

April 26, 1938.

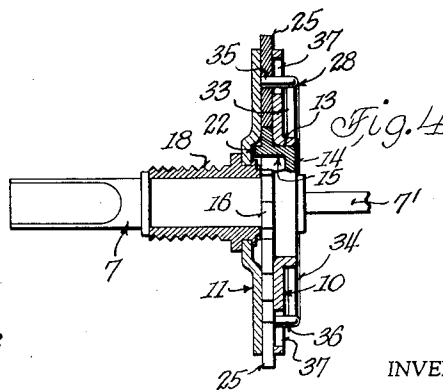
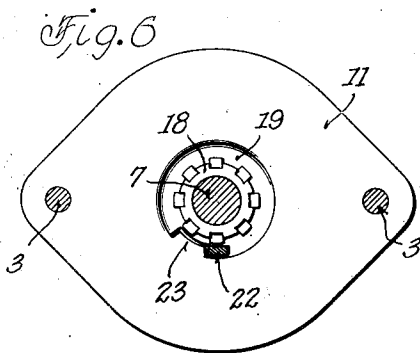
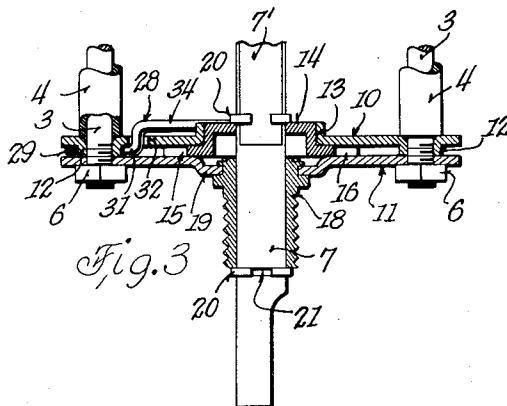
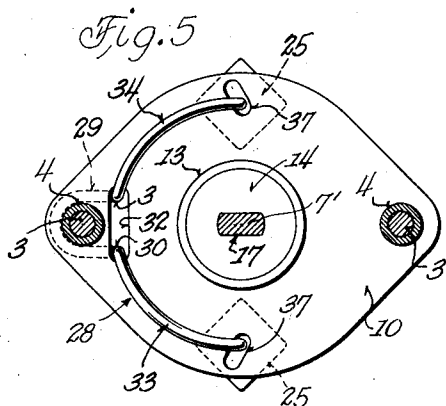
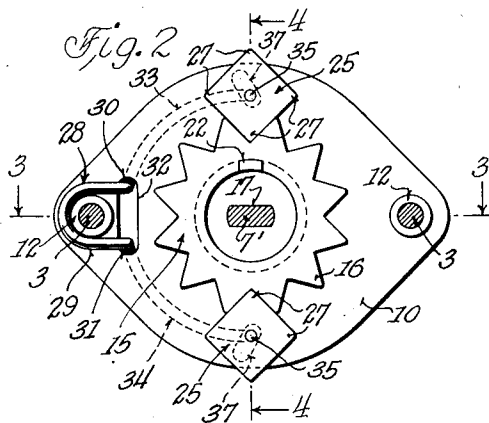
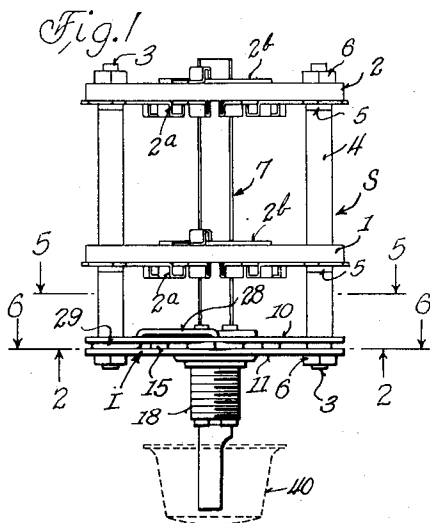
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2,115,284

