

Dec. 23, 1941.

H. J. McGARVEY

2,267,474

PUSH BUTTON TUNING APPARATUS

Filed Dec. 11, 1940

3 Sheets-Sheet 1

Fig. 1.

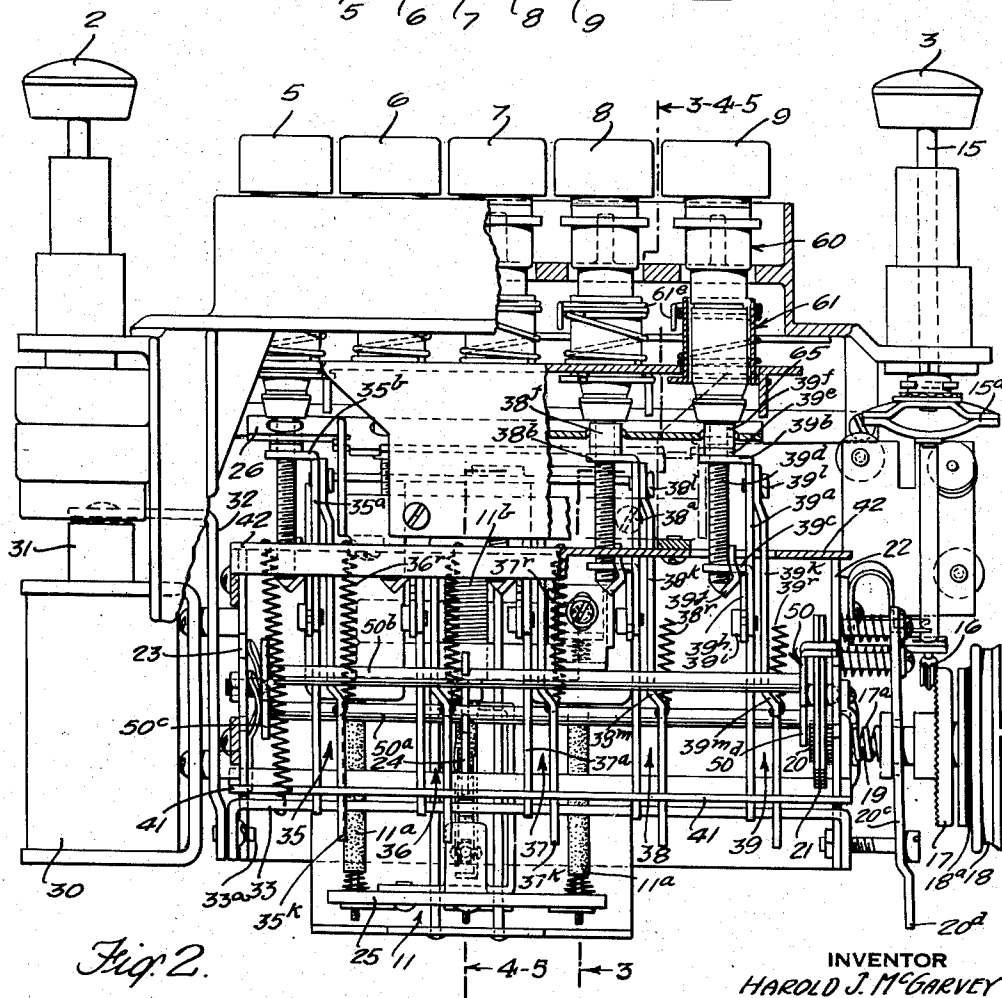
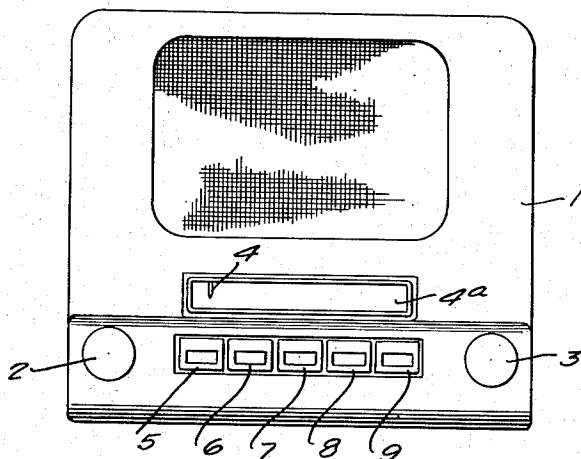


Fig. 2.

