Nov. 17, 1953 E. H. ALLEN 2,659,236

PUSHBUTTON STRUCTURE

Filed Oct. 9, 1950

2 Sheets-Sheet 1

Fig. 1.

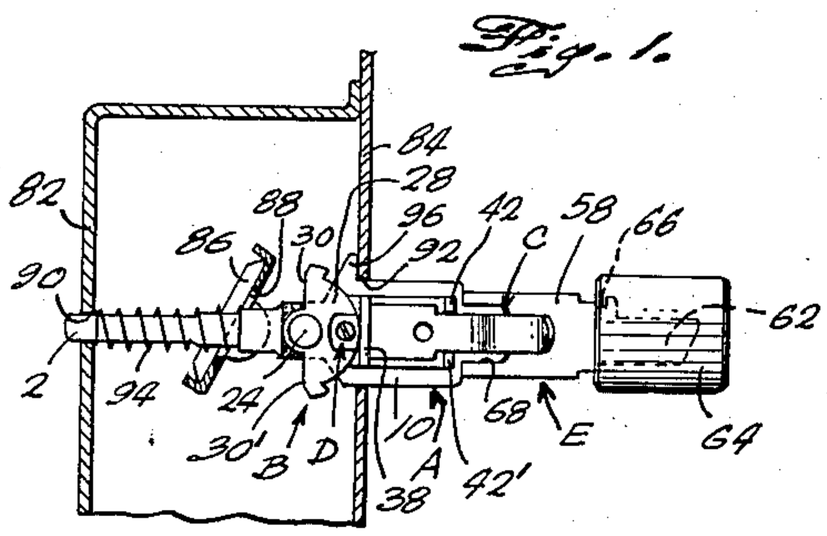
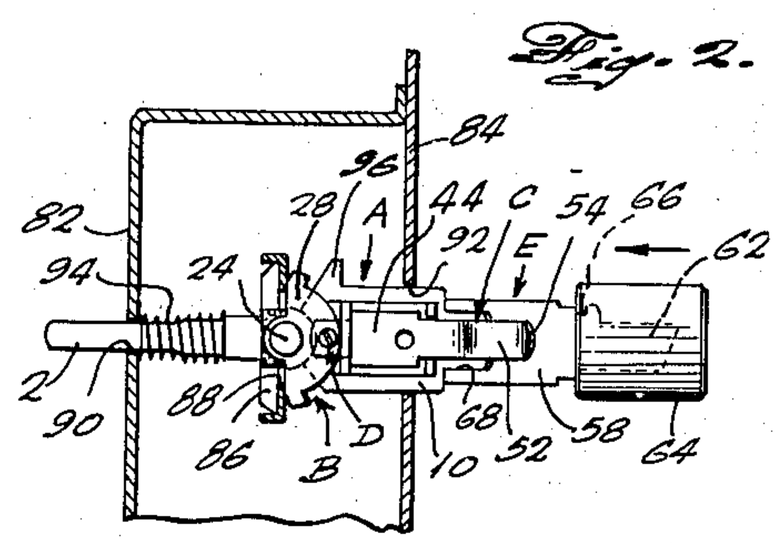


Fig. 2.



