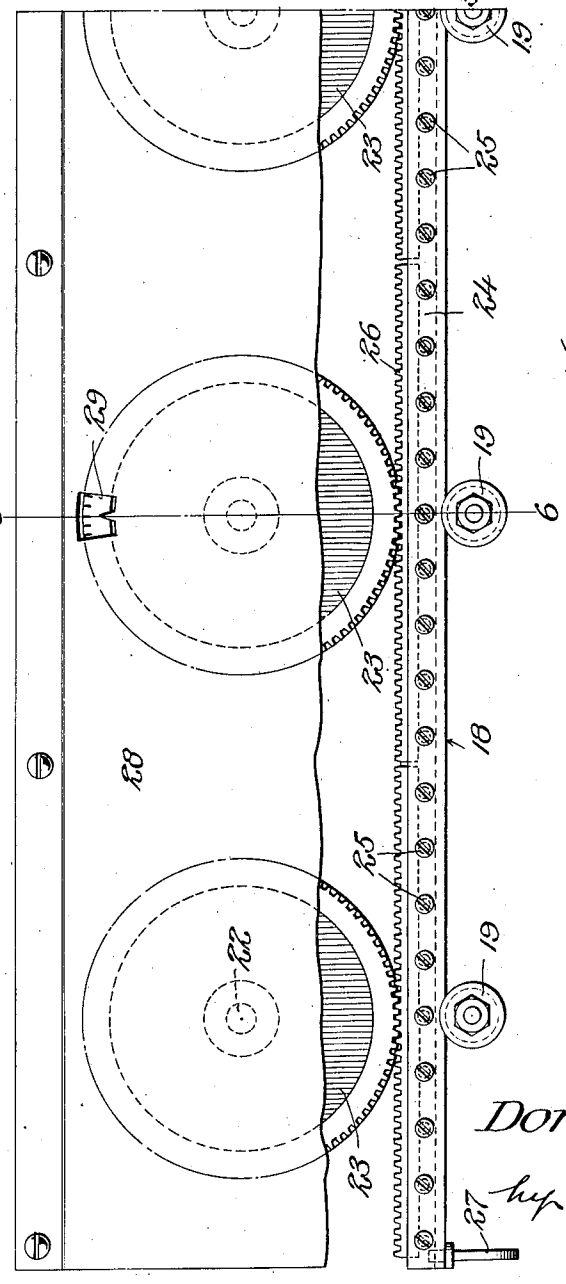
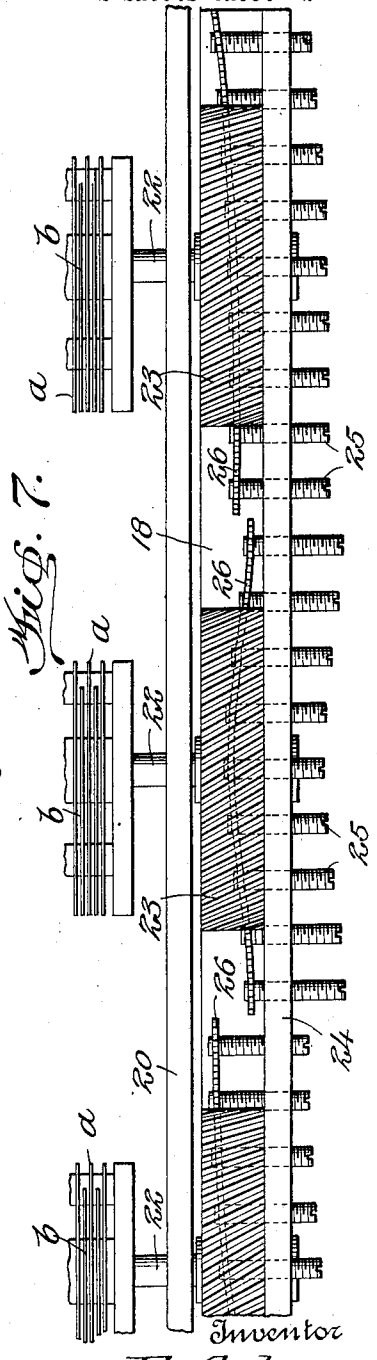


Fig. 7.



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UNITED STATES PATENT OFFICE.

DORSEY F. ASBURY, OF BROOMES ISLAND, MARYLAND.