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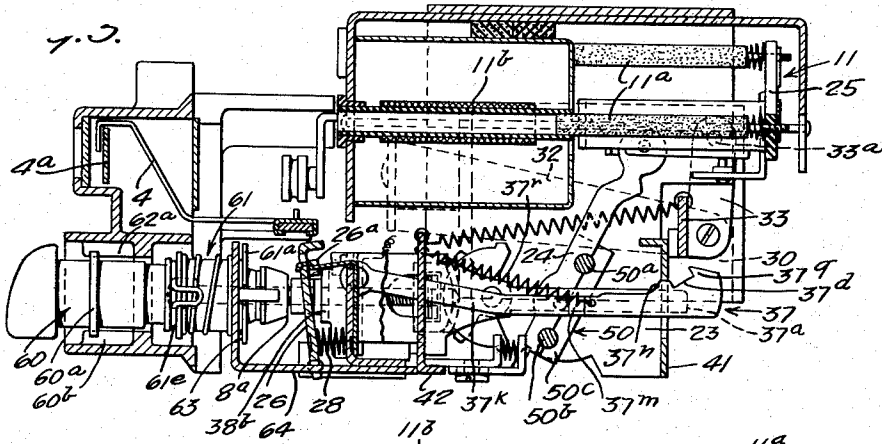
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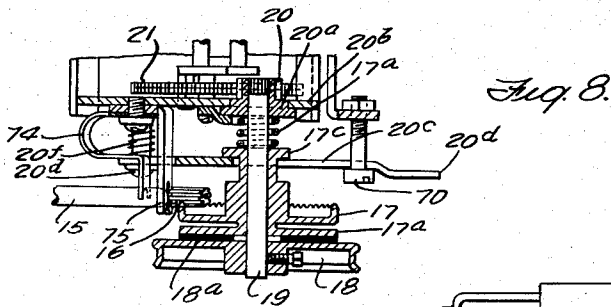


Fig. 6.

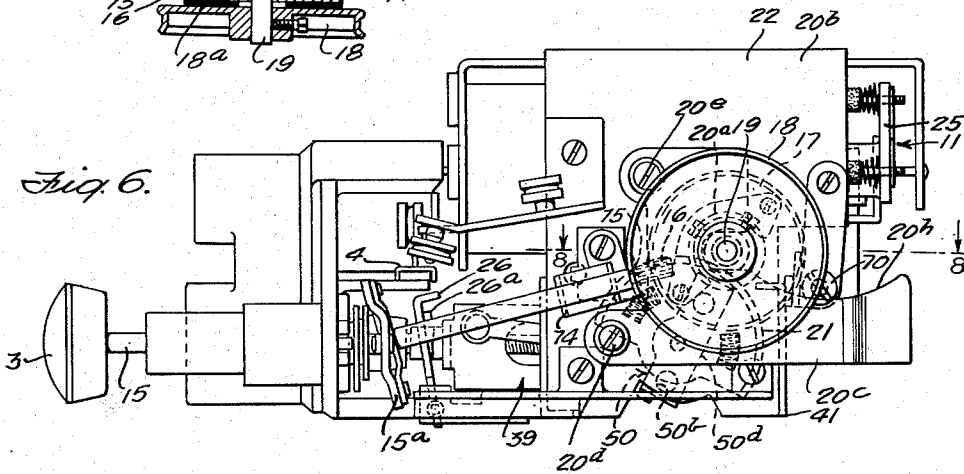


Fig. 7.

