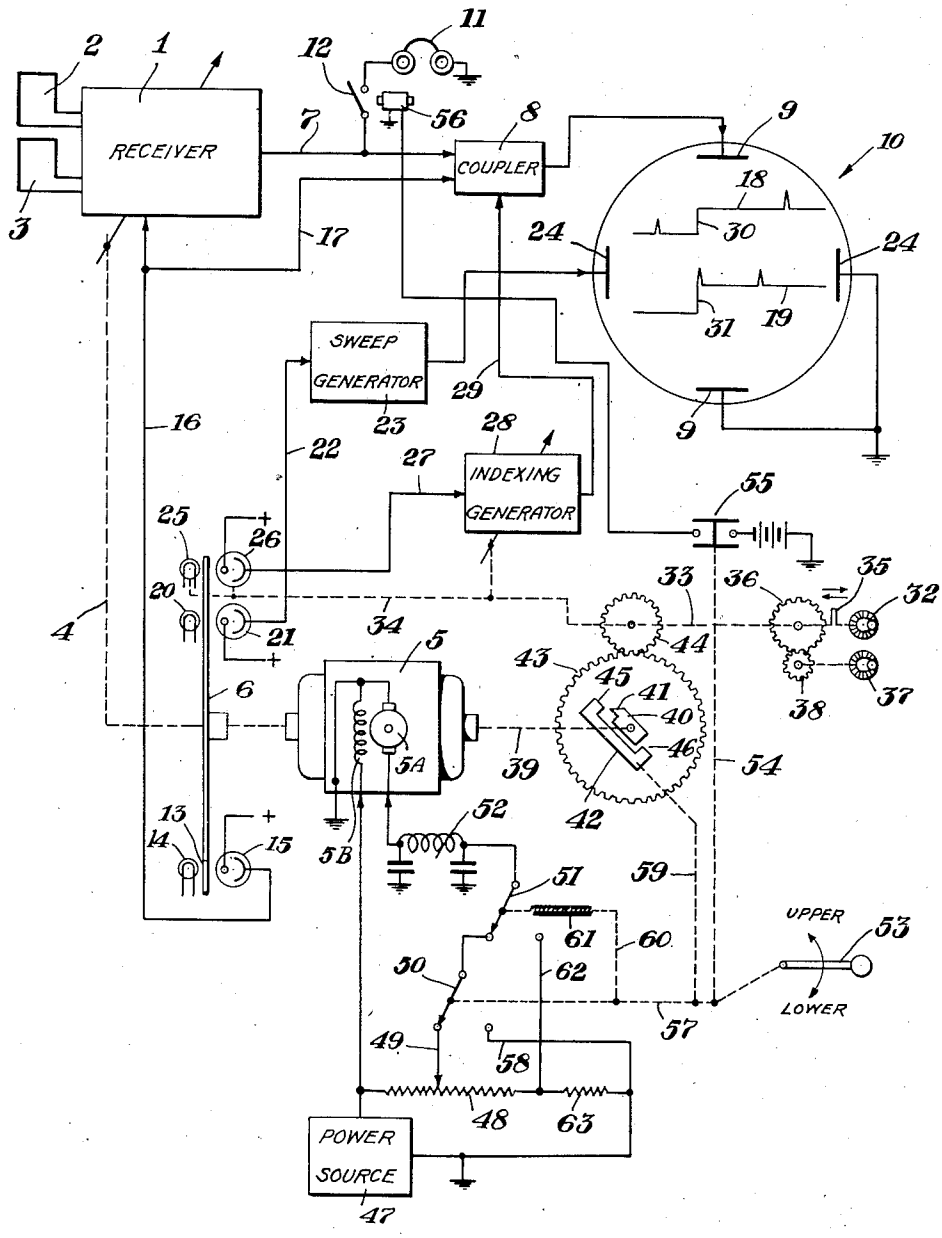
Nov. 30, 1948. F. W. FRINK ET AL 2,454,789

TUNING CONTROL MECHANISM

Filed June 16, 1945 4 Sheets-Sheet 1

Fig. 1.



