

Aug. 26, 1969

R. D. STAMM ET AL

3,463,017

DUAL BAND PUSHBUTTON TUNER

Filed Nov. 24, 1967

3 Sheets-Sheet 1

FIG. 1

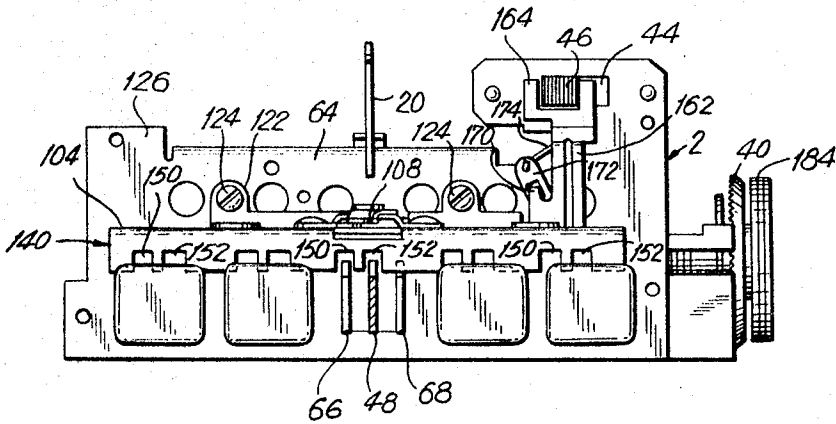
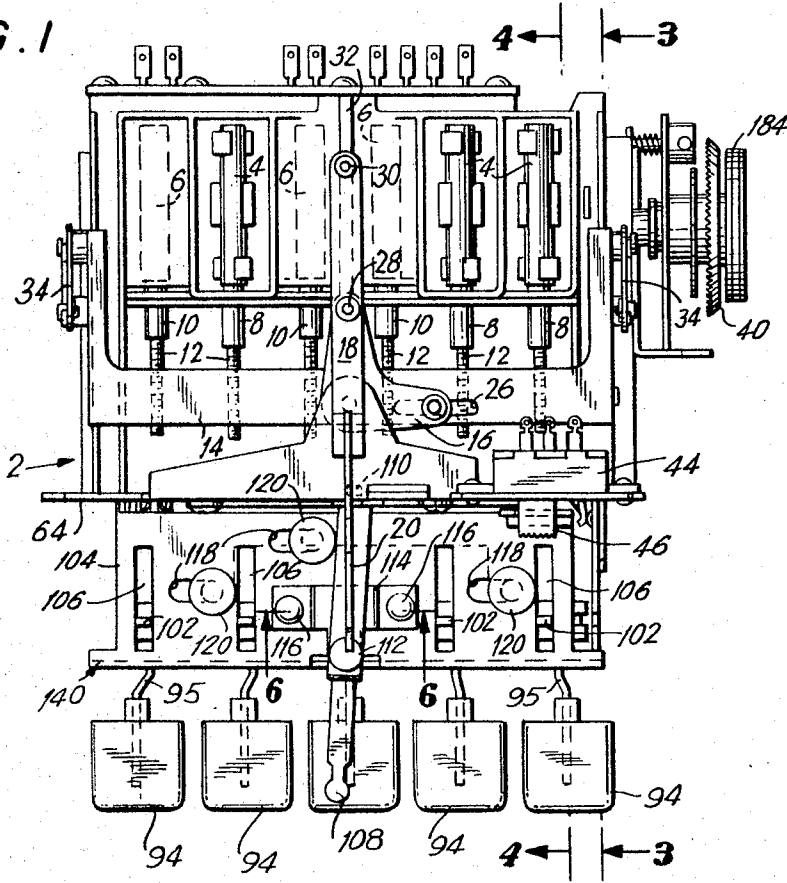


