May 7, 1940. H. Z. BENTON 2,200,211

CAM LOCK

Filed Aug. 8, 1939

Fig. 1.

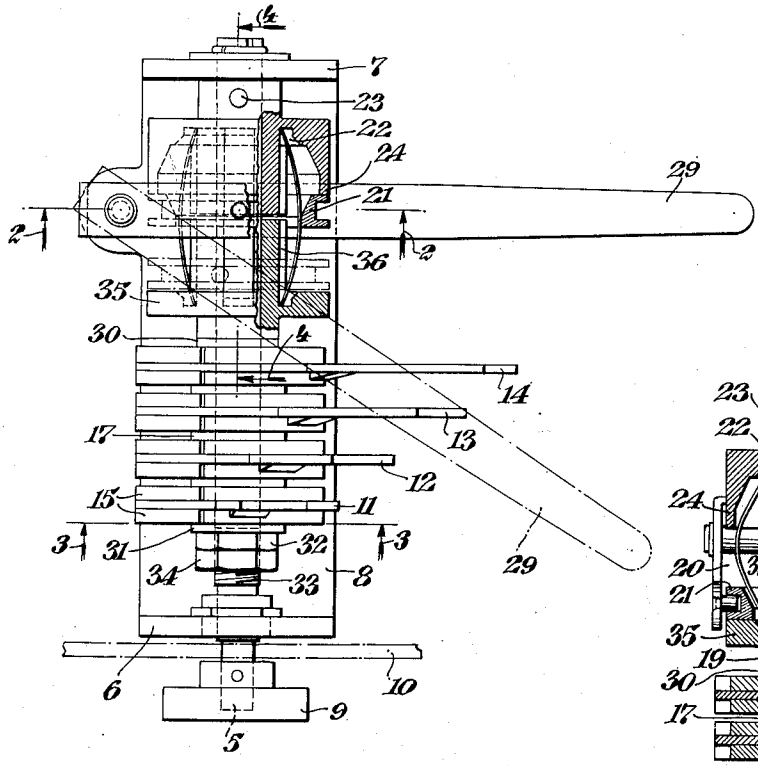


Fig. 4.

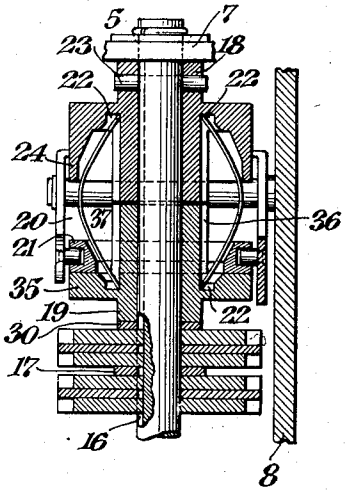


Fig. 3.

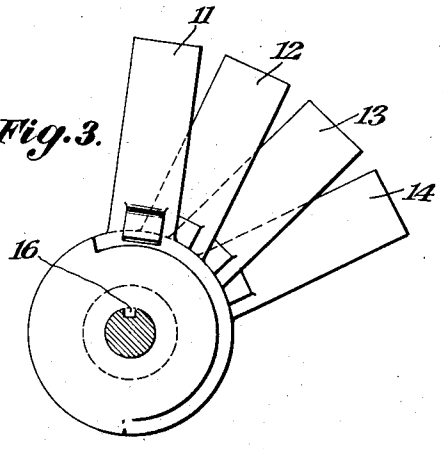
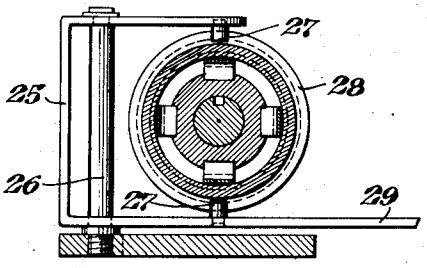


Fig. 2.



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CAM LOCK

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16 Claims. (Cl. 74—10)

The invention herein disclosed relates to devices known as cam locks and employed for securing in adjusted relation the so-called station selecting cam-like levers used in radio tuning apparatus.

