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WAVE BAND SWITCHING

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*Fig. 1*

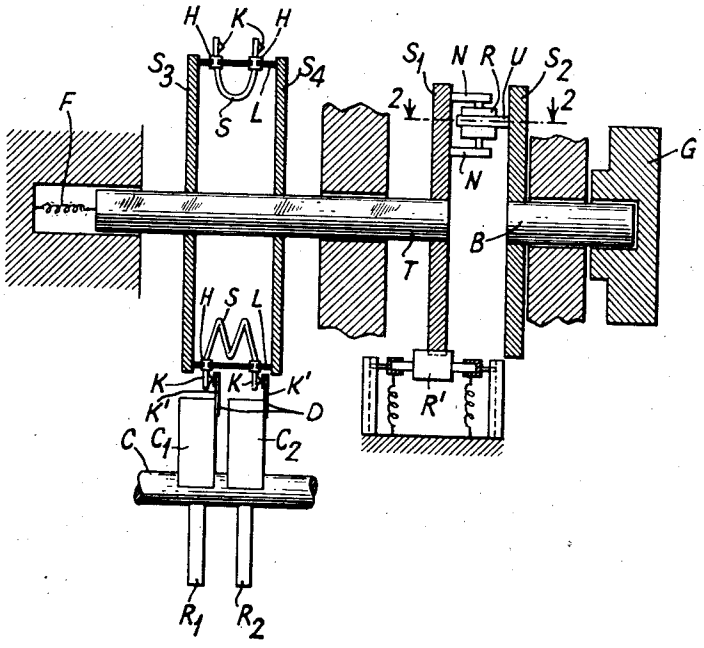
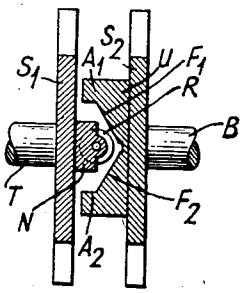



*Fig. 2*




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## WAVE BAND SWITCHING

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3 Claims. (Cl. 200—1)

A magazine or rotary type coil-switch assembly is known in the art for the purpose of effecting a change in the wave-length of radio apparatus in which the contacts to be opened, with a view to minimizing sliding friction, are caused to be lifted at the beginning of the band-change operation by first shifting or disengaging, by the agency of a slide, the shaft or spindle of the coil drum substantially in an axial direction, it being only then that adjustment to the next switch position is effected. However, in this mechanism known in the art, the rotary and the axial motion overlap so that it is inevitable for a certain sliding movement being present. Another inconvenience of this known arrangement is that the operating knob which is secured directly on the drum shaft takes part of the axial shift of the drum shaft.

According to the present invention these difficulties are obviated by providing a distant operating shaft locked with the drum shaft or spindle by means of a slip clutch in such a way that outside a certain range of rotation delimited by stops of the operating shaft, the drum shaft will be positively driven along by and upon turning of the operating shaft, while within the said range of rotation, by the intermediary of a slide, axial displacement of the drum shaft is effected upon rotation of the operating spindle.

With such an arrangement conditions can be made so that the movement of revolution of the drum will occur only when the axial or translatory motion has been terminated, that is, when the contacts have been lifted clear. Inversely, upon a change to the next position, first the rotational movement is finished, and it is only when this has happened that the inverse axial movement of the drum shaft is able to take place with the result that the contacts are again subject to pressure to make engagement.

Rotation of the drum inside the range or angle of rotation demarcated by the stops of the operating shaft will be safely avoidable especially if the drum shaft is fitted with detents for the various switch positions, the pressure thereof being chosen so high that actual drive of the drum shaft by the operating shaft will be feasible only near or at the limits of the range of rotation delimited by the stops.

The drum shaft is preferably locked in position by the aid of a mechanically acting retractile force, arrangements being made so that it is capable of being shifted more or less away therefrom by the agency of the slide in opposition to the restoring or retractile force.