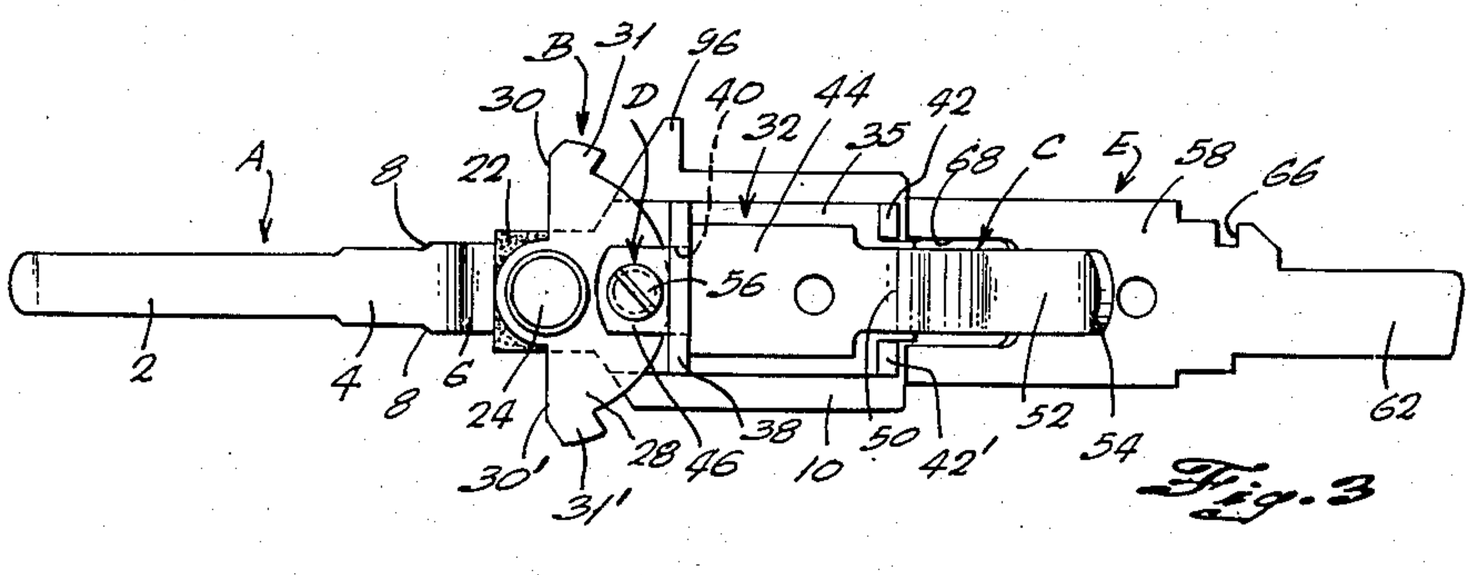


Fig. 3

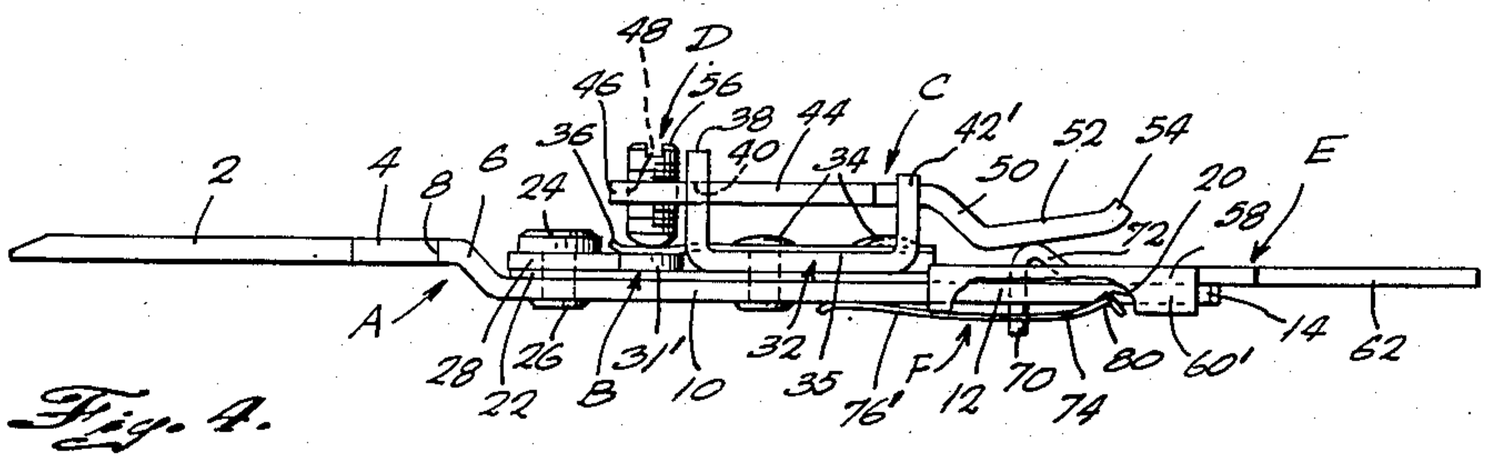


Fig. 4.

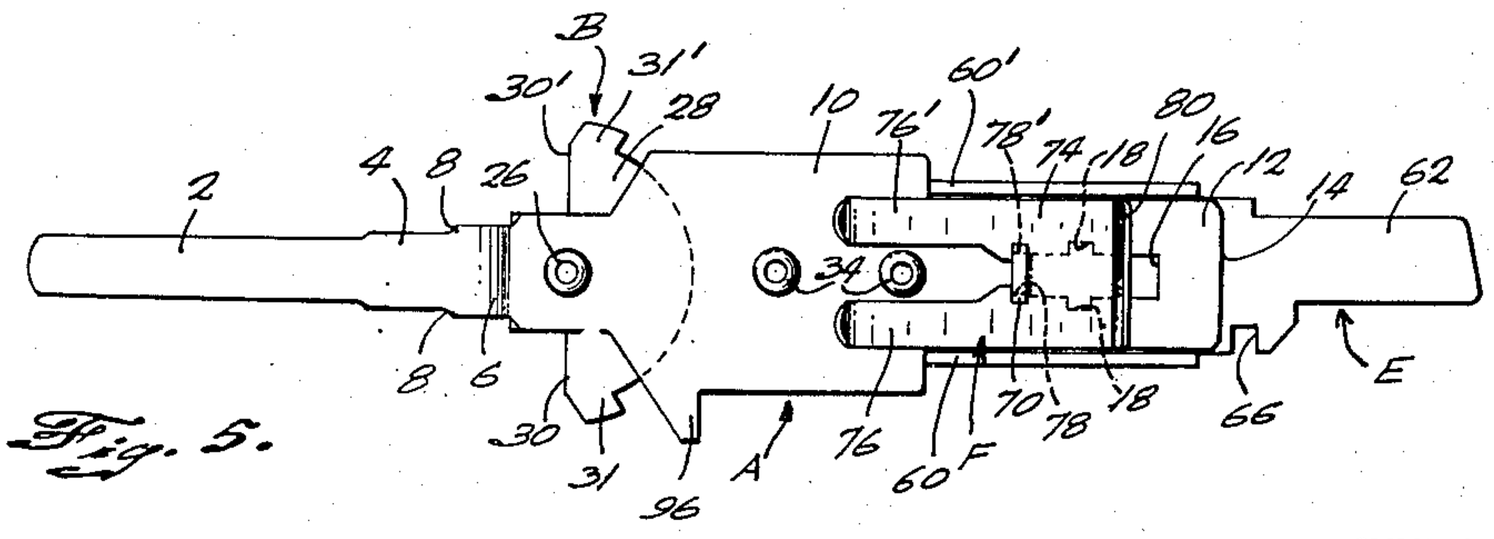


Fig. 5.

INVENTOR.
EARL H. ALLEN
BY
James and Franklin
ATTORNEYS.

