R. CLYDE CRUIT
ATTORNEY AT LAW
PATENTS AND PATENT CAUSES

AMERICAN BUILDING
1317 F STREET N. W.
WASHINGTON, D. C.
TELEPHONE NATIONAL 4784

October 21, 1943.

Mr. Richard A. Marsen
17 West 50th Street
New York City, New York

Dear Mr. Marsen:

In accordance with your instructions of October 11, I have made the usual preliminary search on the magnetic clutch and brake arrangement including the friction spring as described by you and illustrated in the sketch returned herewith.

I have been unable to find a friction spring in the combination as shown, the following patents cited are merely on the use of a friction spring plate or the like in combination with a clutch broadly.

Miller 1,132,958
Baxter 2,189,558

Copies of the above-mentioned patents are enclosed herewith and I am also returning the specimen of the friction spring.

Charge five dollars ($5.00). Pd 10/26/43

Very truly yours,

R. Clyde Cruit.

RCC:ec
Enc.

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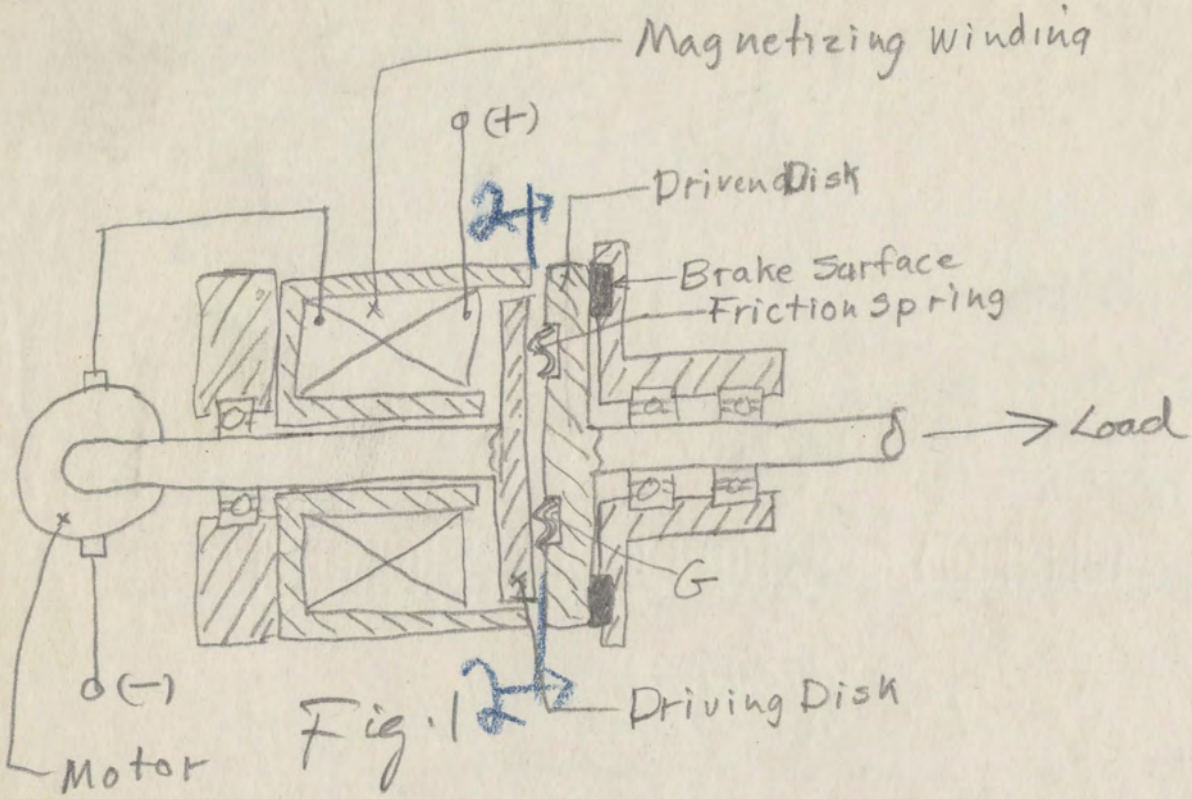

Fig. 1

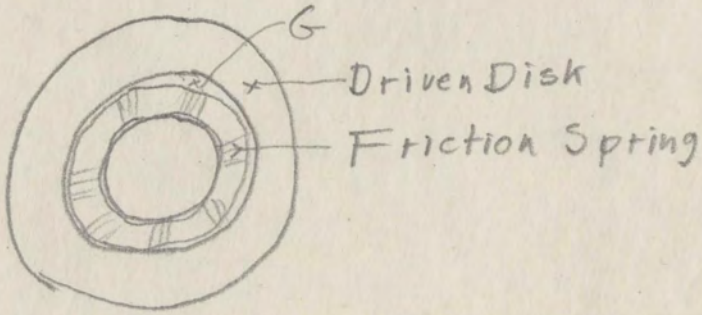

Fig. 2

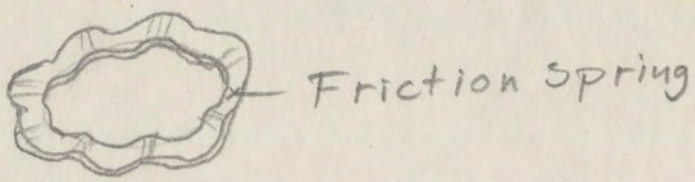

Fig. 3

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O. MILLER.

