April 10, 1951 M. J. PIFER ET AL 2,548,120

MANUAL DRIVE SYSTEM FOR RADIO RECEIVERS

Filed Oct. 22, 1948 3 Sheets-Sheet 1

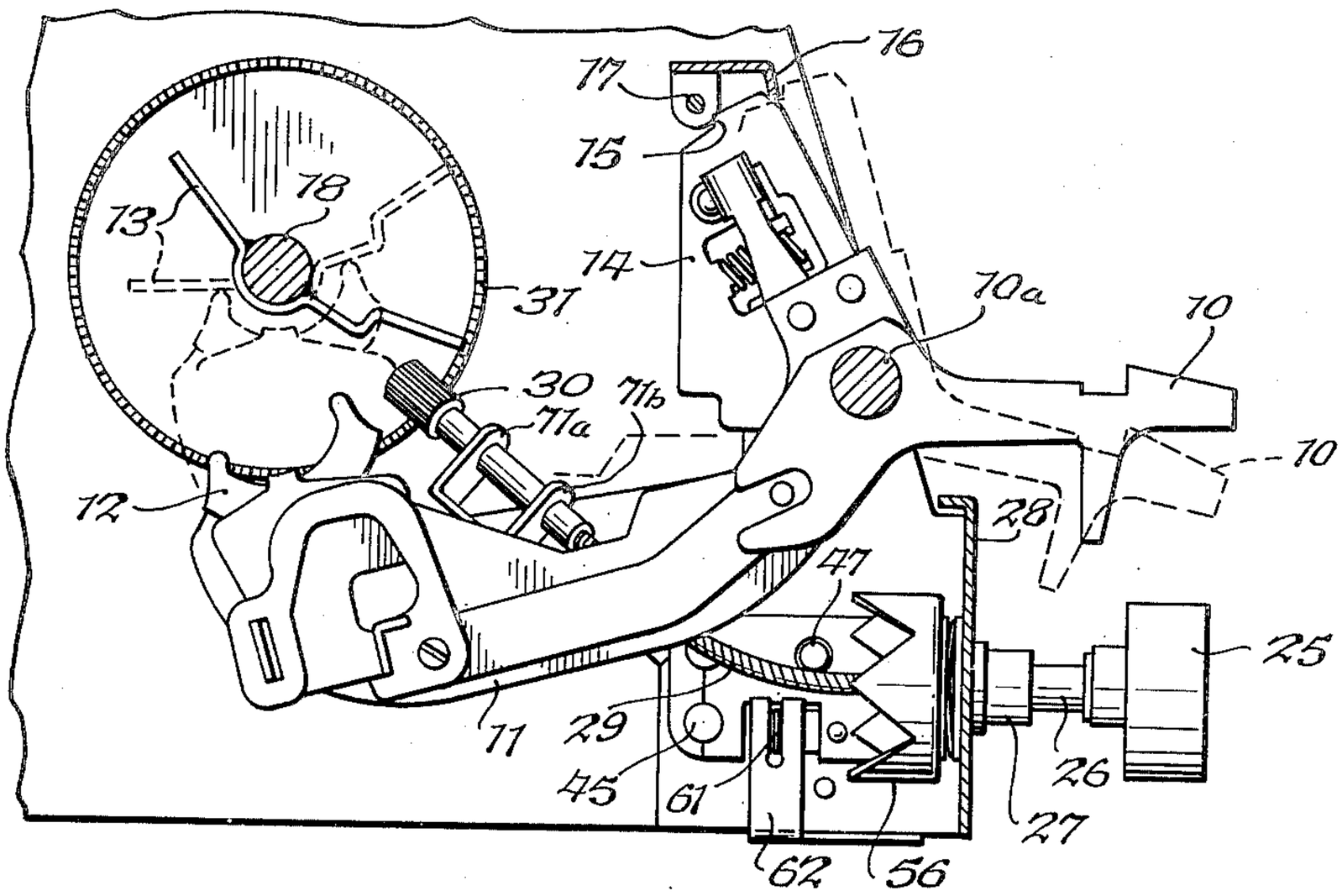

Fig. 1.