Nov. 17, 1953

E. H. ALLEN

PUSHBUTTON STRUCTURE

2,659,236

Filed Oct. 9, 1950

2 Sheets-Sheet 2

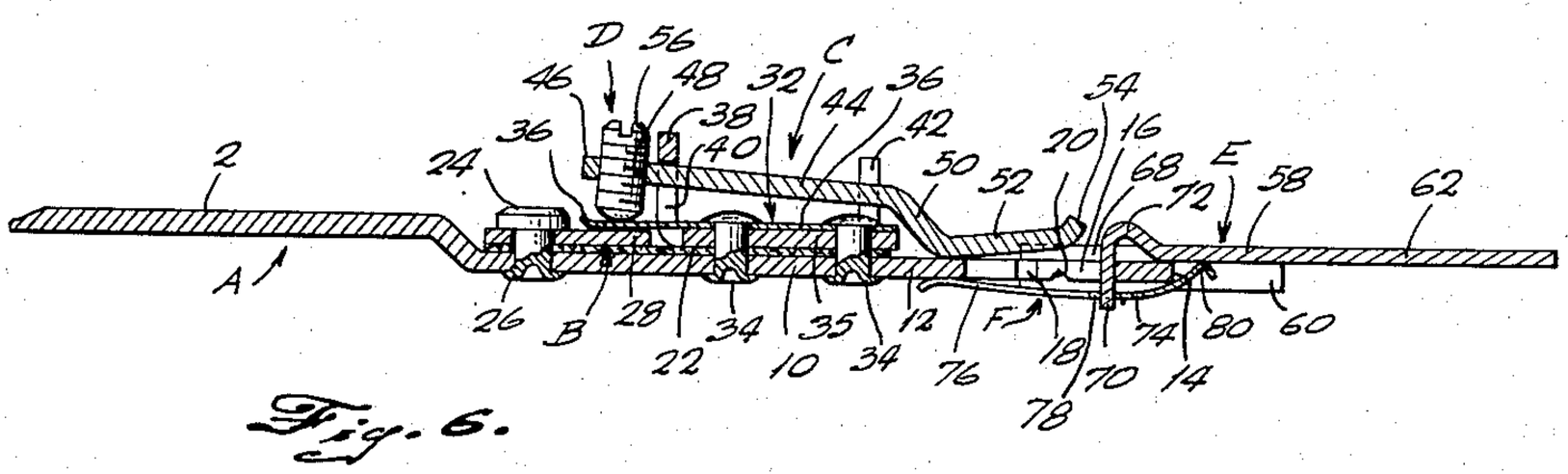
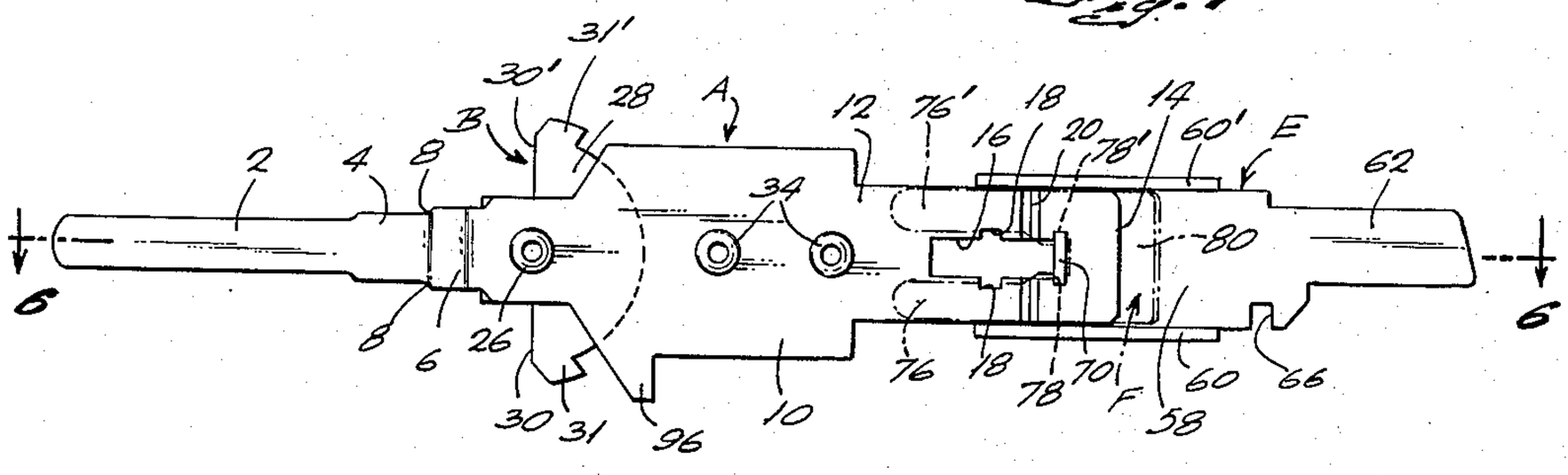


Fig. 6.

Fig. 7



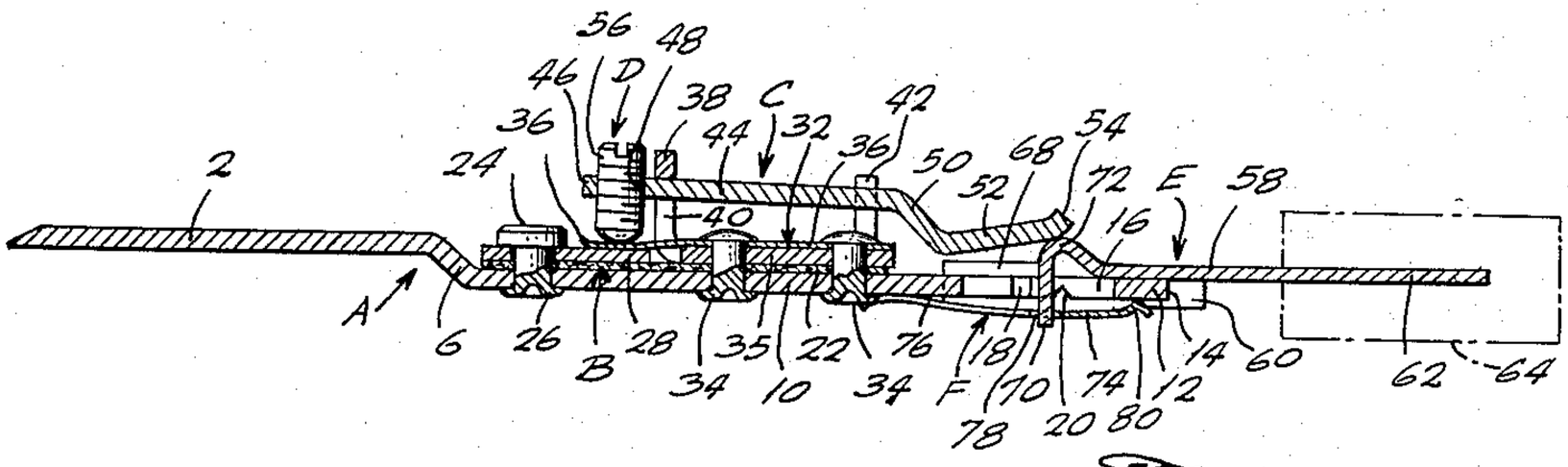


Fig. 9.

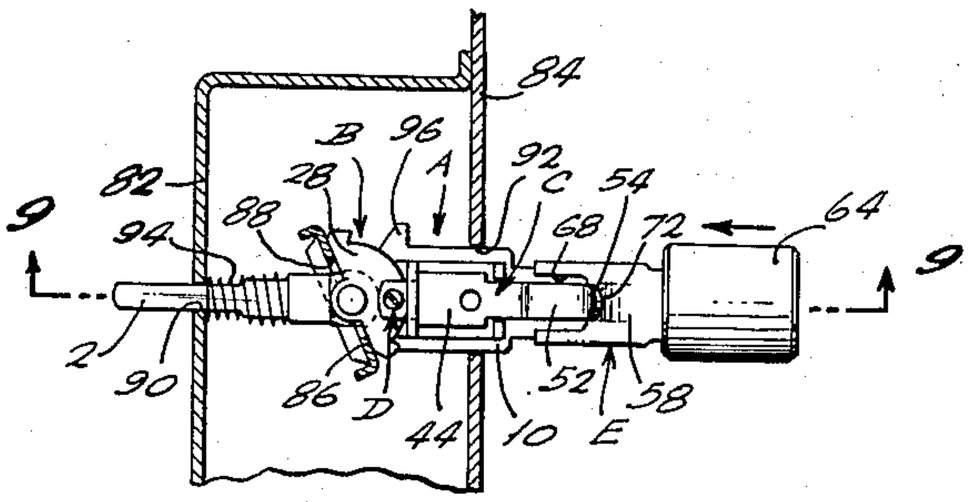


Fig. 8

INVENTOR.

