March 29, 1960 K. J. ROBACK 2,930,241

PUSHBUTTON STRUCTURE

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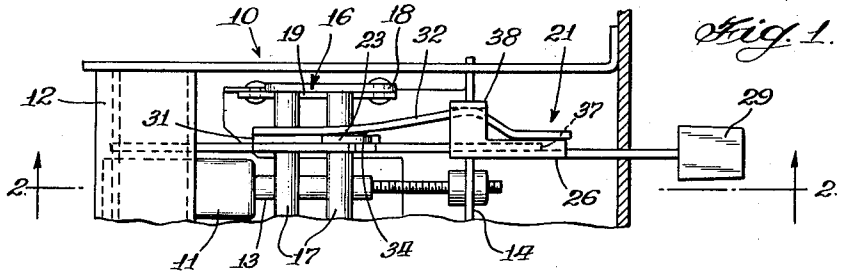


Fig. 1.

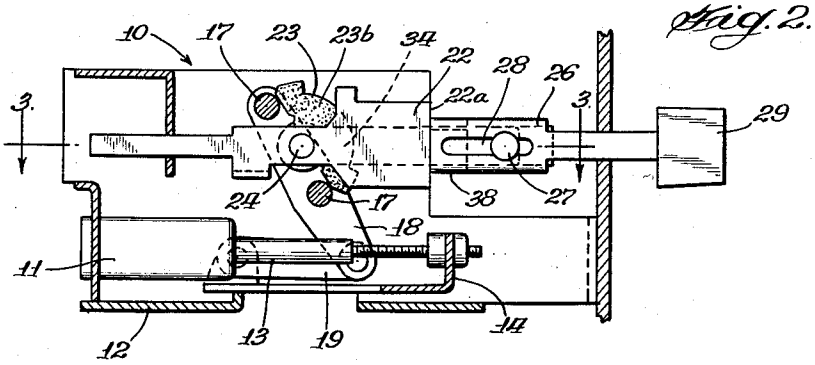


Fig. 2.

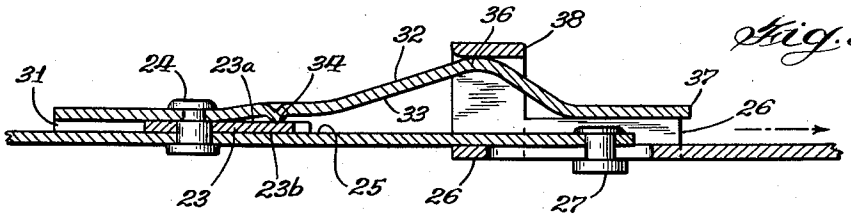


Fig. 3.

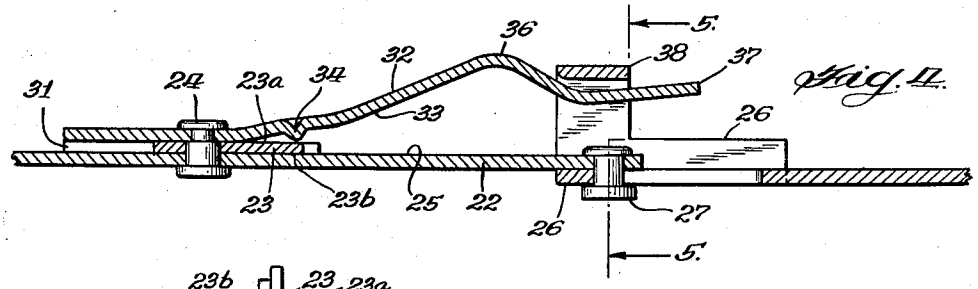


Fig. 4.

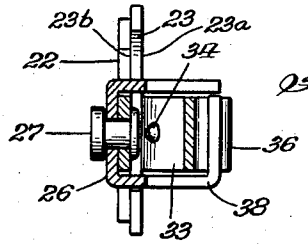


Fig. 5.