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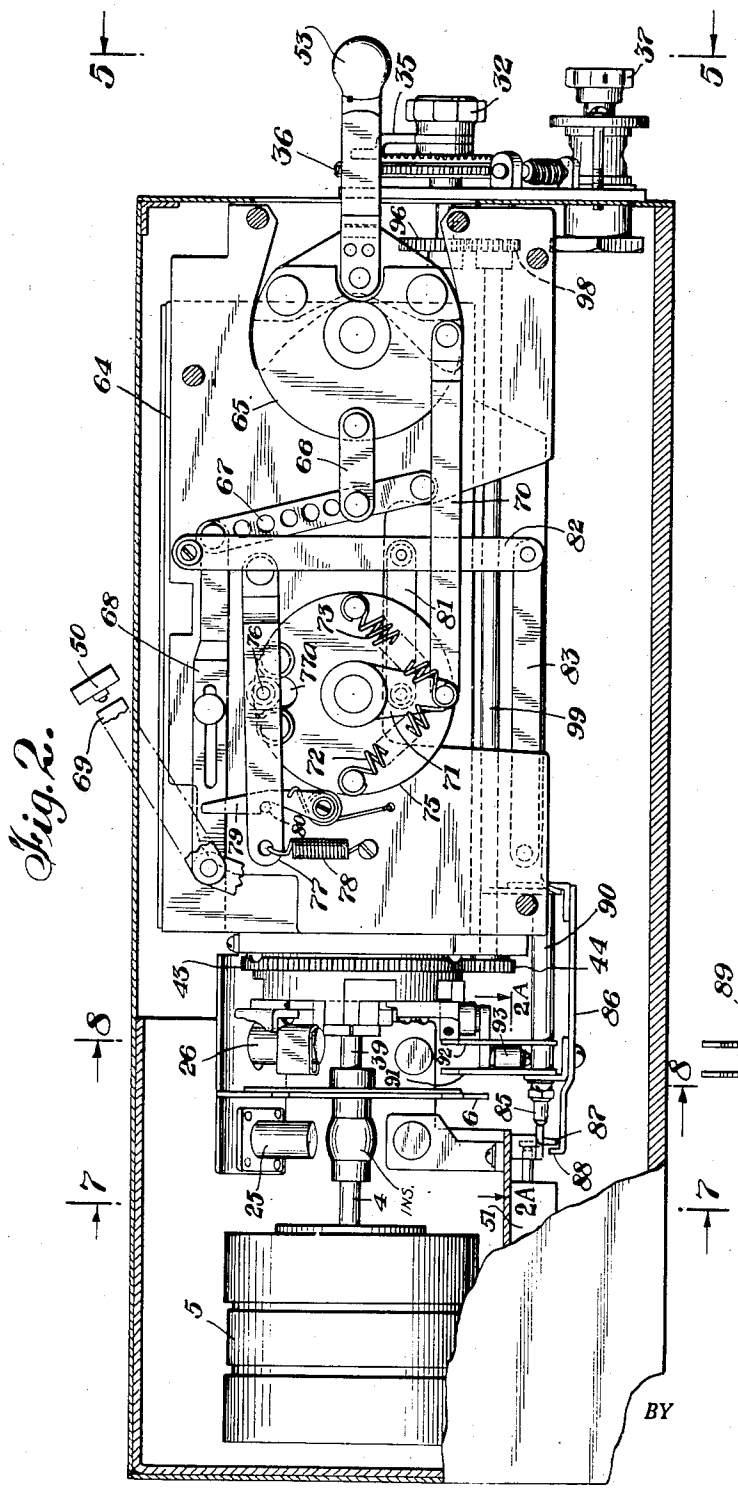


Fig. 2.

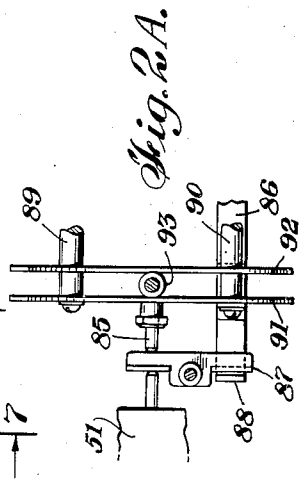


Fig. 2A.

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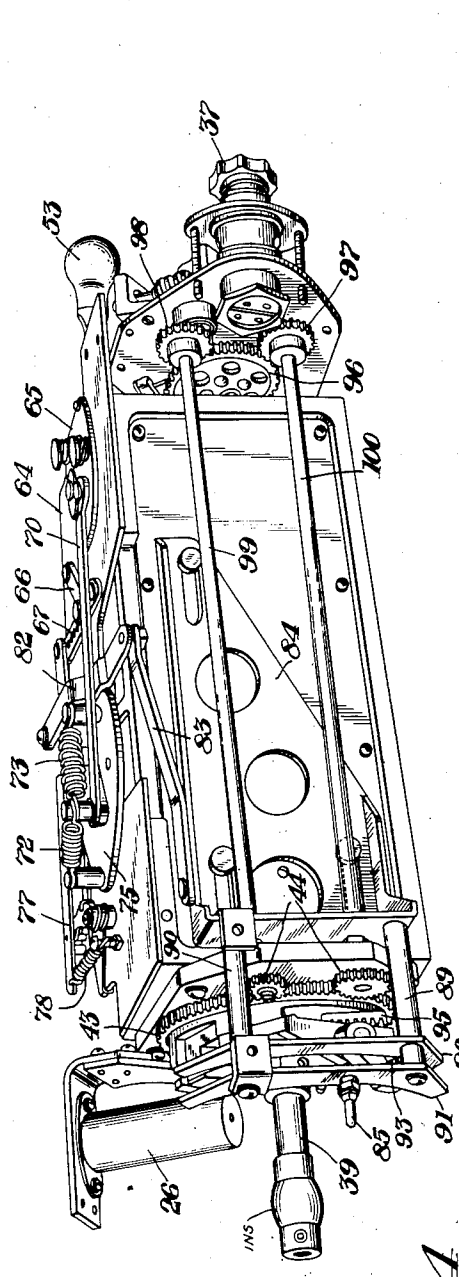


Fig. 3.

