

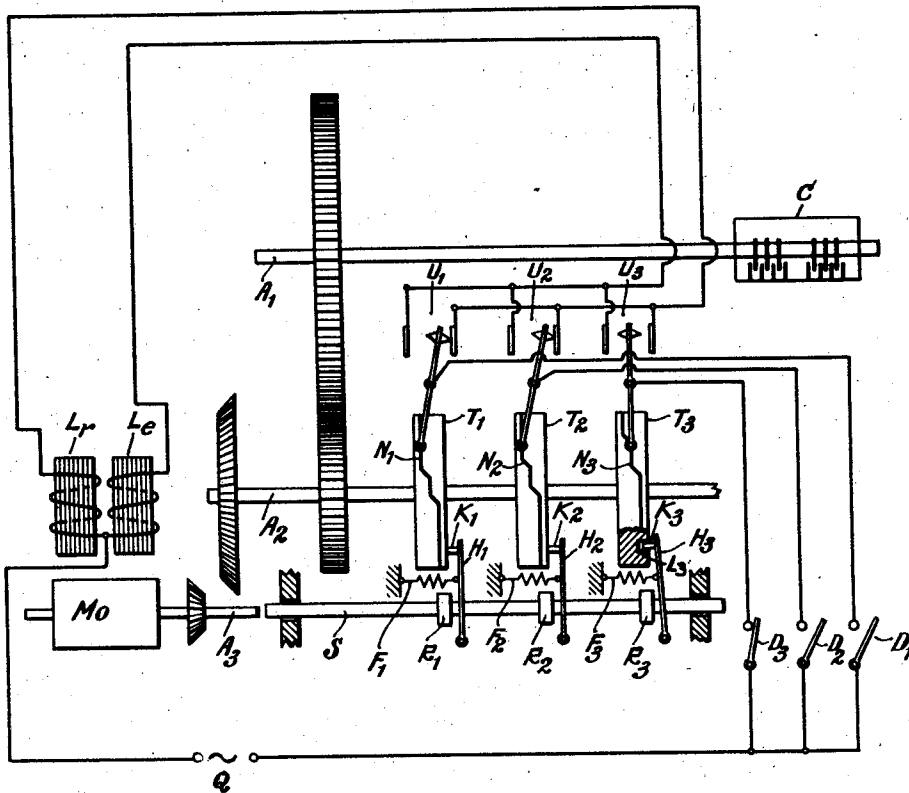
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ADJUSTING OR TUNING MEANS FOR RADIO FREQUENCY APPARATUS

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ADJUSTING OR TUNING MEANS FOR RADIO
FREQUENCY APPARATUS

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It is known in the prior art to use a motor in combination with a bipartite contact segment disk each for switching the motor for clockwise and counter-clockwise rotation and for disconnection upon the median position being reached between the two contact halves so as to effect press button tuning of an R. F. apparatus to predetermined positions. In lieu of the contact disks there could also be used cams or drums with spiral slots of varying depth in conjunction each with a control lever and a change-over or reverser switch for the motor.

The precision of adjustment in arrangements of this nature is so much greater the smaller the range of rotation corresponding to the neutral median position in comparison with the total range of rotation. If this ratio is chosen small, this entails the disadvantage that, especially if the adjusting movement is fast, the neutral median position will be exceeded, in fact, correct adjustment will be reached only after repeated to-and-fro motion or hunting. Indeed, under certain circumstances this rocking motion may become permanent.

On the other hand, attempts have been made to make the range of rotation of the neutral median position relatively large, and to insure fine and sharp adjustment by the aid of an accessory arrester or latch mechanism in that the contact pin sliding on the contact ring is allowed to drop and engage in an arresting hole in the middle of the insulation disk between the two halves. However, schemes of this nature involve the inconvenience that the arresting or notch means must either be made very shallow, that is, of little depth in order that the motor, on changing to another position, may be able to release and disengage the arresting means, or that in the other case, on actuation of the next press button the arrester latch must be lifted clear of the notch by the agency of mechanical force. In the first case the precision is inadequate, while in the second instance, remote control is impossible; indeed, the press button must be connected with the arresting means by mechanically acting rods.

According to the present invention the arrester or locker means are controlled by the motor in such a way that they will be operative only with the motor current being switched off. More particularly speaking, for a control of the arrester means there is to be used the axial shift of the motor shaft occurring on disconnection of the motor current. The arrester means may consist of latches engaging each in an arrester notch or

recess, said latches being disengaged by the motor shaft by means of a coaxial thrust rod against the force exerted by retractile springs in such a way that, with the motor running, they are unable to drop and engage in the arrester notches.

An exemplified embodiment of the invention is shown in the appended drawing. The shaft A₁ of the rotary gang condenser C of a receiver is in tooth-wheel gear relation with the shaft A₂ at the ratio of 2:1. Shaft A₂ supports three drums of reduced length T₁, T₂, T₃, each having a slot N₁, N₂, N₃, respectively, in which engage the control pins of the change-over switches U₁, U₂, U₃, respectively. The slots cover one-half of the circumference of each drum on the left-hand side, and the other half thereof on the right-hand side, while at the transition point thereof there is a stage which corresponds to the median position of the switches.

