74-10.5 SR
FIP8310 OR 2,078,427
Search Room

April 27, 1937. J. H. TEAF 2,078,427

DUAL RATIO TUNING MECHANISM

Filed April 30, 1935

Fig. 1.

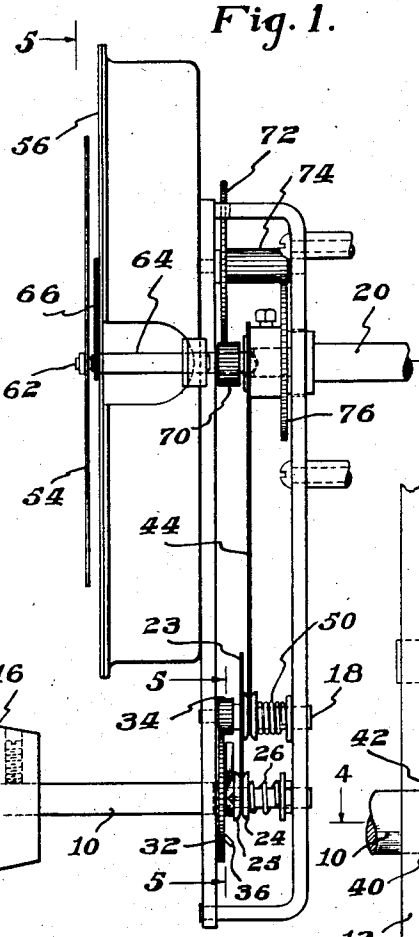


Fig. 4

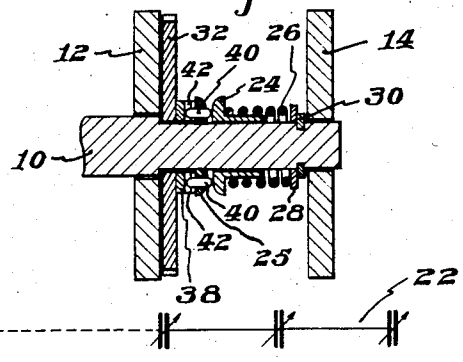


Fig. 2.

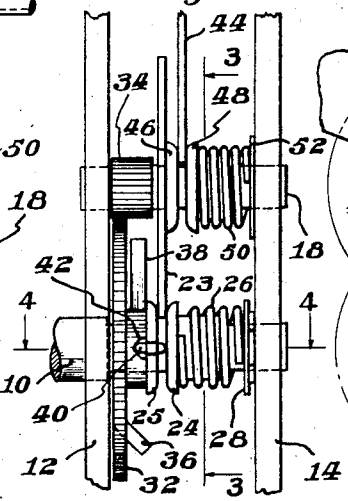


Fig. 3.

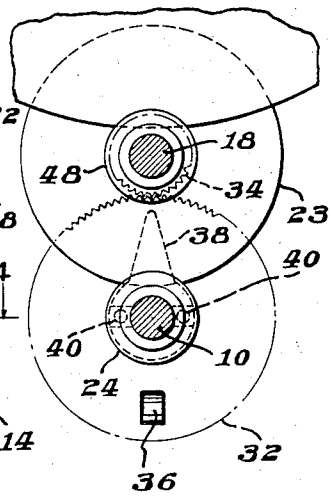
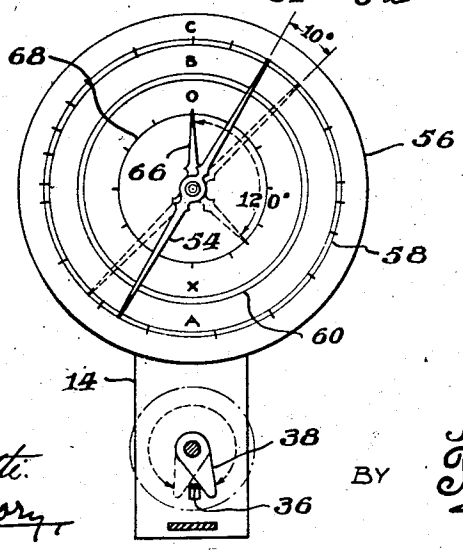