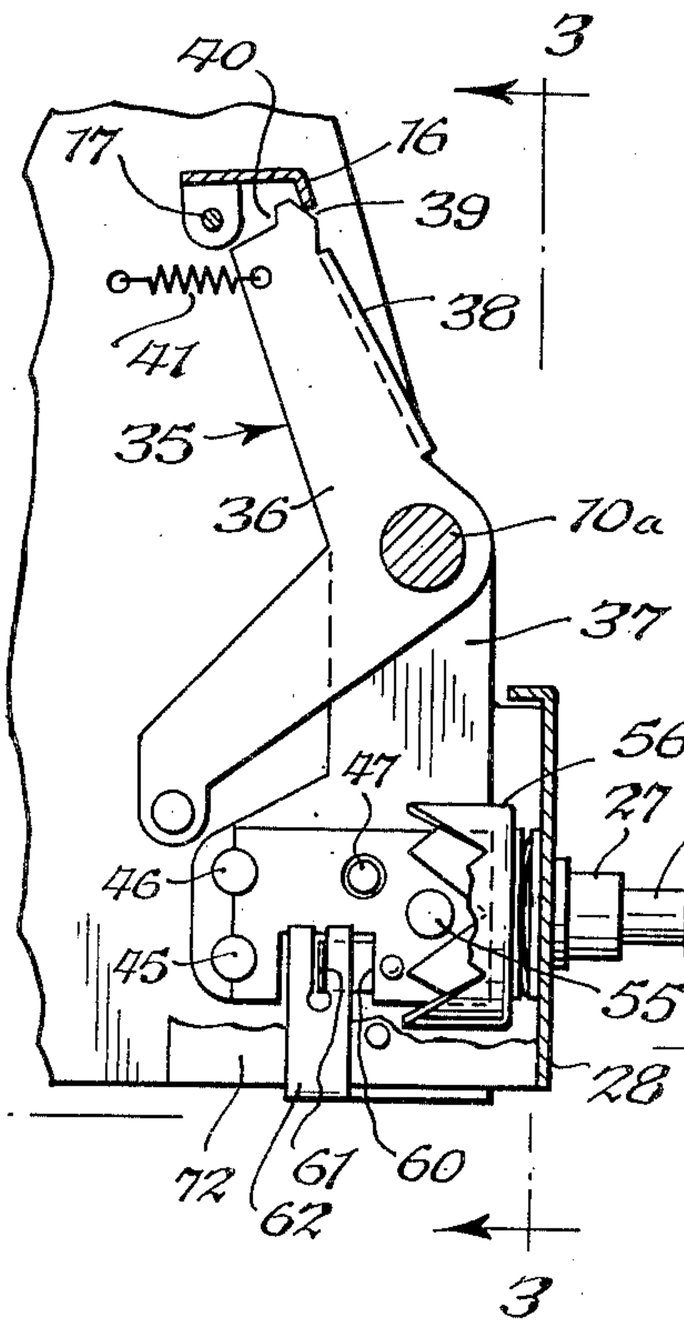

Fig. 2.

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3 Sheets-Sheet 2

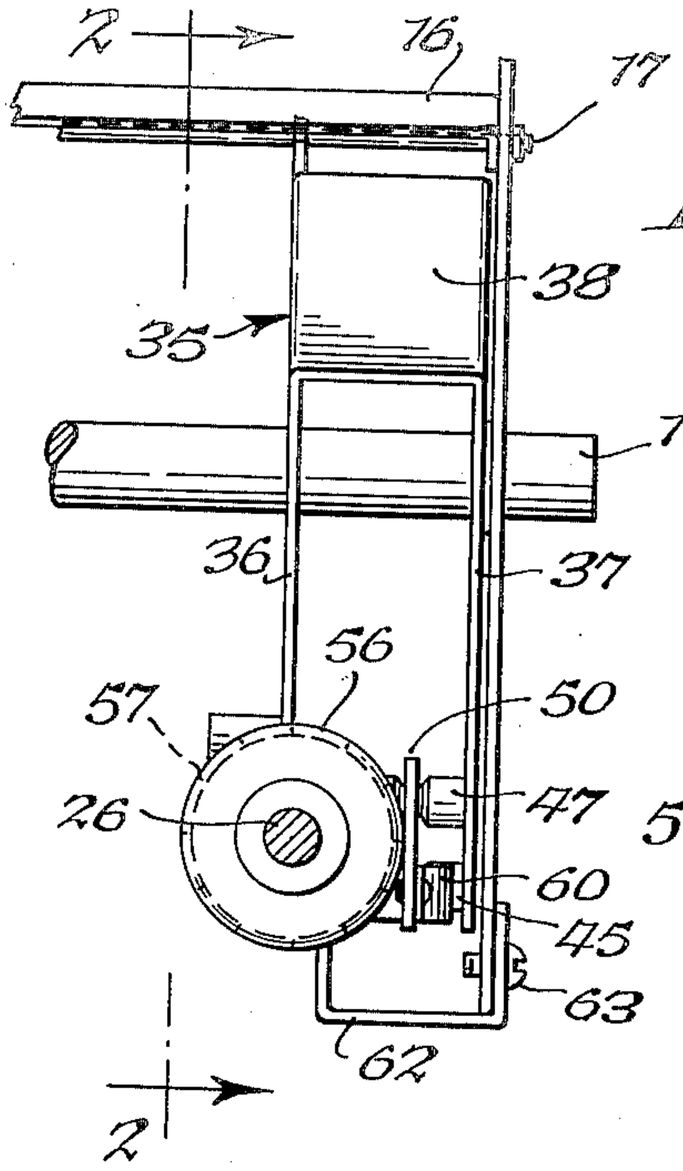

Fig. 3.