INDEXING MECHANISM

Filed April 22, 1936

2 Sheets-Sheet 1



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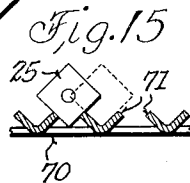
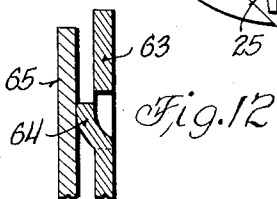
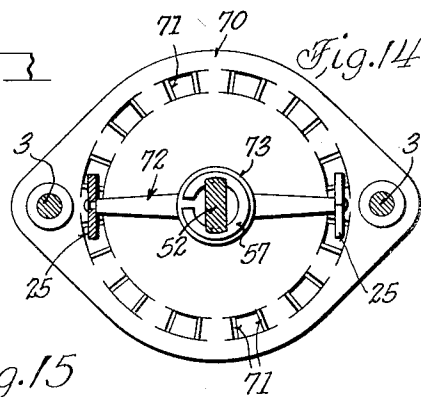
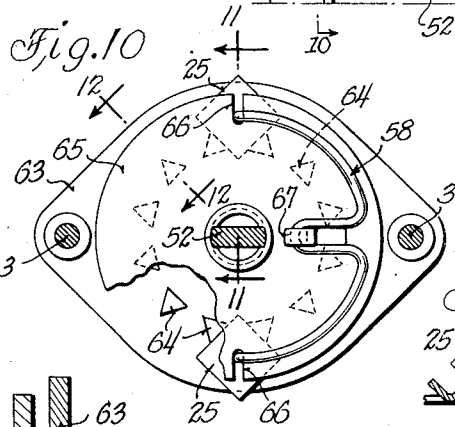
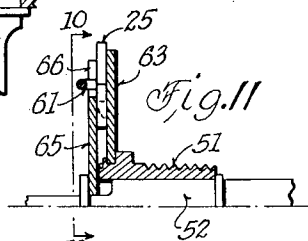
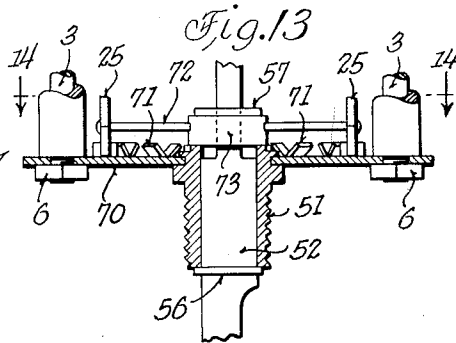
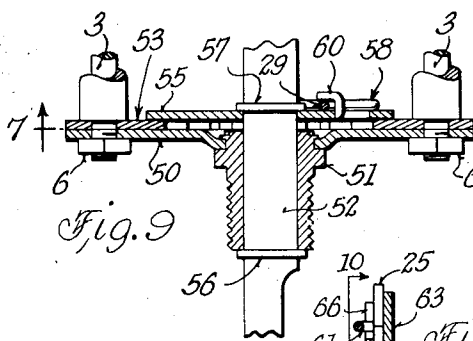
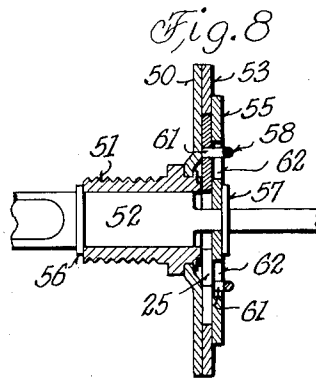
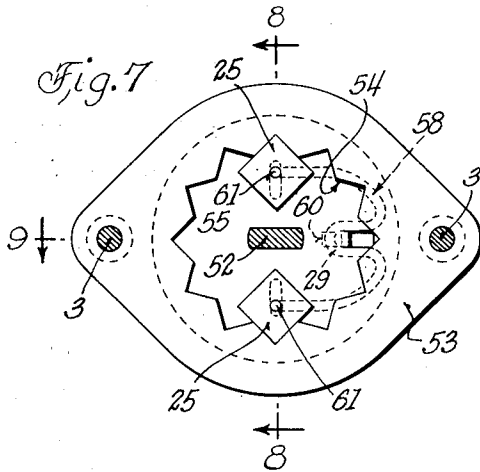
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2,115,284

INDEXING MECHANISM

Filed April 22, 1936

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,115,284

INDEXING MECHANISM

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 Company, Chicago, Ill., a corporation of Illinois

Application April 22, 1936, Serial No. 75,684

2 Claims. (Cl. 74-528)

This invention relates to an indexing mechanism or a positioning device especially designed and adapted for use with electric switches although also capable of other advantageous uses and applications.

In radio receivers of the type having a plurality of tuned circuits to accomplish reception over a number of bands, it is necessary that a suitable switching means be provided to cut out the various coils and condensers in a predetermined cycle. Because of the low potentials and high frequencies involved it is essential that the switch points or contacts be provided with a positive positioning device.