Objects of the invention are to provide a device of the nature stated, which can be operated to release or to secure the so-called cams, without requiring the use of any tools; which when released, will lightly hold the cams in adjusted relation, while permitting free independent adjustment of other cams; which will secure the cams without applying torque such as might have a tendency to displace or throw them out of adjustment and which with all these desirable characteristics will be relatively inexpensive, consisting of but few parts, be easily assembled and be relatively small and compact, so as to add no objectionable weight or bulk to the radio tuning mechanism.

Other objects and the novel features of the invention are set forth or will appear in the following specification.

The drawing accompanying and forming part of the specification illustrates one commercial embodiment of the invention, but structure may be modified and changed in various ways all within the true intent of the invention as hereinafter defined and broadly covered in the claims.

Fig. 1 is a broken and part sectional plan view of one of the units in locking position and with broken lines indicating movement of parts to the unlocked position.

Fig. 2 is a broken cross-sectional view as on line 2—2 of Fig. 1.

Fig. 3 is a cross-sectional detail as on line 3—3 of Fig. 1.

Fig. 4 is a broken longitudinal sectional view on substantially the plane of line 4—4 of Fig. 1.

In the several views, a shaft such as employed for tuning a radio receiving set is indicated at 5, journalled in bearings 6, 7, on a suitable base or supporting structure 8. Such shafts are usually connected with the condensers or other tuning means of a receiving set through a suitable coupling (not shown) and usually are provided with a knob 9, or other manual means of adjustment, exposed at the front of the instrument panel, indicated at 10.

The various station selecting cams may be of different shapes and are here simply shown as levers 11, 12, 13, 14, pivotally engaged over the shaft between pairs of clamping washers 15, slidingly keyed on the shaft at 16, Figs. 3 and 4, and the adjoining pairs separated by spacing washers 17.

Locking of the cam stack is effected in the present invention by straight longitudinal thrust, free of any rotational or torque component, by means comprising relatively fixed and slidable thrust sleeves 18, 19, interposed bowed leaf springs 20, and a surrounding ring 21, for compressing said springs to thrust the movable sleeve endwise into holding relation with the cam pack.

The thrust sleeves are in the nature of cages, socketed at 22, to receive and position the ends of the bowed springs and the sleeve 18, which is fixed to the shaft at 23, additionally has a flange 24, positioned as shown in Fig. 1 to serve as a stop shoulder limiting the locking movement of the spring compressing ring 21.

The locking and unlocking ring may be operated in various ways and it is here shown as operated by a fork 25, pivoted on a stud 26, and carrying diametrically opposite pins 27, entered in an annular groove 28, in the ring. This fork is shown as having a lever extension 29, which may project through the case of the instrument or be otherwise accessibly located for convenient operation when setting the cams to station selecting position.

The movable thrust collar 19, is shown as separated from the adjoining cam securing clamp washer 15, by a spacing washer 30, through which the locking thrust is applied to the pack. A similar spacing washer 31, is shown at the opposite end of the pack engaged by the adjusting nut 32, on the screw-threaded portion 33, of the shaft, said nut when adjusted being made fast by lock nut 34.

In setting up the unit, the nut 32, is usually adjusted to put the springs under a slight tension, so that when relieved of the compressive action of the surrounding ring as in Fig. 4, they will yieldingly hold the cams lightly in various positions of adjustment. This tension may be just sufficient to prevent the cams which have been adjusted from slipping out of position while other cams are being set to desired station selecting position. In this released relation, the control ring may rest flat against the end flange 35, of the movable thrust sleeve as shown in Fig. 4 and as indicated in broken lines in Fig. 1.