EARL H. ALLEN

BY

James and Franklin

ATTORNEYS.

Patented Nov. 17, 1953

2,659,236

UNITED STATES PATENT OFFICE

2,659,236

PUSH-BUTTON STRUCTURE

Earl H. Allen, Westfield, N. J., assignor to General Instrument Corporation, Elizabeth, N. J., a corporation of New York

Application October 9, 1950, Serial No. 189,229

13 Claims. (Cl. 74—10.33)

1

The present invention relates to a novel construction for a pushbutton of a type utilized for the tuning of radio sets, and in particular to such a construction which facilitates the setting of the pushbutton corresponding to a selected radio frequency and which renders the setting, when once made, permanent until it is desired that it be altered.

The pushbutton structure of the present invention is particularly designed for that relatively conventional type of pushbutton-actuated mechanism in which an adjustable setting device is carried by or operatively connected to the pushbutton itself. In tuning units of this type, various expedients have been resorted to in order to release the setting device so that its position relative to the pushbutton may be altered, usually to correspond with the selected radio frequency to which the unit has been manually pretuned, and then to firmly lock the setting device in that altered position, thereby permitting subsequent actuation of the pushbutton to tune the unit to the selected radio frequency. It has proved to be highly desirable to control the locking and releasing of the setting device through manipulation of the pushbutton itself, and preferably through motion of the pushbutton in the same direction as the pushbutton is moved when the unit is to be tuned.

In pushbuttons of this general type, the adjustable setting device is in the form of a cam articulately mounted on a support which is in turn suitably mounted for movement within the tuning unit. An auxiliary member to which the pushbutton is secured is also movably mounted within the unit so as to move with the support and so as to have a limited degree of movement with respect thereto, the relative position of the movable support and the auxiliary member controlling the actuation of a clamp and causing that clamp to operatively engage or disengage the setting device and lock it in or release it from adjusted position. When the setting device is locked in adjusted position, depression of the pushbutton causes the device to engage and move a control element in the tuning unit which is in turn operatively connected to the tuning components, such as coils, condensers or the like. When the setting device is unlocked, depression of the pushbutton causes the device to engage said control element but in that case the setting device conforms to the preset position of the control element.

In the most convenient arrangement when the auxiliary member carrying the pushbutton is

2

outwardly positioned with respect to the movable support the adjustable setting device is unlocked. When so arranged, depression of the pushbutton causes the movable support to be moved thereby without substantially altering its position relative thereto, so that the setting device is positioned according to the tuned status of the unit. Thereafter, continued pressure upon the pushbutton in the direction of its depression will cause the auxiliary member to move inwardly relative to the movable support, thus actuating the clamp and locking the setting device in its newly adjusted position.

One problem which has arisen in the operation of pushbuttons of this type is that, when the auxiliary member has been moved outwardly with respect to the movable support so as to unlock the setting device, subsequent depression of the pushbutton causes the auxiliary member and the movable support to change their relative positions before the setting device engages the control element in the tuning unit, thus causing clamping pressure to be exerted to a greater or lesser degree upon the setting device before it can be positioned corresponding to the tuned status of the unit. In the present invention this defect is eliminated by providing structure which releasably holds the movable support and auxiliary member in extended position during initial depression of the pushbutton. This structure is in the form of a spring active in a detent manner between the movable support and the auxiliary member.

After the setting device, when unclamped, has assumed a position corresponding to the tuned status of the unit, further depressive force exerted upon the pushbutton, is required in order to lock the setting device in position. In prior art devices it has been necessary to exert a substantial depressive force before the setting device is firmly clamped to the movable support, and this often results in a dislocation of the tuned status of the unit which gives rise to decreased fidelity of reception. The desired relationship between setting device, clamp and auxiliary member should be such that the exertion of but a slight force upon the clamp by the auxiliary member will result in the exertion of sufficient pressure upon the setting device to firmly lock it in adjusted position and thus prevent any additional pressure from dislocating the position of the setting device or the control element with which it is engaged. However, the achievement of such a precise and delicate relationship between the parts has not been re-

alized in the past, largely because of the necessary manufacturing variations in the sizes of the various component parts of the pushbutton. The tolerances in fabrication of these parts cannot well be less than a few thousandths of an inch, yet a few thousandths of an inch may make all the difference between success and failure in the achievement of optimum operation. If the parts are a trifle larger than normal and close control is sought, the setting device will not have sufficient freedom of motion on the support when it is presumably unlocked, and consequently dislocation of the tuned status of the unit will result. If the parts are slightly smaller than normal, when the setting device is unclamped it will be completely loose. This is not desirable because it might, by its own weight, fall to an inoperative position. Moreover, if it is completely loose there will be so much play between the auxiliary member and clamp on the one hand and the setting device on the other that immediate locking of the setting device as soon as the auxiliary member actuates the clamp will not take place.

According to the present invention, this defect is eliminated through the provision, on the clamp, of an adjusting means, here shown as a screw depending therefrom and engageable with the setting device, the adjusting means being manually adjustable to conform to and compensate for the variations in size of the component parts of the unit, so that once a given group of parts have been assembled, the adjusting means may be appropriately manipulated to take up all play in the clamp-setting device linkage. A further advantage of this arrangement resides in the fact that a controllable amount of pressure may be exerted upon the setting device even when it is unlocked, so that it cannot accidentlly move to an inoperative position but is still substantially freely movable to adjusted position when it engages the control element in the tuning unit.

Once the setting device has been locked in adjusted position, it is retained in that locked condition only so long as the auxiliary member retains its inner position relative to the movable support. It often occurs that, because of shock, vibration or the like, the auxiliary member tends to move out of its inner position, and when this occurs the setting device becomes unlocked and must be reset. When tuning devices utilizing such pushbutton units are employed in vehicles this becomes a very significant problem, and when, as is often the case, the pushbutton units, after being depressed, are forced outwardly by means of a spring, the shock incident to the stopping of the pushbutton units in the outer position also tends to cause movement of the auxiliary member to its unlocking position relative to the movable support, it being remembered that in most cases that unlocking position is directed outwardly with respect to the movable support, this being in the same direction as the support and the auxiliary member are urged by the spring. In the present invention, this defect is eliminated by utilizing a spring active in a detent manner between the movable support and the auxiliary member so as to releasably retain the auxiliary member in locking position on the support. This spring is preferably the same one which releasably retains the auxiliary member in unlocking position with respect to the support once it is thus placed.