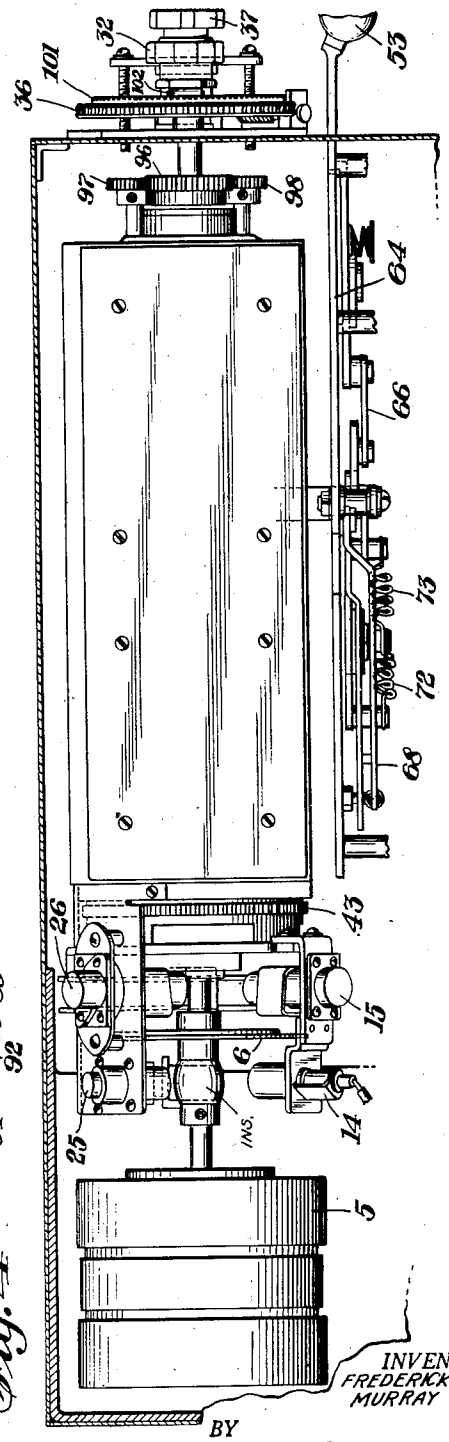


Fig. 4

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TUNING CONTROL MECHANISM

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Fig. 5.

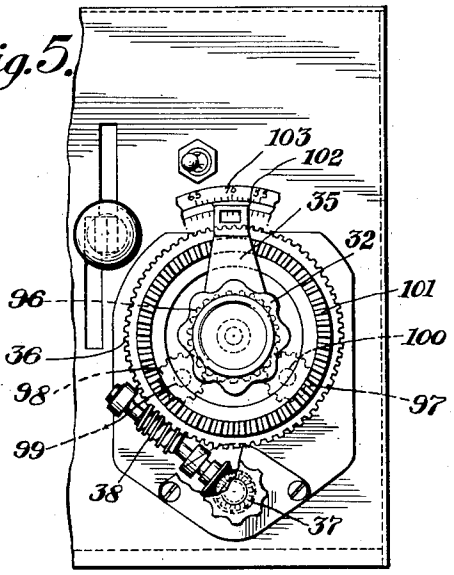


Fig. 6

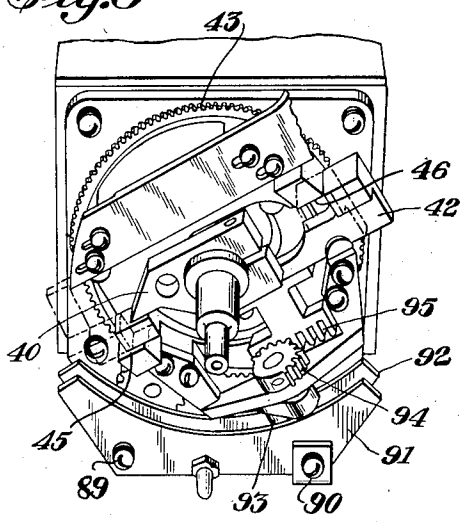


Fig. 7.

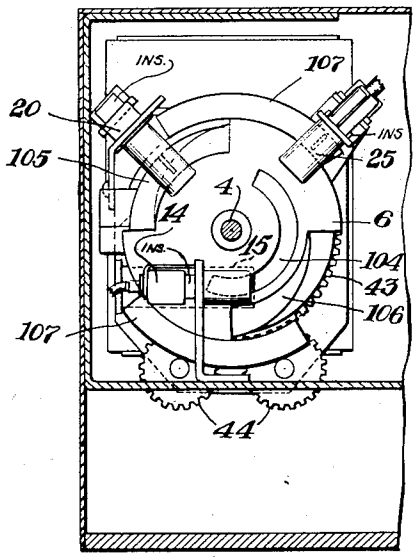
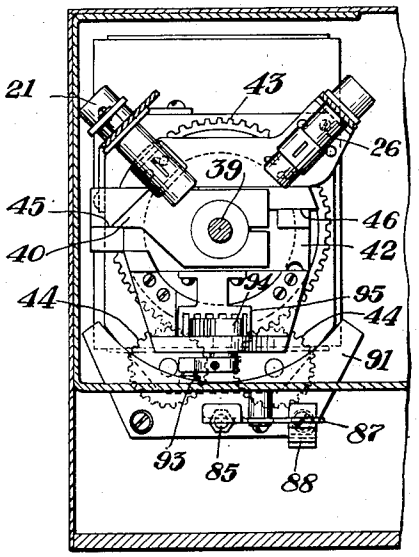


Fig. 8.



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2,454,789

TUNING CONTROL MECHANISM

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Application June 16, 1945, Serial No. 599,908

17 Claims. (Cl. 250—20)

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This invention relates to tuning control mechanism and more particularly to tuning control mechanism for stopping a panoramic tuning receiver in a predetermined tuned position.

In panoramic tuned receivers wherein the receiver is continuously tuned over a frequency band or bands, it is often desired to stop the scanned tuning of the receiver at a particular tuning position representing a received station in order that the station may be tuned in more precisely for listening to or so that direction finding may be accomplished on this particular station. In the panoramic tuning receivers generally some form of drive mechanism such as a motor is used to drive the tuning condensers of such a receiver to tune the system over a desired frequency band or bands. In order to stop the tuning of the receiver in a predetermined tuned position, it is therefor desirable to provide some means for stopping the motor at a particular point in its rotation so that the receiver will be properly tuned to the selected station. Such panoramic tuning receivers are generally provided with some form of visual indicator which may, for example, be a cathode ray tube the sweep of which represents the sweep through the frequency band. Some form of indexing may be provided adjustable over the swept band to a position corresponding to a signal indication.