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PUSHBUTTON STRUCTURE

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3 Claims. (Cl. 74—10.33)

This invention relates to pushbutton tuning mechanisms for radio receivers, and more particularly to a locking device for use in presetting an adjustable pushbutton structure to permit repeated selection of a given station.

In radio tuners, it is common to provide a cam member supported on a slidably mounted plunger rod, which cam member engages a treadle bar structure including a pair of parallel members mounted on a rotatable carriage coupled to tuning elements associated with resonant circuits. In such mechanisms, the cam member is fixed at a certain angle with respect to its supporting plunger rod so that as the rod is moved with respect to the parallel members, the cam member may bring the parallel treadle bar members into alignment with the surface thereof, thus setting the carriage and the resonant circuits to the proper adjustment for reception of the desired station. It is advantageous to have the position of the cam member firmly affixed so that exact tuning may be obtained upon each operation of the plunger rod. For reasons of manufacturing economy it is desirable that the mechanism for locking the cam member into the desired angular position be simple and employ as few component parts as possible consistent with the provision of firm and positive locking action. Furthermore, it is desirable to provide for easy locking and unlocking of the cam member to facilitate adjustment thereof so that the receiver may be tuned to any desired frequency.

An object of the invention is to provide an improved locking mechanism for a cam member supported on the plunger rod of a pushbutton tuner, which mechanism provides for positively locking and firmly holding the cam member in a desired angular position.

Another object of the invention is to provide a pushbutton plunger assembly which is relatively simple and inexpensive to manufacture and which requires relatively few component parts while at the same time providing firm positioning of a cam member in a desired position.

Another object of the invention is to provide a pushbutton plunger assembly in which a cam member carried on a plunger rod can easily be locked against rotation relative to the rod and easily unlocked.

A feature of the present invention is the provision of a pushbutton plunger system including a cam member having a roughened surface which is engaged by a resilient tongue flexed into locking position by a sliding member. The roughened surface increases the coefficient of friction between the two contiguous surfaces and provides for firm holding of the cam member in a desired alignment. Preferably, the cam has a pair of substantially flat roughened surfaces for providing increased friction to both of two surfaces between which it is clamped.

Another feature of the invention is the provision of a pushbutton assembly having a resilient tongue fixed at one end to a plunger rod adjacent the surface of a cam member and free at its other end with a raised or arcuate portion adjacent the free end. Movement of the raised or arcuate portion of the tongue toward the rod by a relatively small force, applied near the free end by a sliding

lock member, will cause the tongue to flex at its fixed end and apply a relatively large clamping force to the surface of the cam member by means of a projection on the tongue which engages the cam member.

In the drawings:

Fig. 1 is a partial top view of a tuning mechanism embodying the present invention;

Fig. 2 is a view in section taken on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged view taken in section on the line 3—3 of Fig. 2;

Fig. 4 is a view similar to Fig. 3 showing the cam member of the device in unlocked position; and

Fig. 5 is a view taken on the line 5—5 of Fig. 4.

The invention provides mechanism for locking and releasing a cam member on a plunger rod in pushbutton tuning apparatus for a radio by further movement of the rod in a direction which also provides station selection. The plunger rod carries a cam member rotatably affixed to a flat surface thereof and also has a resilient tongue member having one end fixed relative to the plunger rod adjacent the cam member and with its other end free. The surface of the tongue is spaced from the side of the plunger rod so that the cam is positioned between the plunged rod and the tongue. The raised or arcuate portion of the resilient tongue adjacent its free end is adapted to be engaged by a slidable locking member mounted on the plunger rod adjacent the free end of the tongue so as to move the raised portion of the tongue toward the plunger rod thus causing it to flex at its fixed end and be brought into clamping or locking engagement with the cam member.

The surface of the tongue which is adjacent the cam member is provided with a projection such as a boss which bears against a surface of the cam member that has been roughened in order to increase the coefficient of friction between the projection and the cam surface to reduce the possibility of relative slippage of the cam member while it is in its locked position. The surface of the cam member bearing against the flat surface of the plunger rod is preferably roughened also for the same reason. The cam member is unlocked by sliding the locking member toward the free end of the tongue out of engagement with the raised portion thereof so that the tongue moves out of engagement with the cam due to its resilience. The slidable locking member is actuated by a pushbutton and after the assembly has been set with the cam member in a locked position further inward movement of the button causes movement of the slidably mounted plunger rod and actuation of the tuning treadle of the mechanism by the positioned cam member.