Fig. 5



Witnesses
Armand Tomasetti.
H. R. Sanders Bryon

BY

INVENTOR
John H. Teaf
T. R. Goldsborough
ATTORNEY

74 MACHINE ELEMENTS AND MECHANISMS
CANCELED
Search Room

Patented Apr. 27, 1937

2,078,427

UNITED STATES PATENT OFFICE

2,078,427

DUAL-RATIO TUNING MECHANISM

John H. Teaf, Camden, N. J., assignor to Radio Corporation of America, a corporation of Delaware

Application April 30, 1935, Serial No. 19,033

3 Claims. (Cl. 74—10)

My invention relates to improvements in dual-ratio tuning mechanism for all-wave radio receivers.

In the conventional all-wave radio receivers, provision has been made for obtaining different drive ratios between the manually operable shaft or shafts for tuning the gang condenser. For this purpose, it has been proposed to provide two tuning knobs on the front panel of the set and independent driving connections to the tuning condenser, construction and relations being such that upon manual rotation of one knob through a given angle, the condenser shaft is rotated through a relatively large angle for coarse tuning, while upon manual rotation of the other knob through the same angle, the condenser shaft is rotated through only a relatively small angle for fine tuning. A tuning mechanism of this general type is disclosed in the co-pending application of William E. Newman, Serial No. 755,337, filed November 30, 1934.

For the purpose of avoiding the use of two separate tuning knobs in mechanism of the general type referred to, it has been proposed to employ a single tuning knob fixed to a tuning shaft which has a slight amount of axial movement, and through which both the high-ratio and the low-ratio driving connections are made to the condenser shaft. The arrangement and construction is such that by pushing the tuning knob in, connection to the condenser shaft at one of the drive ratios is made, while upon pulling out upon the tuning knob connection to the condenser shaft is made at the other drive ratio. A tuning device of this general type is disclosed in the co-pending application by William E. Newman, Serial No. 722,849, filed April 28, 1934.

While the various constructions for dual-ratio tuning mechanism proposed heretofore have been satisfactory in operation, they have required either the use of separate tuning knobs for the different ratios or, in the mechanism employing a single tuning knob, the use of some form of push-pull clutch for changing from one ratio to another. For these reasons, furthermore, the prior dual-ratio tuning mechanisms are more or less troublesome from a manufacturing standpoint, and are relatively expensive.

With the foregoing in mind, it is one of the objects of my invention to provide improved tuning mechanism of the character referred to in which provision is made for dual-ratio tuning with only a single knob and without the necessity for a push-pull action or other movement of the single tuning knob other than rotation of the same about a fixed axis.

Another object of my invention is to provide improved tuning mechanism of the character referred to which is relatively inexpensive and which avoids the various manufacturing difficulties of the constructions proposed heretofore.

Other objects and advantages will hereinafter appear.

In accordance with my invention, dual-ratio driving connections are made between a single tuning shaft and an idler shaft from which the condenser shaft is driven. There is a certain amount of free play in the driving connection at the low-ratio, so that the tuning shaft can be rotated through almost a complete revolution to drive the condenser shaft through only the high-ratio connection, before the low-ratio connection begins to become effective. Upon continuing rotation of the tuning shaft in either direction beyond the limits of the angle for free play in the driving connection at the low ratio, this connection becomes effective, and the driving connection at the high ratio is released automatically by a clutch device associated with the tuning shaft. The condenser shaft is then driven from the tuning shaft at the low ratio for coarse tuning. In tuning to any desired station, the single tuning knob is first rotated to adjust the condenser approximately to a frequency slightly beyond that of the station, after which the tuning knob is rotated in the reverse direction, whereupon the condenser is driven through the high ratio for fine tuning to the desired frequency.

My invention resides in the improved construction of the character hereinafter described and claimed.