When, as is here specifically disclosed, the auxiliary member is slidably mounted directly upon the support, it is necessary for proper and effortless operation of the device that the member and support be retained in parallel slidable relationship. The same spring which acts to releasably retain the auxiliary member in locking or unlocking position on the support also tends to retain the auxiliary member and support in parallel slidable relationship, the spring being mounted on one of the members or supports and engageable with and movable over the other of the members or supports, said spring exerting a resilient action therebetween to attain the desired objective.

Many modes of mounting the clamp on the support have been suggested, but all those simple enough for mass production permit some play or movement of the clamp with respect to the support even when the clamp is engaged with the setting device. This is most undesirable, since such movement of the clamp often results in a corresponding movement of the setting device with which it is engaged, and this leads, as will be understood, to inaccuracy in tuning. To avoid this defect, a member is interposed between the clamp and the setting device, that member being rigidly mounted on the support in the direction of play of the clamp. Consequently, even if the clamp should move, the member directly in contact with the setting device will not move, and as a result the position of the setting device on the support will not be dislocated. In the form here specifically disclosed the member which performs this desirable function is a leaf spring which tends to move the clamp to unlocking position, the setting of the adjusting screw carried by the clamp compensating therefor, the spring thus assisting in reducing play in the clamp-setting device linkage in the direction of motion of the clamp between clamping and releasing positions.

The pushbutton structure of the present invention is made of a plurality of simple and easily constructed parts which lend themselves readily to production on a large scale and to ready assembly. Inexpensiveness of manufacture is facilitated by the fact that the adjusting device carried by the clamp permits the use of reasonable manufacturing tolerances in the dimensions of the parts.

To the accomplishment of the above and to such other objectives as may hereinafter appear, the present invention relates to the structure of a pushbutton unit as defined in the appended claims and as described in this specification, taken together with the accompanying drawings in which:

Figs. 1 and 2 are side cross-sectional views of a portion of a tuning unit, disclosing the manner in which the setting device of the present invention, when locked, controls the tuning of the unit, Fig. 1 showing the unit with the pushbutton in extended position and Fig. 2 showing the unit with the pushbutton in depressed position. In both Figs. 1 and 2 the auxiliary member is in locking position relative to the movable support;

Fig. 3 is a top plan view of the pushbutton unit with the auxiliary member in locking position and with the setting device locked;

Fig. 4 is a side elevational view of the pushbutton unit of Fig. 3;

Fig. 5 is a bottom plan view thereof;

Fig. 6 is a side cross-sectional view, taken along the line 6—6 of Fig. 7, of the pushbutton unit with the auxiliary member in unlocking position and with the setting device unlocked;

Fig. 7 is a bottom plan view of the pushbutton unit of Fig. 6, the spring active between the movable support and the auxiliary member being shown in phantom;

Fig. 8 is a view similar to Fig. 2, but showing the position which the various parts assume when the auxiliary member has moved from its unlocking toward its locking position until it just makes contact with the clamp; and

Fig. 9 is a side cross-sectional view of the pushbutton unit taken along the line 9—9 of Fig. 8.

As here specifically disclosed, the pushbutton unit comprises a movable support generally designated A on which a setting device generally designated B is pivotally mounted so as to assume a plurality of positions, a clamp C being mounted on the support A and movable between a clamping position illustrated in Figs. 3–5 in which position it exerts pressure upon the setting device B so as to lock it in adjusted position, and a releasing position illustrated in Fig. 6, in which position the setting device B is unlocked so as to be relatively freely movable on the support A. An adjusting means D is provided on the clamp C so that the relative position of the clamp C, support A and setting device B can be controlled and fixed despite variations in the dimensions of the parts. An auxiliary member E is slidably mounted on the support A so as to be movable relative thereto between an extended unlocking position, in which the auxiliary member E and the clamp C are disengaged, and a telescoped locking position, in which the auxiliary member E engages the clamp C and moves it to its locking position relative to the setting device B. The operative engagement between the auxiliary member E and the clamp C is achieved by means of contacting surfaces so oriented with respect to one another and so cooperative with the setting of the adjusting means D that a firm locking action is exerted on the setting device B as soon as the auxiliary member E makes contact with the clamp C (see Figs. 8 and 9), the auxiliary member E then being further movable to its full locking position (see Figs. 3–5) so as to intensify the locking action exerted on the setting device B. Resilient means F is active between the auxiliary member E and the support A so as to maintain those parts in parallel relationship, the same resilient means F preferably being utilized to exert a detent action effective to retain the auxiliary member E in its locking or unlocking position relative to the support A once the auxiliary member E has been thus positioned.

Turning now to the details of the embodiment here disclosed, the support A is in the form of an elongated plate of metal or the like having a narrow forwardly projecting tongue 2, a slightly wider portion 4, a wider and downwardly bent portion 6 defining shoulders 8, and a comparatively wide and substantially flat base 10 terminating in a narrow rear extension 12 having an end edge 14. The rear extension 12 is provided with a longitudinal slot 16 which is widened intermediate its length at 18. A lateral groove 20 is formed on the underside of the rear extension 12 at an appropriate point along its length for a purpose hereinafter to be disclosed.

A strip of emery paper 22 or other substance having a frictional surface is secured to the upper surface of the base 10 in any appropriate manner, and the setting device B is placed thereover, a rivet 24 passing through apertures in the setting device B and the base 10 and being secured in place by being curled over at 26 on the underside of the base 10, the rivet 24 thus defining an axis

about which the setting device B can pivot. The setting device B takes the form of a substantially semi-circular metal cam 28 extending out to either side of that portion of the base 10 to which it is secured so as to define a pair of contact surfaces 30, 30'. Projecting ears 31, 31' are formed thereon to limit the degree of rotation of the cam 28 about the rivet 24.

A U-shaped bracket generally designated 32 is secured to the upper side of the base 10 rearwardly of the setting device B by means of rivets 34 passing through the horizontal portion 35 thereof, those rivets also serving to secure a leaf spring 36 to the top of the horizontal portion of the bracket 32. The forward vertical arm 38 of the bracket 32 has a closed-top aperture 40 therethrough through which the end of the leaf spring 36 may project so as to overlie the setting device B. The rear vertical part of the bracket 32 is defined by a pair of upstanding laterally separated fingers 42, 42'.

