Aug. 29, 1944. W. R. KOCH 2,356,935

TUNING MECHANISM

Filed May 30, 1942 2 Sheets-Sheet 1

Fig. 1.

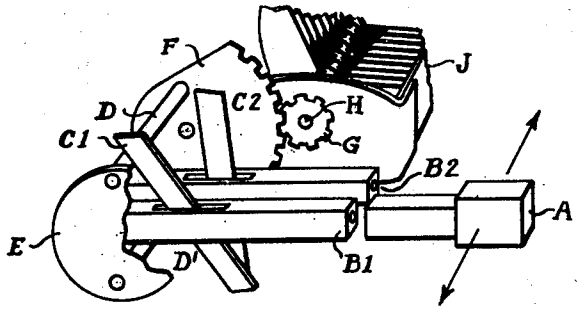


Fig. 2.

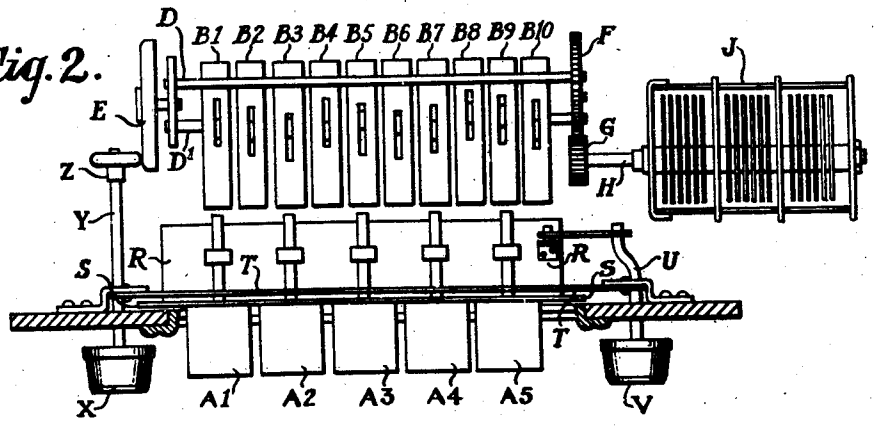
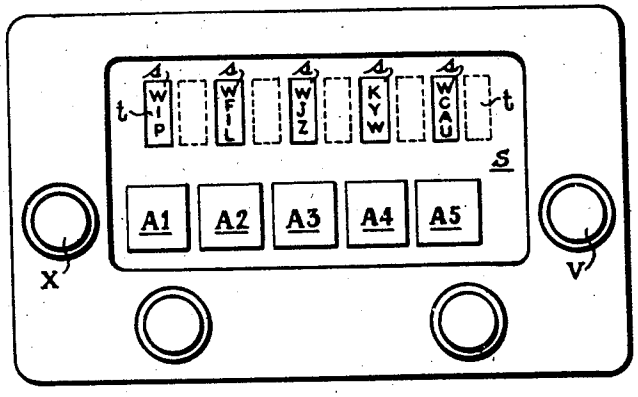


Fig. 3.



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Aug. 29, 1944. W. R. KOCH 2,356,935

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Filed May 30, 1942 2 Sheets-Sheet 2

Fig. 4.