CLUTCH.

APPLICATION FILED JAN. 9, 1914.

1,132,958. Patented Mar. 23, 1915.

Fig. 1

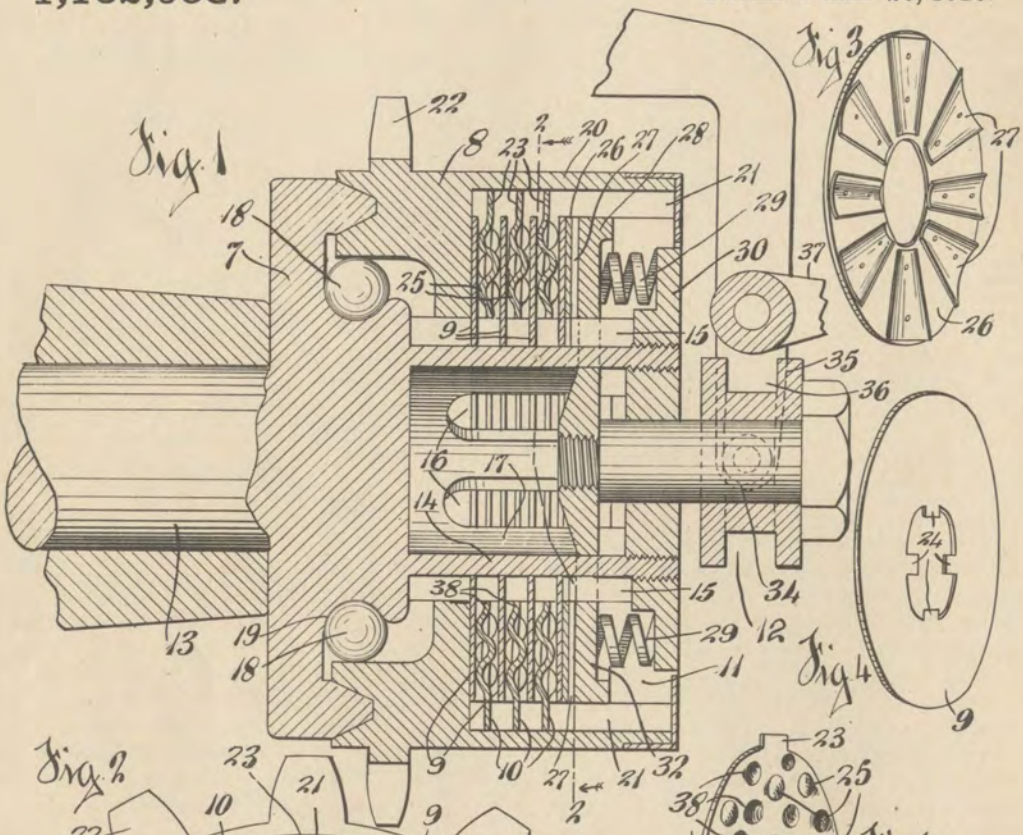


Fig. 3

Fig. 4

Fig. 2

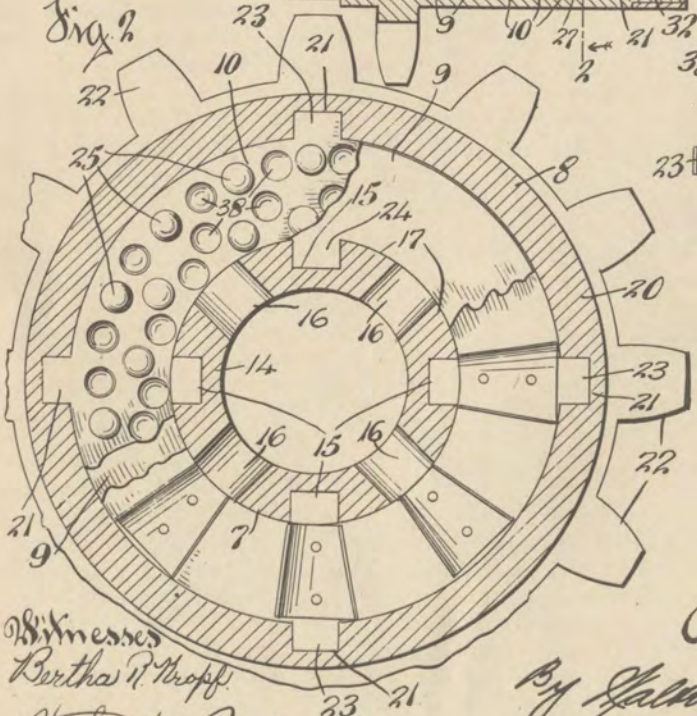


Fig. 5

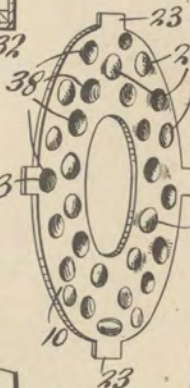
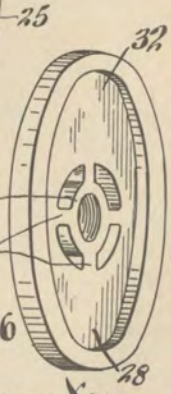


Fig. 6



Witnesses
Bertha P. Kropff
W. Thornton Regert

Inventor
Otto Miller
By Walter J. Murray
Attorney

UNITED STATES PATENT OFFICE.