In accordance with our invention we provide means for simultaneously adjusting a stop mechanism together with the indexing indications so that the stop mechanism will be positioned properly to stop the motor should it be desired to listen in on the selected station. For this purpose, the motor preferably is slowed down or stopped prior to the movement of the stop mechanism into a final stopping relationship so that there will not be too great a shock on the mechanism when the motor stop or detent cooperating with the stop mechanism comes in contact therewith. Furthermore, when two or more frequency bands are being separately scanned in the receiver, it is necessary that the stop mechanism be provided to stop the rotation of the motor at a point corresponding to the selected station within the selected frequency band.

In accordance with our invention, we provide a mechanism which will stop a motor without producing undue strain on the shaft and will stop the motor in the desired tuning position in a selected one of a plurality of frequency bands.

It will be clear that the mechanism we have designed while useful principally in the control of panoramic tuning receivers may be of more

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general application and may serve to stop a motor in a desired adjusted position for other purposes than the tuning of a receiver arrangement.

It is accordingly an object of our invention to provide a motor control system whereby a normal continuously driven motor may be stopped at a predetermined point in its rotation.

It is a further object of our invention to provide a motor control system wherein a stop mechanism is inserted in the path of a detent rotated by the motor, subsequent to a stop control action of the motor after which the motor is driven at a lower rate of speed until the detent comes in contact with the stop mechanism.

It is a still further object of our invention to provide a motor control system for selectively stopping the motor in either of two chosen positions, in which a stop means provided with diametrically opposed stop surfaces is arranged rotatably with respect to the motor and is made movable into the path of a detent driven by the motor in either of two directions to stop selectively the motor in the desired one of the two selected positions.

It is a still further object of our invention to provide, in a frequency scanning receiver, means for stopping the scanning of the receiver in a desired adjusted tuned position by the selective insertion of a stop mechanism into the path of the driving means for the scanning receiver.

It is a still further object of our invention to provide, in a frequency scanning receiver, means for adjusting selectively said receiver in a desired tuned position in one of a plurality of frequency bands by selectively moving a selected one of a plurality of stop surfaces into the path of a detent driven by the motor which normally tunes the receiver through the scanned frequency bands.

It is a still further object of our invention to provide, in a frequency scanning receiver, an indexing indication and means for adjusting this indexing indication simultaneously with stop means in a coarse or fine vernier adjustment, simultaneously with movement of a stop means to the desired relative position with respect to the tuned frequency band over which the receiver is scanned.

While we have outlined briefly above the general objects and features of our invention, a better understanding of these objects and features may be had from the particular description thereof made with reference to the accompanying drawings, in which:

Fig. 1 is a block schematic circuit and opera-

tional diagram of a system incorprating the features of our invention;

Fig. 2 is a side elevational view of the motor control mechanism;

Fig. 2A is a fragmentary view of a portion of the control mechanism shown in Fig. 2 to illustrate more clearly the operation;

Fig. 3 is a perspective view of the mechanism illustrated in Fig. 2;

Fig. 4 is a bottom view of the apparatus illustrated in Fig. 2;

Fig. 5 is an end view taken along line 5—5 of Fig. 2;

Fig. 6 is a perspective end view of the control mechanism;

Fig. 7 is a sectional view taken along the line 7—7 of Fig. 2; and

Fig. 8 is a sectional view taken along line 8—8 of Fig. 2.

Turning first to Fig. 1, it is to be noted that this operational diagram is not intended to be complete in the mechanical details; its primary purpose is to indicate functional relations less readily seen on the other views. In this Fig. 1, a tunable receiver is shown at 1 having coupled thereto antennas 2 and 3 for receiving signal energy in an upper and a lower frequency band. Receiver 1 is tunable through two frequency bands by means of a shaft 4, driven by a motor 5. Motor 5 also drives a scanning disc 6. The output of receiver 1 is coupled over a line 7 and through a coupler 8 to the vertical deflecting plates 9 of a cathode ray oscillograph 10. A pair of headphones 11 are also arranged to be energized from the output of receiver 1 through listen switch 12. Control disc 6 is provided with a slot 13 rotated between a lamp 14 and a photocell 15 which serves to produce a square control wave which is applied over line 16 to receiver 1. This control wave serves to switch the receiver between the bands received on antennas 2 and 3 for each revolution of the disc driven by motor 5. The control wave from the output of tube 15 is also applied over lines 16 and 17 to coupler 8 and then to the vertical deflecting plates 9 to produce a displacement of the tracing indication as shown at 18 and 19 representing the upper and lower frequency bands of the receiver. The horizontal sweep of the indicator beam of oscillograph 10 is provided by the shutter disc 6 through the medium of lamp 20 and photocell 21. The output of photocell 21 is applied over a line 22 to a sweep generator or amplifier 23, the output of which is applied across the horizontal deflecting plates 24 of indicator 10. A third set of control means comprising a lamp 25 and a photocell 26 is associated with disc 6 and serves over line 27 to control the production of indexing pulse in the indexing generator 28. The output of the indexing generator 28 may be applied over a coupling line 29 and coupler 8 to the vertical deflecting plates 9 of oscillograph 10 producing indicating bends or offsets 30 and 31 in the sweeps 18 and 19 indicating the upper and lower frequency bands respectively. A tuning knob 32 serves to rotate an indexing control shaft 33 which serves to adjust the position of the offset indications 30, 31 through the adjustment of indexing generator 28. This adjustment may be made in actual practice by adjustment of the rotary position of lamp 25 and cell 26 relative to disc 6 as shown by the extension of shafts 33 and 34.