One of the objects of the present invention is to provide an indexing mechanism of the character referred to and wherein provision is made for imparting to the movable contacts of the switch a succession of movements of definite amplitude and for the positive retaining of the switch points in certain definite positions upon each adjustment. Accidental stalling or positioning of the switch points in between the predetermined operative positions thereof is effectively precluded.

Another object of the invention is to provide an indexing mechanism having these advantages and which is simple and compact in its construction so as to be capable of convenient combination with the switching mechanism and this in any one of a variety of positions.

Other objects and advantages reside in certain novel features of the construction, arrangement and combination of parts which will be herein-after more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings, forming a part of this specification, and in which:

Figure 1 is a plan view showing an indexing mechanism embodying the invention and illustrating in light and dotted lines associated instrumentalities;

Figure 2 is a view in transverse vertical section taken on line 2-2 of Figure 1;

Figure 3 is a view in horizontal section taken on line 3-3 of Figure 2;

Figure 4 is a view in longitudinal vertical section taken on line 4-4 of Figure 2;

Figures 5 and 6 are transverse sectional views taken on lines 5-5 and 6-6, respectively, of Figure 1;

Figure 7 is a view in transverse vertical section taken on line 7-7 of Figure 9 and showing another embodiment of the invention;

Figure 8 is a fragmentary view in vertical section taken on line 8-8 of Figure 7;

Figure 9 is a similar view in horizontal section taken on line 9-9 of Figure 7;

Figure 10 is a fragmentary view of another form of the invention, the view being partly in elevation and partly in vertical section and illustrating the structure as viewed from line 10-10 of Figure 11;

Figure 11 is a view in vertical section taken on line 11-11 of Figure 10;

Figure 12 is a fragmentary sectional view taken on line 12-12 of Figure 10;

Figure 13 is a fragmentary view taken partly in top plan and partly in horizontal section and showing another embodiment of the invention;

Figure 14 is a view in vertical section taken on line 14-14 of Figure 13; and

Figure 15 is a fragmentary diagrammatic view illustrating the manner in which the detents coast with the teeth in the form of the invention shown in Figures 13 and 14.

Referring to the drawings, and more particularly to Figure 1, a fragment of one type of switch with which the present invention, in its various forms, may be advantageously utilized is designated generally at S and has any suitable number of switch sections of which two are diagrammatically shown and designated at 1 and 2, respectively. The stationary members 2^a of these switch sections are supported on elongated rods 3 and held in position thereon by means of suitable spacing sleeves 4, washers 5 and nuts 6. The movable contacts 2^b of the switch sections are all operated from a common operating shaft 7. The switch S may be of any suitable or well known construction.

The indexing mechanism embodying the present invention is designated generally at I and may also be supported on the elongated rods 3 by the same spacing sleeve, washer and nut arrangement that holds the switch sections in position.

In one embodiment of the invention shown in Figures 1 to 6, inclusive, the indexing mechanism comprises a suitable frame which may be made up of a back plate 10 and a front plate 11. The openings in the plate 10 which accommodate the rods 3 may be flanged as at 12 to properly space the plates in the assembly (see Figure 3).

The plate 10 has a central opening at 13 which is also flanged to receive the cupped hub 14 of a toothed detent wheel 15. The flat body of the wheel 15 is a snug working fit in the space between the plates 10 and 11. The periphery of the

wheel is provided with pointed teeth or projections 16 which, in the construction shown, are triangular in form.

The center of the hub 14 is provided with a substantially rectangular slot 17 which snugly receives a correspondingly shaped or flattened portion 7' of the shaft 7 so that the detent wheel is constrained to rotate with the shaft 7.

If desired, the front plate 11 of the indexing mechanism may be employed to aid in supporting the shaft and in such event a bearing bushing 18 has one end interconnected with the central outwardly offset portion 19 of the front plate 11. A round or circular portion of the shaft 7 is rotatably mounted in the bearing bushing. Split spring washers 20 engaged in annular grooves 21 may be employed to preclude endwise movement of the shaft. It is to be understood, however, that the indexing mechanism of the present invention may be employed at any position in the switching device and that the bushing 18 is a special and not an essential feature.

Cooperating means is provided between the toothed wheel and the front plate 11 to limit the rotation of the toothed wheel and consequently of the shaft 7 in either direction. This means may advantageously consist of a stop lug 22 fixed to or integral with the toothed wheel 15 and engageable with a stop lug 23 provided on the front plate 11.