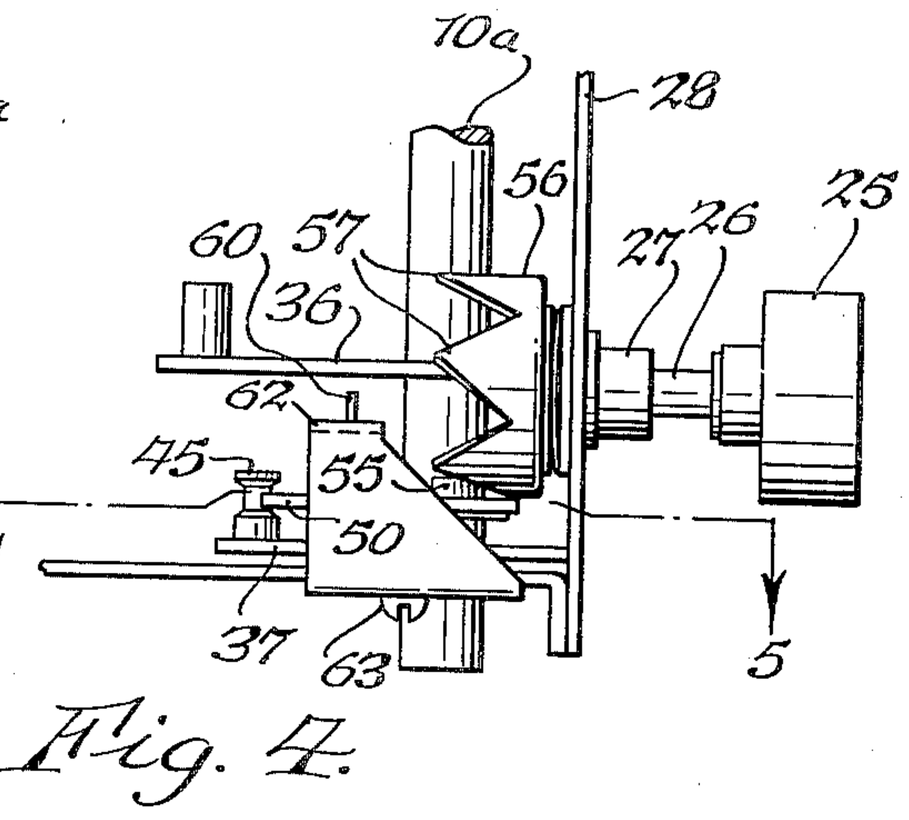

Fig. 4.

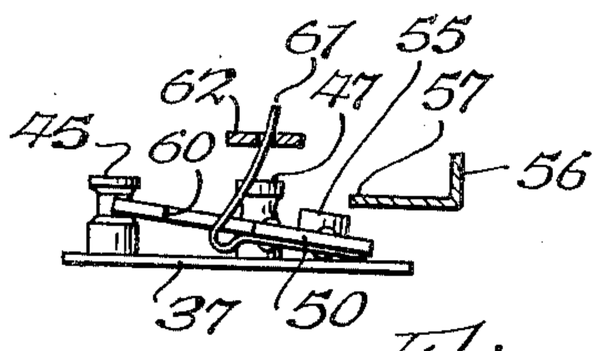

Fig. 8.

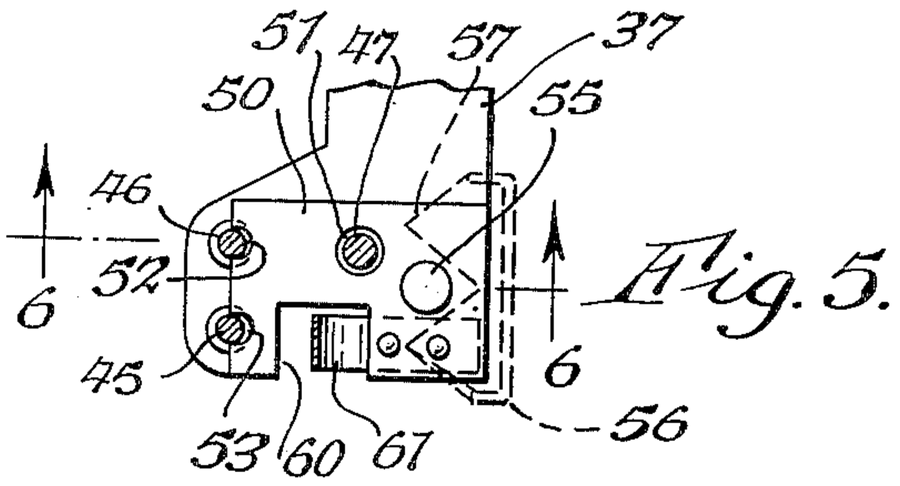

Fig. 5.