Control knob 32 may normally be urged by a spring (not shown) inwardly so as to move a control means 35, which may serve simultaneously as frequency index, into contact with a clutch gear mechanism 36 loosely mounted for rotation about shaft 33. Thus when knob 32 is released from its normal position, gear 36 will normally be clutched to shaft 33. A vernier tuning knob 37 serves to drive vernier gear 38 to rotate shaft 33 to provide the fine adjustment of tuning as indicated by scope indicators 30 and 31. Motor 5 also carries on its shaft 39 a stopping detent 40 having a stopping surface 41. Detent 40 rotates with motor 5 so that it at all times corresponds to the rotary position of the motor. A stop mechanism 42 mounted on a gear 43 is rotatably positioned relative to the motor in accordance with the indexing adjustment by means of a gear 44 carried by shaft 33 meshing with gear 43. Thus, as the indexing indications 30 and 31 are adjusted over the face of the scope, stop mechanism 42 is adjusted in a rotary position with respect to the motor 5 so that it will at all times be positioned with respect to the rotation of the motor at a tuning position indicated by indicators 30 and 31 respectively. Stop mechanism 42 carries two stop surfaces diametrically opposed as shown at 45 and 46.

Under normal operating conditions, energy from power source 47 is applied over a resistor arrangement 48, line 49, switch 50, switch 51 and smoothing filter 52 to motor 5 to drive the motor 5 at a predetermined speed during scanning. When it is desired to stop the motor in a particular scanning position as represented by indications 30 or 31, a control lever 53 is moved into the upper or lower position dependent upon which frequency band is to be observed. Upon movement of lever 53, control link 54 serves to close a switch 55 energizing relay 56 so that switch 12 is closed and the listening device 11 is put into the circuit. Simultaneously, the movement of lever 53 serves, by means of a control linkage 57, to move switch 50 from its contact at line 49 into contact with a line 58 serving to effectively short circuit the armature 5A of the motor 5, field 5B still being energized, and stop the motor's rotation. When motor 5 has been stopped, linkage mechanism 59 serves to move stop 42 in either of its two selective directions to bring stop surfaces 45 or 46 into the path of detent 40, dependent upon which frequency band has been selected. After a delay caused by the normal operation of the linkage mechanism, link 60 through spring 61 serves to move switch contact 51 from its normal position into contact with line 62 again energizing the motor with the energy produced in the resistor 63 and the output of power source 47. It will be noted, however, that in this case the voltage drop is low so that motor 5 will be rotated at a slower speed. Motor 5 will then rotate at this reduced speed until detent 40 comes into contact with the selected stop surface 45 or 46 of stop mechanism 42 at which time the motor will be brought to rest with the receiver 1 adjusted to position corresponding to indexing indications 30 or 31 dependent upon whether lever 53 has been moved up or down. It will be clear that by the use of this type of mechanism, motor 5 may be stopped without undue shock to the equipment and may be stopped precisely in the position indicated by the indexing indication. Should it be necessary then to adjust the tuning of the receiver, for instance to bring the receiver more sharply into tune with the received signal, then knob 37 may be rotated

causing further rotation of gear 43 and stop mechanism 42. The motor, being energized at a lower power level, will follow up this tuning adjustment to adjust the tuning of the receiver through the medium of shaft 4. Simultaneously, the indexing lamp 25 and photocell 26 will be also adjusted to its corresponding new position.

In connection with Figs. 2 through 8 inclusive, a more detailed description of the control mechanism is given. Motor 5, through the medium of shaft 4 and shaft 39, serves to drive the tuning condensers contained within housing 64 when lever 53 is in its normal medium position. Movement of lever 53 upwards or downwards as shown in Fig. 2 serves to rotate a disc 65 moving link 66 either up or down causing link 67 to be moved to the right. Movement of link 67 causes sliding of linkage mechanism 68 which serves through the medium of lever 69 to close switch 50 serving to short circuit the motor as indicated in Fig. 1. At the same time, movement of disc 65 through another link 70 rotates a crank arm 71 in one of two directions causing tensioning of spring 72 or spring 73 depending upon whether lever 53 is moved upwardly or downwardly. Springs 72 and 73 are fastened on a disc 75 which is held from rotation by means of a pin 76 carried on lever 77. A spring 78 normally tends to pull lever 77 into engagement in slot or notch 77a in disc 75. Springs 72 and 73 are strong enough to overcome the action of spring 78 so rotation of disc 71 will raise lever 77. A spring controlled lever 79 fitting over a pin 80 on lever 77 prevents this from happening until linkage 68 has reached the end of its stroke. When the linkage reaches the end of its stroke, however, holding lever 79 releases lever 77 permitting it to move upwardly under the action of spring 72 or 73 and rotation of disc 75. Rotation of disc 75 serves through linkages 81, 82 and 83 to move a carriage 84 (see Fig. 3) to the right or left depending upon which direction lever 53 was moved. Carriage 84 carries with it a push rod 85, pull rod 86 which will serve to rock a bell-crank lever 87 in the same direction regardless of the direction of movement of carriage 84. If carriage 84 moves to the left, then push rod 85 serves to push the lower end of bell-crank 87 into contact with switch 51 causing the circuit of motor 5 to be energized to drive the motor forward at a reduced speed as shown in Fig. 1. However, if the carriage moves to the right then a hook 88 on lever 86 serves to pull on the other end of lever 87 moving the bell-crank lever into contact to close switch 51. It will thus be clear that regardless of the direction of movement of carriage 84, switch 51 will be operated. The time consumed in operation of the linkage mechanism to move the carriage is sufficient for the motor to come to a complete stop before stop mechanism 42 is moved into stopping position.