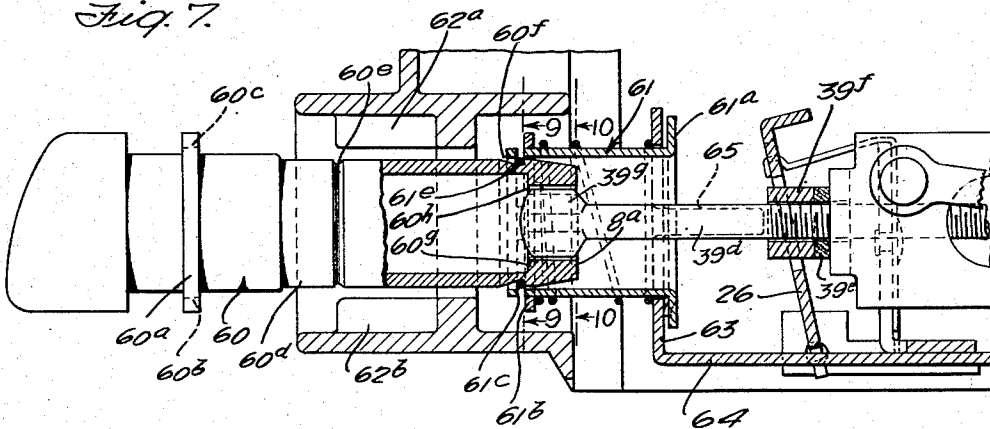
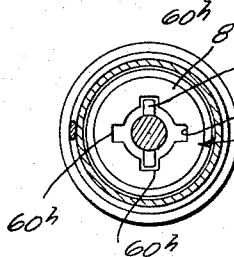
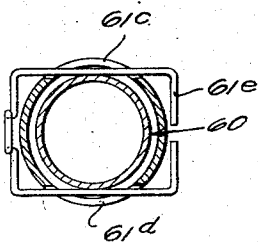


Fig. 9.



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2,267,474

PUSH BUTTON TUNING APPARATUS

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Application December 11, 1940, Serial No. 369,513

10 Claims. (Cl. 74—10)

This invention relates to tuning mechanisms for radio receivers and the like, that is to say, to means by which the radio receiver may be quickly and accurately tuned to a particular station for which the apparatus has previously been set or calibrated. In the particular embodiment herein disclosed, the tuning mechanism is of the so-called electrically operated push button type, by means of which the operator may push a button and the apparatus will be electrically adjusted to the particular station for which that push button has been set or calibrated.

My apparatus also contemplates manual means for selecting the desired stations, which may be operated independently of and without interference with the push buttons, and for this, there is interposed between the manual drive and the tuning element, per se, an improved clutch which operates to disconnect the manual control selector mechanism for the tuning apparatus when any push button is operated. Immediately after the operation of the push button the clutch is again connected so that the apparatus may be tuned manually.

The apparatus herein disclosed embodies the same fundamental principles as those embodied in that disclosed and claimed in my co-pending application Ser. No. 350,420, filed August 3, 1940, but is an improvement over the apparatus of that application in a number of respects, as will hereafter be pointed out.

Among the objects of my invention may be mentioned:

To provide an improved and simplified power-operated push button tuning mechanism of the class described.

To provide a construction by means of which resetting of the buttons may be easily and quickly accomplished without the use of tools.

To provide a construction which the resetting of the buttons may be easily and quickly accomplished without the use of tools, and which permits the use of square or rectangular buttons, heretofore impossible without requiring the use of tools for resetting.

To provide a new and improved construction for holding the button assembly in assembled position but so that it may be easily and quickly removed without the use of tools in case such removal is desired for any reason.

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

In this application I have particularly pointed out and distinctly claimed the part, improvement or combination which I claim as my invention or

discovery, and I have explained the principles thereof and the best mode in which I have contemplated applying those principles, so as to distinguish my invention from other inventions.

In the drawings:

Fig. 1 is a front elevation view of one form of radio receiver embodying my invention;

Fig. 2 is a bottom plan view of my improved tuning mechanism partly broken away and partly in section;

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

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

Fig. 5 is a section on line 5—5 of Fig. 2, showing the apparatus in the position it assumes in the act of selecting a desired station;

Fig. 6 is an end elevation of the tuning mechanism at the manual drive end;

Fig. 7 is a partial section through one of the button assemblies showing the parts in position to reset or calibrate the button;

Fig. 8 is a section on line 8—8 of Fig. 6; and

Figs. 9 and 10 are respectively sections through lines 9—9 and 10—10 of Fig. 6.