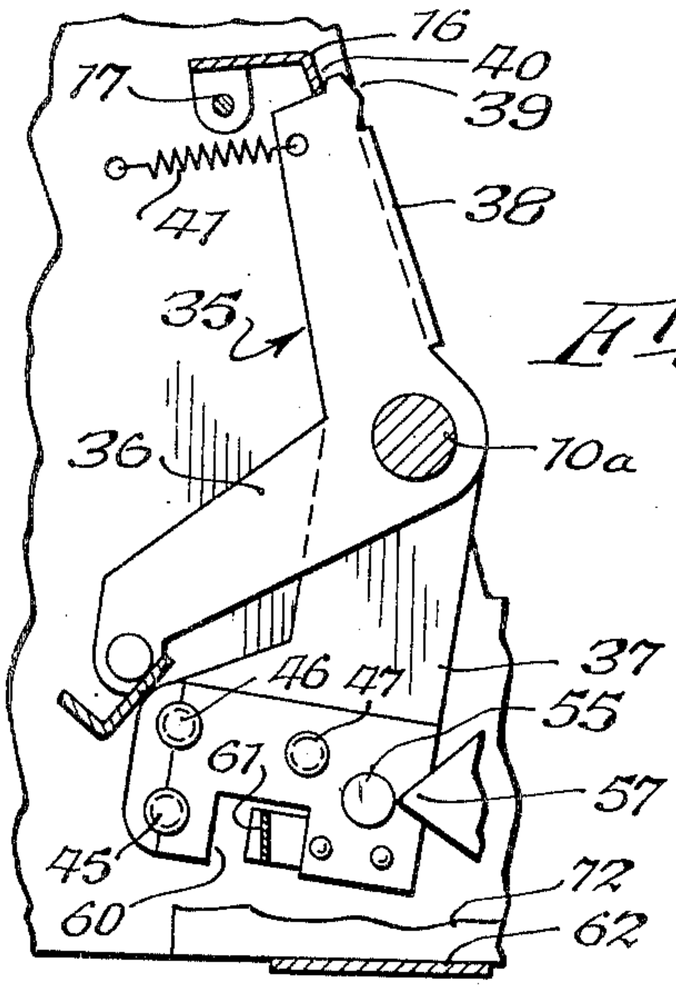

Fig. 9.

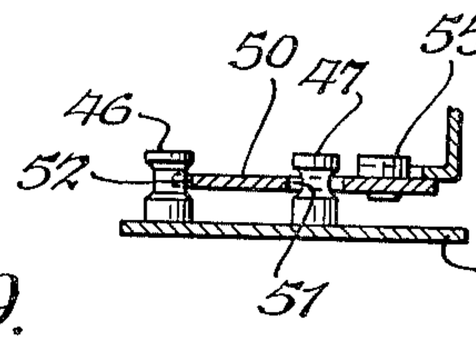

Fig. 6.

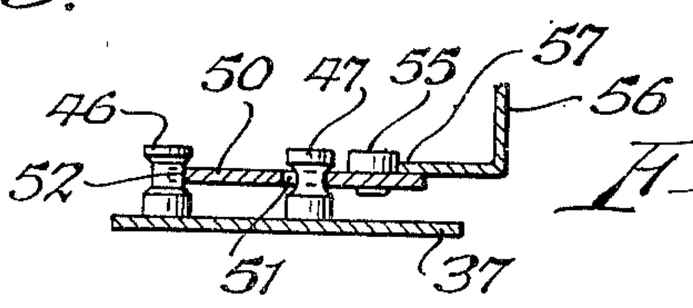

Fig. 7.