Prior to operation of switch 51, however, stop mechanism 42 is moved into the path of the detent mechanism 40 driven by the motor. Operation of this may be more clearly seen by reference to Fig. 6 together with Fig. 3. Carriage 84 carries with it two fixed rods 89 and 90 which serve to move two spaced plates 91 and 92 either forward or backward. Between plates 91 and 92 is provided a crank pin 93 coupled to a mutilated gear 94 which meshes with a rack 95 carried by stop mechanism 42. Thus as the carriage is moved forward, mutilated gear 94 is rocked in one direction serving to move stop mechanism 42 into position for contact with detent 40. When the carriage is moved in the opposite direction, the mutilated gear is rotated in the opposite direction and the stop mechanism is moved in the opposite direction into position for contact with detent 40. Gear 43 carrying stop means 42 is preferably rotatable through 90° so that stop surfaces 45 and 46 may be brought into stopping position anywhere within one quarter of the rotary position of shaft 39 and the coupled condenser. The condenser covers both bands in a single revolution as the rotor is of the balanced 90° type. Thus the stop mechanism may be brought into play anywhere within the scanning range covered by the system.

In order to assure a smooth drive for gear 43 upon rotation of knob 32, the drive mechanism instead of taking a simple form shown in Fig. 1, consists in a gear 96 fastened directly to the driving shaft and meshing with two spur gears 97, 98. These spur gears serve to rotate rods 99, 100 to the ends of which are fastened to two gears 44 meshing with driven gear 43 as can be quite clearly seen in Fig. 3.

The control mechanism for the coarse and vernier tuning of the apparatus can be more clearly seen from Fig. 5. Here the knob 32 is shown provided with the projecting portion 35 and ring gear 36. Gear 36 is provided on its upper surface with a plurality of serrations 101 into which a projection on arm 35 fits as can be seen from Fig. 2. Arm 35 also carries with it the pointer mechanism 102 which cooperates with the tuning scale 103. When rapid coarse adjustment of the tuning index and stop mechanism is desired, knob 32 is pulled outward disengaging 35 from the serrations 101 so that the apparatus may be rapidly rotated. The fixed gear 96 is in engagement with the drive gears 97 and 98 to control the positioning of the stop mechanism as previously described. When the coarse adjustment has been achieved, knob 32 is released bringing arm 35 into a corresponding notch in serrations 101 so that gear 36 will tend to turn the shaft. Then vernier knob 37 is rotated turning the worm gear 38 to drive gear 36 around slowly for the fine adjustment.

Turning now to Fig. 7, the operation of shutter 6 for the purpose of producing the various control waves can be more readily understood. In this arrangement the light 14 is arranged in fixed spaced relation with respect to disc 6 and opposite a slot 104. Slot 104 is semi-circular so that the light will shine half the time on the photocell 15 producing effectively an electrical square wave output in which the positive portions are equal to the negative or zero portions. For the saw-tooth generator the lamp 20 shines through one of two cut-out portions of the disc as indicated at 105, 106. Thus, saw-tooth sweep voltages are produced for alternate quadrants of a rotation corresponding to the sweep voltages for the quarter revolution of the separate frequency bands. The indexing is controlled from lamp source 25 in cooperation with the masking portions 107 which serves to produce a pulse voltage of a higher amplitude upon rotation of the shutter. The initiation point of this higher voltage may be changed by varying rotatably the position of lamp 25 relative to the motor shaft. Thus the indexing voltage or indication may be stepped around to the desired position as shown. Lamp 25 is driven simultaneously with the rotation of gear 43 so that the indexing indication and the position of the stop mechanism will at all times properly coincide.

From the foregoing, the particular apparatus shown in the illustrations of the equipment may be readily understood. While the apparatus has been shown for use with a scanning receiver, it should be clear that the stop mechanism may be utilized for any type of system wherein it is desired to stop a motor at a predetermined position in its rotation. Furthermore, the disc 6 and stop mechanism 46 need not rotate at the same speed as the motor but may be stepped down or upwards by similar gear ratios so that the two will rotate together. For the purpose of stopping the motor in proper indexing position, it is essential, however, that the stop mechanism be rotated relative to the tuning band sweep.

It is further clear from the description above that many alternatives to the specific structural arrangement shown in connection with Figs. 2 to 8 may be used if desired without departing from the scope of our invention. Furthermore, more than two stop positions may be provided if desired or a single stop position may be utilized. To those skilled in the art, the modifications of the apparatus for achieving the various functions will be clearly evident from the description of the foregoing apparatus.

It should therefore be clearly understood that the description given in conjunction with the specific apparatus shown is made merely by way of illustration and is not to be considered as a limitation on our invention as set forth in the objects thereof and in the appended claims.

We claim:

1. In a frequency scanning receiver, means for adjusting said receiver to a desired tuned position, comprising a motor for scanning the tuning means of said receiver over a predetermined range, an indexing generator controlled by said motor to provide an indexing indication of the desired tuned position, means for adjusting said indexing indication over said frequency range, a detent rotatable with said motor, a stop means rotatable with respect to said detent under control of said means for adjusting said indexing indication, and means for moving said stop means into the path of said detent to stop said motor in the tuned position indicated by said index.

2. A receiver according to claim 1 wherein said last-named means comprises means for stopping said motor prior to moving in of said stop means, and means for starting said motor at a reduced speed subsequent to movement of said stop means.

3. In a frequency scanning receiver scannable over two frequency bands, means for selectively adjusting said receiver to a desired tuned position in either of said bands, comprising a motor for scanning the tuning means of said receiver over said two frequency bands, an indexing generator controlled by said motor to provide an indexing indication of the desired tuned position, means for adjusting said indexing indication over the frequency bands, a detent rotatable with said motor, a stop means having diametrically opposed stop surfaces rotatable with respect to said detent under control of said means for adjusting said indexing indication, and means for selectively moving said stop means in either of two directions into the path of said detent to stop said motor selectively in the tuned position with one of said frequency bands indicated by said index.