The clamp C takes the form of a stiffly resilient strip having a body 44 wider than the aperture 40 in the vertical portion 38 of the bracket 32 and wider than the spacing between the bracket fingers 42, 42'. A tongue 46 narrow enough to extend through the aperture 40 extends forwardly from the body 44, said tongue 46 having a tapped aperture 48 therein. A downwardly bent narrow portion 50 extends rearwardly from the body 44 and passes between the upstanding bracket fingers 42 and 42' and merges into a tail portion 52 terminating in a slightly upwardly bent lip 54. An adjusting screw 56, which defines the adjusting means D carried by the clamp C, is threadedly received within the aperture 48 so as to depend from the tongue 46 and engage the tip of the leaf spring 36 over the setting device B.

The device as thus for described is assembled by passing the tongue 46 through the aperture 40, the adjusting screw 56 thereafter being threaded through the aperture 48 so as to press against the spring 36 and setting device B and thus lift the tongue 46 until it engages the closed top of the aperture 40, the clamp C thus pivoting about said closed top as a fulcrum until the tail 52 makes contact with the rearwardly extending support portion 12 which it overlies. Since the top of the screw 56 projects above the tongue 48, the clamp C can no longer be withdrawn from the aperture 40, and it is therefore restrained from undue rearward movement. Since the body 44 of the clamp C is wider than the aperture 40, undue forward movement of the clamp C is prevented and the clamp is thus releasably secured to, and is pivotable on, the support A.

The auxiliary member E comprises a body portion 58 adapted to slide over the upper surface of the rear support portion 12, the body portion 58 having depending rails 60, 60' on either side thereof to encompass the side edges of the rear support extension 12. A tail 62 preferably integrally formed with the body portion 58 is adapted to reecive a pushbutton 64 thereover, the pushbutton being retained in position thereon by means of notches 66. The central forward portion of the body 58 is cut away at 68 and a T-shaped lug 70 extending below the body portion 58 and preferably integral therewith is connected thereto by means of an upwardly projecting connecting portion 72 which defines a cam surface. The head of the lug 70 is adapted to pass through the wide portions 18 of the slot 16 in the rear support extension 12, and the body of the lug 70 is narrower than the slot 16 so that

the lug is slidable therealong, the length of the slot 16 thus limiting the degree of slidability of the auxiliary member E with respect to the support A.

Once the lug 70 has been passed through the slot 16 so as to mount the auxiliary member E on the support A, the resilient means F is engaged between the support A and the head of the lug 70. This means takes the form of a leaf spring having a body 74 and a pair of forwardly projecting arms 76, 76', notches 78, 78' (see Figs. 5 and 7) being formed between the arms 76, 76' so that the resilient means F may be engaged with that portion of the lug 70 which projects downwardly below the support A. When the resilient means F is secured in position it will assume a bowed shape as may best be seen from Figs. 4, 6 and 9, the arms 76, 76' engaging the underside of the support A inwardly of the lug 70 and the body portion 74 engaging the underside of the support A outwardly of the lug 70, the resilient means F tending to pull the lug 70 downwardly through the slot 16 and thus tending to retain the auxiliary member E parallel with the rear support extension 12 on which it is mounted.

Since the resilient means F is positively secured to the lug 70, it is movable with respect to the support A along with the auxiliary member E. It therefore may function as a detent mechanism to hold the auxiliary member E in predetermined positions. To this end, that portion of the body 74 which engages the underside of the support A is rather sharply bent, as at 80, the bent portion 80 being received into the slot 20 in the underside of the support A when the auxiliary member E is telescoped with respect thereto (see Fig. 4), and snapping around the end edge 14 of the rear support extension 12 when the auxiliary member E is extended (see Fig. 6). As a result of this spring detent action the auxiliary member E will be releasably retained in its telescoped or extended positions, but can be moved from those positions upon the application of force thereto solely in the direction in which it is desired that it be slid.

The pushbutton unit of the present invention is adapted to be used in a tuning unit schematically shown in Figs. 1, 2 and 8. The unit may comprise an inner wall 82 and an outer wall 84 between which a rotary control element 86 is mounted, that element being connected to the tuning components of the unit in any desired manner. The element 86 is centrally apertured at 88, the inner wall 82 is apertured at 90 and the outer wall 84 is apertured at 92. The support A is slidably mounted between the walls 82 and 84 with its body portion 10 slidable through the aperture 92, its narrow forward portions 2, 4 and 6 slidable through the aperture 88, and its forward portion 2 slidable through the aperture 90. A spring 94 is active between the inner wall 82 and the shoulders 8 on the support A so as to urge the pushbutton unit outwardly, an upwardly projecting lug 96 on the support A limiting its outward motion.

When the auxiliary member E is telescoped with respect to the support A, so that it assumes the position shown in Figs. 1–5, the cam 72 on the auxiliary member E engages and lifts the tail 52 of the clamp C, thus causing that clamp to pivot in a counter-clockwise direction as viewed in Fig. 4 so as to force the screw 56 against the spring 36 and toward the setting device B, thus pressing that setting device B against the emery strip with considerable and locking force and preventing pivotal motion of the setting device B from its adjusted position. When the pushbutton 64 is depressed from the position of Fig. 1 to the position of Fig. 2 the setting device B will be moved inwardly until its contact surfaces 30, 30' engage the rotatable control element 86 and cause that element to assume a rotative position corresponding exactly to the position of the setting device B on the support A. In this manner the tuning unit is tuned to a predetermined frequency corresponding to the fixed position of the setting device B whenever the pushbutton 64 is depressed.

It will be noted that when the pushbutton 64 is released the spring 94 forces the entire unit outwardly until the lug 96 on the support A engages the outer wall 84, at which time outward motion of the pushbutton is abruptly stopped. The attendant shock, and the inertia of the pushbutton 64 and the auxiliary member E, will tend to cause the auxiliary member E to move outwardly with respect to the support A. This tendency is, however, effectively prevented by the detent engagement of the bent portion 80 of the resilient member F in the groove 20 on the underside of the rear support extension 12.

When it is desired to adjust the position of the setting device B, it is merely necessary to grasp the pushbutton 34 and pull it outwardly beyond its position shown in Fig. 1. The resilient means F is so calibrated that a maximum pull of 7 pounds will cause the bent portion 80 of the resilient means F to disengage from the slot 20 on the support A and will permit the auxiliary member E to be extended with respect to the support A, the lug 70 sliding within the slot 16 and carrying the resilient member F along therewith, until the lug 70 reaches the outer end of the slot 16 (see Figs. 6 and 7). In this position the bent portion 80 of the resilient member F snaps around the rear edge 14 of the rear support extension 12 and thus releasably retains the auxiliary member E in its extended position.