FIG. 2

INVENTORS  
RUSSELL D. STAMM  
SIDNEY K. SMART

BY

*James and Franklin*  
ATTORNEYS



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3 Sheets-Sheet 3

FIG. 6

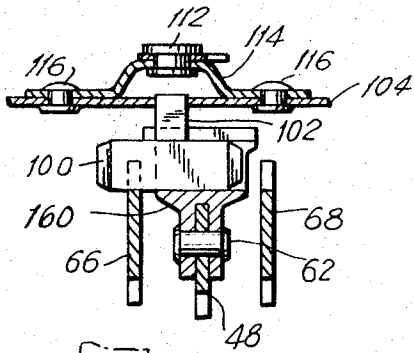


FIG. 7

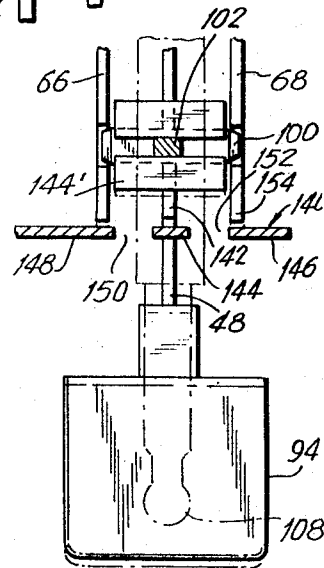
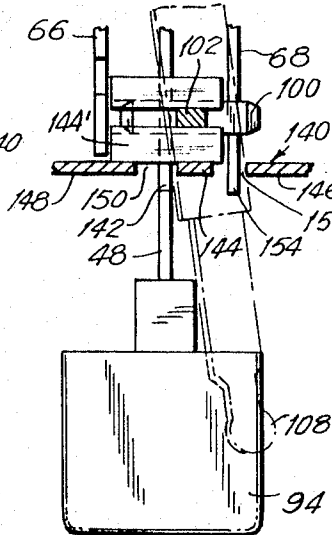
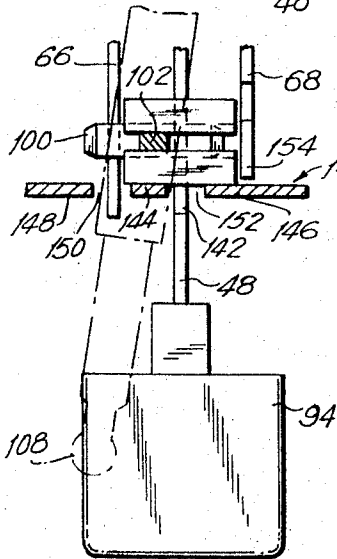
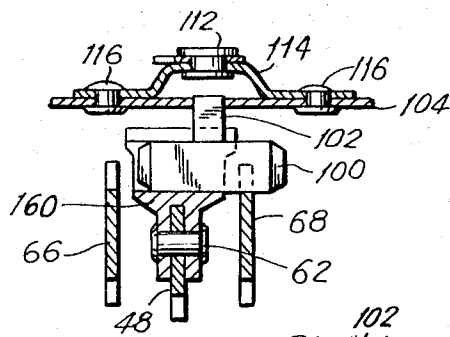


FIG. 8

FIG. 9

FIG. 10

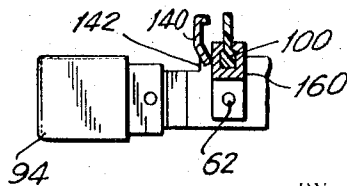
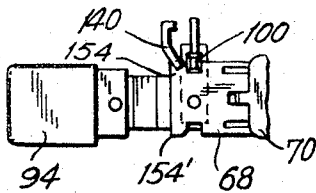


FIG. 11

FIG. 12

INVENTORS  
RUSSELL D. STAMM  
SIDNEY K. SMART

BY

*James and Franklin*  
ATTORNEYS

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3,463,017

**DUAL BAND PUSHBUTTON TUNER**

Russell D. Stamm, Wilbraham, and Sidney K. Smart,  
Westfield, Mass., assignors to General Instrument Corporation,  
Newark, N.J., a corporation of Delaware  
Filed Nov. 24, 1967, Ser. No. 685,446  
Int. Cl. F16h 35/18; H03j 5/06, 5/08  
U.S. Cl. 74—10.33

13 Claims

**ABSTRACT OF THE DISCLOSURE**

The dual band pushbutton tuner comprises the usual movable tuning elements, a rocker for moving the same, and a plurality of button keys for operating the rocker. There is a side key on each side of a button key, and cams carried by the side keys for turning the rocker, and a cam lock for locking the cam in desired tuning position. Each button key carries a shuttle which is movable to one side or the other for engaging one side key or the other, and a manually operable shuttle plate shifts all of the shuttles simultaneously. The improvement centers about the shuttle and the addition of an anti-jam plate movable with the shuttle plate and having parts so positioned in relation to the keys as to prevent manual operation of the shuttle plate and keys in improper sequence. When a button key is pulled forward to unlock a cam, the key is straddled by parts of the anti-jam plate to prevent shifting of the latter while the cam is unlocked. When one side key is being unlocked, a part of the anti-jam plate prevents simultaneous unlocking of the other side key. If the shuttle plate is improperly held in midposition, the anti-jam plate prevents unlocking of either side key.

