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J. F. CURRAN
AUTOMATIC SELECTOR CLUTCH ASSEMBLY
FOR SEARCH RECEIVERS
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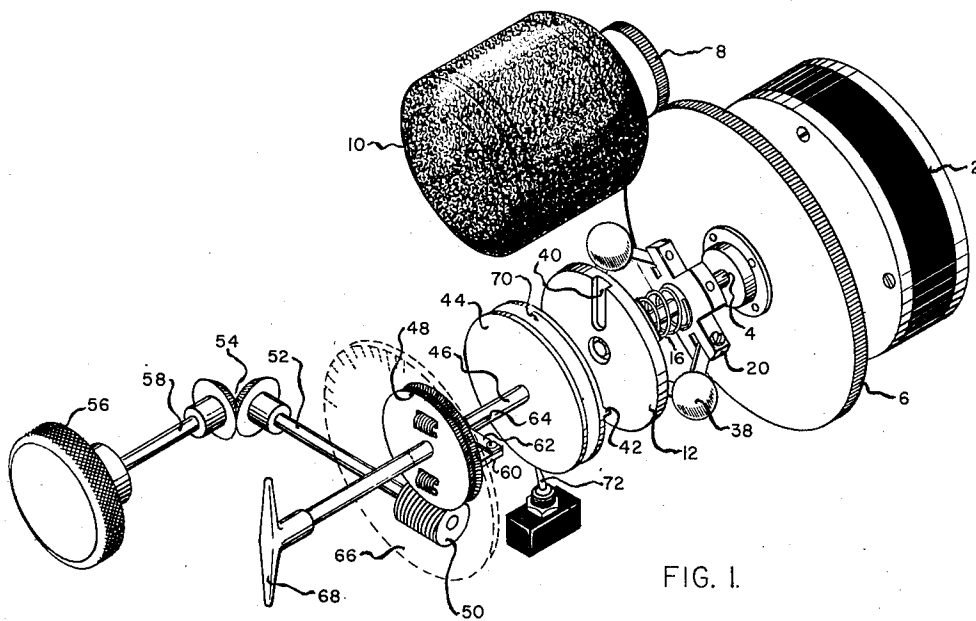


FIG. 1.

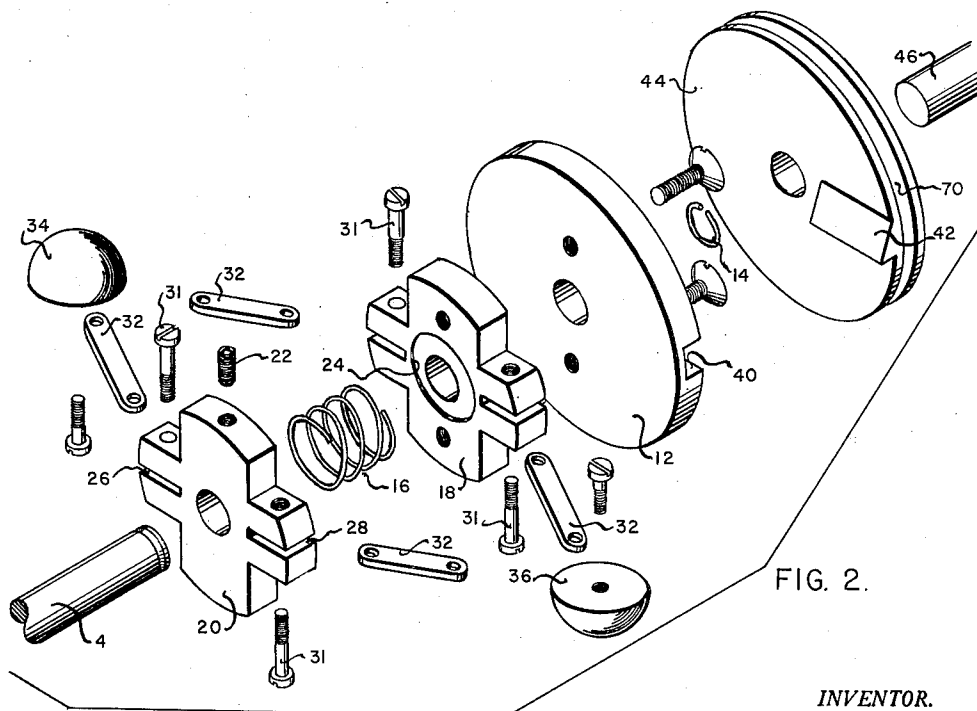


FIG. 2.