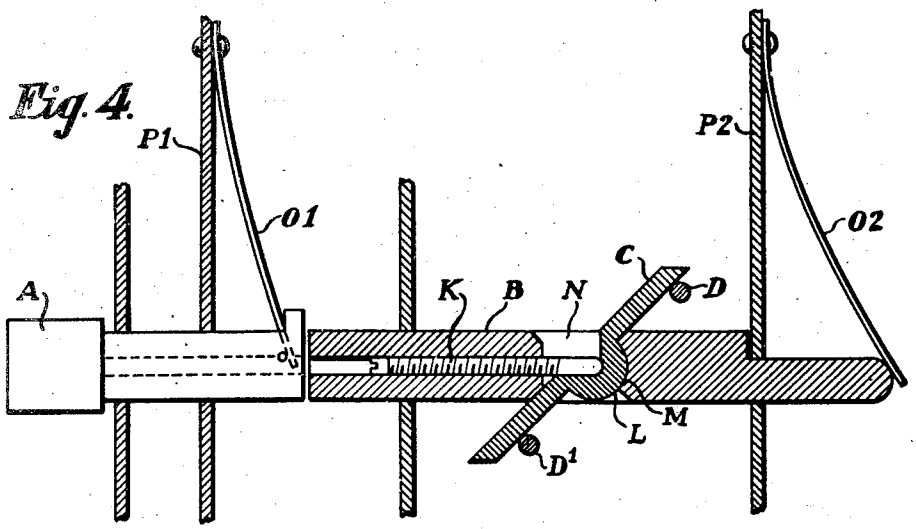
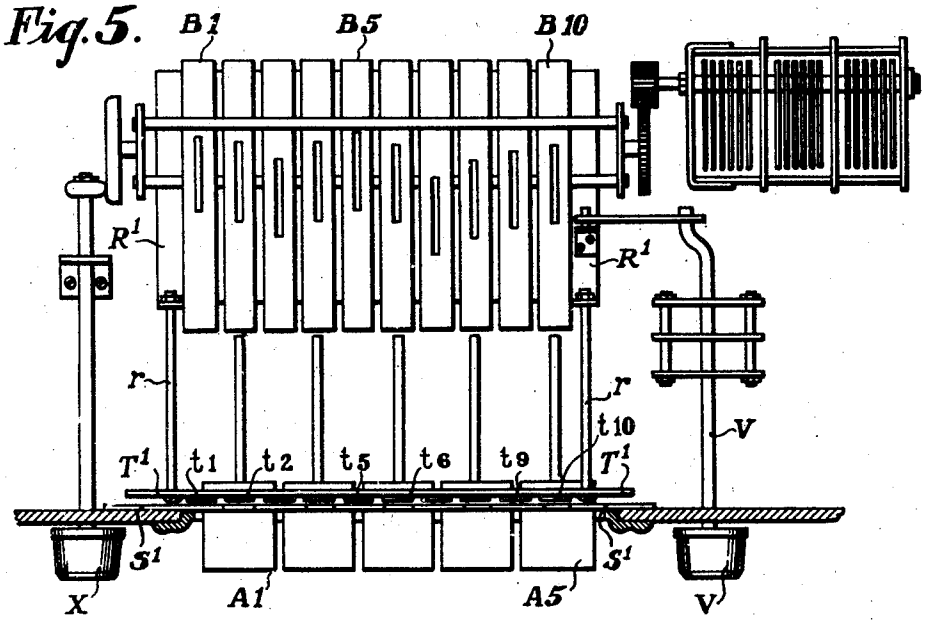


Fig. 5.



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Patented Aug. 29, 1944

2,356,935

UNITED STATES PATENT OFFICE

2,356,935

TUNING MECHANISM

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Application May 30, 1942, Serial No. 445,180

3 Claims. (Cl. 250—40)

This invention relates to tuning mechanisms for radio apparatus and has for its principal object to provide an improved and simplified push button tuner for use in plural and multiband sets.

The bank of push buttons or switch keys commonly provided on modern radio receivers operate to bring in stations within a single band only. Thus, in the case of a plural band set adapted to translate signals within the standard broadcast and frequency modulation bands, it is customary to provide a bank of push buttons for the broadcast band only and to rely upon the operator's skill in manipulating a tuning knob to tune stations within the other band or bands. It is, of course, entirely possible to provide as many banks of switch keys as there are frequency bands and to have as many keys in a given bank as may be desired. Such a multiplicity of parts, however, might prove confusing to the operator and in any event would be extremely cumbersome and expensive.

The present invention obviates the foregoing and other less apparent objections to present day tuning systems by the provision of a tuning mechanism wherein each push button or key in a single bank serves to tune the set, selectively, to two or more stations in the same or in different tuning ranges.

Certain preferred details of construction together with other objects and advantages will be apparent and the invention itself will be best understood by reference to the following specification and to the accompanying drawings, wherein:

Figure 1 is a fragmentary view of so much of capacitive type tuner as is necessary for an understanding of the principle of the present invention;

Figure 2 is a top plan view of a plural band radio receiver incorporating a tuning mechanism within the invention;

Figure 3 is a front elevational view of the tuning control and indicator panel for the receiving set of Fig. 2;

Figure 4 is a detailed view in elevation and partly in cross section on an enlarged scale of a mechanism for setting up different stations on the tuners of Fig. 2; and

Figure 5 is a top plan view of a plural band radio receiver showing an alternate embodiment of the invention.

In the drawings like reference characters designate the same or corresponding parts in all figures.

Fig. 1 shows a variable condenser drive system which has been modified, in accordance with the invention, by making the driving element or push button (or group of push buttons) A movable not only in the axial direction, as in standard practice, but also laterally (as indicated by the double ended arrow) with respect to a group of driven selector elements B1, B2 so that the said driving element or elements A may serve any selected of the driven elements B1, etc. As will hereinafter more fully appear the relative movement between the driving (A) and driven (B), etc., selector elements necessary to bring the former into operative position with respect to the latter may be effected by moving either with respect to the other, as by means of a conventional band-change switch or the like.

Various forms of driving and driven selector elements may be employed in carrying the invention into effect. By way of example: when the invention is applied to an electrically driven tuning system (not shown) the said elements may comprise suitable banks of electrical switches and switch keys. In the embodiments of the invention which have been chosen for purposes of illustration, each driven selector element B1, etc., comprises an axially movable hollow rod-like plunger which is provided, preferably intermediate its ends, with a preset angularly disposed adjustable stop C1, etc., which, when the said plunger is moved inwardly, engages a pair of stop engaging members D and D' which are mechanically coupled through a disc E, a driving gear F, and a pinion G to the rotor shaft H of a conventional variable capacitive tuning unit J. In Fig. 1, the driven selector element B1 is shown in a position whereat, upon being actuated by the push-button A, the upper end of the preset stop C1 thereon will engage the upper stop engaging member D and drive it (and hence the disc E, and gear F) in the counter-clockwise direction until the lower stop engaging member D' comes to rest against the lower end of the said stop C1.

