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RADIO FREQUENCY SWITCH
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Fig. 1

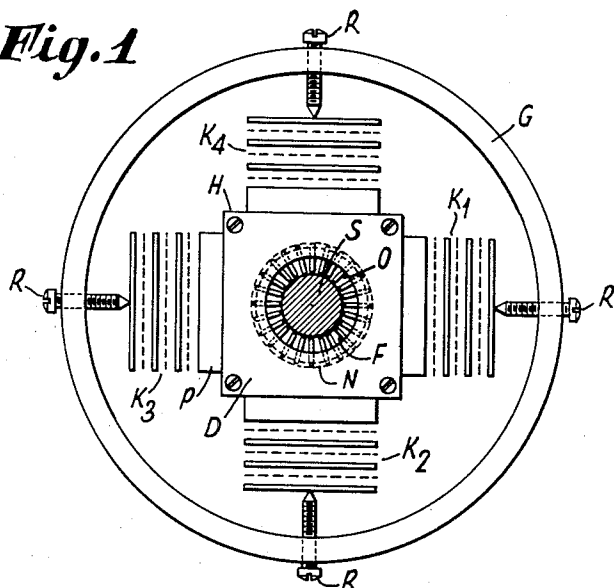
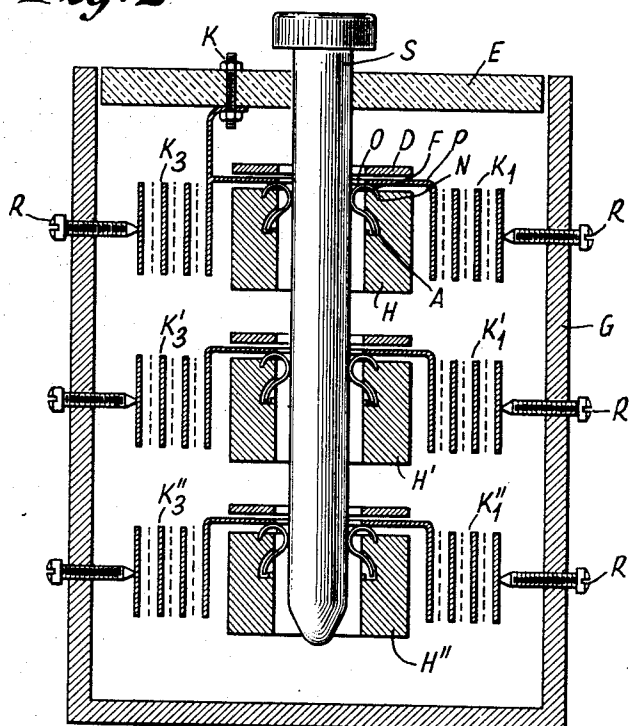


Fig. 2



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RADIO FREQUENCY SWITCH

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8 Claims. (Cl. 175-41.5)

This invention relates to a new and novel radio frequency switch which is especially adapted for short wave circuits.

An object of this invention is to eliminate the defect of imperfect, insufficient contact in transmitters used on both long and short wave circuits, and is accomplished by the arrangement of a plurality of wire springs, cage-fashion, around a circular conductor, each of these springs insuring safe and perfect and uniform contact.

The types of switch known in the earlier art are more or less unserviceable for high-frequency, especially short waves, when large currents and high voltages are used. The underlying reason resides in the special conditions surrounding high frequency work. Where switches intended to handle high-frequency currents are concerned, one problem is to make the path of the current as short and linear as possible in order that the inductance of the path may be minimized. The other problem is to prevent the field from becoming particularly intense at some local point as a result of dissymmetric distribution for this is liable to lead to a dissymmetric current load of the contacts or even sparking at undesired places, for this is likely to lead to the destruction of the contacts. At the same time, the contact-making area should be as large as feasible and should be safe and be dependable at a maximum number of points.

All of these requirements are fulfilled in excellent manner by the switch of this invention in which, interiorly of a hollow body a series or bank of contact springs being interconnected and serving as a switch contact are distributed over its circumference in such a uniform manner that there results an opening into which a metallic rod forming the cooperating contact and shiftable in axial sense may be inserted so that it will cause the contact springs to spread apart.