4. A receiver according to claim 3 wherein said last-named means comprises means for stopping said motor prior to moving in of said stop means, and means for starting said motor at a reduced speed subsequent to movement of said stop means.

5. In a frequency scanning receiver scannable over two frequency bands, means for adjusting said receiver to a desired tuned position in either of said bands, comprising a motor for scanning the tuning means of said receiver over said bands in succession during each revolution of said motor, an indexing generator controlled by said motor to provide an indexing indication of the desired tuning position in both said bands, means for adjusting said indexing indication simultaneously over both said frequency bands, a detent rotatable with said motor, a stop means provided with diametrically related stop surfaces rotatable with respect to said motor under control of said means for adjusting said indexing indication, and means for selectively moving said stop means in either of two directions into the path of said detent to stop said motor in the tuned position within one of said bands indicated by said index.

6. A receiver according to claim 5 wherein said last-named means comprises means for stopping said motor prior to moving in of said stop means, and means for starting said motor in the same direction at a reduced speed subsequent to moving of said stop means.

7. In a frequency scanning receiver operative over a frequency band, tuning means for tuning said receiver over said frequency band, a motor drive means for driving said tuning means through said band, an indexing means controlled by said motor for producing an indexing indication, means for adjusting said indexing indication simultaneously over said frequency band to indicate selected tuning positions, a detent means rotated by said motor, a stop means having a stop surface movable into engaging position with respect to said detent, means for rotating said stop means with respect to said motor simultaneously with adjustment of said indexing indication whereby said stop surface will be positioned with respect to said motor in accordance with said indexing indication, and means for moving said stop surface into the path of said detent to stop said motor in tuned position corresponding to the position of said indexing indication.

8. In a frequency scanning receiver operative over a frequency band, tuning means for tuning said receiver over said frequency band, a motor drive means for driving said tuning means through said band, an indexing means controlled by said motor for producing an indexing indication, means for adjusting said indexing indication simultaneously over said frequency band to indicate selected tuning positions, a detent means rotated by said motor, a stop means having a stop surface movable into engaging position with respect to said detent, means for rotating said stop means with respect to said motor simultaneously with adjustment of said indexing indication whereby said stop surface will be positioned with respect to said motor in accordance with said indexing indication, means for moving said stop surface into the path of said detent to stop said motor in tuned position corresponding to the position of said indexing indication, means for stopping said motor prior to movement of said stop means into stopping position, and means for starting said motor after said movement of said stop means.

9. In a frequency scanning receiver operative over a frequency band, tuning means for tuning said receiver over said frequency band, a motor

drive means for driving said tuning means through said band, an indexing means controlled by said motor for producing an indexing indication, means for adjusting said indexing indication simultaneously over said frequency band to indicate selected tuning positions, a detent means rotated by said motor, a stop means having a stop surface movable into engaging position with respect to said detent, means for rotating said stop means with respect to said motor simultaneously with adjustment of said indexing indication whereby said stop surface will be positioned with respect to said motor in accordance with said indexing indication, means for moving said stop surface into the path of said detent to stop said motor in tuned position corresponding to the position of said indexing indication, and means for coupling an audio signal reproducer to the output of said receiver upon movement of said stop mechanism.

10. In a frequency scanning receiver operative over more than one frequency band, tuning means for successively tuning said receiver over said frequency bands, a motor drive means for driving said tuning means through said successive bands for each revolution of said motor, an indexing means controlled by said motor for producing an indexing indication, means for adjusting said indexing indication simultaneously over said frequency bands to indicate selected tuning positions, a detent means rotated by said motor, a stop means having stop surfaces corresponding to said frequency bands movable selectively into engaging position with respect to said detent, means for rotating said stop means with respect to said motor simultaneously with adjustment of said indexing indication whereby said stop surfaces will be positioned with respect to said motor in accordance with said indexing indication, and means for moving a selected one of said stop surfaces into the path of said detent to stop said motor in tuned position corresponding to the position of said indexing indication in the selected frequency band.

11. In a frequency scanning receiver operative over more than one frequency band, tuning means for successively tuning said receiver over said frequency bands, a motor drive means for driving said tuning means through said successive bands for each revolution, a display indication in the output of said receiver for producing a visual display of signals in said frequency bands, an indexing means controlled by said motor for producing an indexing indication, means for adjusting said indexing indication simultaneously over said display indicator for indication of selected frequencies in said frequency bands, a detent means rotated by said motor, a stop means having stop surfaces corresponding to said frequency bands movable selectively into engaging position with respect to said detent, means for rotating said stop means with respect to said motor simultaneously with adjustment of said indexing indication whereby said stop surfaces will be positioned with respect to said motor in accordance with said indexing indication, and means for moving a selected one of said stop surfaces into the path of said detent to stop said motor in tuned position corresponding to the position of said indexing indication in the selected frequency band.

12. In a frequency scanning receiver operative over more than one frequency band, tuning means for successively tuning said receiver over said frequency bands, a motor drive means for driving

said tuning means through said successive bands for each revolution, a display indicator in the output of said receiver for producing a visual display of signals in said frequency bands, an indexing means controlled by said motor for producing an indexing indication, means for adjusting said indexing indication simultaneously over said display indicator for indication of selected frequencies in said frequency bands, a detent means rotated by said motor, a stop means having stop surfaces corresponding to said frequency bands movable selectively into engaging position with respect to said detent, means for rotating said stop means with respect to said motor simultaneously with adjustment of said indexing indication whereby said stop surfaces will be positioned with respect to said motor in accordance with said indexing indication, and means for moving a selected one of said stop surfaces into the path of said detent to stop said motor in tuned position corresponding to the position of said indexing indication in the selected frequency band, means for stopping said motor prior to movement of said stop means into stopping position, and means for starting said motor at a lower rate after said movement of said stop means.