Referring now more particularly to Fig. 1, 1 designates the casing or container of the radio receiver which may have manual rotary knobs 2 and 3 positioned on opposite sides of the front face thereof, 2 designating the knob which may operate the on-off switch and volume control and 3 the knob operating the tuning mechanism manually to carry the pointer 4 across the dial 4a. 5, 6, 7, 8, and 9 may represent the push buttons which may be calibrated or preset so that when a particular button is pushed, a particular station is tuned in, as indicated by the station call letter tabs which may be carried on the button.

The actual syntonizing of the circuits may be done by any suitable means such for instance as the gang variable inductance tuning assembly indicated as a whole by 11 and having a series of cores of magnetic material 11a movable into and out of the field of a series of inductances 11b. Since such tuning elements are well known in the art and form per se no part of this invention, they are not described in detail, and it will be understood that other tuning instrumentalities such as gang condensers may be employed in place of or in addition to the tuner shown.

In selecting a station manually by means of knob 3, rotation of knob 3 rotates the shaft 15 (see Fig. 2) interposed in which shaft there may be a universal joint 15a and this shaft rotates pinion 16. Pinion 16 may engage the teeth of cup gear 17 which is normally connected to a pulley 18 through the medium of a clutch which

will be described hereinafter more in detail. The pulley 18 may be fixed upon shaft 19 passing through frame end plate 22 and carrying just inside the said end plate a pinion 20 engaging scissors gears 21 on tilt bar 50.

The tilt bar 50, in this instance, may comprise a pair of parallel spaced rods 50a and 50b carried in end plates 50c and 50d to form a rigid rectangular framework. The tilt bar 50 may be mounted on suitable bearing engaging the end members 50c and 50d and carried by frame end plates 22 and 23, so that the tilt bar 50 may rotate about an axis passing through its center, as will be seen more particularly from Figs. 4 and 5.

Secured to and carried by the tilt bar 50, there may be provided an arm 24 extending upwardly and engaging the carriage 25 of the gang tuning unit 11. From this it will be seen that rotation of the knob 3 will cause rotation of the tilt bar 50 and of the arm 24, and the upper end of the arm 24 engaging the carriage of the tuner 11, will move the cores 11a into or out of their respective coils 11b, thereby changing the tuning of the circuits. Pulley 18 may carry any suitable cord arrangement for driving pointer 4 across the dial 4a to show the relative tuning of the receiver. Pushing any one of the buttons 5 to 9 forward, first causes closure of the solenoid operating switch to energize the solenoid 30. It will be observed that the front section at the inner end of each button assembly terminates in the frustum of a cone, this surface being designated at 8a (Fig. 3). On pushing the button inwardly, this surface engages the plate 26 which is pivoted at opposite ends of its bottom and rotates it slightly clockwise against the pressure of restoring spring 28.

Clockwise rotation of the plate 26 closes switch contact 26a carried on the rear side of plate 26 against stationary contact 26b, thereby completing the solenoid circuit and energizing it. The solenoid draws in its core (see Fig. 2), this moving link 32 rearwardly. The rear end of link 32 is connected to bail 33, which bail is connected at its upper end as at 33a.

Rearward movement of the link 32 causes counter-clockwise rotation of bail 33 about pivot 33a (see Figs. 4 and 5). It is this counter-clockwise rotation of bail 33 which applies the power to rotate the tilt bar 50 to the desired angular position previously determined for any particular station for which the button may be set. In order to accomplish this, there may be provided a plunger assembly for each button (see Fig. 2) numbered 35, 36, 37, 38 and 39. Since these plunger assemblies in the present embodiment are the same for each button, only one will be described in detail.