It is, of course, obvious that the pre-set angular position of each of the stops C1, C2 should correspond to the angular setting of the tuning shaft H required to tune the capacitor J (and the circuits associated therewith) to the stations or frequencies to which the said stops are allotted. One suitable means for presetting a stop to a desired angular position is shown in Fig. 4 wherein it will be observed that the stop C may be locked in a desired angular position with respect to the long axis of the selector element B by means of a screw K which extends along the said axis and

which is accessible for purposes of adjustment from the trailing end of the selector. A semicircular surface L on the stop C, intermediate its ends, and a complementary surface M on the wall of the slot N in which it is seated serves as a pivot which permits the angular position of the stop to be adjusted when the clamping force which locks it in a given position is removed by turning the screw K. It may also be noted in connection with this figure that two springs O1 and O2 may be provided for returning the push button A and the selector element B, respectively, to their idle positions. These springs O1 and O2 may be mounted on brackets, panels or plates P1 and P2 upon which the said selector elements are slidably supported.

In Figs. 2 and 3, a tuning mechanism within the invention is shown as applied to a plural band radio receiving set having five odd numbered selector elements B1 etc. allotted to stations in one frequency band range and five even numbered selector elements B2, etc., allotted to stations in the other band. The selector elements of both the odd and even numbered groups are served by a single bank of five keys or push buttons A1—A5 which are so mounted as to permit them to be shifted from their illustrated operating position in front of the odd numbered selector elements to a second operating position in front of the even numbered group. In the instant case the shiftable support upon which the keys or push buttons A are mounted comprises a rearwardly extending surface R upon which the said actuating elements are slidably supported and an upstanding integral surface S which is provided with five sight apertures *s* and serves as a mask or shutter for an immovable dial plate T which carries suitably arranged station indicia or "call letters" *t* on its front surface.

The force required to shift the mask and the bank of push buttons A from one group of selector elements to the other may be applied to the plate R as by means of a shaft U having a control knob V which may be coupled to or comprise a part of the wave change mechanism of the set. The degree of movement required to shift the mask and bank of push buttons from one operating position to the other is minimized when, as in the instant case, the selector elements of both the odd and even numbered groups are mounted side by side along a common lateral axis with the selector elements individual to one frequency band arranged alternately with respect to the elements of the other band.

As shown in Fig. 2, the tuning device of the present invention may be provided with a manual tuning control knob X and shaft Y which may be employed in setting up stops C on the selector bars B and for tuning in stations other than those set up. This shaft Y operates through a gear or friction wheel Z on its inner end to drive the disc E which, as in Fig. 1, is coupled to the driven condenser gears F and G, by the stop engaging members or cross bars D and D'.

In the embodiment of the invention shown in Fig. 5, the ten driven selector elements B1, etc., are mounted upon a supporting plate R' for shiftable movement with respect to a fixed bank of five push buttons A1, etc., instead of vice-versa as in the earlier described arrangement. A "dial plate" here designated T' is mounted on supporting arms *r* for movement with the selector plate R' and with respect to an immovable apertured mask S'. Thus upon turning the wave-change knob V to the right as viewed in the drawings, the odd numbered selector elements B1, etc., and hence the similarly numbered call letters *t1*, etc., will be moved into, and the corresponding even numbered parts *t2*, etc., out of, the operating position.

From the foregoing it will be apparent that the present invention provides an improved tuning mechanism and one which, by reason of its economy of parts, lends itself readily to use in plural and multi-band radio receivers.

What is claimed is:

1. In radio apparatus, tuning means, a plurality of groups of driven selector elements for said tuning means mounted in spaced array along a common axis with the elements of one group arranged alternately with respect to the elements of another group, a group of actuating elements mounted along an axis parallel to said first mentioned axis with the elements thereof arranged in spaced relation adjacent to alternate of said selector elements, and means for causing relative movement between said group of actuating elements and said groups of selector elements whereby to bring said groups of actuating elements into actuating relation with respect to a selected one of said groups of selector elements.

2. The invention as set forth in claim 1 wherein said radio apparatus comprises a plural band receiving set having a wave change switch for changing the frequency range of said set, and wherein the means for bringing said groups of selector and actuating elements into cooperative relation is responsive to the operation of said wave change switch.

3. In radio apparatus, tuning means, a group of actuating elements, a plurality of groups of driven selector elements for tuning said tuning means and mounted for shiftable movement into and out of driven relation with respect to said group of actuating elements, and means for shifting a selected of said groups of selector elements into and out of operating relation with respect to said group of actuating elements.

WINFIELD R. KOCH.