After adjustment of the cams is effected, the entire pack can be securely locked without disturbing their relative positions by simply shifting the handle 29, from the released position indicated in broken lines, Fig. 1 to the full line position. This simple movement shifts the control

ring 21, up over the bowed springs 20, flattening them to an extent such as illustrated in Fig. 1, and causing them to elongate sufficiently to force the loose thrust sleeve against the pack with enough pressure to hold the pack locked solidly on the shaft. In this locked condition, the entire assembly will turn free of any drag, since the shifter pins 26, ride loosely in the groove 28, as the control ring turns with the unit. The stop shoulder 24, of the fixed sleeve may be positioned to stop the ring just as it reaches or passes over the crest of the bowed springs, so that the tension of the springs will be effective to retain the control ring in this locking position. At any time however, the pack can be instantly released for adjustment or other purposes and without any tools, by simple movement of the lever from the full line to the broken line position, Fig. 1.

The device consists of but few and relatively small simple parts, inexpensive and easily assembled. The locking unit is of such size that it can go into sets where small space is allowed for such a device. The sockets in which the ends of the springs fit are shaped to hold the springs in their out-bowed relation between the collars. In the illustration, the hubs of the collars are shown as grooved at 36, in line with and in continuation of the retaining seats to more fully guide and hold the springs as they are flattened inward. The control ring is shown in Fig. 4, as bevelled at 37, in the direction of spring compressing movement to readily ride up over the bowed portions of the springs and also to provide clearance for the springs in the open position, Fig. 4.

Advantages of the invention may be more fully appreciated on considering that locking devices at present on the market require rotating against a stop to lock and unlock, where the present invention enables locking and unlocking right at the tuned station, so as not to lose its identity in the event it is desired to reset more accurately or to move to an adjacent radio channel. In using the end torque type lock, the stations may be retuned and in many cases, when once lost, cannot be easily found again, particularly by one not familiar with the scale calibrations and finer adjustments of a receiving set. All such difficulties are avoided with the present invention.

What is claimed is:

1. In combination with a shaft and individually adjustable lever elements and clamp washers mounted thereon and constituting a cam pack, abutments on said shaft at opposite ends of said cam pack and means for applying endwise locking pressure to said cam pack, comprising bowed leaf springs disposed longitudinally of the shaft and interposed at a position between said abutments and means for applying straightening pressure to said bowed springs to thereby elongate the same.

2. In combination with a shaft and a cam pack thereon, relatively separable abutments on said shaft and arranged to exert locking pressure on said cam pack, bowed leaf springs disposed longitudinally of the shaft and interposed between said relatively separable abutments and means for applying straightening pressure to said bowed springs to thereby elongate the same and effect relative separation of said abutments.

3. In combination with a shaft and a cam pack thereon, thrust collars in longitudinally separable relation on said shaft and adapted to apply endwise locking pressure on said cam pack, said thrust collars having opposed seats, bowed springs having their ends entered in said seats and a ring between said thrust collars and movable over the bowed portions of said springs for relatively flattening and elongating the same.

4. In combination with a shaft and a cam pack thereon, thrust collars in longitudinally separable relation on said shaft and adapted to apply endwise locking pressure on said cam pack, said thrust collars having opposed seats, bowed springs having their ends entered in said seats, a ring between said thrust collars and movable over the bowed portions of said springs for relatively flattening and elongating the same and lever means for shifting said ring in opposite directions.

5. A cam lock, comprising relatively separable shaft collars in opposing relation and having aligned seats in the opposing faces of the same, bowed springs having their ends entered in said seats, a ring element slidingly engaged with the bowed portions of said springs for effecting flattening and elongation of the same and means for shifting said ring element in opposite directions.

6. A cam lock, comprising relatively separable shaft collars in opposing relation and having aligned seats in the opposing faces of the same, bowed springs having their ends entered in said seats, a ring element slidingly engaged with the bowed portions of said springs for effecting flattening and elongation of the same, means for shifting said ring element in opposite directions, including a lever having relatively rotatable engagement with said ring.

7. A cam lock, comprising relatively separable shaft collars in opposing relation and having aligned seats in the opposing faces of the same, bowed springs having their ends entered in said seats, a ring element slidingly engaged with the bowed portions of said springs for effecting flattening and elongation of the same, means for shifting said ring element in opposite directions, said ring having a bevelled portion engageable with the bowed portions of the springs.