The present invention is more particularly adapted for wave-band switching in ultra-short-wave apparatus. For it will be understood that by the ways and means here disclosed the fixed contact springs which in prior practice have mostly been lifted by the agency of cams, may be made extremely short and, if desired, to secure the same directly on the tuning means which is not subject to switching or change, for instance, the rotary condenser. Still, there is no sliding of the contacts so that the latter can be made from a rare metal with the result that the oscillation circuits are subject to less damping.

An exemplified embodiment of the invention is illustrated in Figs. 1 and 2 which schematically illustrate a magazine or rotary type coil-switch arrangement adapted to an ultra-short-wave apparatus. Fig. 1 is an elevation, while Fig. 2 shows a part of the arrangement in section taken on a horizontal plane indicated by the dash-line 2—2 in Fig. 1. Upon the right-hand end of the drum shaft T supporting the coils is seated a disk S1 which bears a cam N in the neighborhood of its periphery. Journalled in the cam is a roller R. A compression spring F comes to bear against the left-hand or rear end of the drum shaft so that there is a tendency for the shaft being forced towards the right-hand side.

Operation of the change-over switch is effected by means of the operating spindle B mounted in co-axial relation to the drum shaft. At the anterior end, the said operating shaft B is fitted with a knob G, while at the rear end facing the drum shaft and disk $S_1$ there is seated a disk $S_2$. The disk $S_2$ is furnished adjacent its periphery with a slide U which comprises a notch with steep slopes F1 and F2 and stops A1 and A2.

The two disks S1 and S2 are so arranged that the roller R is disposed within the notch of the slide U.

The figures of the drawing show that two shafts in a position in which the contacts K, K', are closed or engaged. The disk S1 has recesses or incisions upon its periphery in which a roller R' yieldingly engages so that there is an arrester action in the various switch positions.

As the operating shaft B is turned the roller R is caused to roll on one of the sloped surfaces F1 or F2 of the slide U. Roller R' prevents rotation of the drum shaft. In fact, the drum shaft initially is merely shifted in an axial sense so that the contacts K, K' are opened. It is only at the instant when the tappet A1 or A2 abuts the opposite edge of the cam N that the drum shaft wlil respond to the torque exerted by the operating

shaft until the next switch position of the drum shaft T is reached. The pressure of the spring F, when the knob G is relaxed, will restore the operating shaft B to the normal position of rest as shown, while incidentally the drum shaft is shifted again forwards. As a consequence, the new contacts cut in circuit are engaged.

In order to avoid twisting and distorting of the shafts several, preferably three, such cam and slide means are uniformly spaced around the periphery of the disks S1 and S2. Where this is found to be unnecessary it would also be possible to use arms or brackets to support the cam or slide means in lieu of the disks.

The drum shaft T which is made of ceramic material supports at its mid portion two disks S3 and S3, and on the periphery of the latter are fitted two strips L consisting also of ceramic material. Each of these strips has attached to it on the inside a coil S which for wave-bands down to 1 meter comprises two turns, one turn, or even only one-half turn. The number of these strips is the same as the number of switch positions to be provided, in other words, the same as the number of wave-bands of the apparatus. In the present case it could amount to eight, for instance. Fitted in the strips are bushes H, with the coil ends being soldered in the openings upon the inside, while the contact terminals K are supported on the outside thereof. The co-operating terminals are seated upon short elastic bands K' which are fastened directly on the rotary condenser C disposed below the change-over switch. This condenser consists of two stator plate packets C1 and C2, and each of these is in conductive relation with a contact terminal carried by band K'. Rotor plate packets R1, R2, being conductively connected but otherwise insulated are so arranged that they may be meshed with the stator plates to any desired depth.

In the present instance only one circuit is changed. It will be understood that upon the drum shaft T also a plurality of such coil assemblies could be disposed, each thereof pertaining to an oscillatory circuit to be changed over. Directly below each set of coils must be mounted a rotary condenser in a way as shown in the drawing.

If desired, detent positions may be arranged also on the operating shaft B.