Cooperable with the toothed detent wheel are a number of detents designated at 25 of which a pair are shown. Each detent 25 in the construction illustrated comprises a square piece of metal of a size to be snugly yet rotatably fitted between the plates 10 and 11. The corners of the detents 25 provide in effect detent projections or teeth designated at 27 which interfit with the teeth 16 of the detent wheel in the manner illustrated to advantage in Figure 2. Preferably, the detents are oppositely arranged, that is, are diametrically opposite, so as to exert balanced action.

Each detent is supported for rotation about its own axis and for slight bodily movement radially away from the wheel 15 and yet is constrained against bodily revolution with the wheel. This may be conveniently accomplished by means of a spring designated at 28 and having a central U-shaped portion 29 embracing one of the flanges 12 of the plate 10. Beyond the U-shaped portion the spring 28 is offset as at 30 and 31 and extended through slots 32 to the rear of the plate 10. The extended portion of the spring provides upper and lower spring arms 33 and 34 terminating in inwardly directed ends 35 and 36 fitted in central openings of the detents 25 to provide the pivots therefor. These intumed ends 35 extend through inclined slots 37 provided in the rear plate 10. The spring 28 is so constituted and tensioned that by virtue of its resiliency it urges the detents into interlocking engagement with the projections of the toothed wheel as indicated in Figure 2 and thus tends to hold the toothed wheel in definite position against rotation.

The outer end of the shaft 7 may be provided with an operating knob 40 to facilitate turning thereof.

With an indexing mechanism of the character described, when the knob 40 is grasped and the shaft 7 is turned the detent wheel 15 turns with the shaft. This causes the teeth 16 engaged with the detents 25 to force the detents bodily outwardly in a direction transversely or substantially ra-

dially of the toothed wheel 15, the intumed ends 35 of the spring 28 moving outwardly in the slots 37 to accommodate this motion of the detents 25. At the same time the detents turn about their axes and as the movement progresses they slide or roll across the top of the teeth with which they are engaged and as soon as they pass their centers snap down or click into engagement with the next adjacent teeth. This action occurs, of course, very rapidly but nevertheless positive and definite positioning of the switch shaft and the movable contacts of the switch sections is insured.

The relations between the length of the side of the square detents 25 and the depth of the angular slot or opening provided between adjacent teeth 16 of the toothed wheel 15 may be varied to give any action desired. It is ordinarily desirable to have this relation: each side of each square detent shall be less than twice the length of the angular face of each tooth 16 of the rotatable detent wheel 15. In this way the square side of each detent will be off center when the detent has been rotated half way between its two normal stopping positions. The smoothness of action and non-stalling between positions are dependent upon the selected configurations of the teeth of the wheel 15 and of the detents and the spring tension behind the detents. Obviously, the tooth configuration and detent configuration may be varied but it is apparently essential that adjacent inclined faces of the teeth of the toothed wheel 15 be contiguous. By providing oppositely disposed detents to coact with the toothed wheel a smooth even though positive action is had.

The construction is such that the indexing device presents a very flat or thin structure so as to take up the least possible space and thus maintain the over-all length of the switching device and indexing mechanism within the lowest possible limits.

Another embodiment of the invention is shown in Figures 7 to 9, inclusive, and, while possessing certain of the broad structural characteristics of the embodiment previously described and also the advantages thereof, differs in certain particular respects as will be hereinafter pointed out.

Referring to Figures 7 to 9, it will be seen that the indexing mechanism there shown comprises a front plate 50 supported on the rods 3 and secured in position by the nut 6. The plate 50 has an opening at its center and the margin of the opening is appropriately fastened to the inner end of a bushing 51 in which the switch operating shaft 52 is rotatably supported. Immediately to the rear of the front plate 50 and also fixedly supported by the rods 3 is a plate 53 which has a large opening formed with a circular series of internal teeth 54. These teeth 54 are pointed and have their bases contiguous and correspond in their broad purposes and function to the teeth 16 of the wheel 15 of the other embodiment of the invention. Immediately to the rear of the toothed plate 53 is a disc 55. At its center the disc 55 is fastened to shaft 52. Split spring washers 56 and 57 snapped into annular grooves provided therefor in the shaft 52 and engaged with the outer end of the bushing 51 and the disc 55, respectively, maintain the shaft 52 against axial movement and also hold the disc 55 flush up against the rear face of the toothed plate 53. Cooperable with the internal teeth 54 of the toothed plate 53 a pair of detents 75