OTTO MILLER, OF CINCINNATI, OHIO.

CLUTCH.

1,132,958. Specification of Letters Patent. Patented Mar. 23, 1915.

Application filed January 9, 1914. Serial No. 811,128.

To all whom it may concern:

Be it known that I, OTTO MILLER, a citizen of the United States of America, and resident of Cincinnati, county of Hamilton, and State of Ohio, have invented certain new and useful Improvements in Clutches, of which the following is a specification.

This invention relates to improvements in clutches and particularly to that class commonly known as multiple disk clutches, in which one series of disks are mounted to rotate with the driving member to form the power transmitting disks while the other series are mounted to rotate with the driven member to coöperate with the power transmitting disks in communicating motion to the driven member.

An object of my invention is to produce a clutch, which is capable of more minute adjustment and which will consequently operate more smoothly than other clutches known to me.

Another object of my invention is to produce a clutch, in which improved means are employed for obtaining more efficient lubrication between adjacent friction disks.

These and other objects are attained in the clutch described in the following specification, and illustrated in the accompanying drawings, in which,

Figure 1 is a sectional view of a clutch embodying my invention. Fig. 2 is a transverse sectional view taken on the line 2—2 of Fig. 1, with certain parts broken away for purposes of illustration. Fig. 3 is a perspective view of an auxiliary spring disk forming part of my improved clutch construction. Fig. 4 is a perspective view of a power transmitting disk forming a detail of the clutch. Fig. 5 is a perspective view of an improved friction disk forming part of my improved clutch construction. Fig. 6 is a perspective view of a detail of my invention.

The clutch illustrated comprises a driving member 7, a driven member 8, friction disks 9 and 10, for communicating motion from the driving to the driven member, means 11 for causing the disks to frictionally engage each other and manually operated means 12 for causing the engaging means 11 to release the frictional engagement of the disks with each other.

The driving member 7 is mounted on the power shaft 13 and has an outwardly extending hollow cylindrical portion 14, in the outer surface of which key-ways 15 are formed. Between these keyways, slots 16 are provided, which extend from the outer end to the inner end of portion 14, and divide it into sections 17.

The driven member 8 is mounted to rotate on ball bearings 18 running in a ball race 19 formed on the driving member 7 and is provided with an outwardly extending shell-like portion 20.

In the inner surface of the shell 20, keyways 21 are formed, while on its outer surface, driving means, such as the sprocket teeth 22 are located.

The friction disks 10 are provided with lugs or keys 23, which engage the keyways 21 of the driven member 8 and the alternate disks 9 are provided with lugs or keys 24, which engage the keyways 15 of the driving member 7. The series of driving disks 9 are of plain flat metal, as shown in Fig. 4, while the driven disks 10, shown in Fig. 5, are roughened or formed with a series of projections 25, which extend from each side thereof, forming a series of oppositely located recesses 38. These projections hold the adjacent smooth disks 9 away from the body of the disks 10, so that they contact only the tops of the projections.

Contacting the outermost smooth disk 9 is an auxiliary spring-carrying disk 26, which is provided with a series of radially extending flat springs 27, curved outwardly from the disk, as shown in Fig. 3. Against these springs rests a thick disk 28, which is held into engagement with the auxiliary spring disk by a series of coil springs 29. At their outer ends, these springs contact a plate 30, screwed to the other end of the cylindrical portion 14 of the driving member 7. Disk 28 has a central threaded portion 31, which is connected with the annular ring-like part 32 by webs 33. These webs engage the slots 16, thus locking disk 28 in driving engagement with member 7, but permitting reciprocatory movement thereof in the slots. For the purpose of effecting the engagement and disengagement of the friction disks, the disk 28 is provided with a short stub shaft 34, which extends outside the clutch and has a grooved collar 35 secured to it. A yoke 36 engages the groove in this collar, and by operating a handle 37 secured to this yoke, the disk 28

is withdrawn to release the friction disks from the pressure of the springs 29.

In operation: We will assume the clutch disks to be frictionally disengaged from one another by the withdrawal of disk 28 from contact with them. The coil springs 29 are held under compression in this position of disk 28, while flat springs 27 on disk 26 are permitted to assume their normal or curved form, as shown in Fig. 3, and disks 9 are permitted to revolve with the driving member 7, while disks 10, mounted on the driven member 8, remain stationary. When it is desired to frictionally engage the clutch members, the yoke 36 is moved to permit the disk 28 to move gradually inward under the pressure of springs 29. As the disk moves in, the auxiliary spring disk 26 is forced against the outermost of the smooth disk series 9. All of the friction disks of both the series 9 and 10 are now caused to lightly engage one another, permitting the driven member 8 to gradually take up the driving power of member 7. As the disk 28 is permitted to move farther, the springs 27 on the disk 26 are placed under greater tension, thus causing the tops of the projections 25 on the roughened disks 10 to engage the smooth surfaces of the disks 9 with greater force, consequently increasing the friction between adjacent disks and causing the driven member 8 to receive more of the driving power of member 7. As springs 29 are permitted to exert more pressure upon disk 26, through the moving of disk 28, springs 27 on disk 26 become entirely flattened and exert their entire compressive force on the friction disks. Relative movement between the two series of disks 9 and 10, and the driving and driven members, is still permissible, however, under some strains, which may be imposed on the driven member 8 and these members are not locked together for ordinary loads, until the disk 28 is finally permitted to engage the disks with the entire force of springs 29.