For the purpose of illustrating my invention, an embodiment thereof is shown in the drawing, wherein

Figure 1 is a side elevational view of tuning mechanism constructed and operating in accordance with my invention;

Fig. 2 is an enlarged, detailed, fragmentary view, taken from Fig. 1;

Fig. 3 is a sectional view, the section being taken on the line 3—3 in Fig. 2;

Fig. 4 is a sectional view, the section being taken on the line 4—4 in Fig. 2; and

Fig. 5 is a front elevation view, partly in section, the section being taken on the line 5—5 in Fig. 1.

With reference to the drawing, my improved tuning mechanism for dual-ratio tuning com-

prises a single tuning shaft 10 journalled at one end thereof in the frame members 12 and 14 and provided at its other end with a knob 16, an idler shaft 18 journalled in the frame members, and a third shaft 20 coupled to the shaft of a gang condenser represented at 22.

The idler shaft 18 is driven from the tuning shaft at a relatively high ratio by a connection comprising a disc 23 fixed on the shaft 18 and complementary discs 24 and 25 associated with the tuning shaft 10 and engaging respectively opposite faces of the disc 23 at the edge of the latter, as more clearly shown in Fig. 2. The disc 25 is fixed on the shaft 10, while the disc 24 is slidable along this shaft and is urged toward the disc 25 by a spring 26 compressed between the disc 24 and a washer 28. The washer 28 is loose on the shaft 10, and is backed by a split collar 30 fixed against axial movement on this shaft by being snapped in place thereon in an annular groove in the shaft, as shown more clearly in Fig. 4.

The idler shaft 18 is driven from the tuning shaft 10 at the relatively low ratio by a connection comprising a gear member 32 loose on the shaft 10 and meshing with a pinion 34 fixed on the shaft 18. For the purpose of causing the gear 32 to rotate with the shaft 10, it is provided with a projection 36 disposed to be engaged by an arm 38 which is loose on this shaft but is connected for rotation with the disc 25 by pins 40. The pins 40 extend through and have a sliding fit in the disc 25 fixed to the shaft 10. One end of each of the pins 40 is disposed in a V-shape notch 42 in the member 38, and each pin is held in this position by engagement of its other end with the adjacent face of the disc 24. The condenser shaft 20 is driven from the idler shaft 18 at a relatively high ratio by a connection comprising a disc 44 fixed to the shaft 20 and having its edge disposed between complementary discs 46 and 48 on the shaft 18. The disc 46 is fixed for rotation with the disc 23, while the disc 48 is loose on the shaft 18. A spring 50, compressed between the disc 48 and a washer 52 on the shaft 18, operates to maintain frictional driving engagement between opposite faces of the disc 44 and the respective faces of the discs 46 and 48.

An indication of the frequency or station to which the receiver is tuned is provided by a pointer 54 and a fixed dial 56 provided with the scales 58 and 60 concentric about its center. The pointer 54 is fixed on the end of a spindle 62 connected by rotation with the condenser shaft 20 and extending through a hollow shaft or bushing 64 to which a vernier pointer 66 is fixed.

In operation, the vernier pointer 66 rotates over a vernier scale 68 through an angle of about 120° while the pointer 54 rotates over the scales 58 and 60 through an angle of about 10°, as represented in Fig. 5. For this purpose, a pinion 70, fixed on the bushing 64, meshes with an idler gear 72 fixed for rotation with a pinion 74 which meshes with a gear 76 fixed for rotation with the condenser shaft 20.

In operation, the tuning knob 16 can be turned through almost one complete revolution before the arm 38 engages the projection 36 to carry the gear along with the arm as the shaft 10 continues to be rotated. The idler shaft 18 is then driven from the tuning shaft 10 at the low ratio, through the gear 32 and the associated pinion 34. As the arm 38 engages the projection 36, however, there will be a slight resistance to continued rotation of the shaft 10 on account of the frictional engagement of the disc 44 with the discs 46 and 48 under the action of the spring 50. This resistance is sufficient to force the pins 40 to the right, as viewed in Fig. 2, by the cam action provided by the inclined faces of the notches 42. In this way, the disc 24 is forced to the right sufficiently, against the action of the spring 26, to release the edge of the disc 23 from its full, normal frictional driving engagement with the adjacent faces of the discs 24 and 25. The high-ratio driving connection between the shafts 10 and 18 is thereby automatically released when the shaft 10 is rotated to cause the arm 38 to engage the projection 36 from either side thereof. When the condenser shaft 20 is being driven through the low-ratio drive comprising the gear 32 and the associated pinion 34, therefore, the operator does not have to overcome any substantial drag which would otherwise be caused by the normal friction or engagement between the parts comprising the high-ratio driving connection.