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AUTOMATIC SELECTOR CLUTCH ASSEMBLY
FOR SEARCH RECEIVERSJoseph F. Curran, Neptune, N. J., assignor to the
United States of America as represented by the
Secretary of the Army

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6 Claims. (Cl. 74—10.2)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to an automatic frequency selector mechanism and more particularly to a clutch assembly for automatically selecting a particular frequency from a predetermined frequency spectrum. While the invention is subject to a wide range of applications, it is especially suited for use in conjunction with a motor driven tuning assembly which determines the operating frequency spectrum of a search receiver, and will be particularly described in connection with apparatus containing such a receiver.

In search receivers employing a motor driven tuning assembly, it is sometimes desirable to examine a particular frequency of the spectrum swept by said assembly. Heretofore, this was achieved by stopping the motor and then resetting the tuning assembly to the desired position. Such a process is necessarily slow and time consuming.

It is therefore an object of this invention to provide an improved frequency selector mechanism.

It is a further object of this invention to provide a mechanism whereby a particular frequency may be automatically selected.

It is a further object of this invention to provide a clutch assembly for rapidly selecting a predetermined frequency from an available frequency spectrum.

In accordance with the invention the frequency selector mechanism consists of a motor actuated tuning device having one plate of a rotatably mounted clutch affixed thereto, and a speed-controlled means operable in response to manual control for engaging and disengaging said clutch at a preselected position of said tuning device. In the engaged position, the motor is rendered inoperative by means of a switch which is activated by the axial movement of one of the clutch plates, and in this position means are provided for manually operating said tuning device. When the clutch is disengaged, the motor is rendered operative to again drive the tuning device through the frequency spectrum.

For a better understanding of the present invention, together with other and further objects thereof, reference is made to the following description taken in connection with the accompanying drawing in which:

Fig. 1 shows a perspective view of my invention; and

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Fig. 2 shows an exploded view, inverted with respect to Fig. 1, of the clutch assembly embodied in my invention.

Referring to Figs. 1 and 2 there is shown at 2 a rotary tuning device of a search receiver. Rotatably mounted on shaft 4 of the rotary tuning device is a gear wheel 6 which meshes with gear 8 mounted on a shaft, not shown, at one end of an electric motor 10. Affixed to the end of shaft 4 is disc-shaped upper clutch plate 12. Clutch plate 12 is held in position at the end of said shaft by a snap ring, or washer 14 and the pressure provided by spring 16 which is mounted coaxially with said shaft between cross-shaped supports 18 and 20. As shown, said supports are axially spaced along shaft 4. The lower support 18 is rigidly mounted to the top surface of clutch plate 12 and the upper support 20 is axially adjustable along shaft 4 by means of set screw 22 to effectively control the pressure of spring 16 against upper clutch plate 12. Circular recesses as at 24 are provided in the opposing surfaces of supports 18 and 20, respectively, to maintain spring 16 axially in position.

As illustrated, one cross arm of each of said supports is provided with a pair of coplanar slots 26 and 28, respectively. Pivotaly mounted in each of said slots by means of screws 31 is a link arm 32 to which balanced weights 34 and 36 are secured to form a speed-controlled governor 38.

The bottom surface of upper clutch plate 12 is provided with a recess, or slot 40, which extends radially inwards from the periphery of said clutch plate. Recess 40 is adapted to engage a corresponding protrusion 42 on disc-shaped lower clutch plate 44 which is secured to the upper end of a manually operable shaft 46. Shaft 46 is axially aligned with shaft 4 and extends freely through the hub, not shown, of a spring-loaded split worm wheel 48 which meshes with worm gear 50 affixed to one end of transverse shaft 52. Shaft 52 is rotatably driven through reduction gear 54 by means of knob 56 which is secured to one end of vernier drive shaft 58.

Mounted on the rear of worm wheel 48 is a pair of diametrically spaced L-shaped brackets, one of which is shown at 60. Joining the ends of the brackets and secured thereto is flat spring-like member 62 which extends freely through a longitudinal slot 64 provided therefor in shaft 46. The lower end of shaft 46 extends freely through a frequency calibrated dial 66 which is rotatably mounted on the front of worm wheel 48. Secured to the lower end of shaft 46 is a manually operable handle 68 to control the axial

movement of shaft 46. It can readily be seen that by this arrangement, axial movement of lower clutch plate 44 may be achieved manually by operating handle 68 while clutch plate 44 may be manually rotated by means of vernier drive shaft 58.