**Background of the invention**

Dual band pushbutton tuners are already known, particularly (but not necessarily) in radio receivers designed to receive both AM and FM broadcast programs. Such a tuner is disclosed in copending patent application Ser. No. 594,865, filed Nov. 16, 1966, and entitled "Dual Band Pushbutton Tuner." The tuner comprises movable tuning elements and a rocker connected thereto for moving the same to a desired tuning position. There are a plurality of button keys, say five, and a side key on each side of a button key. A cam is adjustably carried by each side key for engaging and thereby rocking the rocker to a desired tuning position when the side key is pushed inward or rearward. A cam lock is carried by each side key for locking its cam in a desired tuning position. There is a transverse shuttle for each button key which is bodily moved in fore-and-aft direction by the button key, and which is also movable to one side or the other for engaging one side key or the other side key for causing fore-and-aft movement of the selected side key with the button key. There is also a manually operable shuttle plate for shifting all of the shuttles to one side, say for AM reception, or to the other side, say for FM reception.

In the tuner of said Ser. No. 594,865 the shuttle tilts or oscillates to one side key or the other, but in the later form of tuner here disclosed, the shuttle is a short stiff horizontal bar which is slid horizontally to one side key or the other. A part of each side key is a key extension at its forward end, and it is this which is engaged by the shuttle. The cam lock of a side key is unlocked by pulling the key extension forward relative to the remainder of the side key, and for this purpose the button key and its shuttle are pulled forward to unlock the cam lock, and are pushed rearward to again lock the cam lock.

Such dual band pushbutton tuners have functioned

well, the shuttle plate being moved to one side or the other while the button keys are at rest, and the latter being manipulated manually only when the shuttle plate is in either side position. However, it has been discovered that on rare occasions the parts may be misused, with consequent difficulty with the tuner. In such case the receiver chassis must be removed to gain access to the tuner.

For example, if the operator unlocks a key assembly, and then begins pushing the button key back somewhat, and at the one distance when it is possible to do so he moves the shuttle plate from one side toward the other side, say from left to right, enough to release the left key extension from the shuttle, the left key extension may move forward, and this will prevent the shuttle from being moved back from right position to left position. The unlocked left key remains unlocked and is useless, and the remaining button keys may be used in only the right position, because the entire shuttle plate and therefore all of the shuttles cannot be moved to the left position.

The shuttle plate has a detent or over-the-center spring to keep it in one side position or the other, but in a rare case an operator may manually move the shuttle plate to mid-position and hold it there, and then pull a button key forward as though to unlock a cam. The shuttle then engages both side key extensions and both side keys would be simultaneously unlocked. If then the shuttle plate is moved to the left, releasing the right key extension, the latter will move and block return of the shuttle and shuttle plate to the right (or vice versa if the shuttle plate has been moved to the right).

Another even rarer possibility arises if the operator pulls a button key forward to unlock a side key, say the right key, and while that side key is unlocked the operator pushes the shuttle plate so hard to the left, that it warps the left or locked key sideward by brute force far enough for the right end of the shuttle to leave the right key extension. In such case the latter may move and prevent the shuttle from being moved back to the right (or vice versa if the left key was first unlocked). Moreover, with the shuttle then disposed between the then excessively separated side keys the button key may be bodily pulled out of the tuner altogether, it normally being held in by the shuttle which normally is in engagement at all times with one side key or the other.

**Summary of the invention**

The present improved dual band pushbutton tuner includes an improved shuttle and an anti-jam plate which is movable from side to side with the shuttle plate, and which has parts so positioned in relation to the keys as to prevent the aforesaid manual operations being performed in one or another of the undesirable sequence described above. The button key when pulled forward to unlock a cam has a part which is straddled by parts of the anti-jam plate, to thereby prevent manual shift of the shuttle plate while the button key is in the forward unlocking position. However, when the button key has been pushed back to again lock the cam and is in rest position, the said part of the button key clears the anti-jam plate so that it and the shuttle plate can be shifted from side to side. Moreover, when the button key is pulled forward with its shuttle and one side key (or more specifically its side key extension), to unlock the cam of that side key, a part of the anti-jam plate is disposed in front of the other side key (or more specifically its extension), to prevent it from moving forward, and therefore its cam necessarily remains locked. Thus, only one side key or the other can be unlocked at one time.

Differently described, the anti-jam plate may be said to have pairs of slots, one pair for each key assembly.