25 are identical with those previously described and having their corners designed to interfit with the teeth 54 in the manner shown in Figure 7. As before, each detent is supported for rotation about its own axis and also for slight bodily movement radially although constrained to bodily rotation with the wheel by means of a spring 58 corresponding to the spring 28 and having a U-shaped portion 59 anchored to the disc 55 by means of a securing lug 60. The ends of the spring are extended inwardly as at 61 through radial slots 62 provided in the disc 55 and are interfitted with the central pivot openings provided in the detents 25. This spring 58 is designed and tensioned so as to resiliently and firmly urge the detents 25 into engagement with the teeth 54.

With this construction, when the shaft 52 is turned the disc 55 turns with the shaft and carries the detents 25 with it. The detents in partaking of this turning movement ride over the points of the teeth 54 and in so doing move radially inwardly and thus snap from engagement with one set of teeth 54 into engagement with another set. During this action they also rotate about the intumed ends 61 of the spring 58. In this way a positive and definite positioning of the switch shaft and consequently of the movable contacts of the switch sections is insured.

The form of the invention shown in Figures 10, 11 and 12 is very similar to that shown in Figures 7 to 9, and, as before, comprises a front plate 50, bushing 51 and shaft 52. The toothed plate which is also fixedly supported on the rods 3 is designated at 63 and differs in construction from the toothed plate 53 only in the manner of forming and arranging its pointed teeth 64. These teeth 64 are pressed out from the plate 63 and present an outwardly facing circular series of teeth instead of a circular series of internal teeth. As clearly shown in Figure 10, a disc 65 corresponding to the disc 55 is also provided and is fixed to the shaft 52 as before. However, because of the provision of an outwardly facing circular series of teeth the slots in the disc 65 which are designated at 66 are located at the periphery of the disc. They accommodate the intumed ends 61 of the spring 58 which is also anchored to the plate 65 by a lug 67. The ends 61 are pivotally connected with the detents 25 as before. The action of this structure is identical with that shown in Figures 7 to 9 and, in fact, the two merely differ in the structural respects pointed out.

In the embodiment of the invention shown in Figures 13, 14 and 15 a toothed plate 70 is fixedly supported on the rods 3 by means of the nut 6 and itself serves to support the bushing 51 in which the shaft 52 is rotatably supported. Struck rearwardly from the plate 70 are teeth 71 which

are shaped and arranged to provide a circular series of teeth corresponding in function to the teeth 54 and 64 although extending laterally from the toothed plate rather than in the plane thereof. A spring arm 72 is provided and has its hub 73 fitted on the shaft 52 so as to be constrained therewith. Rotatably mounted on the ends of the arm are the square detents 25 which are positioned to engage the teeth 71 or interfit therewith as clearly shown in Figure 15. The inherent resiliency of the arm 72 biases the detents 25 into interlocking engagement with the teeth 71. Moreover, the spacing of the teeth, their dimensions and the size of the square detents 25 are such that the detents snap up quickly into engagement with successive teeth to insure definite and positive positioning of the shaft upon turning thereof.

While I have shown and described several constructions in which the invention may be advantageously embodied, it is to be understood that this construction has been selected merely for the purpose of illustration or example and that various changes in the size, shape and arrangement of the parts may be made without departing from the spirit of the invention or the scope of the subjoined claims.

The invention claimed is:

1. An indexing mechanism comprising a mounting plate, a toothed wheel rotatably mounted thereon, means for turning said toothed wheel, detents cooperable with the toothed wheel, and a spring anchored on the plate and having a pair of arms, one for each of the detents, each arm terminating in an intumed end providing pivotal mountings for the detents and also for connection between the detents and the spring, whereby upon turning of the wheel the detents will successively click into positive engagement with the teeth of the wheel.

2. An indexing mechanism comprising a pair of mounting plates, a toothed wheel interposed between said plates and rotatably mounted thereon, means for turning said toothed wheel, detents interposed between the plates and cooperable with the toothed wheel, a spring anchored to the plates and having arms exposed exteriorly thereof, there being one arm for each of the detents, one of said plates being slotted adjacent the detents, each arm terminating in an intumed end extending through one of said slots and interfitted with and providing a pivotal mounting for the associated detent, the spring arms being tensioned to urge the detents into interlocking engagement with the teeth of said wheel, whereby upon turning of the wheel the detents will successively click into positive engagement with the teeth of the wheel.

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