RADIO APPARATUS.

Application filed February 19, 1926. Serial No. 89,442.

My invention relates to radio apparatus, particularly to receiving sets employing plural tuning units, and my object, generally speaking, is to provide means for operating the tuning units of a set collectively varying amounts with respect to one another as set forth in my copending applications 683,756; 72,514; 80,833 and 192,756, whereby movement of a single operator is all that is required to cause all tuning units to tune simultaneously and accurately with different wave lengths.

More particularly it is my present purpose to provide improved means for producing movement of the movable part of a tuning unit at variable velocities during movement of an operator for such movable part at a constant velocity, such improved means enabling me to provide a simple, compact arrangement whereby a single movement of a single operator will cause collective variable movements of the movable parts of a plurality of tuning units and to provide an arrangement in which the relation between a single operator and the movable parts of a plurality of tuning units may be varied at any time with respect to any particular unit while the movable parts of all units are in engagement with said operator and without disturbing the relation between said operator and the other units.

With the foregoing general purposes in view, my invention consists in the various 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 related views:—

Fig. 1 is a rear elevation of a plural tuning unit arrangement showing a preferred form of my improved operating mechanism associated therewith;

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

Fig. 3, a detail perspective illustrating the adjustable gear arrangement associated with each of the tuning units shown in Figures 1 and 2;

Fig. 4, a detail elevation of one of the adjustable gears;

Fig. 5, a front elevation showing a modified form of my improved operating mechanism embodied in a plural tuning unit receiving set;

Fig. 6, a section on the line 6—6 of Fig. 5; and

Fig. 7, a plan view of the mechanism shown in Fig. 5.

In the embodiment of my invention illustrated in Figures 1 to 4 I contemplate collective variable operation of the movable parts of a plurality of tuning units by means of an operator having only rotary movement, and to this end an operator is provided in the form of a rotatable gear wheel 10 having teeth extending diagonally with respect to its axis of rotation, said wheel being mounted on a shaft 11 which is equipped with any suitable means such as a dial 12 whereby it may conveniently be rotated.

The tuning units herein illustrated are in the form of variable plate condensers, each including, as usual, a stator *a* and a rotor *b*, and in accordance with my invention the rotor shaft 13 of each condenser has mounted thereon a gear 14, the gear of each condenser being in mesh with gear 10 whereby rotation of said gear 10 will effect collective rotation of all rotors *b* as is manifest.

The toothed face of gear wheel 10 is relatively wide whereas the gears 14 are relatively thin and pliable so that each of them is bendable to shift its point of contact with gear wheel 10 longitudinally along the latter, the result being that if the point of contact of any particular gear 14 with gear wheel 10 is so shifted while said gear wheel 10 remains stationary that gear 14 will be rotated due to the wedging effect produced by the diagonal teeth of gear wheel 10. Thus it is apparent that if the gears 14 are bent into irregular form as shown in Fig. 2 of the drawings the movable parts of the tuning units will be moved varying amounts with respect to one another during collective movements thereof due, as aforesaid, to the points of contact of the gears 14 with gear wheel 10 shifting longitudinally of said gear wheel 10 during rotation of said gear 10. It is further apparent that by bending said gears 14 into proper irregular form the movable part of each tuning unit may be caused to move the exact amount required during collective movements of the movable parts of all of said tuning units to bring all tuning units simultaneously and accurately in tune with different wave lengths, simply by rotating gear wheel 10.

A preferred structural arrangement for bending gears 14 to and for maintaining them in proper irregular form consists, as shown

in the drawings, of a segmental member 15 affixed to each rotor shaft 13, each member having threaded therein a plurality of spaced screws 16 carrying an associated gear 14, swivel connections being provided between said screws and said gears whereby rotation of said screws is effective to bend said gears into irregular form, said swivel connections being produced for example by bending spaced pairs of fingers 17 provided on each gear 14 into annular grooves formed in the screws 16.

Any desired number of tuning units may be arranged to be operated by gear wheel 10 and they may be formed either separate from one another or embodied in a single structural unit as desired, the principal advantage of the arrangement shown residing in the provision whereby the amount of movement of the movable part of any particular tuning unit may be varied with respect to a constant amount of movement of operating gear wheel 10 while all gears 14 are in mesh with gear wheel 10, thus adapting a receiving set to be readily and easily adjusted according to the particular conditions of use of the set, so that thereafter all tuning units thereof will tune simultaneously and accurately with different wave lengths, upon collective movement being imparted to said movable parts.