The plunger assembly 39 may for example comprise longitudinal member 39a which may be a stamping having a front ear 39b and a rear ear 39c, pressed outwardly, extending at right angles. Each of these ears is drilled and one or both may be threaded to receive clamping screw 39d which extends through both ears. Sector 39h may be pivotally mounted on the longitudinal member 39a at 39i. Sector 39h may be held in any desired angular position by means of clamping strip 39j which may take the form of a small disc slightly bent as indicated (see Fig. 2), and having a slot therein to receive the ear 39c. When clamping screw 39d is loosened, sector 39h is free to rotate on its pivot 39i, but when clamping screw 39d is tightened, its point

impinges against the bent portion of the clamp strip 39j and wedges it tightly against the sector 39h, thus securing it in its angular position.

Around the screw 39d and in front of ear 39b, there may be provided an insulating washer 39e and a collar 39f secured upon the said screw. The screw may project forwardly well beyond the switch plate 26, passing through an opening therein and may terminate in a flat e-like head 39g wider than the diameter of the screw (see Figs. 7 and 10).

Pivotally mounted on member 39a there may be provided the dog or latch member 39k, pivotally secured as at 39l just behind the front ear 39b. The front end of the dog may be slightly offset and another offset may be provided nearer the rear end as at 39m. The dog may be urged upwardly by spring 39r attached thereto and to the front frame plate 42. There may be a cam surface as at 39n and a depression at 39d with a latch or hook surface at 39q at the rear top of the dog. Both the longitudinal member 39a and the dog 39k may project at their rear ends through guide slots in rear frame plate 41, which serve to prevent lateral displacement and at the front the longitudinal member 39a fits at the top and bottom into locating notches at the top and bottom of a clearance hole in the front frame plate 42, through which the plunger assembly may be mounted in the frame. Thus, the plunger may move forward and backward, but is held against lateral shifting, while the dog has a limited motion about its pivot. The normal position of the dog is shown in Fig. 3, in which it will be noted that the dog is held down by the cam surface 39n so that the bail 33 normally clears the hook 39q. When the plunger assembly moves to the rear, the dog moves upwardly under the force of spring 39r until the hook 39q is in position to be engaged by the bail 33 as it swings.

It will now be clear how the apparatus operates to select a station, it is believed. On pushing any button the corresponding dog moves backwardly and its rear end moves upwardly in position to be engaged by the bail when the same is flung by the action of the solenoid. At the same time that the dog moves into bail-engaging position, the solenoid energizing switch is closed and the solenoid pulls in its core rotating the bail counter-clockwise, the bail engaging the hooked end of the dog, carries the dog with it moving the entire slider assembly to the rear until the sector on that assembly engages the tilt bar and rotates the tilt bar until both rods of it are in engagement with opposite sides of the sector, the angular position of the sector determining the final angular position of the tilt bar and the tilt bar through its upwardly extending arm moving the carriage carrying the cores into or out of the coils to the final position determined by the angular adjustment of the sector.

The construction and operation of the button assembly and the manner of adjusting the sector by the buttons without tools will now be described. Since this construction is identical for each button assembly, only one will be described in detail. The button member itself designated in its entirety as 60 may comprise a button head of any suitable material and shape, attached to a button plunger which in this instance is preferably made cylindrical and relatively longer than in diameter. Near the outer end there may be provided a flange 60a and this flange may have locating notches formed therein at the top and bottom as at 60b and 60c. These notches engage

oppositely disposed ribs 62a and 62b in the button housing and serve to prevent insertion of the button plunger into the housing in any angular position except the desired one or at 180° relation to it.

The inner portion of the plunger which is normally within the housing is preferably made of slightly reduced diameter and near its beginning portion may have a small groove 60e formed therein. Near its front extremity, it may have a second groove 60f which may be somewhat deeper. Beyond this point the inner end may be tapered as shown.

The plunger may be made hollow but at its inner end the openings will preferably be of somewhat smaller diameter than further out. At four points disposed 90° from each other around the inner periphery I may provide small grooves 60h. The diameter of the opening at the inner end of the plunger is preferably somewhat less than the width of the key head of screw 39g, and the width and depth of the slot 60h is such that when the button plunger is lined up with two of the slots 60h registering with the key head 39g the head will pass within the slots 60h and thereupon rotation of the button plunger will rotate the clamping screw by means of the engagement with head 39g (see Figs. 7 and 10).