When tuning to any station, the operator rotates the knob 16 in the proper direction to place the pointer 54 in a position, along the scale on which he is working, slightly beyond the point on the scale at which he estimates the station will be in tune, during which time the arm 38 is engaging the projection 36 whereby the condenser shaft is being driven through the low-ratio drive provided by the gear 32 and the pinion 34. The knob 16 is then rotating in the reverse direction, whereupon the arm 38 recedes from the projection 36 so that the pins 40 can again slide fully into the recesses 42 and the spring 26 cause frictional driving engagement of the discs 24 and 25 with the disc 23. The condenser shaft 20 is then driven from the tuning shaft 10 through the high-ratio drive provided by the discs 23, 24 and 25, and by now observing the position of the vernier pointer 66, the operator can locate exactly the frequency or station to which he wants to tune.

From the foregoing it will be seen that I have provided improved tuning mechanism in which provision is made for dual-ratio tuning by rotation of a single tuning knob, the action being such that the condenser shaft is rotated through a high-ratio connection for fine tuning during rotation of the tuning shaft through a range of approximately 360°, after which the condenser shaft is rotated through a low-ratio connection for coarse tuning. Furthermore, it will be seen that my improved construction is relatively simple and inexpensive.

Various modifications, within the conception of those skilled in the art, are possible without departing from the spirit of my invention or the scope of the claims.

I claim as my invention:

1. Tuning mechanism for a radio receiver comprising a tuning shaft, an idler shaft, a third shaft, means for driving the idler shaft from the tuning shaft at a relatively high ratio, means for driving the idler shaft from the tuning shaft at a relatively low ratio and comprising a member loose on the tuning shaft, an element carried by the tuning shaft for rotating said member with the tuning shaft, said element being freely movable with respect to said member through a given angle, means for releasing said first-named means when the tuning shaft is rotated in either direction to bring said element into

AND MECHANISMS
CANCELLED
Search Room

position to rotate said member, and means for driving the third shaft from the idler shaft.

2. Tuning mechanism for a radio receiver comprising a tuning shaft, an idler shaft, a third shaft, means for driving the idler shaft from the tuning shaft at a relatively high ratio and comprising complementary discs carried by the tuning shaft and a disc fixed on the idler shaft and having its edge disposed between the complementary discs, spring means for urging said complementary discs together into frictional driving engagement with said third-named disc, means for driving the idler shaft from the tuning shaft at a relatively low ratio and comprising a member loose on the tuning shaft, an element carried by the tuning shaft for rotating said member with the tuning shaft, said element being freely movable with respect to said member through a given angle, means associated with said element and one of said complementary discs for releasing said complementary discs from frictional driving engagement with said third-named disc when said element is moved through said angle, and means for driving the third shaft from the idler shaft.

3. Tuning mechanism for a radio receiver comprising a tuning shaft, a second shaft, means for driving the second shaft from the tuning shaft at a relatively low ratio comprising a gear loose on the tuning shaft and a pinion fixed on the second shaft and meshing with said gear, means for driving the second shaft from the tuning shaft at a relatively high ratio comprising a pair of complementary discs carried by the tuning shaft and a third disc fixed on the second shaft and having its edge disposed between said pair of discs, spring means for urging said complementary discs together, said gear being provided with a projection, an arm carried by the tuning shaft and arranged to engage said projection to rotate said gear, and means connecting said arm to one of said complementary discs for rotation therewith and operable to spread said complementary discs apart as the tuning shaft is rotated in either direction to cause rotation of said gear by said arm.

JOHN H. TEAF.