In the embodiment of my invention illustrated in Figures 5 to 7, I contemplate collective variable operation of the movable parts of a plurality of tuning units by means of an operator having only reciprocal movement, and to this end an operator is provided in the form of an elongated bar 18 mounted for longitudinal movement upon rollers 19 carried by any suitable support such, for example, as a panel board 20, and held against lateral movement in any suitable manner as, for instance, by means of end flanges 21 on said rollers.

The tuning units, the movable parts of which are adapted to be operated by bar 18, are in the form of variable plate condensers each including, as usual, a stator *a* and a rotor *b*. The rotor shaft 22 of each condenser has mounted thereon a gear wheel 23 having diagonally extending teeth, and said condensers are mounted in any suitable manner with their gears 23 disposed in a line above operator bar 18.

Operator bar 18 is provided with an upstanding flange 24 in which is threaded a plurality of sets of horizontally disposed screws 25 which screws are spaced longitudinally of said bar as shown, each set carrying a rack 26 in mesh with a related gear wheel 23 whereby longitudinal shifting movement of bar 18 is effective to rotate the rotors *b* of all of the condensers collectively as is apparent.

Racks 26 are formed from relatively thin, pliable material whereby each of them is bendable to shift its point of contact with its related gear 23 longitudinally along the latter, the result being that if the point of contact of any particular rack with its related gear 23 is so shifted while operator 18 is held against movement that gear 23 will be rotated due to the wedging effect produced by the diagonal teeth thereof. Thus it is apparent that if the racks 26 are bent into irregular form as shown in Figure 7 of the drawings the movable parts of the tuning units will be moved varying amounts with respect to one another during collective movements thereof due, as aforesaid, to the points of contact of racks 26 with gears 23 shifting longitudinally of said gears during longitudinal movement of bar 18. It is further apparent that by bending racks 26 into proper irregular form the movable part of each tuning unit may be caused to move the exact amount required during collective movements of the movable parts of all of said tuning units to bring all tuning units simultaneously and accurately in tune with different wave lengths, simply by shifting bar 18.

The screws 25 have swivel connections with racks 26 whereby they are adjustable to bend said racks to and hold them in irregular form, said swivel connections being produced, for example, in the manner set forth in connection with the gears 14 and screws 16 of the preferred embodiment of my invention.

A suitable finger grip device 27 is provided on bar 18 for convenience in shifting the same, and preferably gears 23, bar 18 and the other parts constituting my invention are covered by a shield plate 28 secured to panel board 20 and having an opening 29 therein through which graduations on the front face of one of the gears 23 may be viewed to determine the rotative position of said gears, other openings 30 being provided in said shield plate whereby access may conveniently be had to screws 25 for adjusting same.

Obviously in the form of my invention shown in Figures 5 to 7, the diagonal teeth may be provided on bar 18 instead of on gears 23, in which event gears such as the gears 14 shown in the preferred embodiment of my invention would be used in lieu of gears 23, the result being the same in either instance. Likewise, the arrangement of Figures 1 to 4 might be reversed by substituting a bendable gear for gear 10 and placing a gear similar to gears 23 on each rotor shaft 13 in lieu of the gears 14.

I claim:

1. In radio apparatus, a tuning unit having a movable part, means for moving said movable part including a pair of members one of which is fixed with respect to said movable part and the other of which constitutes an operator for the one that is fixed to said movable part, said members having in-

terfitting contact formations, respectively, one of which extends diagonally whereby movement of said operator other than in a direction to shift the point of contact between said members along said diagonal formation is effective to move said movable part, and whereby shifting of the point of contact between said members along said diagonal formation also is effective to move said movable part, and means embodied solely in said contact formations whereby the point of contact between said members is shifted along said diagonal formation during movement of said operator in a direction as first mentioned, to produce movement of said movable part at variable velocities during movement of said operator at a constant velocity.

2. In radio apparatus, a tuning unit a part of which is movable, means for moving said movable part including a pair of intermeshing gears one of which is fixed with respect to said movable part and the other of which constitutes an operator for the one that is fixed to said movable part, one of said gears having diagonally extending teeth and the other gear being of irregular form whereby its teeth are movable along the diagonally extending teeth of said first mentioned gear during movement of said operator to move said movable part to cause said movable part to be moved at variable velocities during movement of said operator at a constant velocity.