These slots are so located that when the shuttle plate and anti-jam plate are moved to one side, the button key and one side key can move forward, one in each slot of the pair of slots, while the other side key is obstructed by the anti-jam plate and cannot move forward. The anti-jam plate has tabs with slots between the tabs, and these are so located that if the shuttle plate and anti-jam plate are mistakenly held in mid-position, instead of being moved as intended to one side position or the other side position, the tabs of the anti-jam plate then are disposed in front of a part of the button key and side keys, and the tabs prevent forward movement of the button key and both of its side keys. At this time the two slots for a key assembly are disposed between the button key and side keys, instead of in alignment with two of them, and the button key then cannot be pulled forward to simultaneously unlock both side keys.

In preferred structural form each shuttle has a lug at the top, and the shuttle plate is disposed over the keys and shuttles and has long slots extending in fore-and-aft direction. The slots receive the lugs for shifting the shuttles to one side or the other with the shuttle plate. The slots accommodate the fore-and-aft movement of the keys. The anti-jam plate is formed integrally with the shuttle plate, and is bent downward from the forward edge of the shuttle plate.

The foregoing and additional features are described in the following detailed specification, which is accompanied by drawings in which:

FIG. 1 is a plan view of a dual band pushbutton tuner embodying features of the invention;

FIG. 2 is a front elevation thereof, with one pushbutton removed;

FIG. 3 is a vertical section taken approximately on the line 3—3 of FIG. 1;

FIG. 4 is a section taken approximately on the line 4—4 of FIG. 1;

FIG. 5 is a horizontal section taken approximately on the line 5—5 of FIG. 3;

FIG. 5A shows the support for the shuttle plate;

FIG. 6 is a fragmentary vertical section drawn to enlarged scale and taken approximately on the line 6—6 of FIG. 1;

FIG. 7 is a section like FIG. 6, but showing the shuttle moved from the left side key to the right side key;

FIG. 8 is a fragmentary horizontal view showing the relation of the parts when a button key has been pulled forward to release a left side key;

FIG. 9 is a similar view showing the relation of the parts when a button key has been pulled forward to release a right side key;

FIG. 10 is a similar view showing the relation of the parts when the shuttle plate and anti-jam plate are held (improperly) in mid-position;

FIG. 11 is a fragmentary view like the left part of FIG. 3, but with the side key extension in unlocked position; and

FIG. 12 is a fragmentary view like the left part of FIG. 4, but with the button key in unlocking position.

The drawings disclose a tuner comprising a support generally designated 2 on which a plurality of adjustable tuning elements are mounted. In this case there are two sets of tunable inductors, one set 4 being used for reception in one band, say FM, and the other set 6 being used for reception in another band, say AM. The inductors 4 are tuned in conventional fashion by slidable cores 8, and the inductors 6 are tuned in corresponding fashion by slidable cores 10. All of the cores are connected by rods 12 to a carriage 14 which is bodily movable toward and away from the inductors. A crank 16 and arm 18 actuate a pointer 20 which cooperates with indicating scales (not shown) to indicate the frequency being tuned. The crank 16 is pivotally and slidably received in a slot 26 in the carriage 14, and the other arm is pivotally connected at 28 to the arm 18. The end 30 of the arm

18 is pivotally and slidably received in a groove 32 which is formed in the support 2. The carriage 14 slides in fore-and-aft direction, and is connected by side links 34 to arms extending up at opposite sides of the support 2 from a rocker 38 (FIGS. 3 and 4) which is pivotally mounted on horizontal pivots. The rocker 38 comprises upper and lower rods 42, and is here shown in upright or mid-position. The position of the carriage 14 determines how far the cores telescope within their respective inductors for tuning.

Only one type of tuning (say AM or FM) will be used at one time, the particular type being determined by which set of the inductors 4 or 6 is electrically connected in circuit. This is controlled by a switch 44 which is mounted on the support 2 and is provided with a button 46 shiftable from side-to-side as later described.

The rocker 38 with its side connections to the carriage 14 is a known arrangement adapted to be actuated by pushbuttons 94. A rotatable knob and shaft extend rearward to a pinion (these parts are not shown) to rotate a crown gear 40 (FIGS. 1 and 2) geared to the rocker for ordinary manual tuning. The rotative position of the rocker controls the location of the carriage 14 and therefore the tuning of the inductors.

The pushbutton structure comprises a plurality of operating members here called center keys or button keys 48 (FIGS. 4 and 5) disposed collaterally across the front face of the support 2, as shown in FIGS. 1 and 2, and mounted in the support 2 for sliding movement in fore-and-aft direction. Each key 48 has an elongated rearwardly extending narrowed part 50; a forwardly extending part 52; and a body part 56 between the parts 50 and 52. The rearwardly extending part 50 is slidably received in an aperture in a rear support plate 60. The body portion 56 is slidably received in a front support plate 64.