The periphery of lower clutch plate 44 is grooved as at 70 to form a guide channel for a toggle switch 72 which is in abutment with the grooved surface. The actuation of switch 72 is controlled only by the axial movement of lower clutch plate 44. It is to be understood that toggle switch 72 electrically connects motor 10 to a power source, not shown. Thus, when clutch plate 44 is moved axially in one direction by handle 68, switch 72 is in position to supply power to motor 10. By reversing the axial movement of clutch plate 44, power may be removed from motor 10. In either position, the toggle switch merely slides along groove 70 when lower clutch plate 44 is rotated by means of vernier drive shaft 58.

In operation, when tuning device 2 is motor-driven, the clutch plates are normally disengaged, and the power to motor 10 is applied through toggle switch 72 which is actuated by groove 70 on lower clutch plate 44. It can readily be seen that in addition to providing power to motor 10, toggle switch 72 also limits the axial movement of lower clutch plate 44.

With motor 10 operating, the balanced weights 34 and 36 of governor 38 are outwardly driven by centrifugal force, thus acting on spring 16 to lift upper clutch plate 12 away from lower clutch plate 44 to prevent the plates from meshing at high speeds. This is the normal running position of the device.

To observe a particular frequency, lower clutch plate 44 is rotated manually to the desired position as determined by calibrated dial 66 by means of vernier drive shaft 58, reduction gear 54, worm gear 50 and worm wheel 48. Shaft 46 is then pushed inwardly to reverse the position of toggle switch 72, thus shutting off the power to motor 10. With the power to motor 10 disconnected, the speed of the motor is gradually reduced and, consequently, as the motor loses its speed, the action of weights 34 and 36 against spring 16 is reduced thus causing upper clutch plate 12 to slowly approach positioned lower clutch plate 44 until recess 40 on upper clutch plate 12 engages protrusion 42 on said lower clutch plate. At this instant all rotation ceases and the torsional strain of shaft 46 is checked by the action of spring-like member 62 and spring-loaded worm wheel 48.

If desirable, shaft 4 of the rotary tuning device may be manually operated by knob 56 after the power to motor 10 is removed. By so doing, shaft 52 is rotatably driven through reduction gear 54, thus rotating split worm wheel 48 which in turn rotates the tuning device by means of the engaged clutch.

While many types of gearing drive mechanism may be employed, it is desirable to employ a worm gear drive in order that lower clutch plate 44 be immovable with the engaging shock. By this arrangement, lower clutch plate 44 is prevented from being driven past the preselected point when it meshes with upper clutch plate 12.

To revert again to motor drive it is necessary only to pull out shaft 46. This disengages the two clutch plates and simultaneously actuates toggle switch 72 so that power is again applied to motor 10. As the motor picks up speed, clutch plate 12 is again pulled backwards by the cen-

trifugal force applied to weights 34 and 36, thus leaving enough space between the two clutch plates so that when lower clutch plate 44 is again pushed in, the plates will not immediately touch or mesh at high speeds.

As mentioned above, upper support 20 is made slidably adjustable on shaft 4 by means of set screw 22. By this arrangement the initial tension of spring 16 may be properly adjusted to give positive functioning of the engaging clutch plates at a relatively slow speed. It is to be understood that the speed of rotation of the tuning device 2 is governed by the mass of the weights 34 and 36 and may be adjustable. Thus as a governor, these weights may also maintain a uniform running speed over slight variation for input voltage to motor 10 or any change in load.

While there has been described what is at present considered to be the preferred embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is, therefore, aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

I claim:

1. A frequency selector device comprising an upper clutch plate and a lower clutch plate, said plates being normally disengaged, power means for rotating said upper plate at a predetermined speed, means associated with said upper plate responsive to the speed of rotation of said power means for controlling the spacing between said plates, means for rotatably positioning said lower clutch plate to a predetermined position, means for deenergizing said power means when said lower clutch plate is in said predetermined position whereby the upper clutch plate is lowered to engage said positioned lower clutch plate, means for maintaining the plates in the engaged position, means for manually operating the engaged clutch plates, and means for simultaneously disengaging said clutch plates and reenergizing said power means.

2. A frequency selector device comprising a clutch plate having mutually opposing upper and lower plates, said plates being normally disengaged, a first shaft, said upper clutch plate being rotatably mounted at one end of said first shaft, a tuning device tunable through a certain frequency spectrum mounted at the other end of said first shaft, power means for rotating said first shaft, a second shaft axially aligned with said first shaft, said lower clutch plate being mounted at one end of said second shaft, speed-controlled means on said first shaft intermediate said tuning device and said upper clutch plate to control the spacing between said upper clutch plate and said lower clutch plate, means for rotatably positioning said lower clutch plate to a position corresponding to a particular frequency of said tuning device, means for deenergizing said power means when said lower clutch plate is in said position whereby said upper clutch plate is lowered to engage said lower clutch plate, and means for maintaining the clutch plates in the engaged position.