A plunger guide is preferably provided in the form of a cylindrical member a little larger in inside diameter than the button plunger, said guide being designated generally by 61. This may have an inner flange 61a, an outer flange 61b of smaller diameter and just beyond the flange 61b there may be provided a pair of circumferential slots 61c and 61d in which spring clip 61e may be inserted. The guide 61 may be carried in an opening in an upwardly extending portion 63 of face plate 64 attached to the frame, and in forming the opening in plate 63 a finger 65 may be left projecting backwardly to engage a corresponding notch in flange 61 thereby preventing the guide 61 from being assembled in plate 63 in any but the correct angular position. The guide 61 is resiliently urged to its forward position by means of a coil spring 61f surrounding it and engaging at opposite ends against flange 61b and plate 63.

It will now be seen that, assuming the button plunger is out of the remainder of the assembly. It may be inserted by pushing its forward end into the opening in guide 61. The opposite sides of spring clip 61e will ride up the conical portion of the head of the plunger and into groove 60f, provided, of course, that the button plunger has been turned so that the key head 39d enters the slots 60h. When the button is in this position its head or finger end projects beyond the casing and beyond the remainder of the buttons so that the button plunger may be rotated by simply holding the head in the finger and turning it. This will rotate the screw 39d.

Assuming now that the screw 39d has been loosened, so that the corresponding sector is no longer held in position, the receiver may be tuned manually to the desired station for which it is wished to calibrate the particular button. Leaving the receiver tuned to this station, the button will then be pressed inward from the position shown in Fig. 7. It will move inwardly through the guide 61 until the spring clip 61e enters the groove 60e, assuming that it has been turned to the proper angular position so that slot 60b and 60c and collar 60a register with rib 62a and 62b.

Further inward movement of the button assembly will cause the front face of the button plunger to engage switch plate 26 and collar 39f as already described, to cause energization of the solenoid, rotation of the bail and full rearward motion of the slider assembly. When the sector engages the tilt bar which is already in the desired position, the sector itself will be rotated to the same angular position. When this occurs, it is only necessary to take the button in the fingers and pull it outwardly until it reaches the position shown in Fig. 7. In doing this, it may be necessary to rotate the plunger slightly but such rotation will be always less than 90° because of the position of the key slots 60h to register slots 60h with key head 39g. When the plunger has reached this position, it is merely necessary to rotate the button head to the right until the clamping screw is felt to be engaged, at which time the sector is locked in the angular adjustment for the desired position. It is then only necessary to push the button inwardly until the slots 60h are clear of the head 39g whereupon the button may be rotated to the proper angular position for re-insertion to the full extent, such angular position being determined, of course, by the registration of slots 60b and 60c with ribs 62a and 62b.

If, however, for any reason, it is desired to fully remove the button assembly from the housing from the position shown in Fig. 7, this may be done by pulling somewhat more strongly on the button, whereupon the spring clip 61e will be disengaged from groove 60f and the button assembly can be entirely removed.

Referring now more particularly to Figs. 6 and 8, my improved clutch mechanism will now be described. As already stated, rotation of shaft 15 rotates pinion 16 on the end thereof. This pinion engages the teeth of cup gear 17. Secured to the cup gear I may provide disc 17a which forms one of the clutch surfaces, the other clutch surface being formed by clutch facing 18a secured to the inner face of pulley 18, which in turn is secured on shaft 19. As shown in Fig. 8 the clutch is engaged, so that rotation of the shaft 15 rotates shaft 19 which in turn rotates pinion 20 meshing with scissors gear 21 and thereby operates the tuner. The clutch is held in engaged position as shown in Fig. 8 by means of clutch spring 17a interposed between flange 17c of gear 17 and bushing 20a secured to pinion 20, the bushing engaging a suitable opening in the frame end plate 20b. Clutch operating plate 20c is shown as mounted on bolts 20d and 20e. These bolts carry between the frame end plate 20b and the clutch operating plate 20d seating springs 20f and 20g, so that the clutch operating plate may be rotated slightly counter-clockwise on its seat as seen in Fig. 8. The clutch operating plate may be provided with an opening or notch formed therein to receive the bushing extending from gear 17, and further with an operating extension 20d slightly offset therefrom as indicated in Fig. 8. The upper edge of this offset portion and of the unoffset portion adjacent thereto may be formed with an arcuate upper edge 20h conforming to the motion of bolt 70 attached to the bail 33. When the bail rotates counter-clockwise, as driven by solenoid 30, the head of bolt 70 will engage the offset portion 20d and will rotate the clutch operating plate 23 slightly in a counter-clockwise direction, this engaging flange 17c and