The shaft A₂ at the same time is in connection with the motor M₀ by means of a disengageable friction clutch or drive. When the motor is excited, the rotor is moved out to the right-hand side with the result that the friction gear is engaged. At the same time, the shaft butt A₃ of the rotor causes the thrust rod S with adjuster rings R₁, R₂, R₃, respectively, to be pushed to the right-hand side so that the locker levers H₁, H₂, H₃, are disengaged to the right against the forces of the springs F₁, F₂, F₃. The locker levers carry at their top ends the locker latches or catches K₁, K₂, K₃, respectively. These may have the form of slightly coned pins, and they are adapted to engage in suitable arrester holes or recesses formed in the drums T₁—T₃, of which holes only hole L₃ is shown in the drawing. Each arrester hole is so arranged that the corresponding latch or pin is located ahead of the hole when the control pin of the corresponding switch (in the present case U₃) is in the median position of the control slot (N₃). However, notching is possible only when the motor is disengaged, that is to say, is not excited.

The switches U₁, U₂, U₃ connect the potential of the source of current Q to respective press button switches D₁, D₂, D₃, according to their position with the right-hand rotation winding L_r or the winding L_l corresponding to counter-clockwise rotation of motor M₀.

The position shown in the drawing is the one for which the switch D₂ has been closed. Now, if D₁, for instance, is closed and D₃ reopened by positively acting means, the winding causative of clockwise rotation of the motor will be fed with

current, the rotor is pulled into the field and the shaft A₃ through the intermediary of the thrust rod S pushed the locking lever H₃ with latch K₃ out of the hole L₃. At the same time the friction clutch causes rotation of the shaft A₂. The first point reached is the median position of the slot N₁. However, inasmuch as it is not D₂ but D₁ that has been closed, the motor continues to revolve; but the latch K₂ is unable to engage in the corresponding recess of drum T₂. It is only a brief instant prior to the median position of the slot N₁ being reached that the motor current is broken. The clutch is disengaged and at the same time the spring F₁ pulls the latch K₁ against the lateral wall of the drum T₁. But the momentum inherent in the mechanism continues to revolve the shaft A₂ a small distance. The sliding locker pin K₁ soon after reaches the corresponding arrester notch or hole (not shown) and engages therein, with the result that the mechanism is locked in position.

The accuracy of adjustment in this arrangement is governed only by the play or backlash of the locking pin in its recess or hole (and this is less than one-tenth of one millimeter), indeed it is independent both of the width of the median position and of the distance of the two springs of the change-over switch. The length of the step in the slot corresponding to the median position must only be chosen in accordance with the momentum of the motor and the locking means, that is, so that the locker pin prior to the proper adjustment being reached, will be set upon the edge of the disk, and that the arrangement will continue to run as far as the proper position.

The press buttons D₁ and D₂, of course, may be spaced apart at will. The control of the thrust rod S and thus of the locking latches could be accomplished also by a single relay controlling the motor current instead of by the disengageable rotor shaft of the motor.

I claim:

1. In a tuning control system for radio receiving apparatus and the like, a control shaft, an electric motor for driving said shaft, a plurality of contactors for controlling the operation of said motor, a plurality of operating members for said contactors mounted on said shaft, a plurality of locking means one for each of said operating members, each of said locking means cooperating with its associated operating member to lock said member in a predetermined desired position and means controlled by said motor and effective only when said motor is in operation for rendering said locking means inoperative.

2. In a control system for radio receiving apparatus and the like, a control shaft, an electric motor for operating said shaft, said motor being

provided with an axially shiftable motor shaft which is adapted to be shifted from a position of rest to a running position upon the application of a predetermined voltage to the motor and back to the position of rest upon removal of the voltage, a plurality of contactors for controlling the operation of said motor, a plurality of operating members one for each of said contactors, said operating members being mounted for operation by said control shaft, locking means acting normally to lock the control shaft in any desired position of rest and means operated by said motor shaft upon displacement of the motor shaft to the running position for rendering the locking means inoperative.

3. In a control system for radio receiving apparatus and the like, a control shaft, an electric motor of the type having an axially shiftable motor shaft which is arranged so as to be shifted from a position of rest to a running position upon energization of the motor and back to the position of rest upon de-energization of the motor, means associated with both said motor shaft and the control shaft for coupling the motor shaft to the control shaft upon displacement of the motor shaft to the running position to provide for driving the control shaft by the motor, a plurality of contactors for controlling the operation of the motor, a plurality of operating members for said contactors, said members being adjustably mounted on said control shaft, locking means acting normally to lock the control shaft in any desired predetermined position, and means operated by said motor shaft upon displacement of the shaft to the running position for rendering said locking means inoperative.

4. In a control system for radio receiving apparatus and the like, a reversible motor, a plurality of reversing contactors for said motor, a plurality of operating members for said contactors, a control shaft having said operating members mounted thereon, said motor having an axially shiftable motor shaft which is automatically shifted from a position of rest to a running position upon energization of the motor and back to the position of rest upon de-energization of the motor, means effective only when the motor shaft is in the running position for providing a driving connection between the motor and the control shaft, locking means for said control shaft to lock said control shaft in any desired predetermined position, and means operated by said motor shaft upon displacement of the motor shaft to the running position for rendering said locking means inoperative while the motor is energized whereby the locking means is effective to lock the control shaft only when the motor is in a de-energized state.

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