It will be understood that the invention will be found useful also in cases where the drum supports other circuit or tuning means say, condensers or tubes, rather than coils.

What I claim is:

1. In a switching device of the type provided with a rotatable drum carrying on its periphery a plurality of spaced contacts which are adapted to selectively cooperate with a stationary contact, mechanism to enable the successive engagement with the stationary contact of the contacts carried by the drum without the use of sliding contact therebetween comprising driven and driving shafts which are axially disposed in spaced relation, the driven shaft having mounted thereon the contact carrying drum, a disk carried by each of said shafts at their adjacent ends, and a cam and a follower carried respectively by opposing faces of said disks so constructed and arranged to provide distinct slidable and rotatable motions of the driven shaft upon rotary motion of the driving shaft, that during the initial rotation of the driving shaft through a predetermined range the driven shaft and incidentally the drum and its contacts are shifted axially a sufficient amount to disengage one of the latter contacts from the stationary contact, continued rotation of the driving shaft imparting rotary motion to the driven shaft while still in its axially shifted position, the driving shaft at its next position of adjustment permitting the driven shaft to return to its normal position thereby enabling another of the contacts carried by the drum to engage the stationary contact.

2. In a switching device of the type provided with a rotatable drum carrying on its periphery a plurality of pairs of contacts which are adapted to selectively cooperate with a pair of stationary contacts, switching mechanism to enable the successive engagement with the pair of stationary contacts of the pairs of contacts carried by the drum without the use of sliding contacts comprising a driven shaft and an operating shaft, said shafts being axially disposed and in spaced relation, the driven shaft having mounted thereon the contact carrying drum, a disk carried by each of said shafts at their adjacent spaced ends, at least one pair of means including a cam and a follower carried by opposing faces of said disks which cooperate to provide distinct slidable and rotatable motions of the driven shaft upon rotary motion of the operating shaft between successive switch positions, and means cooperating with the disk carried by the driven shaft for defining its various switch positions, the arrangement being such that during the initial rotation of the operating shaft through a predetermined range the driven shaft and incidentally the drum and its contacts are shifted axially a sufficient amount to disengage one pair of the latter contacts from the stationary contacts, continued rotation of the operating shaft imparting rotary motion to the driven shaft while still in its axially shifted position, the operating shaft at its position of adjustment for the newly adjusted position permitting the driven shaft to return to its normal position thereby enabling the pair of contacts corresponding to the latter adjusted position to engage the stationary contacts.

3. In a switching device of the type provided with a rotatable drum carrying on its periphery a plurality of pairs of contacts which are adapted to selectively cooperate with a pair of stationary contacts, switching mechanism to enable the successive engagement with the pair of stationary contacts of the pairs of contacts carried by the drum without the use of sliding contacts comprising a driven shaft and an operating shaft, said shafts being axially disposed and in spaced relation, the driven shaft having mounted thereon the contact carrying drum, a disk carried by each of said shafts at their adjacent spaced ends, at least one pair of means carried by opposing faces of said disks which cooperate to provide distinct slidable and rotatable motions of the driven shaft upon rotary motion of the operating shaft between successive switch positions, said means comprising a V-shaped cam member having terminal abutments and a roller carried by a member also having terminal abutments, means cooperating with the disk carried by the driven shaft for defining its various switch positions, and a spring for normally urging the driven shaft in a direction such that the roller lies at the bottom of the V-shaped cam and incidentally the contacts are in contacting relation with the stationary contacts, the arrangement being such that during the initial rotation of the operating shaft until the corresponding terminal abutments

of the roller and cam member are in contact, the driven shaft and incidentally the drum and its contacts are shifted axially a sufficient amount to disengage one pair of the latter contacts from the stationary contacts, continued rotation of the operating shaft imparting rotary motion to the driven shaft while still in its axially shifted position, the operating shaft at its successive position of adjustment permitting the driven shaft to return to its normal position thereby enabling the pair of contacts corresponding to the latter adjusted position to engage the stationary contacts.

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