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3 Sheets-Sheet 3

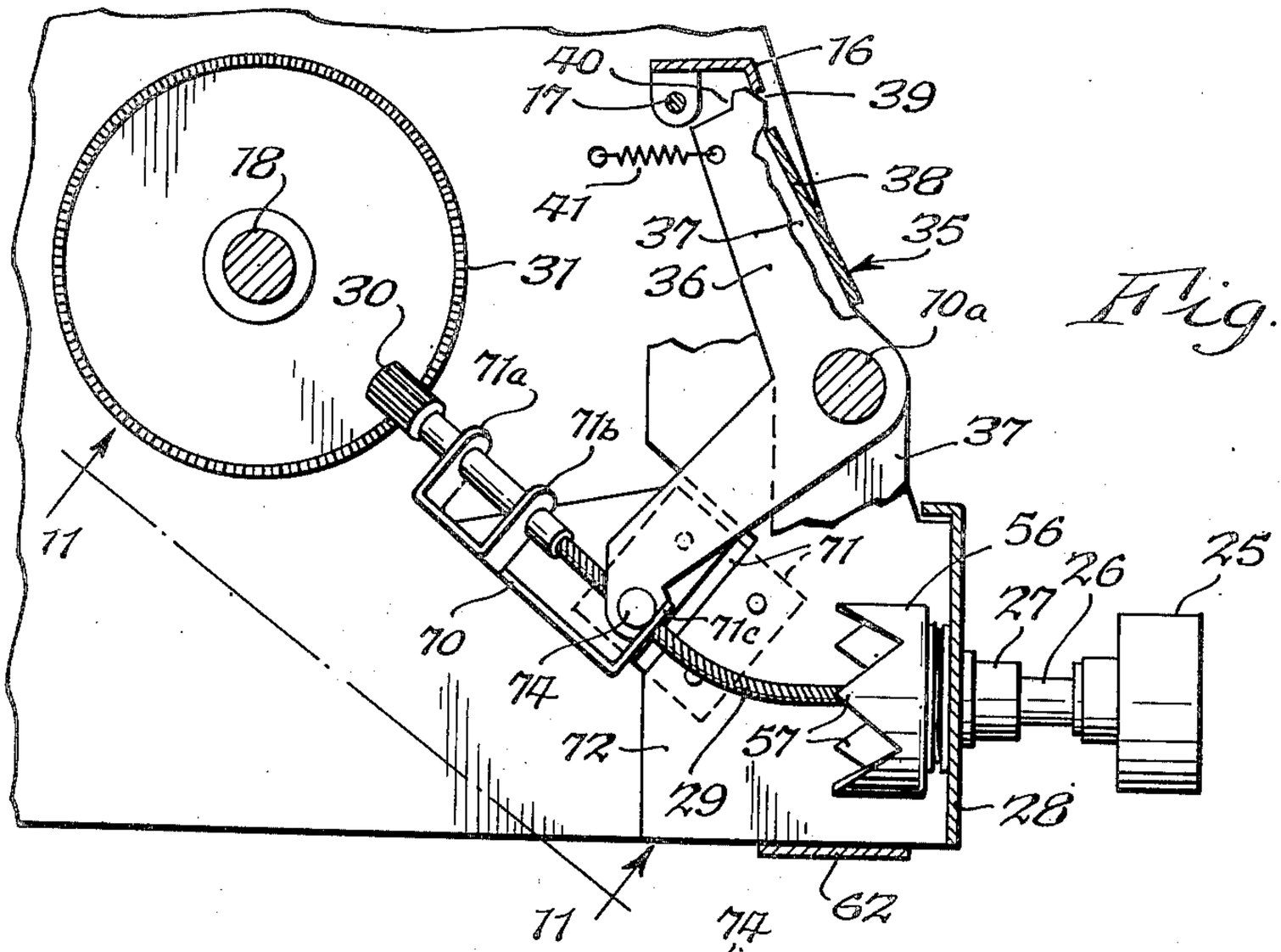

Fig. 10.

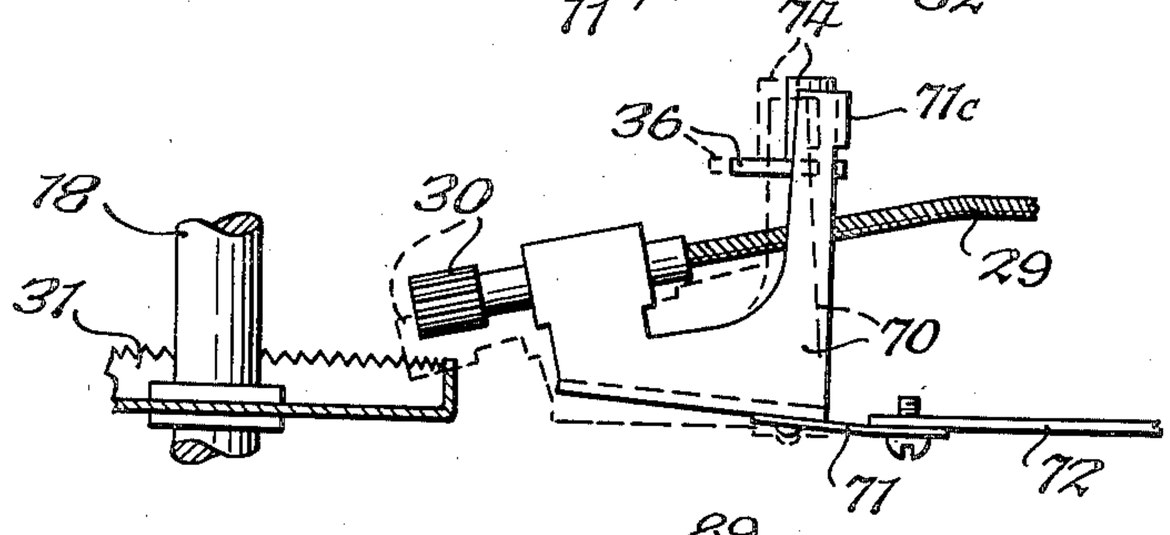

Fig. 11.

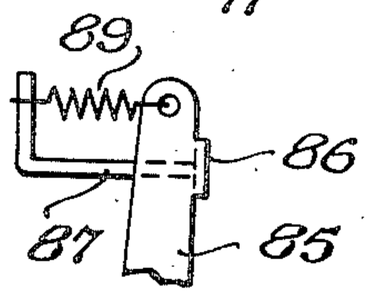

Fig. 12.

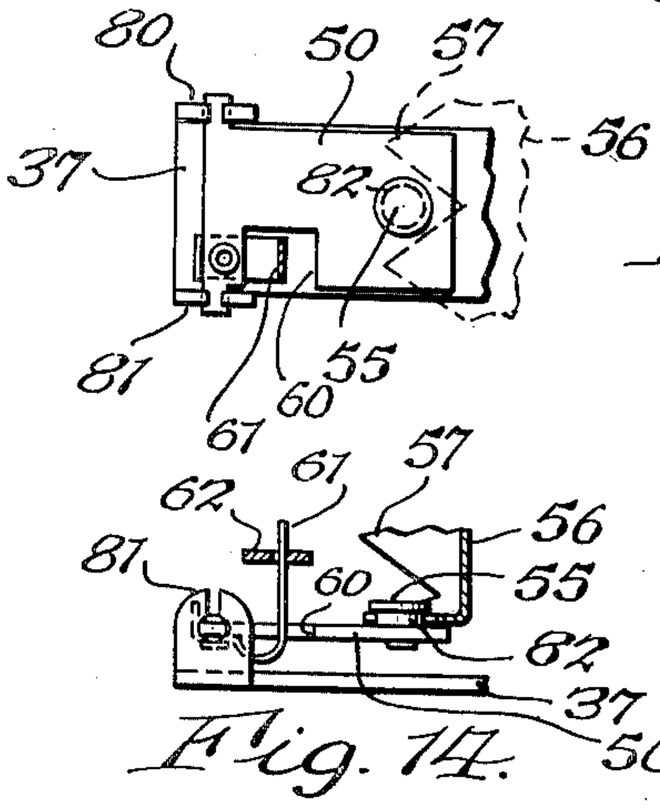

Fig. 13.

Fig. 14.