A pair of control members generally designated 66 and 68, here called side keys, are provided on either side of each button key 48. Each side key comprises a body portion 70 having a rearwardly extending narrowed part 72 slidably received in an aperture in the rear support plate 60, and the body portion 70 being slidably received in the front support plate 64. Springs 78 are compressed between the rear support plate 60 and the keys to urge them forward.

Each of the side keys 66 and 68 carries a rotationally adjustable cam 80 adapted when pushed rearwardly to engage the rods 42 of the rocker 38 and to rotatively position the latter. The cam position is locked by a cam locking lever 86 (FIG. 5). Each side key has an extension member 88 limitedly slidable on the body portion 70, and having a raised or wedging part 90 (FIG. 5) movable into engagement with the locking lever 86 to cause the latter to lock the cam. This type of pushbutton assembly is disclosed and described in a single band tuner in my Patent 2,996,925 dated Aug. 22, 1961, and is shown in a dual band tuner in the aforesaid pending application Ser. No. 594,865, but with a different shuttle mechanism and without the anti-jam improvement hereinafter described.

Each of the side key extensions 88 is provided on its upper surface with a notch which is adapted to register with a shuttle 100 carried by the button key when the keys are in their normal or forward rest position.

The keys are movable between a normal forward or rest position, shown in FIGS. 1, 3 and 4, and a rear position in which the cam 80 bears against and rotatively positions the rocker 38. In addition, by the exertion of adequate pulling force on a button key, it may be pulled forward further than its normal forward or rest position. The side key extension is pulled forward with it, and this serves to dislodge the part 90 of the key extension 88 from the cam lock lever 86, thereby unlocking the cam. This forward movement of the key extension is limited by interengaging bent parts riding in mating slots, all as is

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described more fully in the aforesaid Patent 2,996,925 and the aforesaid application Ser. No. 594,865.

The forwardly extending parts 52 of the keys 48 have the pushbuttons 94 fixed thereon. For comfortable use the buttons may be spaced more than the spacing between the button keys 48, in which case the forward parts 52 of some keys may be sidewardly offset as shown at 95 in FIG. 1. The middle one of the five button keys is straight, and all of them could be straight.

Referring now to FIGS. 6 and 8, the button key 48 carries a transverse shuttle 100 which is bodily moved in fore-and-aft direction by means of the button key 48, and which is also movable to one side or the other for engaging one side key or the other. In FIGS. 6 and 8 the shuttle 100 is received in a mating slot in the left side key 66, whereas in FIGS. 7 and 9 the shuttle 100 has been moved to the right and engages the right side key 68. The shuttle has an upwardly projecting lug 102 which is received in a slot in a shuttle plate 104.

Referring to FIGS. 1 and 2, the shuttle plate 104 has five slots 106 each receiving the upstanding lug 102 of a shuttle. The shuttle plate is shifted between left and right positions by means of a control lever 108, this being pivoted at its necked rear end 110 which is received in a mating slot in fixed front support plate 64. It is connected to the shuttle plate 104 by means of a pivot 112 connected to a forwardly extending tongue of a bracket 114 (see also FIGS. 6 and 7), the latter being secured to the shuttle plate 104 by means of two rivets 116. The long slots 106 (FIG. 1) accommodate the main fore-and-aft movement of the pushbuttons and shuttles, but compel simultaneous shift of all of the shuttles to either the left position or the right position. The forward end of lever 108 is received in a slot in a hand actuated button (not shown) that is slidable from side to side and which is assembled at the front of the radio receiver's decorative escutcheon.

The shuttle plate 104 has slots 118, in this case three, which receive rivets at 120 on a fixed support 122 which is secured, preferably by screws 124, to the front plate 64 of the frame. The fixed support 122 is shown in plan in FIG. 5A, with the shuttle plate removed. The three guide rivets for the shuttle plate are secured in holes at 120. The support 122 is L-shaped in section, and its upright part is secured to the front plate 64 of the tuner frame, as by means of the two screws 124. The fixed support 122 is so shaped that the rivets at 120 do not interfere with fore-and-aft movement of the shuttles when the shuttle plate is in either its left or its right position and also do not interfere with shift of the shuttle plate between its left and right positions when the shuttles are in their normal forward or rest position. The slots 118 also serve to limit the shift motion of the shuttle plate.