In ordinary multiple disk clutch construction, the disks of both driving and driven series are alike. In such a construction lubrication of the surfaces of adjacent disks is difficult, because when the disks are pressed together, lubricating material is squeezed out from between them, and when the disks are allowed to slip, the lubricating material is used up, until the surfaces of the disks become dry. When the friction disks are dry, the slightest engaging movement of the clutch members, causes the friction disks to "grab" or lock in frictional engagement with one another and to thereby subject the parts of the mechanism to undesirable shocks. In order to overcome these objections, I have provided the one series of disks 10 with the hemispherical projections 25. I have found that the frictional surface afforded by the tops of these projections, is ample to effect a locking engagement of the two series of disks, while the space between adjacent disks and the recesses created by the formation of the projections enables the lubricant to enter between them and to effectively lubricate the disk surfaces.

In providing the auxiliary spring disk, the clutch is caused to operate with increased smoothness, for the reason that greater range of adjustment as to the degree of friction between adjacent disks is available. Assuming the range of action of springs 27 on disk 26 to be from 0 to 25 pounds, and the range of action of springs 29 to be from 25 to 100 pounds, it may readily be seen that for any adjustment of the disk 28 from 0 to 25 pounds, the springs of the auxiliary disk will be brought into action, these springs becoming entirely flattened at 25 pounds pressure. For any adjustment from 25 to 100 pounds, springs 29 will be brought into action, because a minimum pressure of 25 pounds is necessary to start compression of these springs.

I desire it to be understood that I do not claim the particular form of clutch disclosed, but

What I do claim are the improvements above described and set forth in the appended claims:

1. A multiple disk clutch comprising a driving member and a driven member, a series of disks mounted on the driving member, a second series of disks concentric with and alternately arranged with the disks of the first series and mounted on the driven member, the disks of one of said series having a plurality of hemispherical projections extending from each side of each disk, a casing inclosing said members and said disks and means for causing the disks to frictionally engage each other.

2. A multiple disk clutch comprising a driving member, a driven member, a series of plain disks mounted to rotate with the driving member, a series of disks provided with a plurality of projections and recesses on each side of each disk mounted to rotate with the driven member and alternately arranged with the disks of the driving member, a casing inclosing said members and said disks and means effecting the engagement and disengagement of the disks.

3. A friction disk clutch comprising a driving member, a driven member, a series of driving disks mounted on the driving member, a series of driven disks mounted on the driven member and provided with a plurality of hemispherical projections, means for causing the disks of one series to engage the disks of the other series, said means comprising auxiliary springs and main springs, the auxiliary springs being interposed be-

tween the disks and the main springs, and a casing inclosing said members, said disks and said springs.

4. In a friction clutch, the combination of a series of smooth disks, a series of disks having hemispherical projections extending from each side of each disk, the disks of one series being alternately arranged with the disks of the other series, a plurality of main springs, means adapted to control the main springs, a plurality of auxiliary springs located between the main springs and the disks, adapted to enable said main springs to press said disks together gradually when said means are operated, and to permit said main springs to frictionally lock said disks together after the auxiliary springs have reached the limit of their action, and a casing inclosing said disks and said springs.

5. A clutch comprising a series of thin metal driving disks and a series of thin metal driven disks, the metal of the disks of one of said series being distorted to form a plurality of oppositely disposed recesses and projections, the disks of each series being alternately arranged with one another and the undistorted disks contacting with the projections of the distorted disks, means for causing the driven disks to be brought into driving engagement with the driving disks, and a casing inclosing said disks.

6. A clutch comprising a driving member, a driven member, a series of disks mounted on the driving member, a second series of disks mounted on the driven member, the disks of one of said series having a plurality of projections stamped from the faces thereof and alternately arranged with the disks of the other series, an oil tight casing inclosing said members and said disks and means for causing the disks to engage and disengage.

7. A clutch comprising a driving member, a driven member, a series of disks mounted on the driving member, a second series of disks mounted on the driven member, the disks of one of said series having a plurality of projections extending from the faces thereof and alternating with the disks of the other series, and means for causing the frictional engagement of the disks, said means consisting of a set of main springs and a set of auxiliary springs located between the disks and the main springs.

8. A clutch comprising a driving member and a driven member, a series of disks mounted on the driving member, a second series of disks mounted on the driven member and alternating with the disks on the driving member, the disks of one of said series being roughened to form a series of oppositely disposed projections and recesses, and means for causing the disks to engage and disengage.

In testimony whereof, I have hereunto subscribed my name this 6th day of January, 1914.