In the accompanying drawings, there is shown in Fig. 1 a portion of a tuning apparatus 10 which includes a plurality of slug tuned coil units 11 which are supported by frame 12. The units 11 are incorporated in resonant circuits of a radio receiver circuit as is familiar to those in the art, and the movable slugs 13 thereof are fastened to a slidable portion of carriage 14. Carriage 14 also includes a treadle structure 16 having a pair of parallel bar members 17 mounted on a rotatable arm 18 about an axis midway between the bar members. Link section 19 connects the slidable portion of carriage 14 to an extension of the arm 18 so that as bars 17 are rotated about their axis, carriage 14 and slugs 13 attached thereto are moved to effect continuous tuning of the coil units.

The tuning apparatus 10 is provided with a multiplicity of plunger assemblies 21 which are all of identical structure so that only one is illustrated and described. Each plunger assembly includes a plunger rod 22 having a flat surface 25 to which a cam member 23 is rotatably attached by means of rivet 24. A slide member 26 is attached at one end of the plunger rod 22 by the bolt 27

slidable in the slot means 28. Slide 26 is actuated by pushbutton 29 attached to its end.

In pushbutton operation of the tuning apparatus the cam member 23 must be firmly affixed in a desired angular position. After the carriage 14 has been adjusted by suitable manual tuning means to a desired setting with the bars 17 in a position charactertistic of that setting, the plunger rod 22 and its rotatably mounted cam member 23 are moved to bring the cam member against the bars 17 so that this assumes an angular position in alignment with the bars. In order to duplicate this position of the bars 17 and the carriage 14, the cam member 23 is locked in this angular position. Since the function of the cam member 23 is to adjust the position of the bars 17 when brought into contact with them by movement of the plunger rod 22, it is necessary that the cam member 23 be firmly held against rotational movement with respect to the plunger rod.

The means of locking the cam member 23 in its preset position are particularly illustrated in Figs. 3 and 4. The plunger assembly 21 includes a resilient tongue member 32 which is fixed with respect to plunger rod 22 at one end being integral with the rod through the connecting portion 31 and also being connected to the rod by the shoulder rivet 24. The cam 23 is thus positioned between plunger rod 22 and tongue 32. The shoulder of rivet 24 contacts surface 33 of tongue 32 to prevent the tongue from locking cam 23 during assembly. The portion of the surface 33 of the tongue 32 which is adjacent the cam member 23 is provided with a projection or boss 34. The tongue 32 has an arcuate or raised portion 36 adjacent its free end 37. Slide member 26 is provided with an integral locking member 38 through which the free end 37 of the tongue 32 extends.

In order to lock the cam member 23 in a desired position, the slide member 26 is moved to the position shown in Fig. 3 by depression of pushbutton 29. In this position the locking member 38 constrains the arcuate or raised portion 36 of the tongue 32 moving free end 37 toward rod 22 causing the tongue to flex at its fixed end adjacent rivet 24. This causes the projection 34 against surface 23*a* of the cam member 23. The substantially flat surface 23*a* of the cam member 23 is roughened in order to increase the coefficient of friction between it and the projection 34 so that the probability of slippage of the cam 23 from its locked position is reduced. Substantially flat surface 23*b* of the cam which bears against surface 25 of rod 22 is also roughened for the same reason. Because of the lever effect, the constraining force applied to the arcuate or raised portion 36 of the tongue 32 need not be very great to provide a substantial clamping force of the projection 34 against cam member 23. In this way, the cam member can be locked easily by depression of the pushbutton 29.

When in the locked position the locking member 38 bears against the shoulder 22*a* of the plunger rod 22 so that further pressure on the pushbutton 29 will effect slidable movement of the plunger rod 22 and move cam member 23 for positioning of bars 17.

