June 25, 1940. J. H. CLEMENTS 2,205,844

MECHANICAL PUSH-BUTTON CONTROL

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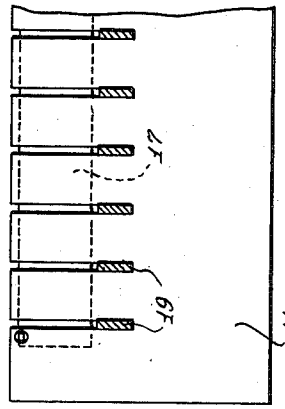


Fig. 3.

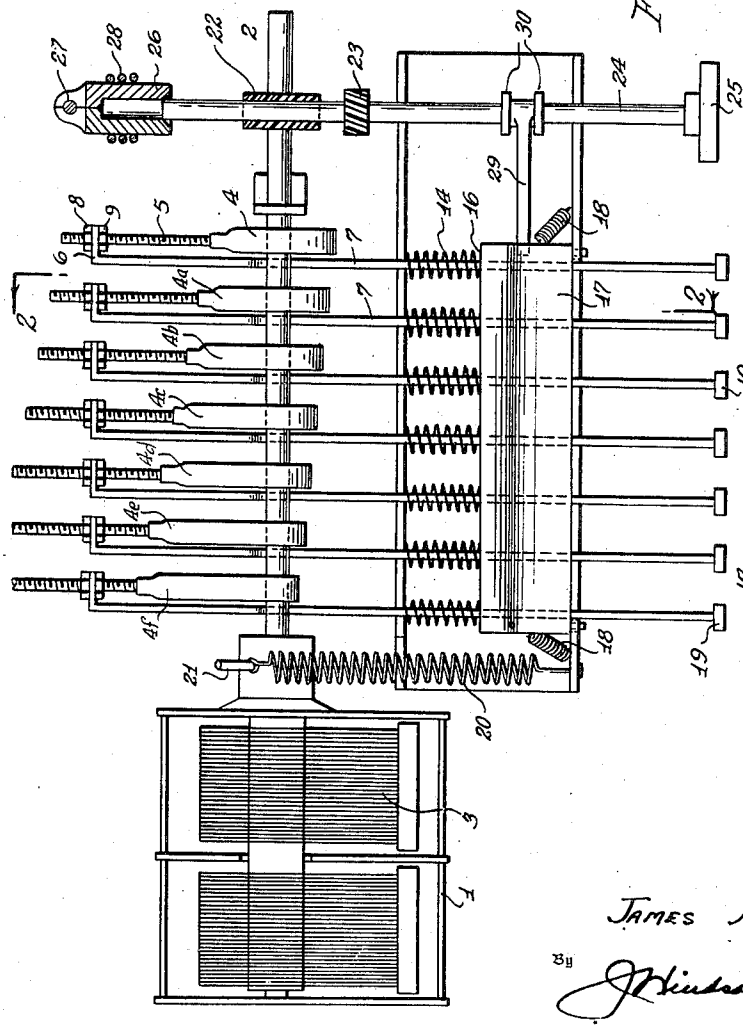


Fig. 1.

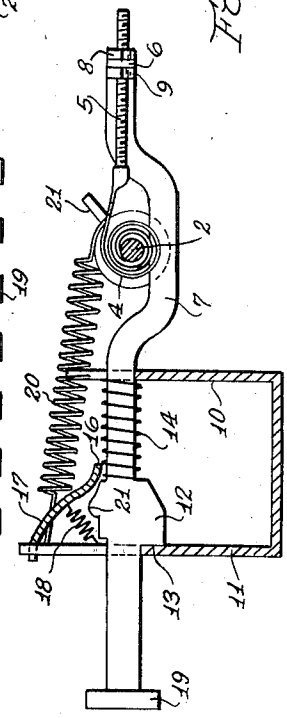


Fig. 2.