OTTO MILLER.

Witnesses:
BERTHA R. KROPF,
W. THORNTON BOGERT.

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Feb. 6, 1940. J. M. BAXTER 2,189,558

CONTROL FOR VOLUME AND TUNING OF A RADIO SET

Filed Sept. 28, 1938

FIG. 1

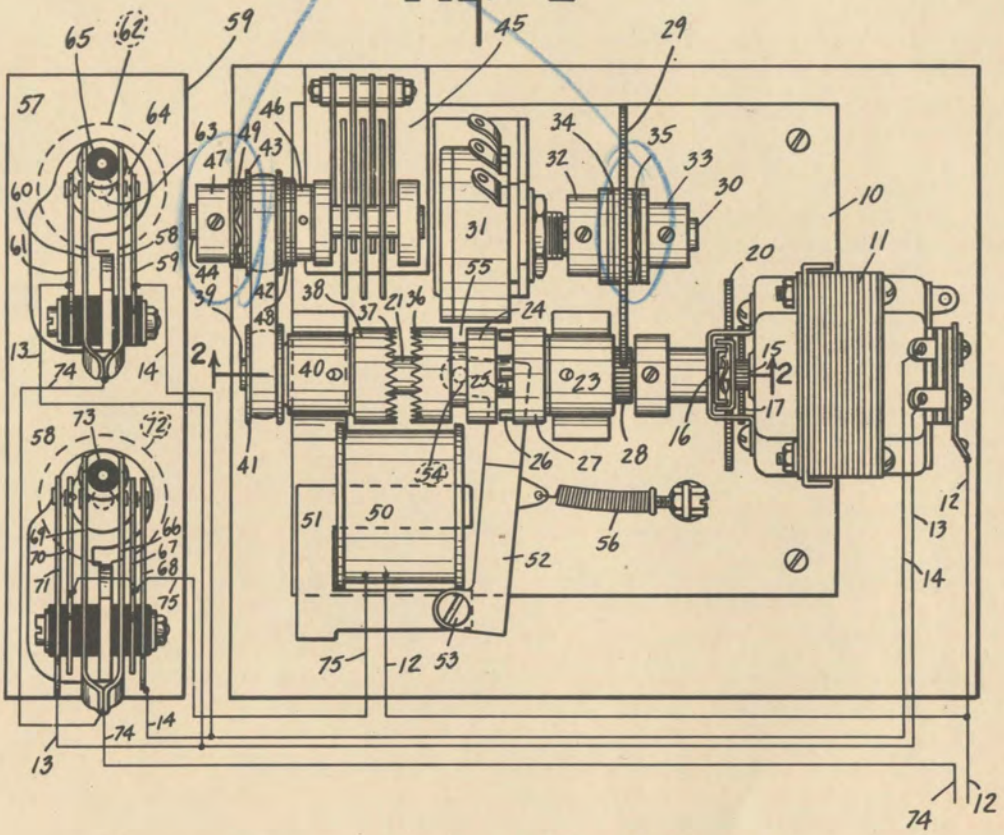
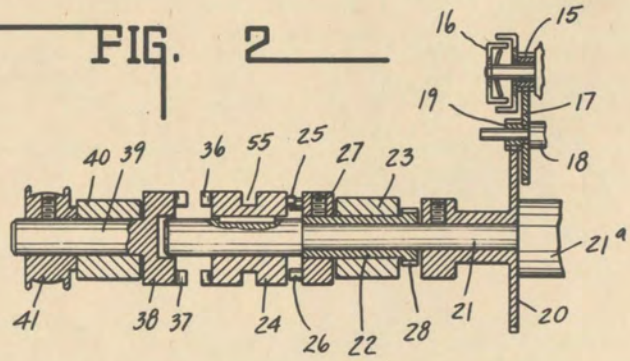


FIG. 2



INVENTOR.
JOSEPH M. BAXTER.
BY Lockwood, Goldsmith & Galt.
ATTORNEYS.

Patented Feb. 6, 1940 2,189,558

UNITED STATES PATENT OFFICE

2,189,558

CONTROL FOR VOLUME AND TUNING OF A RADIO SET

Joseph M. Baxter, Fort Wayne, Ind., assignor, by mesne assignments, to Farnsworth Television & Radio Corporation, Dover, Del., a corporation of Delaware

Application September 28, 1938, Serial No. 232,153

6 Claims. (Cl. 192—.02)

This invention relates to a control for volume and tuning of a radio set and is particularly adapted for remote control.

One object of the invention is to simplify mechanism required for remote control of tuning and volume. To that end a single electric motor is used for both controls and means are provided for selectively connecting the motor to operate each control. The control of the selecting means is accomplished by electrical means which may be operated at a remote station.

Another object of the invention is to provide electrical control means for the motor by which one control device operates the volume control and another control device operates the tuning control, although a single motor is used for both purposes.

Other objects and features of the invention will be understood from the accompanying drawing and the following specification and claims:

Fig. 1 is an elevational view of the apparatus employed in a preferred form of the invention and shows both the apparatus at the radio itself and at a control station with electrical connections shown diagrammatically. Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1.