In accordance with the present improvement an anti-jam plate 140 (FIGS. 2, 3 and 4) is provided, this being movable from side-to-side with the shuttle plate 104. This anti-jam plate has parts so positioned in relation to the keys as to prevent manual operation of lever 108 and buttons 94 in improper sequence. Thus, referring to FIG. 8, when button 94 and its button key 48 are pulled forward, to unlock a cam for tuning adjustment, the button key has a raised part 142 which is straddled by the parts 144 and 146 of the anti-jam plate 140, and this prevents manual shifting of the shuttle plate from its left position shown in FIG. 8 to its right position shown in FIG. 9. However, when the button key 48 is pushed rearward to again lock the cam, and is released to its rest position, the part 142 clears the anti-jam plate 140 so that the shuttle plate can be shifted to either side. The side key 66 also prevents untimely shift of the shuttle plate. In FIG. 9 it will be seen that the same result obtains when the button key 48 and side key 68 are pulled forward while the shuttle 100 and the anti-jam plate 140 are in the right position.

Reverting to FIG. 8, when the button key 48 is pulled

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forward to unlock the cam of the left side key 66, the right side key 68 cannot move forward, it being obstructed by the part 146 of the anti-jam plate 140. Similarly, in FIG. 9, when the button key 48 is pulled forward with the right side key 68, to unlock its cam, the left side key 66 cannot move forward, it being obstructed by the part 148 of the anti-jam plate 140. Thus, only one side key and cam can be unlocked at a time.

Described in different fashion, or considered in different aspect, and referring to FIG. 2, the anti-jam plate 140 may be said to have pairs of slots 150, 152, one pair for each button. In FIG. 2 the shuttle plate 104 and with it the anti-jam plate 140 have been moved to the left, and in that case the slot 150 is aligned with the side key 66 and the slot 152 is aligned with the button key 48, there being no slot to receive the other side key 68, which instead, is obstructed against forward movement. However, when the shuttle plate 104 and anti-jam plate 140 are moved to the right hand position, the slot 150 of each pair is aligned with a button key 48, and the slot 152 of each pair is aligned with a right side key 68, the left side key 66 being obstructed.

Referring now to FIG. 10, the shuttle plate and anti-jam plate 140 have been moved by the manual operating lever 108 to mid-position, and are improperly held there. In such case the button 94 and button key 48 cannot be pulled forward because the raised part 142 of the button key is obstructed by the tab 144 between the slots. Moreover, if it were pulled forward, the shuttle 100 would attempt to move the side keys 66 and 68 forward, but these also are obstructed by the parts or tabs 148 and 146 respectively of the anti-jam plate 140. This prevents unlocking of two cams at once. In brief, the anti-jam plate 140 prevents improper forward movement of the right side key 68 in FIG. 8, or the left side key 66 in FIG. 9, or all three keys in FIG. 10. On the other hand, when keys are properly in forward or cam releasing position, e.g., the keys 66 and 48 in FIG. 8, or the keys 48 and 68 in FIG. 9, the keys in turn prevent improper side-ward movement of the shuttle plate.

Referring to FIGS. 3 and 4, the generally upright anti-jam plate 140 is located at the forward edge of the horizontal shuttle plate 104. In preferred form the plates are integral, the anti-jam plate 140 being bent downward from the forward edge of the shuttle plate 104.

FIG. 3 shows how the side key extension 68 has an upward projection 154 so that it will safely interengage the anti-jam plate 140 when moved forward. FIG. 11 shows the side key 68 in its forward position, with the part 154 interlocked with the anti-jam plate 140, that is, it has entered a slot in the anti-jam plate. The bottom projection 154' is merely for symmetry, so that the same part may be used for either a left side key or a right side key.

FIG. 4 shows how button key 48 has a raised part 142 dimensioned for engagement with the anti-jam plate 140. FIG. 12 shows the button key 48 in forward position, with the raised part 142 interlocked with the anti-jam plate 140, that is the raised part 142 has entered a slot in the anti-jam plate.

Referring now to FIGS. 4, 6 and 7, the shuttle 100 is slidable in a small diecast guide 160 the bifurcated lower part of which is riveted to button key 48 by means of a rivet 62. The diecast piece 160 includes rails at the top (144' in FIGS. 9 and 10) which hold the shuttle against upward movement, there being enough space between the rails to pass the upwardly projecting lug 102 of the shuttle. The ends of the shuttle are preferably bevelled somewhat, as is best shown in FIGS. 6 and 7, to assure easy movement of the shuttle into a mating slot at the top of either the left side key 66 or the right side key 68.

Referring to FIG. 2, the shuttle plate 104 has an upstanding arm 162 with a bifurcated upper end 164 which straddles the button 46 of the switch 44. This causes electrical changeover from AM to FM circuitry or vice versa,

concurrently with movement of the shuttle plate by means of the forwardly projecting control arm 108.