3. A frequency selector device comprising a clutch having mutually opposing upper and lower plates, said plates being normally disengaged, a first shaft, said upper clutch plate being rotatably mounted on one end of said first shaft, a tuning device tunable through a certain frequency spectrum mounted at the other end of said first shaft,

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power means for rotating said first shaft, a second shaft axially aligned with said first shaft and having said lower plate mounted at one end thereof, a spring coaxial with said first shaft intermediate said tuning device and said upper clutch plate, one end of said spring affixed to said upper clutch plate, the other end of said spring being slidably adjustable along said first shaft to control the initial tension of said spring, a governor rotatably mounted on said first shaft across said spring to control the axial spacing between said upper clutch plate and said lower clutch plate, means for rotatably positioning said lower clutch plate to a position corresponding to a particular frequency of said tuning device, means for deenergizing said power means when said lower clutch plate is in said position whereby said upper clutch plate is lowered to engage said positioned lower clutch plate, means for maintaining the clutch plates in the engaged position, and means for manually operating the tuning device in the engaged position.

4. A frequency selector device comprising a clutch having mutually opposing upper and lower plates, said plates being normally disengaged, a first rotary shaft having said upper clutch plate mounted at one end thereof, a tuning device tunable through a certain frequency spectrum mounted at the other end of said first shaft, a rotary governor mounted on said first shaft intermediate said tuning device and said upper clutch plate, one end of said governor being affixed to said upper clutch plate to control the axial movement thereof, the other end of said governor being axially adjustable along said first shaft, a metallic spring coaxial with said first shaft positioned longitudinally across said governor, a second shaft axially aligned with said first shaft and having said lower clutch plate mounted at one end thereof, a motor for actuating said first shaft, manual means for rotating said lower clutch plate to a position corresponding to a particular frequency of said tuning device, means for deenergizing said motor when said lower clutch plate is in said position whereby said upper clutch plate is lowered to mesh with said lower clutch plate, means for maintaining the clutch plates in the meshed position, and means for manually operating the tuning device in the meshed position.

5. A frequency selector device comprising a first shaft, a motor for actuating said first shaft, a tuning device tunable through a certain frequency spectrum mounted on one end of said first shaft, a second shaft axially aligned with said first shaft, clutch means for connecting said first and second shafts comprising an upper clutch plate mounted at the other end of said first shaft, a speed-controlled governor mounted on said first shaft in-

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intermediate said upper clutch plate and said tuning device for controlling the axial movement of said upper clutch plate, a lower clutch plate mounted on said second shaft in spaced relation to said upper clutch plate, means for rotating said lower clutch plate to a position corresponding to a particular frequency of said tuning device, means for deenergizing said motor when said lower clutch plate is in said position whereby said upper clutch plate is axially lowered to engage with said lower clutch plate, means for maintaining the clutch plates in the engaged position, means for manually operating the engaged clutch plates, and means for simultaneously disengaging said clutch plates and reenergizing said motor.

6. A frequency selector device comprising a first shaft, a second shaft axially aligned with said first shaft, a tuning device tunable through a certain frequency spectrum mounted at one end of said first shaft, clutch means for connecting said first and second shaft, said clutch means comprising an upper clutch plate mounted at the other end of said first shaft, a lower clutch plate mounted at one end of said second shaft in spaced relation opposite said upper clutch plate, said upper and lower plates being normally disengaged, a pair of spaced supports coaxial with said first shaft disposed between said tuning device and the upper clutch plate, one of said supports being affixed to said upper clutch plate, the other of said supports being slidably adjustable on said first shaft, a spring coaxial with said shaft intermediate said supports and in abutment therewith, a speed-controlled governor pivotally mounted across said supports to control the axial movement of said upper clutch plate, power means for rotating said first shaft, means for rotatably positioning said lower clutch plate to correspond to a predetermined frequency of said tuning device, means for deenergizing said power means when said lower clutch plate is in the predetermined frequency position whereby said upper clutch plate axially approaches said lower clutch plate, means for meshing said upper and lower clutch plates, means for maintaining the clutch plates in the meshed position, means for manually operating the tuning device when the clutch plates are in the meshed position, and means for disengaging said clutch plates and simultaneously reenergizing said power means.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,528,489	Bednash et al.	Nov. 7, 1950