

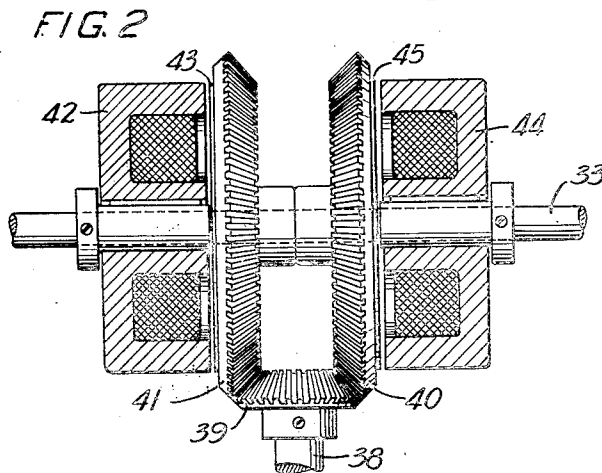
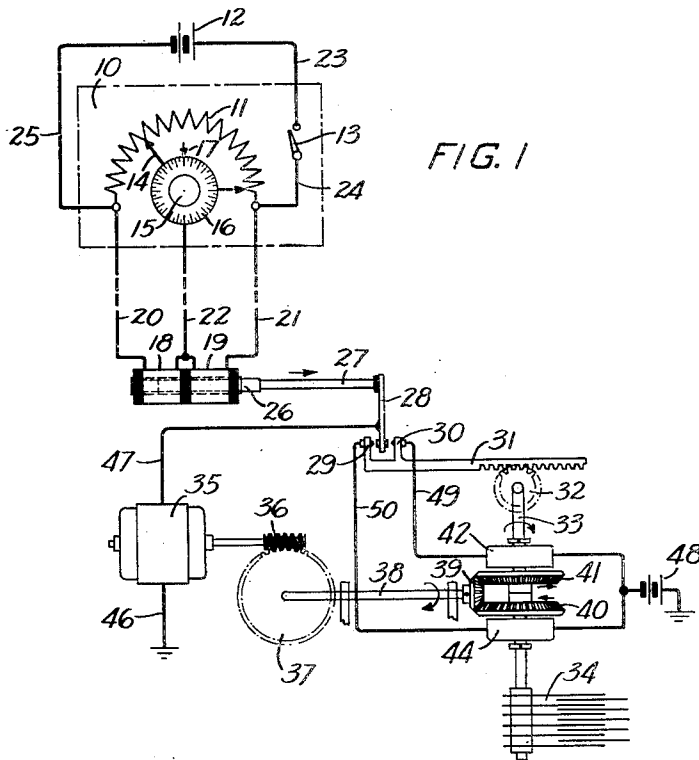
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REMOTE CONTROL DEVICE

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REMOTE CONTROL DEVICE

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This invention relates to remote control devices.

In radio receiving and transmitting apparatus of the type used in airplanes, for example, where the set is placed at a considerable distance from the operator, a remote control mechanism actuated by the operator is provided for moving the tuning element of the set in adjusted position with respect to marks on the dial, which indicate the wave length at which radio signals are received or sent.

The object of this invention is to provide a remote control arrangement of this character, which will be efficient in operation, cheap to manufacture and wherein the tuning element is moved in adjusted position in a simple and positive manner.

According to this invention the manual operation of a wiper on a resistance coil placed at the operator's position is effective to shift the center of magnetism of a double-wound solenoid located at the remote end of the control. The solenoid core while moving closes a pair of contacts in the circuit of a motor. The movement of the motor is imparted to the tuning element of the set through a differential mechanism in which magnetic clutches operate upon the starting of the motor to move the tuning element in either of two directions, depending upon the movement of a knob to which the wiper is operatively connected, the movement of the shaft which carries the tuning element being in turn effective to position contacts for opening the motor circuit when the tuning element reaches its adjusted position.

In the drawing Fig. 1 is a diagrammatical view of a remote control system illustrating the invention, and

Fig. 2 is an enlarged view of the differential mechanism showing the magnetic clutches in section.

In Fig. 1 of the drawing 10 indicates a container placed at the operator's position. This container is provided for enclosing a coil 11, a battery 12 and a switch 13. A wiper 14 associated with the coil 11 may be moved in adjusted position thereon by the rotation of a manually operable knob 15 and a

dial 16 actuated by the movements of this knob cooperates with a pointer 17 on the container 10 for translating the movement of pointer 14 into wave lengths of the radio signals.

A solenoid placed at the remote end of the control consists of magnets 18 and 19 which are wound on a common core 26 and connected to the coil 11 by line wires 20 and 21. The other ends of magnets 18 and 19 are connected to wiper 14 by line wire 22, the magnets 18 and 19 being energized upon the closure of switch 13 through a circuit extending from one side of battery 12, the conductor 23, switch 13, and the conductor 24 connected to line wire 21, the other side of battery 12 being connected to the line wire 20 by conductor 25.