The shuttle plate is preferably provided with an over-the-center mechanism to resiliently urge it to either its left or its right position. In the present case the shuttle plate has a lug at 170 engaging a hole in a short arm 172 which is pivoted at its lower end, and to the upper end of which a coiled spring 174 is connected. The arm 172 is urged leftward when it is moved to the left of its upright position, and is urged rightward when it is moved to the right of its upright position, and this force is exerted on the shuttle plate 104 through the lug 170.

Referring to FIG. 4, the strip 180 on rod 182 is oscillated when a pushbutton is operated, and serves to disengage a clutch located at 184 (FIGS. 1 and 2). This frees the gear 40, so that operation of a pushbutton is not resisted by the need to spin the gearing leading to a rotatable control knob (not shown) at the front of the receiver.

It is believed that the construction and operation of our improved dual band pushbutton tuner, as well as the advantages thereof, will be apparent from the foregoing detailed description. It will be understood that while the illustrated tuner is intended for AM and FM broadcast bands, the improvement is applicable to other tuners in which the bands might for example be a broadcast band and a short wave band, or for that matter, the tuner might be used for pushbutton tuning of ten stations in one band, while using only five buttons as here shown. It will also be understood that while the tuning elements have been illustrated as variable inductors, they may instead be variable capacitors.

It will therefore be understood that while we have shown and described our improved tuner in a preferred form, changes may be made without departing from the scope of the invention. In the claims the reference to a side key includes the forward extension as a part of the side key.

We claim:

1. A dual band pushbutton tuner comprising movable tuning elements, a rocker connected thereto for moving the same to a desired tuning position, a plurality of button keys, a side key on each side of each button key, a cam carried by each side key for engaging and thereby turning said rocker to a desired tuning position when the side key is pushed rearward, a cam lock carried by each side key and bearing against its respective cam for locking that cam on the side key in desired tuning position, a shuttle for each button key movable in fore-and-aft direction by its button key and also movable to one side or the other for engaging one side key or the other side key for causing movement of a side key with said button key, a manually operable shuttle plate operatively connected to all of the shuttles for shifting said shuttles to one side or the other, the aforesaid cam lock of a side key being unlocked by manually pulling that side key forward by pulling its button key and shuttle forward, and being locked by manually pushing the side key rearward by pushing its button key and shuttle rearward, and an anti-jam plate operatively connected to and movable with said shuttle plate and having parts so positioned in relation to cooperating parts of the keys as to permit the aforesaid manual operation of the button keys and the shuttle plate being performed in one sequence but not in another sequence.

2. A dual band pushbutton tuner as defined in claim 1, in which said cooperating parts include a part on a button key which when the button key is pulled forward to unlock a cam said part comes forward between spaced parts of the anti-jam plate, and in which the latter spaced parts then straddle the said part of the said button key in order to thereby prevent manual shifting of the anti-jam plate and consequently of the connected shuttle

plate while the said button key remains in its forward unlocking position.

3. A dual band pushbutton tuner as defined in claim 2, in which the said spaced parts of the anti-jam plate are also stop parts which are disposed in front of cooperating parts of one side key or the other, depending on the side to side position of the shuttle plate and its connected anti-jam plate, the relation of the said cooperating parts being such that when a button key is pulled forward with its shuttle and one side key to unlock the cam of that side key, one of the said stop parts of the anti-jam plate is disposed in front of the cooperating part of the other side key in order to prevent the latter from moving forward so that its cam remains locked, whereby only one of the two cam locks controlled by one button key may be unlocked at a time.

4. A dual band pushbutton tuner as defined in claim 3, in which the anti-jam plate has pairs of slots between the said spaced stop parts, one pair of slots for each button key, and in which the said button and side keys have parts located behind the anti-jam plate when the keys are in rest position, but which are movable across the anti-jam plate when pulled forward, said pairs of slots in the anti-jam plate being so located relative to the cooperating keys that they are in the paths of the button key and one of its side keys when the shuttle plate and anti-jam plate have been moved to one side position, said keys if pulled forward being received in said pair of slots, while the second side key is obstructed by the opposed stop part of the anti-jam plate so that it cannot move forward, whereas when the shuttle plate and anti-jam plate have been moved to the other side position, the said button key and its second side key are then aligned to be received in said pair of slots and can be pulled forward, whereas the first side key is obstructed by one of said stop parts of the anti-jam plate so that the said first side key cannot move forward.

5. A dual band pushbutton tuner as defined in claim 4, in which there are stop parts on the keys which are normally behind the anti-jam plate when the keys are in rest position, but move forward to intersect the anti-jam plate when the keys are pulled forward, said stop parts of the anti-jam plate being disposed in front of said stop parts of the keys when the shuttle plate and its connected anti-jam plate are improperly disposed in an intermediate position instead of being disposed in one proper side position or the other proper side position, thereby preventing forward movement of a button key and its side keys unless the shuttle plate and connected anti-jam plate are in proper position.