8. A cam lock, comprising relatively separable shaft collars in opposing relation and having aligned seats in the opposing faces of the same, bowed springs having their ends entered in said seats, a ring element slidingly engaged with the bowed portions of said springs for effecting flattening and elongation of the same, means for shifting said ring element in opposite directions, said ring having an external annular groove and said shifting means having pin elements engageable in said groove.

9. In combination, a shaft, a cam pack thereon, relatively separable thrust collars bearing endwise on said cam pack, bowed springs engaged between said relatively separable thrust collars and exerting a light spring pressure to lightly hold the elements of the cam pack in the unlocked condition of the parts and a ring slidable over the bowed portions to effect relative separation of said thrust collars and heavy endwise locking pressure on said cam pack.

10. In combination, a shaft, a cam pack thereon, relatively separable thrust collars bearing endwise on said cam pack, bowed springs engaged between said relatively separable thrust collars and exerting a light spring pressure to lightly hold the elements of the cam pack in the unlocked condition of the parts, a ring slidable over the bowed portions to effect relative separation of said thrust collars and heavy endwise locking pressure on said cam pack and an end abutment on the shaft for taking the combined thrust of the cam pack and locking means de-

scribed, said abutment being longitudinally adjustable on the shaft for presetting the position of parts to determine the initial holding tension of the bowed springs.

11. In combination, a shaft, a cam pack thereon, relatively separable thrust collars bearing endwise on said cam pack, bowed springs engaged between said relatively separable thrust collars and exerting a light spring pressure to lightly hold the elements of the cam pack in the unlocked condition of the parts and a ring slidable over the bowed portions to effect relative separation of said thrust collars and heavy endwise locking pressure on said cam pack and lever means having a relative rotatable engagement with said ring for shifting the same.

12. In combination, a shaft, a cam pack thereon, relatively separable thrust collars bearing endwise on said cam pack, bowed springs engaged between said relatively separable thrust collars and exerting a light spring pressure to lightly hold the elements of the cam pack in the unlocked condition of the parts and a ring slidable over the bowed portions to effect relative separation of said thrust collars and, heavy endwise locking pressure on said cam pack and stop means for limiting the movement of said ring.

13. In combination, a shaft, a cam pack thereon, relatively separable thrust collars bearing endwise on said cam pack, bowed springs engaged between said relatively separable thrust collars and exerting a light spring pressure to lightly hold the elements of the cam pack in the unlocked condition of the parts and a ring slidable over the bowed portions to effect relative separation of said thrust collars and heavy endwise locking pressure on said cam pack, one of said collars having a stop flange engageable by said ring.

14. In combination, a shaft, a cam pack thereon, relatively separable thrust collars bearing endwise on said cam pack, bowed springs engaged between said relatively separable thrust collars and exerting a light spring pressure to lightly hold the elements of the cam pack in the unlocked condition of the parts and a ring slidable over the bowed portions to effect relative separation of said thrust collars and heavy endwise locking pressure on said cam pack and means for stopping said ring in position substantially at or over the crest of said bowed springs for effecting the holding of said ring in such position by said springs.

15. In combination, a shaft, a cam pack thereon, relatively separable thrust collars bearing endwise on said cam pack, bowed springs engaged between said relatively separable thrust collars and exerting a light spring pressure to lightly hold the elements of the cam pack in the unlocked condition of the parts and a ring slidable over the bowed portions to effect relative separation of said thrust collars and heavy endwise locking pressure on said cam pack, one of said collars having a stop shoulder limiting the movement of said ring to a position substantially at the crest of the bowed springs.

16. A cam lock, comprising oppositely disposed relatively separable thrust applying shaft collars provided with aligned seats in the opposing faces of the same, outwardly bowed springs interposed between said thrust collars and having their ends engaged in said seats, a spring contracting ring slidingly engaged over the intermediate bowed portions of said springs and means for shifting said ring in opposite directions.

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