When it is desired to reset the cam member 23 in a different angular position, the slide 26 is moved along the arrow shown in Fig. 3 to the position shown in Fig. 4 by pulling on pushbutton 29 and the resilience of tongue 32, being released from constraint by movement of locking member 38 moves the projection 34 out of contact with surface 23*a*. The tuner may then be manually tuned to the desired station and when the pushbutton is again depressed the cam member will turn until it assumes the position of the treadle bar. Then when the pushbutton is depressed all the way the cam member will be locked in the desired position.

This invention provides, therefore, a locking mechanism for securing a cam member to a pushbutton plunger rod in a desired angular position, which locking mechanism contains few component parts and is therefore relatively simple and inexpensive to manufacture. By means of a resilient tongue member having one end fixed relative to the plunger rod and adjacent the cam member, a positive and firm clamping action can be transmitted to the cam by relatively small constraining force applied near the free end of the tongue. By providing roughened surfaces on the cam member to increase the co-efficient of friction between it and the surfaces it contacts when in locked position, danger of slippage of the cam member from such position is substantially reduced.

I claim:

1. A plunger assembly for use in pushbutton operated selecting means including in combination, a plunger rod, a resilient tongue having one end thereof fixed with respect to said plunger rod and a free end movable toward and away from said rod, a cam member rotatably mounted on said rod between said rod and said tongue and adjacent the fixed end of the latter, said tongue having a projecting portion adjacent said cam member but held clear thereof solely by the resiliency of said tongue, said tongue having a raised portion adjacent the free end thereof, and a locking member slidably mounted on said rod adjacent the free end of said tongue and adapted to constrain said raised portion when said locking member is slid therealong to flex said resilient tongue from a relaxed unlocked position spaced from said rod to a strained locking position nearer thereto whereby said projection on said tongue is forced against said cam member to lock the same between said rod and said tongue thereby holding said cam member against rotation relative to said rod.

2. A plunger assembly for use in pushbutton operated selecting means, said assembly including in combination, a plunger rod having a flat surface, a resilient tongue having an end fixed with respect to said rod and a free end movable toward and away from said flat surface of said rod, said tongue having a raised portion adjacent the free end thereof, a cam member having a pair of substantially flat roughened surfaces, said cam member being rotatably mounted on said rod with one of its roughened surfaces against the flat surface of said rod and the other of its roughened surfaces adjacent said tongue, said tongue having an integral projection formed in the surface thereof adjacent said cam member but held clear of said cam member solely by the resiliency of said tongue, and a locking member slidably mounted on said plunger rod and adapted to constrain said raised portion of said tongue when said locking member is slid therealong to cause said resilient tongue to flex from a relaxed unlocked position spaced from said rod to a strained locking position nearer thereto whereby said projection on said tongue is forced against said other roughed surface of said cam member to lock said cam member in position between said tongue and said flat surface of said rod thereby preventing rotation with respect to said rod.

3. A plunger assembly for use in pushbutton operated tuning means, said assembly including in combination, a plunger rod having a flat surface, a resilient tongue having an end fixed with respect to said rod and a free end movable toward and away from said flat surface of said rod, said tongue having a raised portion adjacent the free end thereof, a shoulder rivet spaceably connecting said rod and said tongue, a cam member rotatably mounted on said rivet between said tongue and said rod, said cam member having a pair of substantially flat roughened surfaces with one of its roughened surfaces against the flat surface of said rod and the other of its roughened surfaces adjacent said tongue, a projecting boss formed by deformation of the surface of said tongue adjacent the other roughened surface of said cam member but held clear thereof solely by the resiliency of said tongue, and a locking member slidably mounted on said plunger rod adjacent the free end of said tongue and adapted to constrain said raised portion of said tongue

when said locking member is slid toward the fixed end thereof causing said tongue to flex from a relaxed unlocked position spaced from said rod to a strained locking position nearer thereto and forcing said boss against said other roughened surface of said cam to lock said cam into position between said tongue and said flat surface of said rod thereby holding said cam member against rotation with respect to said rod.

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