13. In a frequency scanning receiver operative over more than one frequency band, tuning means for successively tuning said receiver over said frequency bands, a motor drive means for driving said tuning means through said successive bands for each revolution, a display indicator in the output of said receiver for producing a visual display of signals in said frequency bands, an indexing means controlled by said motor for producing an indexing indication, means for adjusting said indexing indication simultaneously over said display indicator for indication of selected frequencies in said frequency bands, a detent means rotated by said motor, a stop means having stop surfaces corresponding to said frequency bands movable selectively into engaging position with respect to said detent, means for rotating said stop means with respect to said motor simultaneously with adjustment of said indexing indication whereby said stop surfaces will be positioned with respect to said motor in accordance with said indexing indication, means for moving a selected one of said stop surfaces into the path of said detent to stop said motor in tuned position corresponding to the position of said indexing indication in the selected frequency band, and means operative upon movement of said stop means to couple an audio signal reproducer to the output of said receiver.

14. In a frequency scanning receiver operative over two frequency bands, tuning means for successively tuning said receiver over said frequency bands, a motor drive means for driving said tuning means through said successive bands for each revolution, a visual display indicator for producing separate displays of received signals in said two bands, an indexing means controlled by said motor for producing an indexing indication, means for adjusting said indexing indication over said display indicator to indicate the tuning of a selected one of the received signal frequencies within said frequency bands, a detent means rotated by said motor, a stop means having diametrically opposed stop surfaces corresponding to said frequency bands movable selectively into engaging position with respect to said detent, means for rotating said stop means with respect to said motor simultaneously with adjustment of said indexing indication whereby said stop sur-

faces will be positioned with respect to said motor in accordance with said indexing indication, selective means for stopping said scanning in a selected one of said bands, and means responsive to operation of said selective means for moving a selected one of said stop surfaces into the path of said detent to stop said motor in tuned position corresponding to the position of said indexing indication in the selected frequency band.

15. In a frequency scanning receiver operative over two frequency bands, tuning means for successively tuning said receiver over said frequency bands, a motor drive means for driving said tuning means through said successive bands for each revolution, a visual display indicator for producing separate displays of received signals in said two bands, an indexing means controlled by said motor for producing an indexing indication, means for adjusting said indexing indication over said display indicator to indicate the tuning of a selected one of the received signal frequencies within said frequency bands, a detent means rotated by said motor, a stop means having diametrically opposed stop surfaces corresponding to said frequency bands movable selectively into engaging position with respect to said detent, means for rotating said stop means with respect to said motor simultaneously with adjustment of said indexing indication whereby said stop surfaces will be positioned with respect to said motor in accordance with said indexing indication, selective means for stopping said scanning in a selected one of said bands, means responsive to operation of said selective means for moving a selected one of said stop surfaces into the path of said detent to stop said motor in tuned position corresponding to the position of said indexing indication in the selected frequency band, and means for maintaining said motor energized at a lower level, whereby the motor will maintain said detent in contact with said stop mechanism upon further rotation of said stop means.

16. In a frequency scanning receiver operative over two frequency bands, tuning means for successively tuning said receiver over said frequency bands, a motor drive means for driving said tuning means through said successive bands for each revolution, a visual display indicator for producing separate displays of received signals in said two bands, an indexing means controlled by said motor for producing an indexing indication, means for adjusting said indexing indication over said display indicator to indicate the tuning of a selected one of the received signal frequencies within said frequency bands, a detent means rotated by said motor, a stop means having diametrically opposed stop surfaces corresponding to said frequency bands movable selectively into engaging position with respect to said detent, means for rotating said stop means with respect to said motor simultaneously with adjustment of said indexing indication whereby said stop surfaces will be positioned with respect to said motor in accordance with said indexing

indication, selective means for stopping said scanning in a selected one of said bands, means responsive to operation of said selective means for moving a selected one of said stop surfaces into the path of said detent to stop said motor in tuned position corresponding to the position of said indexing indication in the selected frequency band, means for stopping said motor prior to said movement of said stop means, and means for again starting said motor and maintaining said motor energized at a lower level to cause rotation of said detent into engagement with the selected stop surface, and to maintain it in such engagement during further rotation of said stop means.

17. In a frequency scanning receiver operative over more than one frequency band, tuning mean for successively tuning said receiver over said frequency bands, a motor drive means for driving said tuning means through said successive bands for each revolution of said motor, an indexing means controlled by said motor for producing an indexing indication, means for adjusting said indexing indication simultaneously over said frequency band to indicate selected tuning positions, a detent means rotated by said motor, a stop means having stop surfaces corresponding to said frequency bands movable selectively into engaging position with respect to said detent, means for rotating said stop means with respect to said motor simultaneously with adjustment of said indexing indication whereby said stop surfaces will be positioned with respect to said motor in accordance with said indexing indication, selective means movable into selective positions for stopping scanning in a selected one of said bands, means responsive to operation of said selective means for moving a carriage mechanism in a selected direction, means responsive to movement of said carriage for successively stopping said motor, moving the selected surfaces of said stop mechanism into the path of said detent, and starting said motor at a reduced speed, whereby said motor will be finally stopped in the selected tuning position determined by said index adjustment.

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