In the preferred form of the invention illustrated in the drawing there is provided a base plate 10 which is preferably mounted in any convenient position inside the cabinet of the radio to be controlled. Mounted on the base plate 10 there is a reversible motor 11 adapted to be operated in one direction when current is supplied thereto on a pair of wires 12 and 13 and adapted to be operated in the opposite direction when current is supplied on the wire 12 and a wire 14. The motor has a pinion 15 freely mounted on the shaft thereof and rotatable by a friction clutch 16 of a well known commercial form which automatically engages the pinion when the motor has attained a predetermined speed. The pinion 15 meshes with a gear 17 mounted on a stub shaft 18. Said stub shaft also carries a pinion 19 meshing with a gear 20 secured to a main drive shaft 21. The shaft 21 is journaled in a bearing 21*a* secured to the frame of the motor 11 and is also journaled in a bushing 22 in turn journaled in a bearing 23 secured to the base plate 10.

A clutch member 24 is slidably keyed on the shaft 21 and is provided with a pin 25 adapted to engage any one of a number of similar pins 26 carried by a clutch collar 27 secured to the sleeve 22. The sleeve 22 has formed thereon a pinion 28 meshing with a gear 29 which is freely mounted on the operating shaft 30 of a variable resistor or rheostat 31 which may be used for volume control of the radio. The shaft 30 has secured thereto a collar 32 and a collar 33. Between the gear 29 and the collar 32 there is inserted a disc 34 of cork or other suitable friction material. Between the gear 29 and the collar 33 there is inserted a resilient washer 35 adapted to press the gear 29 against the disc 34 and thus to form a yielding drive connection between the gear 29 and shaft 30. By this means, the operation of the motor 11 may turn the rheostat 31 in either direction as long as the clutch member 24 is in engagement with the clutch member 27. When the rheostat 31 reaches the end of its travel in either direction, the friction connection between gear 29 and shaft 30 slips and permits the motor 11 to continue to operate without damage to the rheostat.

The clutch member 24 is provided with teeth 36 adapted to engage teeth 37 formed on a clutch member 38. The clutch member 38 is formed integrally with a stub shaft 39 or may be mounted thereon, as desired. The shaft 39 is journaled in a bearing 40 and carries a pulley 41. The pulley 41 is engaged by a belt 42 which is trained about a pulley 43 rotatably mounted on the operating shaft 44 of a variable condenser 45. The shaft 44 carries collars 46 and 47, a friction disc 48 and a resilient washer 49 together forming a friction drive connection similar to that described for the rheostat 31. The condenser 45 may be connected in the amplification system of the radio set for tuning purposes in any well known manner. By means of this connection, the operation of the motor 11 may operate the tuning condenser 45 in either direction whenever the clutch member 24 has been moved into engagement with the clutch member 38.

An electromagnet 50 mounted on a magnetic core 51 is provided with an armature 52 pivoted to said core at 53. The armature 52 carries a pin 54 operating in a groove 55 in the clutch member 24. A tension spring 56 is attached to the armature 52 and has its opposite end anchored to the base plate 10. Said spring normally biases the armature and the clutch member 24 toward engagement with the clutch member 27 and thus maintains the driving connection between the motor 11 and the rheostat 31. When the electromagnet 50 is energized however, the armature 52 is drawn to the left against the action of the spring 56 and thus engages the clutch member 24 with the clutch member 38. The driving connection between the motor and the

condenser 45 is thus established and the driving connection of the rheostat 31 is broken.

For control of the motor 11 and electromagnet 50 there are provided a pair of switches 57 and 58 mounted on a panel 59 which may be located in any convenient position at the radio or remote therefrom. The switch 57 includes resilient contact leaves 58, 59, 60 and 61 suitably mounted and insulated. A knob 62 is rotatably mounted on the panel 59 by means of a stem 63 extending therethrough. The stem 63 carries a disc 64 on which there is eccentrically mounted a cylindrical member 65 formed of insulation material. The member 65 is interposed between the leaves 58 and 60 and is normally held in the position shown in Fig. 1 by said leaves. In this position no contact exists between any of said leaves. However, when the knob 62 is turned clockwise the member 65 is moved to engage the leaf 58 with the leaf 59 and when said knob is turned in the opposite direction leaf 60 is moved to engage leaf 61.

The switch 58 includes resilient contact leaves 66, 67, 68, 69, 70 and 71, a knob 72 and a cylindrical insulation member 73 operated by said knob in the same manner as the member 65. When knob 72 is moved clockwise, leaf 66 first engages leaf 67. Further movement of the knob engages leaf 67 with leaf 68. Similarly, when the knob 72 is moved in the opposite direction, leaf 69 is first engaged with leaf 70 and thereafter leaf 70 is engaged with leaf 71.

Power for operating the device is supplied to the conductor 12 and to a conductor 74 from any suitable source. The conductor 12 is connected both to the motor 11 and electromagnet 50. The conductor 74 is connected to the contact leaves 66, 69, 58 and 60. The contact leaves 59 and 68 are connected by the conductor 14 to the motor. The contact leaves 61 and 71 are connected by the conductor 13 to the motor. The contact leaves 67 and 70 are connected by a conductor 75 to the electromagnet 50.