Inventor

JAMES H. CLEMENTS

By J. Hindes Davis

Attorney

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MECHANICAL PUSH-BUTTON CONTROL

James H. Clements, Detroit, Mich., assignor to James P. Burke, Knoxville, Tenn.

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15 Claims. (Cl. 74—10)

This invention relates to control means for a radio receiver and particularly to a selector for selecting and tuning any one of a number of given wave lengths.

The vast majority of radio listeners are interested primarily in the programs of stations more or less local to their own community. I am aware that selectors capable of tuning any one of several stations broadcasting on known wave lengths are now being furnished as a part of certain expensive receivers. The commercial success of these receivers has created a demand for selectors on less expensive sets. It is, therefore, an object of this invention to provide a selector adapted for incorporation as a part of the less expensive sets and which is accurate, reliable, easy and simple to operate and which is economical to construct.

More particularly it is an object of this invention to provide a station selector in the form of a simple mechanical device comprising a plurality of control fingers each operative to rotate a condenser shaft independently of each other and each individually adjustable as to the number of degrees of rotation which it can impart to the shaft.

Another object is to provide a plurality of control fingers each operative against a spring resistance for a distance predetermined by a latch device in combination with means automatically operative upon actuation of any other finger to release the latch whereby the finger last actuated determines the position of the condenser and whereby all other fingers are in position for reactuation.

A further object is to provide a condenser shaft and a manual control knob therefor carried by a second shaft, the second shaft being engageable and disengageable with said shaft, said second shaft upon being actuated into engagement with said condenser acting to release the control of said shaft by any of said fingers.

Another object is to provide a control shaft rotatable by fingers operative against spring resistances to rotate a shaft against a further spring resistance, the arrangement being such that each actuation of any finger rotates the shaft an exact, predetermined number of degrees. Since it is this latter spring resistance which reversely rotates the shaft upon release of a latch, as previously mentioned, rotation of the shaft by the control knob is accompanied by response of the latter spring. It is therefore also an object to provide means for overcoming the tendency of the shaft to reversely rotate after movement under the influence of said manual knob.

Other objects and advantages will hereinafter become more apparent as reference is had to the accompanying drawing wherein:

Fig. 1 is a top plan view of my novel selector attached to a condenser for control thereof,

Fig. 2 is a transverse section taken along the line 2—2 of Fig. 1, and

Fig. 3 is a front view of the selector fingers and their front panel.

More particularly, 1 indicates one or more variable condensers of conventional or special type by which a radio receiver may be tuned to different wave lengths by varying the capacity thereof. The capacity is varied by rotation of the shaft 2 thus rotating some of the segmental plates 3 with respect to others as is well known in the art. Wrapped around the shaft 2 at spaced points are a plurality of metallic ribbons 4, 4*a*, 4*b*, 4*c*, 4*d*, 4*e* and 4*f* each secured to the shaft 2 at their inner end and each secured at its outer end to an individual threaded shaft 5. Each shaft 5 passes through an eye in the outer end 6 of a selector finger 7 and nuts 8 and 9 threaded onto the shafts 5 on opposite sides of the eyes secure the shafts to their respective fingers.

The several fingers, threaded shafts and ribbons are of identical construction. One is best illustrated in Fig. 2. Each finger 7 extends forwardly from the end 6, that is,—toward the end thereof exposed to the operator, into a U-portion which underpasses the condenser shaft 2 and which then extends through supporting slots in two panels 10 and 11 with which it has sliding engagement. Between the walls 10 and 11 the finger is enlarged at 12, the lower front edge 13 thereof abutting the wall 11 to constitute a stop for the finger which is urged forwardly by a spring 14 therearound which abuts the wall 10 at one end and the rear edge of the enlarged portion 12 at its other end. The front top edge 15 of the portion 12 constitutes a latch member for engagement with the edge 16 of a latch plate 17 pivotally mounted in or on the wall 11 and spring pressed toward finger engaging position by a spring 18 operation.