3. In radio apparatus, a tuning unit a part of which is movable, means for moving said movable part including a pair of intermeshing gears one of which is fixed with respect to said movable part and the other of which constitutes an operator for the one that is fixed to said movable part, one of said gears having diagonally extending teeth and the other gear being bendable into irregular form whereby its teeth are movable along the diagonally extending teeth of said first mentioned gear during movement of said operator to move said movable part to cause said movable part to be moved at variable velocities during movement of said operator at a constant velocity, and means for bending said bendable member to irregular form and for maintaining an irregular form thereof.

4. In radio apparatus, a tuning unit a part of which is movable, means for moving said movable part including a pair of intermeshing gears one of which is fixed with respect to said movable part and the other of which constitutes an operator for the one that is fixed to said movable part, one of said gears having diagonally extending teeth and the other being bendable into irregular form whereby its teeth are movable along the diagonally extending teeth of said first mentioned gear to move said movable part, and means for bending said bendable gear into irregular form and for maintaining an irregular form thereof.

5. In radio apparatus, a tuning unit a part of which is movable, means for moving said movable part including a pair of intermeshing gears one of which is fixed with respect to said movable part and the other of which constitutes an operator for the one that is fixed to said movable part, one of said gears having diagonally extending teeth and the other being bendable into irregular form whereby its teeth are movable along the diagonally extending teeth of said first mentioned member to move said movable part, and means constantly associated with said bendable member for bending same into irregular form and for maintaining an irregular form thereof.

6. In radio apparatus, a tuning unit a part of which is movable, means for moving said movable part including a pair of intermeshing gears one of which is fixed with respect to said movable part and the other of which constitutes an operator for the one that is fixed to said movable part, one of said gears having diagonally extending teeth and the other being bendable into irregular form whereby its teeth are movable along the diagonally extending teeth of said first mentioned member to move said movable part, and screw means for bending said bendable member into irregular form and for maintaining an irregular form thereof.

7. In radio apparatus, a tuning unit having a movable part, a pair of intermeshing gears one of which is fixed to said movable part and the other of which constitutes an operator for the one that is fixed to said movable part, one of said gears being bendable, and means whereby bending of said bendable gear moves said movable part.

8. In radio apparatus, a tuning unit a part of which is movable, a pair of gears one of which is fixed to said movable part and the other of which constitutes an operator for the one that is fixed to said movable part, one of said gears being bendable to move said movable part, and means constantly associated with said gear for bending same.

9. In radio apparatus, a tuning unit having a movable part, a pair of gears one of which is fixed to said movable part and the other of which constitutes an operator for the one that is fixed to said movable part, one of said gears being rotatable and one of them having diagonally extending teeth, the other of said gears being of irregular form whereby the point of contact between said gears is shifted longitudinally of said diagonal teeth during rotation of said rotatable gear.

10. In radio apparatus, a tuning unit having a movable part, a pair of gears one of which is fixed with respect to said movable part and the other of which constitutes an operator for the one that is fixed to said

movable part, one of said gears being rotatable and having diagonally extending teeth and the other being of irregular form whereby it traverses said diagonal teeth longitudinally during rotation of said rotatable gear to cause said movable part to move at variable velocities during movement of said operator at a constant velocity.

11. In radio apparatus, a tuning unit a part of which is rotatable, a rotatable gear fixed with respect to said rotatable part, another gear for driving said rotatable gear, one of said gears having a relatively wide toothed surface and having diagonally extending teeth, the other of said gears being relatively thin and bendable into irregular form whereby its teeth traverse the diagonal teeth of said first mentioned gear longitudinally during rotation of said rotatable gear to produce variable movement of said rotatable part during a constant movement of said driving gear.

12. In radio apparatus, a tuning unit having a rotatable part including a shaft, a member secured to said shaft, a plurality of screws threaded in said member, a bendable gear carried by said screws, said gear being bendable into irregular form by adjustment of said screws in said member, and a gear for driving said bendable gear, said driving gear having diagonal teeth.

In testimony whereof I hereunto affix my signature.

DORSEY F. ASBURY.