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Patented Apr. 10, 1951

2,548,120

UNITED STATES PATENT OFFICE

2,548,120

MANUAL DRIVE SYSTEM FOR RADIO RECEIVERS

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Application October 22, 1948, Serial No. 55,928

2 Claims. (Cl. 74—10)

1

This invention relates to mechanism which is particularly useful in radio receivers equipped with push button tuning for selecting predetermined stations, and with a manual control for selecting other stations.

In such apparatus, it is desired to have the push buttons operate with a minimum of pressure, and to have the manual control arranged with a considerable step down of motion from the manual control to the tuner. These requirements made it necessary in the past to provide some form of clutch for connecting the manual control to the tuner when the manual control was desired to be used, and for disconnecting it when push buttons were to be used, because the force required to operate the push buttons with the manual drive connected was excessive.

In the past, this has required the addition of another control to the receiver, which the operator must remember to use.

It is an object of this invention to do away with this additional control, and to provide mechanism by which the manual control is automatically connected to the tuner without any other operation, when the manual control is operated, and is automatically disconnected when any push button is operated.

It is a further object of this invention to provide mechanism of the class described which is positive and reliable in operation, involves only screw machine and punch press parts not requiring high precision, and requires no attention on the part of the operator of the receiver.

Still other objects and advantages of our invention will be apparent from the specification.

While the mechanism is of particular utility in connection with radio receivers, it will be understood that it has other applications, and may be advantageously employed in other apparatus wherein both push-button and manual control is desired, and wherein operation of either automatically disconnects the other, without a separate operation.

The features of novelty which we believe to be characteristic of our invention are set forth with particularity in the appended claims. Our invention itself, however, both as to its fundamental principles and as to its particular embodiments, will best be understood by reference to the specification and accompanying drawing, in which

Fig. 1 is a section through a tuner embodying our invention,

Fig. 2 is a similar fragmentary view on an enlarged scale of part of the mechanism shown in Fig. 1,

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Fig. 3 is a section on line 3—3 of Fig. 2,

Fig. 4 is a section on line 4—4 of Fig. 2,

Fig. 5 is a section on line 5—5 of Fig. 4,

Fig. 6 is a section on line 6—6 of Fig. 5,

Figs. 7 and 8 are views similar to Fig. 6, but showing the mechanism in different portions of its operational cycle,

Fig. 9 is a view similar to Fig. 2, but showing the mechanism at a different point in its cycle of operation,

Fig. 10, is a view similar to Fig. 1 but with part of the push-button tuning mechanism removed for clarity,

Fig. 11 is a detail view of a portion of the mechanism,

Fig. 12 is a detail view of a modified form, and

Figs. 13 and 14 are detail front elevation and top plan views of portions of the mechanism of the same modified form.

Referring now more particularly to Fig. 1, we provide a plurality of push buttons which may be preset or calibrated to adjust the tuner to select a predetermined station. Because the particular construction of the push buttons and the mechanism thereof is not, per se, a part of this invention, but is the subject of a copending application by us and Harold J. McGarvey, Ser. No. 20,348, now Patent No. 2,530,663 assigned to the assignee of this application, only so much of the push button mechanism is shown and described as is necessary to an understanding of the present invention.

In the embodiment of the invention herein disclosed, which is for certain purposes the preferred embodiment, we employ push buttons such as 10 of the so-called piano key type, but other types may be equally well employed. In this embodiment, these keys 10 are pivoted side by side on shaft 10*a* mounted on the frame of the machine, and when depressed to tune a station, move from the full line position to the dotted line position of Fig. 1.

Each has an extension 11 carrying an adjustable rocker arm or tappet 12 which engages tilt bar 13 mounted on shaft 18 which may be a continuation of the tuning condenser shaft, or geared thereto. The tappet 12 is secured in adjusted position for a particular station by locking means which is not a part of this invention, but is claimed in the application above referred to.

Each key carries an upwardly extending pawl 14 having a notch 15 in its upper edge to be engaged by latch 16 common to all the push buttons, mounted on latch shaft 17 and free to rotate through a small angle, and spring or gravity

biased to engaged position. The latch shaft 17 is mounted on the frame of the mechanism.

When any key is depressed to select a station, the key is latched in the dotted line position of Fig. 1 by latch 16 engaging in notch 15, holding the tuner in tune with the desired station. When any other key is depressed the latch is first released by the key pawl 14 of the newly depressed key, unlocking the key first depressed, and permitting the newly depressed key to change the setting of the tuner to bring in the station desired, after which the latch engages the newly depressed key to hold the tuner in its new position.

Manual adjustment of the tuner to a station not set up on the keys may be obtained by the rotation of manual control knob 25 mounted on manual shaft 26 in bearings 27 secured to front panel 28 and connected to flexible shaft 29 terminating in pinion 30 arranged to be engaged with or disengaged from crown gear 31 secured to tuner shaft 18. It will be clear, however, that manual control 25 cannot be used to tune as long as any push button is in depressed position. Therefore we provide mechanism whereby rotation of the manual control 25 releases latch 16, permitting the formerly depressed key to return to its initial position and free the tuner shaft 18 for rotation under control of the manual drive knob 25.