The front end of each finger 7 has a knob 19 which when actuated to the right, Fig. 2 pushes the end 6 and the shaft 5 which in turn first draws the metallic ribbon 4 tightly about the condenser shaft and thereafter rotates the shaft 2 directly proportionate to the amount of further actuation of the finger to the right. Upon release of pressure by the operator the shoulder 15

will come to rest against the edge 16 of the latch plate 17. The fingers 7 are all of the same length and the shoulders 15 all travel the same distance before finding support against the edge 16 so that the amount of rotation imparted to the shaft 2 is dependant on the amount of initial wind-up by the spring 4 before actuation of the shaft 2 begins. In the interests of economy of manufacture all ribbons are of the same length, hence to vary the amount of initial wind-up the threaded shaft 5 is adjusted by the nuts 8 and 9 with respect to the ends 6. In Fig. 1 the ribbon 4 in starting position is wound around the shaft 2 to a greater extent than the ribbon 4*a* and the ribbons 4*b*, 4*c*, 4*d*, 4*e* and 4*f* are wound around the shaft 2 in progressively decreasing amounts thereby progressively decreasing the slack from one ribbon to the next. The amount of rotation imparted to the condenser plates 3 is selected to correspond exactly with a desired tuning and each station or selected rotative point is different from every other one.

The ribbons 4, 4*a* . . . 4*f* are springs, in fact, but reverse rotation of the shaft 2 upon release of a finger is affected by the spring 20, anchored at one end to the panel 11 and to a pin 21 in the shaft 2 at its other end. Release of any shoulder 15 and consequent return of its finger 7 to its initial position is accompanied by the tendency of the shaft 2 to return to its original position and is brought about by a cam surface 21 forming the top of the portion 12. Thus if the shoulder 15 of one finger 7 is engaged with the edge 16 of the plate 17 and another finger is actuated to the right, Fig. 2, the cam surface 21 of the second finger elevates the plate 17 thus disengaging the shoulder 15 of the first finger, the plate 17 being common to all fingers.

For manual instead of finger operation of the condenser shaft 2, I provide a worm gear 22 on the shaft 2 engageable with a second gear 23 carried by a manual control shaft 24. This shaft 24 may be journalled in the wall 11 for sliding and for rotation with respect thereto. When the shaft 24 is pushed inwardly thus causing engagement of the gears 22 and 23 the shaft 2 may be rotated by rotating the knob 25, however the rotation is opposed by the spring 20 which tends to reversely rotate the shaft 2 to its initial position. In order to overcome this tendency I provide a friction device 26 into which the end of the shaft 24 travels and in which it remains so long as the gears 22 and 23 are in mesh. The device 26 may be of any desired type and is here illustrated as a longitudinally split sleeve anchored at 27 and having a spring 28 which urges the parts of the sleeve into pressure engagement with the shaft 24.

In order to release any finger 7 which may be in control of the shaft 2 when it is desired to obtain a dial setting by the shaft 24 I provide a release finger 29 which is journalled on the shaft 24 between two collars 30 and which extends beneath the plate 17. Thus when the shaft 24 is pushed inwardly for engagement of the gears 22 and 23 the plate 17 is elevated.

This invention ma' be developed within the scope of the following claims without departing from the essential features of the said invention and it is desired that the specification and drawing be read as being merely illustrative and not in a limiting sense, except as necessitated by the prior art.

What I claim is:

1. The combination of a variable capacity electrical condenser having a control shaft, a plurality of manually operable fingers residing transversely of said shaft at spaced intervals therealong, a flexible connection between said shaft and each of said fingers each operative under tension to rotate said shaft when its finger is actuated in one direction and being substantially inoperative to compel movement in opposite directions, spring return means operative to rotate said shaft in reverse direction, a latch device for retaining each of said fingers in actuated position and means for adjusting the effective length of each of said fingers at the connection thereof with said flexible connection whereby said shaft is rotated through a different angle by each of said fingers.