6. A dual band pushbutton tuner as defined in claim 5, in which each shuttle has a lug fixed on and projecting upward at the top, and the shuttle plate is disposed over the keys and their shuttles and has slots extending in fore-and-aft direction and receiving said lugs for shifting the shuttles to one side or the other, and in which the anti-jam plate is formed integrally with the shuttle plate and is bent downward from the forward edge of the shuttle plate.

7. A dual band pushbutton tuner as defined in claim 6, in which the tuning elements of one band are for AM reception, and the tuning elements of the other band are for FM reception, and in which the shuttle plate has a part operatively connected to an electrical switch for shifting electrically from the AM tuning elements to the FM tuning elements, or vice versa.

8. A dual band pushbutton tuner as defined in claim 1, in which the said cooperating parts include stop parts of the anti-jam plate which are disposed in front of cooperating parts of one side key or the other, depending on the side-to-side position of the shuttle plate and its connected anti-jam plate, the relation of the said cooperating parts being such that when a button key is pulled forward with its shuttle and one side key to unlock the cam of that side key, one of the said stop parts

of the anti-jam plate is disposed in front of the cooperating part of the other side key in order to prevent the latter from moving forward so that its cam remains locked, whereby only one of the two cam locks controlled by one button key may be unlocked at a time.

9. A dual band pushbutton tuner as defined in claim 1, in which the anti-jam plate has pairs of slots, one pair for each button key, and in which the said button and side keys have parts located behind the anti-jam plate when the keys are in rest position, but movable across the anti-jam plate when pulled forward, said pairs of slots in the anti-jam plate being so located relative to the cooperating keys that they are in the paths of the button key and one of its side keys when the shuttle plate and anti-jam plate have been moved to one side position, said keys if pulled forward being received in said pair of slots, while the second side key is obstructed by the anti-jam plate so that it cannot move forward, whereas when the shuttle plate and anti-jam plate have been moved to the other side position, the said button key and its second side key are then aligned to be received in said pair of slots and can be pulled forward whereas the first side key is obstructed by the anti-jam plate and cannot move forward.

10. A dual band pushbutton tuner as defined in claim 1, in which the aforesaid cooperating parts include tabs and slots on the anti-jam plate and stop parts on the keys which are normally behind the anti-jam plate when the keys are in rest position, but which move forward to intersect the plane of the anti-jam plate when the keys are pulled forward, said tabs of the anti-jam plate being disposed in front of said stop parts of the keys when the shuttle plate and its connected anti-jam plate are improperly disposed in an intermediate position instead of being disposed in one proper side position or the other proper side position, thereby preventing forward movement of a button key and its side keys unless the shuttle plate and connected anti-jam plate are in proper position.

11. A dual band pushbutton tuner as defined in claim 1, in which each shuttle has a lug fixed on and projecting upward at the top, and the shuttle plate is disposed over the keys and their shuttles and has slots extending in fore-and-aft direction and receiving said lugs for shifting the

shuttles to one side or the other, and in which the anti-jam plate is formed integrally with the shuttle plate and is bent downward from the forward edge of the shuttle plate.

12. A dual band pushbutton tuner as defined in claim 1, in which the tuning elements of one band are for AM reception, and the tuning elements of the other band are for FM reception, and in which the shuttle plate has a part operatively connected to an electrical switch for shifting electrically from the AM tuning elements to the FM tuning elements, or vice versa.

13. A dual band pushbutton tuner comprising movable tuning elements, a rocker connected thereto for moving the same to a desired tuning position, a plurality of button keys, a first side key on one side of each button key, a second side key on the other side of each button key, said keys being longitudinally slidable in fore and aft direction, a cam carried by each side key for engaging and thereby turning said rocker to a desired tuning position when the side key is pushed rearward, a cam lock carried by each side key and bearing against its respective cam for locking its cam in desired tuning position, a shuttle guide disposed transversely of and fixedly carried by each button key, a short stiff horizontal shuttle bar longitudinally slideable in said guide in a direction transverse of the key toward one side or the other for engaging a mating slot in a first side key or a second side key for thereafter causing longitudinal movement of the engaged side key with its button key, a manually operable shuttle plate operatively connected to all of the shuttles for sliding said shuttles to one side or the other to engage either the first side keys or the second side keys.

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MILTON KAUFMAN, Primary Examiner

U.S. Cl. X.R.