In this position, the cam 72 is disengaged from the tail 52 of the clamp C, and the clamp C will then assume the position shown in Fig. 6, unlocking the setting device B. As has been previously set forth, it is important that as little play as possible exist between the clamp C and the setting device B when the setting device is unlocked, in order that the setting device B should not tumble to an inoperative position, and in order that it may be positively locked at the earliest possible moment after it has been reset to desired position. The spring 36 tends to pivot the clamp C in a clockwise direction as viewed in Fig. 6 until its tail 52 engages the upper surface of the support A. For best operation, and in order to compensate for slight variations in the dimensions of the various parts, the screw 56 is initially adjusted upon assembly of the device so that, with the parts in the position shown in Fig. 6, a very slight pressure will be exerted upon the setting device B. It has been found very suitable to adjust the screw 56 so that a torque of no more than 1 inch ounce would be required to pivot the setting device B about the rivet 24. Because of the use of the adjusting screw 56, this can be accurately achieved in every unit, although the particular position of the screw 56 will vary from unit to unit depending upon variations in dimensions of the parts thereof. Once a given unit

has been thus adjusted, a drop of cement may be applied around the threads on the screw **56** so as to fix its position.

In order to readjust the position of the setting device B on the support A once it has been unlocked, the tuning unit is first manually tuned so that the rotatable control element **86** will assume a given position, such as the position shown in Fig. 8. Then, while the auxiliary member E remains in extended and unlocking position with respect to the support A, retained in that position by the detent action between the bent spring portion **80** and the end support edge **14**, the pushbutton **64** is depressed, thus carrying the support A and the setting device B along therewith. This time, since the setting device B is comparatively free to pivot about the rivet **24**, the setting device B will assume the position of the rotatable element **86**, thus preconditioning the pushbutton unit to tune the device to the frequency in question whenever that pushbutton is later depressed.

After the setting device B has assumed the rotative position of the element **86**, continued inward pressure on the pushbutton **64**, on the order of 8 pounds maximum, will disengage the bent spring portion **80** from the end support edge **14** and permit the auxiliary member E to telescope with respect to the support A. The above-mentioned force is sufficiently small so that the application thereof to the setting device B and the control element **86** will not cause dislocation of their rotative positions. The above-named force is, however, sufficiently great so as to prevent the auxiliary member E from beginning to telescope with respect to the support A before the setting device B has assumed its desired position corresponding to that of the pre-set control element **86**.

As the auxiliary member E telescopes with respect to the support A, the cam **72** carried thereby will engage the upwardly curled tip **54** of the tail **52** on the clamp C and will tend to cause that clamp to pivot in a counter-clockwise direction (see Figs. 8 and 9). Since the screw **56** has already been adjusted to take up all play between the clamp C and the setting device B, even the slightest cam action exerted on the tip **54** by the cam **72** will cause the clamp C to press down firmly on the setting device B, and to a sufficient degree to positively lock the setting device B in adjusted position. It will be noted that this positive lock is achieved even though only slight pressure is applied to the clamp C, and this because of the prior adjustment of the screw **56**.

Thereafter, the exertion of continued inward pressure on the pushbutton **64** will move the auxiliary member E to fully telescoped position (see Figs. 3–6), bending the clamp C and increasing the clamping force exerted on the setting device B. While this may require the exertion of appreciable force on the pushbutton **64**, that force being necessarily transmitted to the setting device B, dislocation of the setting device B cannot take place because it has already been firmly clamped in position by the interaction between cam **72** and lip **54**.

Because of the simple manner in which the clamp C is manufactured and assembled in operative position on the support A, appreciable freedom of lateral movement thereof is possible. However, because the spring **36** is interposed between the screw **56** and the setting device and has no lateral play, any such lateral motion of the clamp C will not be transmitted to the setting device B and consequently the position of the setting device B will not be dislocated thereby.

The construction here disclosed therefore produces a pushbutton unit which functions more accurately and positively than prior art structures, the construction of which is simple and inexpensive, and which does not require the maintaining of precise tolerances in manufacture.

Although but a single embodiment of the present invention is here specifically disclosed, it will be apparent that many variations may be made therein, all within the spiirt of the invention as defined in the following claims.

I claim:

1. In a tuning structure for a radio set, a movable support, an adjustable setting device articulately mounted thereon, a clamp pivotally mounted on said support, one end of said clamp being directed toward said setting device, a screw adjustably threadedly received in said end, extending therefrom toward said setting device, and adapted to exert locking pressure on said setting device when said clamp is appropriately moved, a leaf spring mounted on said support and having a portion interposed between said screw and said setting device, said spring being biased to urge said screw away from said setting device, and an auxiliary member including a pushbutton operatively connected to said clamp and effective, when said auxiliary member is moved in a given direction with respect to said support, to force said clamp to move on said support in a direction such as to press said screw toward said setting device against the action of said leaf spring and lock said setting device in adjusted position, said screw being adjustable to vary the degree to which it depends from said clamp so as to regulate the pressure applied thereby on said setting device and so as to press said leaf spring lightly against said setting device when said auxiliary member is not moved in said given direction.

2. In a tuning structure for a radio set, a movable support, an adjustable setting device articulately mounted thereon, a clamp articulately mounted on said support, one end of said clamp being directed toward said setting device, a screw adjustably threadedly received in said end, extending therefrom toward said setting device and adapted to exert locking pressure on said setting device when said clamp is appropriately moved, an auxiliary member including a pushbutton slidably mounted on said support so as to be movable between a locking position telescoped with respect to said support, in which position said auxiliary member is connected to said clamp, and an unlocking position extended with respect to said support, in which position said auxiliary member is disconnected from said clamp, said auxiliary member and said support defining relatively movable elements, a spring carried by one of said elements and engageable with the other of said elements, said other of said elements having detent portions so spaced therealong as to be cooperable with said spring when said auxiliary member is in locking or unlocking position, whereby said auxiliary member is releasably retained in said positions until an excess of force is exerted thereon in the direction in which it is to be slid, the degree to which the screw depends from said clamp being adjustable to regulate the pressure applied thereby on said setting device.

3. In a tuning structure for a radio set, a slidable support, an adjustable setting device articu-

lately mounted thereon, a clamp articulately mounted on said support, one end of said clamp extending toward said setting device and another end thereof having a cam-engaging surface of appreciable length, a screw threadedly received in said one end, extending therefrom toward said setting device, and adapted to exert locking pressure on said setting device when said clamp is appropriately moved, an auxiliary member including a pushbutton operatively connected to and movable with respect to said support and having a cam engageable with the cam-engaging surface of said clamp, the end of said surface being so oriented with respect to the direction of movement of said cam as to make a small acute angle therewith, said auxiliary member being movable relative to said support from an unlocking position, in which said cam is free of said cam-engaging surface, through a starting locking position, in which said cam first engages the end of said cam-engaging surface and, upon the exertion of slight force upon the pushbutton in its direction of movement, immediately and easily moves said clamp so that said screw exerts locking pressure upon said setting device and to a full locking position, in which the action of said cam on the length of said cam-engaging surface progressively locks said setting device in and more firmly, said other end of said clamp overlying said support and being engageable therewith, and a leaf spring mounted on said support and having a portion interposed between said screw and said setting device, said spring being biased to urge said screw away from said setting device, said screw being adjustable so as to press said leaf spring lightly against said setting device when said auxiliary member is disengaged from said clamp and when said other end of said clamp engages said support.