2. The combination of a variable capacity electrical condenser having a control shaft, a plurality of manually operable fingers residing transversely of said shaft at spaced intervals therealong, a flexible connection between said shaft and each of said fingers each operative under tension to rotate said shaft when its finger is actuated in a shaft rotating movement and being substantially inoperative to compel movement in opposite directions, a latch device for retaining each of said fingers in actuated position, spring means urging the return of each of said fingers to its starting position and consequently in firm engagement with said latch device, spring means anchored at one end to said shaft opposing rotation thereof by said flexible connections, and means for adjusting the effective length of each of said fingers whereby said shaft is rotated through a different angle by each of said fingers.

3. The combination of a variable capacity electrical condenser having a control shaft therethrough, spaced panels paralleling said shaft and having a plurality of spaced notches therethrough with the notches in one of said panels alined with those of the other panel, a plurality of control fingers each extending through two alined notches and projecting outwardly of both of said panels, one end of each of said fingers having a manual knob thereon, that part of each finger between said panels being enlarged with one edge thereof constituting a stop for contacting one of said panels and another edge thereof constituting a latch stop, a spring abutting the other of said panels at one end and said enlarged portion at its other end thereby urging said stop edge against the first named panel, a spring pressed latch plate pivotally mounted on said first named panel overlying all of said enlarged portions, a cam surface on each of said enlarged portions for the elevation of said plate upon actuation of one of said fingers, said enlarged portion having an edge engageable by said plate upon actuation past said cam surface, the other end of said finger being bent to bypass said shaft and terminating in a bent end portion having an eye therethrough, a threaded shaft extending through said eye adjustably secured thereto by nuts on either side thereof, said threaded shaft being secured to a metallic ribbon partially wound about said control shaft with the inner end of said ribbon anchored to said shaft, and a spring having one end anchored to said control shaft for opposing rotation thereof by said fingers.

4. Control means for a variable capacity electrical condenser having a control shaft comprising a plurality of manually operable fingers residing transversely of the shaft at spaced in-

tervals therealong, an individual flexible tension member connecting each of said fingers with said shaft, and spring return means rotating said shaft in reverse direction upon return of any actuated finger to its original position.

5. Control means for a variable capacity electrical condenser having a control shaft comprising a plurality of manually operable fingers residing transversely of the shaft at spaced intervals therealong, an individual flexible tension member connecting each of said fingers with said shaft, said flexible members each being partially wrapped around said shaft and anchored thereto at one end, said flexible members being wrapped in a direction such that actuation of any one of said fingers causes said shaft to rotate in a direction which unwinds the flexible connections to the other of said fingers, and spring return means rotating said shaft in reverse direction upon return of the actuated finger to its original position.

6. Control means for a variable capacity electrical condenser having a control shaft comprising a plurality of manually operable fingers residing transversely of the shaft at spaced intervals therealong, an individual flexible tension member connecting each of said fingers with said shaft, means for altering the length of each of said tension members whereby to alter the amount of rotation imparted to said shaft by any particular finger, and spring means rotating said shaft in reverse direction upon return of any actuated finger to its original position.

7. Control means for a varible capacity electrical condenser having a control shaft comprising a plurality of manually operable fingers residing transversely of the shaft at spaced intervals therealong, an individual flexible tension member connecting each of said fingers with said shaft, said flexible members each being partially wrapped around said shaft and anchored thereto at one end, said flexible members being wrapped in a direction such that actuation of any one of said fingers causes said shaft to rotate in a direction which unwinds the flexible connections to the other of said fingers, means for altering the number of turns about said shaft by each of said tension members whereby to alter the degrees of rotation imparted to said shaft by actuation of any one of said fingers, and spring return means rotating said shaft in reverse rotation upon return of the actuated finger.