By means of these connections, the operation of the knob 62 in one direction completes a circuit for operation of the motor 11 in one direction while the operation of said knob in the opposite direction runs the motor in the opposite direction. Since the electromagnet 50 is not energized by the operation of the knob 62, the resulting movement of the motor controls the setting of the rheostat 31. When the knob 72 is operated in either direction, the first movement of the knob completes a circuit for the electromagnet 50 and thus throws the clutch member 24 into engagement with clutch member 38 to connect the motor to the tuning condenser 45. Further movement of the knob 72 operates the motor 11 to adjust the condenser 45, the operation of the knob in one direction resulting in movement of the condenser in one direction and operation of said knob in the opposite direction resulting in movement of the condenser in the opposite direction.

From the foregoing description it will be apparent that an individual control for both the volume and the tuning of the radio is provided although a single motor is used to actuate both controls. No forethought is required on the part of the operator to shift the selective clutch mechanism. It is only necessary that he select the proper switch knob for either tuning or volume control.

The foregoing specification describes the invention in one of its preferred forms. The details thereof may be varied by those skilled in the art without departing from the scope of the invention as defined in the appended claims.

The invention claimed is:

1. Remote control apparatus for a radio having a variable volume controlling element and a variable tuning element, said apparatus including a reversible electric motor, power transmission mechanism, an electrically operated device adapted to control said transmission mechanism to connect said motor to operate either of said elements selectively, and remotely controlled electrical circuits adapted to operate said motor selectively in either direction and to operate said electrically operated device.

2. Control apparatus for a radio having a variable volume controlling element and a variable tuning element, said apparatus including a reversible electric motor, power transmission mechanism, an electrically operated device adapted to control said transmission mechanism to connect said motor to operate either of said elements selectively, and electrical circuits adapted to operate said motor selectively in either direction and to operate said electrically operated device.

3. Control apparatus for a radio having a variable volume controlling element and a variable tuning element, said apparatus including an electric motor, a shaft rotatable by said motor, a clutch member splined to said shaft, a pair of mating clutch members engageable thereby, means biasing said first mentioned clutch member toward engagement with one of said mating members, electromagnetic means adapted to move the same into engagement with the other of said mating members, transmission mechanism connecting each of said mating clutch members to operate one of said first mentioned elements, and an electric circuit adapted to operate said motor, a second electric circuit adapted to operate said electromagnetic means, a circuit controlling device adapted to operate said first mentioned circuit, and a second circuit controlling device adapted to operate both of said circuits.

4. Control apparatus for a radio having a variable volume controlling element and a variable tuning element, said apparatus including an electric motor, power transmission mechanism, an electrically operated device adapted to control said transmission mechanism to connect said motor to operate either of said elements selectively, an electric circuit adapted to operate said motor, a second electric circuit adapted to operate said electrically operated device, a circuit controlling device adapted to control said first mentioned circuit, and a second circuit controlling device adapted to control both of said circuits.

5. Control apparatus for a radio having a variable volume controlling element and a variable tuning element, said apparatus including an electric motor, power transmission mechanism including clutch means adapted to connect said motor to operate said elements, an electrically operated device adapted to operate said clutch means to connect said motor to operate one of said elements, means biasing said clutch means in opposition thereto to connect said motor to operate the other of said elements, an electric circuit adapted to operate said motor, a second electric circuit adapted to operate said electrically operated device, a circuit controlling device adapted to control said first mentioned circuit,

and a second circuit controlling device adapted to control both of said circuits.

6. Control apparatus for a radio having a variable volume controlling element and a variable tuning element, said apparatus including an electric motor, power transmission mechanism, an electrically operated device adapted to control said transmission mechanism to connect said motor to operate either of said elements selectively, an electric circuit adapted to operate said motor, a second electric circuit adapted to operate said electrically operated device, a circuit controlling device adapted to control said first mentioned circuit, and a second circuit controlling device adapted in a single movement to control first the second mentioned circuit and thereafter the first mentioned circuit.

JOSEPH M. BAXTER.

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L-d-95

October 11, 1943

R. Clyde Cruit, Esq.
1317 F Street, N. W.
Washington, 4, D. C.

Dear Mr. Cruit:

I am interested in the electromagnetic clutch and brake arrangement shown in the attached sketch. Referring to Fig. 1, a clutch driving disk of magnetic material is secured to the armature shaft of a motor. A driven disk of magnetic material is secured to a load shaft mounted on suitable bearings in a housing. A magnetizing winding is provided, which is adapted to create a magnetic flux through the driving and driven disks to urge them into magnetic and frictional coaction upon energization of the winding.

The driven disk is normally urged away from the driving disk by means of a friction spring disposed in an annular groove G in the face of the driven disk. When urged away from the driving disk, the driven disk engages a brake surface mounted in the housing supporting the load shaft. The driven disk and the friction spring are shown more clearly in Figs. 3 and 4. The friction spring may be any type of annular spring and, as shown, preferably has a sinusoidal shape in annular section. A sample of such spring is attached.