4. The tuning structure of claim 2, in which said support has a slot, said auxiliary member being mounted on one side of said support and having a lug passing through said slot and beyond the other side of said support, and a spring active between said lug and said other side of said support so as to urge said lug away therefrom, thereby maintaining said auxiliary member and said support in desired spatial relationship.

5. The tuning structure of claim 2, in which said support has a slot, said auxiliary member being mounted on one side of said support and having a lug passing through said slot and beyond the other side of said support, and a spring carried by said lug, movable with said auxiliary member, and active between said lug and said other side of said support so as to urge said lug away therefrom, thereby maintaining said auxiliary member and said support in desired spatial relationship.

6. The tuning structure of claim 2, in which said support has a slot, said auxiliary member being mounted on one side of said support and having a lug passing through said slot and beyond the other side of said support, and a spring engaged by said lug at a point spaced from said other side of said support and having a portion resiliently engaging said other side of said support, thereby maintaining said auxiliary member and said support in desired spatial relationship.

7. The tuning structure of claim 2, in which said support has a slot, said auxiliary member being mounted on one side of said support and having a lug passing through said slot and beyond the other side of said support, and a spring

carried by said lug at a point spaced from said other side of said support, movable with said auxiliary member, and having a portion resiliently engaging said other side of said support, thereby maintaining said auxiliary member and said support in desired spatial relationship, and said support having detent portions spaced therealong so as to be cooperable with said spring portion when said auxiliary member is in locking or unlocking position, whereby said auxiliary member is releasably retained in said positions until an excess of force is exerted thereon in the direction in which it is to be slid.

8. The tuning structure of claim 2, in which said support has a slot, said auxiliary member being mounted on one side of said support and having a lug passing through said slot and beyond the other side of said support, and a spring carried by said lug at a point spaced from said other side of said support, movable with said auxiliary member, and having a portion resiliently engaging said other side of said support, thereby maintaining said auxiliary member and said support in desired spatial relationship, and said support having an end surface and a groove spaced therefrom, said end surface and said groove defining detent portons cooperable with said spring portion.

9. In a tuning structure for a radio set comprising a slidable member carrying an adjustable setting device and a releasable clamp active on said device to retain it in adjusted position, and an auxiliary member mounted on said slidable member so as to have a limited degree of slidability relative thereto, operatively engageable with said clamp and movable between a locking position in which it forces said clamp against said device and an unlocking position in which said clamp is released from said device, the improvement which comprises one of said members having a slot extending in the direction of relative motion of said members, the other of said members having a lug passing through and beyond said slot, and a spring active between said lug and said one of said members to urge said lug away from said one of said members, thereby maintaining said members in desired spatial relationship.

10. In a tuning structure for a radio set comprising a slidable member carrying an adjustable setting device and a releasable clamp active on said device to retain it in adjusted position, and an auxiliary member mounted on said slidable member so as to have a limited degree of slidability relative thereto, operatively engageable with said clamp, and movable between a locking position in which it forces said clamp against said device and an unlocking position in which said clamp is released from said device, the improvement which comprises one of said members having a slot extending in the direction of relative motion of said members, the other of said members having a lug passing through and beyond said slot, and a spring carried by and movable with said lug and active between said lug and said one of said members to urge said lug away from said one of said members, thereby maintaining said members in desired spatial relationship.

11. In a tuning structure for a radio set comprising a slidable member carrying an adjustable setting device and a releasable clamp active on said device to retain it in adjusted position, and an auxiliary member mounted on said slidable member so as to have a limited degree of slid-

ability relative thereto, operatively engageable with said clamp, and movable between a locking position in which it forces said clamp against said device and an unlocking position in which said clamp is released from said device, the improvement which comprises one of said members having a slot extending in the direction of relative motion of said members, the other of said members having a lug passing through and beyond said slot, and a spring engaged by said lug at a point spaced from said one of said members and having portions resiliently engaging said one of said members at points on opposite sides of said lug in the direction of relative motion of said auxiliary member, thereby maintaining said members in desired spatial relationship.

12. In a tuning structure for a radio set comprising a slidable member carrying an adjustable setting device and a releasable clamp active on said device to retain it in adjusted position, and an auxiliary member mounted on said support so as to have a limited degree of slidability relative thereto, operatively engageable with said clamp, and movable between a locking position in which it forces said clamp against said device and an unlocking position in which said clamp is released from said device, the improvement which comprises one of said members having a slot extending in the direction of relative motion of said members, the other of said members having a lug passing through and beyond said slot, and a spring carried by said lug at a point spaced from said one of said members, movable with said lug, and having a portion resiliently engaging said one of said members, thereby maintaining said members in desired spatial relationship, and said one of said members having detent portions spaced therealong so as to be cooperable with said spring portion when said auxiliary member is in locking or unlocking position, whereby said auxiliary member is releasably retained in said positions until an excess of force is exerted thereon in the direction in which it is to be slid.

13. In a tuning structure for a radio set comprising a slidable member carrying an adjustable setting device and a releasable clamp active on said device to retain it in adjusted position, and an auxiliary member mounted on said support so as to have a limited degree of slidability relative thereto, operatively engageable with said clamp, and movable between a locking position in which it forces said clamp against said device and an unlocking position in which said clamp is released from said device, the improvement which comprises one of said members having a slot extending in the direction of relative motion of said members, the other of said members having a lug passing through and beyond said slot, and a spring carried by said lug at a point spaced from said one of said members, movable with said lug, and having a portion resiliently engaging said one of said members, thereby maintaining said members in desired spatial relationship, and said one of said members having an end surface and a groove spaced therefrom, said end surface and said groove defining detent portions cooperable with said spring portion when said auxiliary member is in locking or unlocking position, whereby said auxiliary member is releasably retained in said positions until an excess of force is exerted thereon in the direction in which it is to be slid.

EARL H. ALLEN.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,401,744	Watson	Dec. 27, 1921
1,454,238	Kaufman	May 8, 1923
2,233,330	Tyzzer	Feb. 25, 1941
2,301,090	Teaf	Nov. 3, 1942