An important part of this mechanism is the latch actuating lever 35 (Figs. 2, 3 and 9) consisting of a pair of spaced arm portions 36 and 37 joined together by connecting portion 38. The latch actuating lever 35 is pivoted on shaft 10*a* adjacent one end thereof and adjacent the manual control 25, as best seen in Fig. 3. The upper end of the latch actuating lever 35 has a latch release cam surface 39, which, upon slight clockwise rotation of the latch actuating lever from the position of Fig. 2, engages latch 16 and lifts it, releasing any key 10 which may have been depressed. If the latch actuating lever is rotated clockwise to the full extent of its movement, the latch 16 rides into latching notch 40 as shown in Fig. 9, holding the latch actuating lever in the position of Fig. 9 against the pull of latch actuating lever return spring 41 secured to the latch actuating lever and to the frame, and the latch actuating lever will remain latched in this position until one of the keys 10 is depressed to select its station. This action lifts the latch 16, permitting the latch actuating lever to return to the position of Fig. 2.

In one form of our invention, the lower end of arm 37 of the latch actuating lever 35 carries three inwardly projecting studs 45, 46, and 47, each of these being grooved as best seen in Figs. 6 and 7. Mounted on stud 47 is provided the rectangular flipper plate 50 provided with opening 51 to receive stud 47 and permit the flipper plate 50 to move to the right and left, within limits, as seen in Figs. 6 and 7. Notches 52 and 53 are provided on the left hand edge of flipper plate 50 to receive studs 45 and 46. Flipper plate 50 also carries an inwardly projecting stud 55.

Mounted on and driven by the manual shaft 26 there is provided a cupped cam 56, having axially projecting cam teeth 57. When the mechanism is in the position of Fig. 2, the flipper plate 50 is at the right hand extremity of its travel, in the position shown in Fig. 6, and stud 55 is in position to be engaged by the axially projecting cam teeth 57 of cupped cam 56. It will be remembered that the mechanism will be in the position of Fig. 2 whenever any station selector push button 10 is depressed to tune a station.

If a station selector key is depressed and the operator wishes to tune the set manually to select a station for which the push buttons are not set, he will simply grasp manual drive knob and start rotating it. The direction of rotation makes no difference, as the following action occurs for rotation of the manual knob in either direction.

One of the cam teeth 57 engages stud 55 and moves flipper plate 50 to the left from the position of Fig. 6 to that of Fig. 7 at which time the clearance in holes 51, 52, and 53 from studs 45, 46, and 47 is taken up, and further rotation of the manual knob applies force to the lower end of arm 37 of the latch actuating lever 35, rotating it clockwise to the position of Fig. 9, lifting latch 16 and releasing any key 10 which may have been depressed, freeing the tuner shaft 18 for rotation, and latching the latch actuating lever in the position of Fig. 9.

The flipper plate 50 is provided with a notch 60, and a leaf spring 61 is secured to the outer side of the flipper plate, and its free end passes through the notch 60 and is engaged between the arms of bifurcated bracket 62 mounted on the frame. This spring is so chosen and mounted that when the flipper plate is at the right hand end of its travel, as in Fig. 6, it urges the right hand end of the flipper plate upwardly, whereas when the flipper plate is at the left hand end of its travel, it urges the right hand end of the flipper plate downwardly, as seen in Fig. 8.

The action of spring 61 on flipper plate 50 is as follows:

The spring 61 exerts no pressure on flipper plate 50 when the plate 50 is at an intermediate point between the extremities of its movement to right or left, as seen in Figure 8. At either extremity of movement, however, the action of the bracket 62 exerts a pressure on the free end of spring 61 tending to close the spring on itself when the flipper plate is at the left hand extremity of its movement and to open the spring when the flipper plate is at the right hand extremity of its movement. This force is in turn transmitted to the mounting end of the spring 61 in a downward direction when the flipper plate is at the left hand extremity of its motion and in an upper direction when the flipper plate is at the right hand extremity of its motion. Expressed in terms of mechanics, when the plate 50 moves to the left looking at Figure 8, the pressure on the left hand side of spring 61 introduces a clockwise rotational couple on flipper plate 50 causing it to pivot about its left hand edge. When flipper plate moves to the right, spring 61 introduces a counter-clockwise rotational couple causing the flipper plate to rotate in a counter-clockwise direction on its pivot axis.

Consequently, as the manual knob is rotated further, after the mechanism has reached the position of Fig. 9, tooth 57 of cupped cam 56 passes out of engagement with stud 55, and the spring 61 rotates the flipper plate slightly clockwise to the position of Fig. 8, in which stud 55 is out of the path of the teeth 57 of cupped cam 56, and the manual knob may now be rotated freely to select any station manually. It will be noted that as long as a tooth 57 is pressing against stud 55, and thereby pressing flipper plate against studs 45, 46, and 47, the rotation of flipper plate cannot occur. This occurs only after latch actuating lever 35 has been latched in its clockwise position and further rotation of the manual

knob has released contact between teeth **57** and stud **55**.

To facilitate adjustment of spring **61**, bracket **62** is preferably adjustably mounted on the frame of the instrument so that its position can be changed for best results, and is secured in adjusted position by a locking screw, **63** shown in Figures 3 and 4.

If a station selector key is now depressed, this first releases latch **16**, permitting latch actuating lever **35** to rotate counter-clockwise, returning to initial position. The flipper plate **50** will then be rotated counter-clockwise from the position of Fig. 8, and will tend to return to the position of Fig. 6. If cam **56** happens to be in position such that stud **55** does not clear teeth **57** this does not matter, because as soon as the manual shaft is rotated slightly, the teeth will clear the stud, and the flipper plate **50** will return to the position of Fig. 6, and further rotation of the manual shaft will engage the stud with a cam tooth and produce the action already described.