8. Control means for a variable capacity electrical condenser having a control shaft comprising a plurality of manually operable fingers, an individual flexible member directly connecting each of said fingers to said shaft for individual rotation of the shaft by varying degrees, means retaining any one finger in actuated position, means automatically releasing any finger from its actuated position upon actuation of any other of said fingers, normally inoperative manual means for rotating said shaft, and means automatically releasing any finger from its actuated position by movement of the manual means to an operative position.

9. Control means for a variable capacity electrical condenser having a control shaft comprising a plurality of manually operable fingers, an individual flexible member directly connecting each of said fingers to said shaft for individual rotation of the shaft by varying degrees, means retaining any one finger in actuated position, means automatically releasing any finger from its actuated position upon actuation of any other of said fingers, means returning the automatically released finger to its original position, normally inoperative manual means for rotating said shaft, and means automatically releasing any finger from its actuated position by movement of the manual means to an operative position.

10. Control means for a variable capacity electrical condenser having a control shaft comprising a plurality of manually operable fingers, an individual flexible member directly connecting each of said fingers to said shaft for individual rotation of said shaft through selective degrees, spring return means urging said shaft to a normal position, said shaft responding to actuation by any one of said fingers, means latching the actuated finger in its actuated position, said shaft responding immediately to actuation of a subsequently actuated finger without return of the shaft to said normal position, normally inoperative manual means for rotating said shaft, and means automatically releasing any finger from its actuated position by movement of the manual means to an operative position.

11. Control means for a variable capacity electrical condenser having a control shaft comprising a plurality of manually operable fingers, an individual flexible member directly connecting each of said fingers to said shaft for individual rotation of said shaft through selective degrees, spring return means urging said shaft to a normal position, said shaft responding to actuation by any one of said fingers, means latching the actuated finger in its actuated position, said shaft responding immediately to actuation of a subsequently actuated finger without return of the shaft to said normal position, means automatically releasing the first actuated finger from its latched position in response to actuation of the second actuated finger, normally inoperative manual means for rotating said shaft, and means automatically releasing any finger from its actuated position by movement of the manual means to an operative position.

12. Control means for a variable capacity electrical condenser having a control shaft comprising a plurality of manually operable fingers for selective rotation of said shaft, flexible tension members each connected to one of said fingers and to said shaft, said tension members each being of substantially equal length and wrapped around said shaft by varying amounts, said tension members being wrapped around said shaft in a direction such that actuation of any one of said fingers rotates said shaft in a direction to unwind the remainder of said tension members, a return spring opposing rotation of said shaft by said fingers, means latching any one of said fingers in its actuated position, and automatic means operative in response to actuation of a subsequently actuated finger releasing the latch holding the previously actuated finger.

13. Control means for a variable capacity electrical condenser having a control shaft, comprising a plurality of manually operable fingers residing transversely of said shaft at spaced intervals therealong, an individual flexible member connecting each of said fingers with said shaft and wrapped around said shaft for rotation thereof upon actuation of any one of said fingers, and spring means opposing actuation of each of said fingers.

14. Control means for a variable capacity electrical condenser having a control shaft comprising a plurality of manually operable fingers

residing transversely of the shaft at spaced intervals therealong, an individual flexible tension member connecting each of said fingers with said shaft, said flexible members each being partially wrapped around said shaft and anchored thereto at one end, said flexible members being wrapped in a direction such that actuation of any one of said fingers causes said shaft to rotate in a direction which unwinds the flexible connections to the other of said fingers, and a spring individual to each of said fingers urging return thereof after an actuation.

15. Control means for a variable capacity electrical condenser having a control shaft comprising a plurality of manually operable fingers residing transversely of the shaft at spaced intervals therealong, an individual flexible tension member connecting each of said fingers with said shaft, means for altering the length of each of said tension members whereby to alter the amount of rotation imparted to said shaft by any particular finger, means for rotating said shaft in reverse direction, and spring means urging said fingers toward their starting position.

JAMES H. CLEMENTS.