moving gear 17 and clutch plate 17a inwardly until clutch plate 17a is disengaged from clutch plate 18a.

This lateral movement carries with it the end of shaft 15 and pinion 16 which movement is permitted by the universal joint 15a and by the spring support 74 for the shaft, which is held against displacement in any other direction by means of bifurcated arm 75 secured to the end plate 20d. After the solenoid is de-energized and the ball returned to its normal position, spring 17a returns gear 17 to its normal position of clutch engagement.

Certain aspects of the subject matter disclosed but not claimed in this application and included for purposes of clarity are more completely disclosed and claimed in a co-pending application of Marion J. Pifer, Verlis H. Wiley, and George E. Archenbronn, assigned to the assignee of this application.

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

I claim:

1. In push button tuning mechanism, in combination, a tilt bar, tuning means connected thereto to be driven thereby, a plurality of plungers for selectively operating said tilt bar, each of said plungers having means rotatably adjustable thereon for engaging said tilt bar, means associated with each plunger for clamping said tilt bar engaging means in adjusted position, a push button assembly associated with each plunger for causing said plunger to engage and rotate said tilt bar on depression of its push button, and means on said push button assembly for engaging said clamping means when extended beyond normal rest position, whereby rotation of said button in extended position clamps and unclamps its corresponding tilt-bar engaging means.

2. In push button tuning mechanism, in combination, a tilt bar, tuning means connected thereto to be driven thereby, a plurality of plungers for selectively operating said tilt bar, each of said plungers having means rotatably adjustable thereon for engaging said tilt bar, means associated with each plunger for clamping said tilt-bar engaging means in adjusted position, a push button assembly associated with each plunger for causing said plunger to engage and rotate said tilt bar on depression of its push button, and interlocking means carried by said push button assembly and said clamping means, for establishing a driving connection between said push button and its associated clamping means when said push button is pulled out beyond its normal rest position, whereby said rotatably adjustable means may be clamped and unclamped by rotation of said push button in extended position.

3. In push button tuning mechanism, in combination, a tilt bar, tuning means connected thereto to be driven thereby, a plurality of plungers for selectively operating said tilt bar, each of said plungers having a sector rotatably adjustable thereon for engaging said tilt bar, rotatable means associated with each plunger for clamping said sector in adjusted position, a push button assembly associated with each plunger for causing said plunger to engage and rotate

said tilt bar on depression of its push button, and means on said push button assembly for interlocking with said rotatable means when extended beyond normal rest position, whereby rotation of said button in extended position clamps and unclamps its sector.

4. In push button tuning mechanism, in combination, a tilt bar, tuning means connected thereto to be driven thereby, a plurality of plungers for selectively operating said tilt bar, each of said plungers having means adjustable thereon for engaging said tilt bar and determining its position, rotatable means associated with each plunger for clamping said tilt bar engaging means in adjusted position, a push button assembly associated with each plunger for causing said plunger to engage and rotate said tilt bar on depression of its push button, means preventing rotation of said push buttons in normal and depressed position, means for permitting withdrawal of said push button to permit disengagement of said rotation-preventing means, and interlocking means on said rotatable means and push button assembly, engageable when said push button is in withdrawn position, to permit clamping and unclamping of said tilt-bar engaging means by rotation of the push button.