The operation of the device is as follows. Upon energization of the magnetizing winding, the driven disk is urged into magnetic and frictional coaction with the driving disk, overcoming the resistance of the friction spring. The load shaft is thereby driven as a unit with the motor armature shaft. Upon deenergization of the magnetizing winding, the friction spring snaps the driven disk away from the driving disk and into engagement with the brake surface, resulting in substantially instantaneous stopping of the load shaft. At the same time, the frictional engagement between the spring and the driving disk slows down the motor armature more rapidly than if left free, thus effecting a quick stopping of the latter. This is useful in automatic controls whereby the motor is ready quicker for reverse currents.

With the above in mind, please make a pre-ex search on this arrangement and send me one copy of any U. S. patent which you may find having a bearing thereon, and a list of any publications or related foreign patents.

Yours very truly,

RAM:n
Encls.

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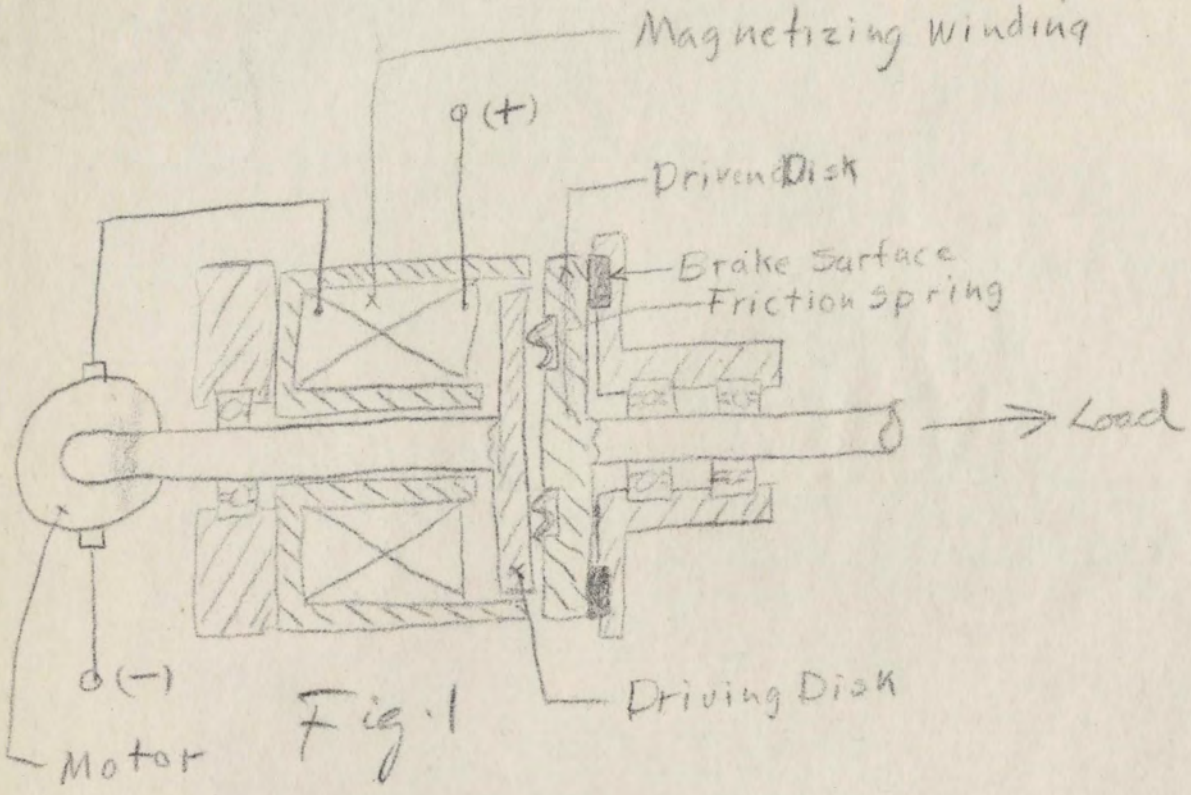

Fig. 1

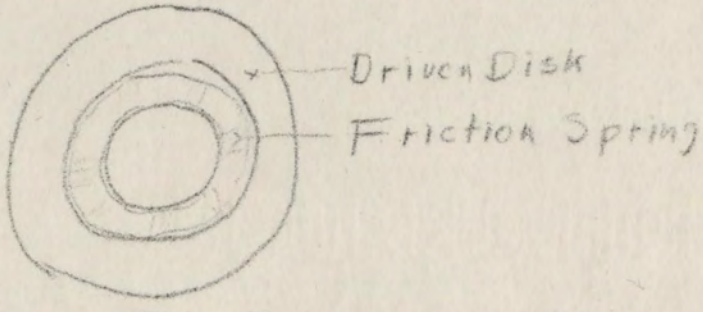

Fig. 2

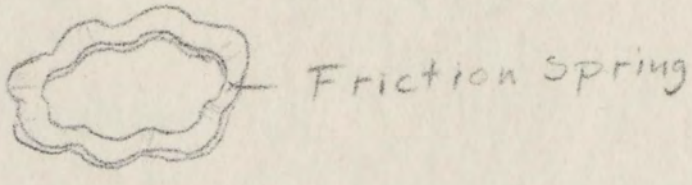

Fig. 3

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FASTOP CLUTCH WITH FRICTION
SPRING - NYGARD ET AL L-d-95

(80-11)

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