In the core 26 there is slidably mounted a plunger 27, which carries at one end an arm 28 which may be insulated therefrom in any suitable manner. This arm is provided for engaging associated contacts 29 and 30, depending upon the movement of plunger 27 as will be hereinafter described in detail. Contacts 29 and 30 are mounted on a gear rack 31 which engages a pinion 32 keyed on one end of shaft 33 on which the tuning element represented in Fig. 1 in the form of condenser plates 34 are mounted. Shaft 33 is operatively connected to a motor 35 through a worm 36 and worm gear 37, a shaft 38 and a differential gear mechanism which consists of pinion 39 and gears 40 and 41, the gears being mounted to turn freely on shaft 33. On this shaft and associated with gear 41 there is slidably mounted a magnet 42 which cooperates with a ring 43 (shown in Fig. 2) of magnetic material to form a magnetic clutch provided for operatively connecting the shaft 33 with the gear 41. Another magnet 44 also slidably mounted on shaft 33 cooperates with a ring 45 to form a magnetic clutch provided for operatively connecting the shaft 33 with gear 40.

The operating circuit of motor 35 extends from grounded conductor 46 the armature winding of the motor 35, conductor 47, the arm 28, the magnetic clutches 42 and 44 through conductors 49 and 50, depending

upon the closing of contacts 29 and 30 with arm 28, to battery 48 and ground.

In operation, with the switch 13 closed, the movement of the knob 15 and the wiper 14 in a counter-clockwise direction from normal position as indicated in a dotted line in Fig. 1, is effective to cause the movement of plunger 27 through the difference in current in the coils 18 and 19. The movement of plunger 27 in the direction indicated by the arrow, is effective to cause the operation of the motor 35 and to simultaneously energize the magnetic clutch 42 through the engagement of arm 28 with contact 30 for operatively connecting the shaft 33 with the gear 41. The movement of shaft 33 in the direction indicated by the arrow actuates the rotor plates 34 and the gear 32 carried by shaft 33 for imparting movement to the gear rack 31, the arm 28 remaining in engagement with contact 30 until the plunger 27 reaches its adjusted position wherein the contact 30 is disengaged from the arm 28 due to the follow-up action of the motor in the well-known way, which causes the deenergization of magnetic clutch 42 and the opening of the motor operating circuit. While there is a small overlap movement of the condenser when the plunger has reached its set position, this movement is negligible and can easily be compensated for in a variety of ways such as by proper selection of gears for the rack 31 and the provision of a gear reduction mechanism connecting the condenser 34 with shaft 33. The movement of shaft 33 is thus effective to move the rotor plates 34 in adjusted position as determined by the position of wiper 14 on coil 11.

Similarly the movement of wiper 14 in a clockwise direction, is effective to actuate the plunger in a direction opposite to that indicated by the arrow, and cause the engagement of arm 28 with contact 29, the engagement of this contact being effective to close the motor operating circuit and cause the energization of magnetic clutch 44 through an obvious circuit. The operation of this clutch is effective to operatively connect the shaft 33 with gear 40 and thus reverses the movement of the shaft, the arm 28 being disengaged from contact 29 due to the follow-up action of the motor, for causing the release of the magnetic clutch and open the motor circuit when plunger 27 and the rotor plates 34 reach their adjusted position.

What is claimed is:

1. In a remote control system, a double-wound solenoid having a movable core, a variable resistance, a circuit including said resistance and the winding of said solenoid, a brush engaging said resistance and connected to the midpoint of said winding to shift the center of magnetism of said solenoid upon movement of said contact, and thus move said core in either direction, a tuning element, a motor, a shaft driven thereby, differential gear mechanism associated with said shaft, magnetic clutches for connecting said tuning element to said mechanism, a circuit for each clutch, a circuit for said motor, and means mounted on said solenoid core for closing the motor circuit and the circuit of one of said clutches dependent upon the direction of movement of said solenoid core.

2. In a radio remote control mechanism, a magnet, a plunger actuated by said magnet, a contact arm carried by said plunger, a resistance for variably energizing said magnet for positioning said plunger, a motor, a differential mechanism actuated by said motor, a driven shaft, a tuning element operatively connected to said shaft, magnetic means operable upon the starting of said motor for variably connecting said shaft to said mechanism, and means actuated by said shaft and cooperating with the contact arm for controlling the operation of said motor and adjustably positioning said tuning element.

In witness whereof, I hereunto subscribe my name this 19th day of October, 1929.

FRANK VAN VOORHIS, JR.