The rearward motion of the flipper plate **50** under the action of the cupped cam **56** allows engagement of the pinion **30** on flexible shaft **29** with crown gear **31** on the tuning shaft **18** in a manner which will now be described.

The pinion end of the flexible shaft **29** is carried in ears **71***a* and **71***b* on bracket **70** (Fig. 10) secured to a leaf spring **71**, which is in turn secured to plate **72** secured to the frame of the machine, and the bracket **70** carries a third ear **71***c* engaged by stud **74** on arm **36** of latch actuating lever **35** (Fig. 10). The spring mounting of the bracket **70** permits it to rotate slightly as shown by the full and dotted lines of Fig. 11 by flexing of the spring **71**.

When no pressure is applied to bracket **70**, and it is free to assume the position normal to spring **71**, it takes the dotted line position of Fig. 11, in which pinion **30** is engaged with crown gear **31**. This is the position it assumes upon rotation of the manual control knob **25**, after latch actuating lever **35** has been latched in the position of Fig. 9. In this position, the manual knob may be rotated to adjust the tuner to any desired station manually.

When any key **10** is depressed to select a station, the latch actuating lever **35** is released, as already described, and rotates slightly counter-clockwise under the tension of spring **41**. This presses stud **74** against ear **73** of bracket **70**, rotating bracket **70** slightly clockwise to the full line position of Fig. 11, disengaging pinion **30** from crown gear **31** and leaving the tuner free to operate without driving the manual knob **25** through pinion **30**.

It should be noted at this point that this construction provides another benefit. Should the tuner be of the type which has only 180° rotation, when the tuner comes against the limiting stop, further attempts to rotate manual knob **25** simply flex spring **71**, and pinion **30** slips on crown gear **31**, signalling the operator that he has reached the end of the tuner travel. As soon as he begins to turn the knob **25** in the opposite direction, the gears drop back into engagement, and the tuning can be continued in the reverse direction. The same action occurs when the tuner reaches the other end of its travel.

Referring now to Figs. 12, 13, and 14, we have shown a slightly modified form of our invention. In this form, studs **45**, **46** and **47** are eliminated, and flipper plate **50** is pivoted on arm **37** of latch actuating lever **35**, in ears **80** and **81** formed

thereon, and stud **55** is slightly grooved or undercut as at **82** to prevent the teeth of cupped cam **56** from slipping off the stud, before the teeth **57** have disengaged themselves from stud **55**.

Instead of the stud **74** engaging ear **71***c* to disengage pinion **30** from crown gear **31**, bracket **70** is provided with an extension **85** carrying an ear **86**, engaged by a projection **87** formed on arm **36** of latch actuating lever **35**. The outer end of arm **87** is turned to provide an anchor point for spring **89**, the opposite end of which is connected to the end of arm **85**.

The operation is the same, however. As latch actuating lever **35** rotates clockwise, arm **87** is carried to the left in Fig. 12, and arm **85** on bracket **70** rotates counter-clockwise by the flexing of spring **71**, carrying pinion into engagement with crown gear **31**. When any key **10** is depressed to select a station, latch actuating lever **35** is released and the pull of spring **41** returns the mechanism to the position of Fig. 2.

In the specification, we have explained the principles of our invention and the best mode in which we have contemplated applying those principles, so as to distinguish our invention from other inventions; and we have particularly pointed out and distinctly claimed the part, improvement or combination which we claim as our invention or discovery.

While we have shown and described certain preferred embodiments of our invention, it will be understood that modifications and changes may be made without departing from the spirit and scope thereof, as will be clear to those skilled in the art.

We claim:

1. In a radio receiver having a tuner, a plurality of pushbuttons and a manual drive for operating said tuner, a shaft for rotating said tuner having a gear, a second gear on said manual drive for engaging the first said gear, said second gear mounted for movement toward and away from the first said gear, and biased toward engagement with the first said gear, a pivoted lever having a portion restraining movement of said second gear into engagement with the first said gear, a flipper plate mounted on said lever for translational and limited swinging movement, a cupped cam mounted on said manual drive and engaging said flipper plate to produce translational movement thereof, and partial rotation of said pivoted lever, spring means secured to said flipper plate to effect swinging movement thereof out of engagement with said cam at the extremity of movement thereof effected by said cupped cam, and latching means for releasably holding said pivoted lever in the position to which it is moved by said cam, whereby said second gear is biased into engagement with the first said gear.

2. In a radio receiver having a tuner, a plurality of pushbuttons and a manual drive for operating said tuner, a shaft for rotating said tuner having a gear, a second gear on said manual drive for engaging the first said gear, said second gear mounted for movement into and out of engagement with the first said gear and biased toward engagement, a pivoted lever having a portion restraining movement of said second gear into engagement with the first said gear, a flipper plate mounted on said lever for limited translational and swinging movement, a cupped cam mounted on said manual drive and engaging said flipper plate to produce translational movement thereof and partial rotation of said pivoted lever,

spring means secured to said flipper plate to produce swinging movement thereof in opposite directions at opposite ends of its translational movement, and latching means for releasably holding said pivoted lever in the position to which it is moved by said cam, whereby said second gear is biased into engagement with the first said gear.

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