5. In push button tuning mechanism, in combination, a tilt bar, tuning means connected thereto to be driven thereby, a plurality of plungers for selectively operating said tilt bar, each of said plungers having means adjustable thereon for engaging said tilt bar and determining its position, rotatable means associated with each plunger for clamping said tilt bar engaging means in adjusted position, a push button assembly associated with each plunger for causing said plunger to engage and rotate said tilt bar on depression of its push button, means preventing rotation of said push buttons in normal and depressed position, means for yieldingly opposing withdrawal of said buttons to a position in which said rotation preventing means is disengaged, and interlocking means on said push button and said rotatable means, engageable in said last named position of the push button, whereby said push button may be rotated to clamp and unclamp said tilt-bar engaging means.

6. In push button tuning mechanism, in combination, a tilt bar, tuning means connected thereto to be driven thereby, a plurality of plungers for selectively operating said tilt bar, each of said plungers having means adjustable thereon for engaging said tilt bar and determining its position, rotatable means associated with each plunger for clamping said tilt bar engaging means in adjusted position, a push button assembly associated with each plunger for causing said plunger to engage and rotate said tilt bar on depression of its push button, means preventing rotation of said push buttons in normal and depressed position, means yieldingly opposing withdrawal of said buttons to a position in which said rotation preventing means is disengaged, interlocking means on said push button and said rotatable means, engageable in said last named position of the push button, whereby said push button may be rotated to clamp and unclamp said tilt-bar engaging means, and means yieldingly opposing further withdrawal of said push button, but permitting its complete withdrawal.

7. In push button tuning mechanism, in combination, a tilt bar, tuning means connected thereto to be driven thereby, a plurality of plungers for selectively operating said tilt bar, each of

said plungers having means rotatably adjustable thereon for engaging said tilt bar, means associated with each plunger for clamping said tilt bar engaging means in adjusted position, a hollow push button assembly associated with each plunger for causing said plunger to engage and rotate said tilt bar on depression of its push button, said clamping means extending axially into said button and interlocking therewith when said push button is withdrawn to a predetermined position, whereby rotation of said button in extended position clamps and unclamps its corresponding tilt-bar engaging means.

8. In push button tuning mechanism, in combination, a tilt bar, tuning means connected thereto to be driven thereby, a plurality of plungers for selectively operating said tilt bar, each of said plungers having means rotatably adjustable thereon for engaging said tilt bar, means associated with each plunger for clamping said tilt-bar engaging means in adjusted position, said means comprising a screw having a key head and extending parallel to said plunger, a hollow push button assembly associated with each plunger for causing said plunger to engage and rotate said tilt bar on depression of its push button, said clamping means extending axially into said button, and said button having a key slot for interlocking with the key head of said screw when said button is withdrawn to a predetermined position, whereby rotation of said button in extended position clamps and unclamps its corresponding tilt-bar engaging means.

9. In push button tuning mechanism, in com-

bination, a tilt bar, tuning means connected thereto to be driven thereby, a plurality of plungers for selectively operating said tilt bar, a bail, power means for swinging said bail to drive said plungers, manual means for rotating said tilt bar, and clutch mechanism for disconnecting said manual means from said tilt bar, said clutch mechanism comprising a disk fixed on a shaft operatively connected to said tilt bar, a second disk free to rotate on said shaft but connected to said manual means, means normally urging said disks, into power transmitting contact with each other, and means carried by said bail for separating said disks when said bail is swung.

10. In push button tuning mechanism, in combination, a tilt bar, tuning means connected thereto to be driven thereby, a plurality of plungers for selectively operating said tilt bar, a bail, power means for swinging said bail to drive said plungers, manual means for rotating said tilt bar, and clutch mechanism for disconnecting said manual means from said tilt bar, said clutch mechanism comprising a disk fixed on a shaft operatively connected to said tilt bar, a second disk free to rotate on said shaft, said disk carrying a gear, a shaft extending from said manual means and having a pinion meshing with said gear, spring means yieldingly maintaining said pinion and gear in mesh, means normally urging said disks into power transmitting contact with each other, and means carried by said bail for separating said disks when said bail is swung.

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