The chief advantage of the invention resides in the symmetric arrangement, for the disposition of a great number of individual springs insures a practically symmetric field. The contact is resolved or divided into a series of paralleled and symmetrically disposed solitary contact points, and the contact conductance of these may be rendered alike since each of the springs is adjustable separately. The contacting of each spring may be insured practically in one point, while the contact pressure can be made very high. The path over which the current is made to flow is comparatively short and straight. These merits of the invention become particu-

larly manifest when the hollow body has a cylindrical hole and when the springs form a circular opening into which a cylindrical rod is shifted.

5 The line may be connected with the rod, for instance, by means of a flexible and movable strand or cable or the like. However, a preferable plan is to mount two or more hollow cylinders comprising symmetrically mounted springs
10 are superposed coaxially and insulated from one another that the rod will pass through all of the hollow cylinders so that, by axial shifting, one bank of springs is united with the other. The leads or circuit elements to be connected together
15 are then united each with a distinct bank of springs.

An exemplified embodiment of the invention is shown in Fig. 1, this being a top view after removal of the upper closing lid E. Fig. 2 is a cross-sectional view. The embodiment shows a step condenser for radio frequency. In a metallic case of cylindrical shape G are disposed three similarly shaped metal squares H, H', H'' with cylindrical bores O so as to be placed in superposition and coaxial and insulated from one another. Each of the squares has an annular groove on its top face into which are fitted the ends of a row of hook-shaped springs F. The ends of the springs are anchored in position by
20 means of annularly recessed contact plates fitted thereon as indicated at P, while the latter, in turn, are held in position by a flange-like clamp or pressure plate D fitted on them and screwed fast on the four corners of the square. The
25 springs F are preferably made of cylindrical copper wire. Shiftable in the bores is the metallic switch column S of cylindrical shape. The lower end of the said rod-like column or pillar is tapered conically so that the rod when pushed into
30 the bore causes the springs to spread apart symmetrically in the presence of sliding friction until they have assumed the operating position. In this latter position the bottom ends of these springs bear firmly against the outer edge of the
35 milled recess A formed in the interior of the bore O. The springs may be individually adjusted in a simple manner so that the contact pressure of all the springs becomes of like amount. Each of the three groups of banks of
40 springs is united with a coat of the condenser group; and each of the condenser groups, in turn, comprises four paralleled condensers disposed in circular symmetry. In other words, the upper stage contains the four condensers designated by K1, K2, K3, K4; the second stage the

condensers K1', K2', K3', K4', and the lowermost stage the condensers K1'', K2'', K3'', K4''. The switch shaft S is constantly united with the upper group of springs and thus with the top stage or group of condensers. Each of the condensers, say, K1 comprises a series system of several individual condensers, in other words, of several coats separated by insulation. The innermost coat is formed by bending over a projecting flap or lug of the contact plate P so as to be positioned parallel to the cylinder axis and as a result very perfect contact is established between the condenser and the switch springs F. The outer coat of each condenser is united with the casing G in that a screw R inside the casing compresses the condenser packet in the direction towards the cylinder axis. These screws establish not only conductive connection between the outer coats and the casing, but they also hold the entire stage inside the casing. If desired, in order to improve the conductive connection, a separate connecting lead may be provided between the outer condenser coat and the casing.

The outer casing is grounded, while the inner coat of the uppermost stage condenser is fixedly and conductively connected with a terminal K fitted into the closing plate or lid E consisting of insulation material. The said terminal could, of course, consist also of a metallic ring which would then serve at the same time to afford a hold for the switch pillar or shaft.

In case a relatively high initial capacity is desired, it will be advantageous to provide four stages or tiers, and of these the ungrounded coats of the first two stages are permanently in conducting relation with the switch shaft S and thus with the terminal K, while in the two bottom condenser groups the switch column may be introduced at will.

The arrangement as shown insures a strictly symmetric and concentric positioning of the wires with a very low resultant inductance; at the same time it represents a very compact efficiently organized construction unit.

The motion of the rod-shaped switch pillar S may be effected in any desired manner at all either from a remote or from a neighboring control or operating point.

A plurality of step condensers of this kind may be disposed adjacent or behind one another, and they may be fitted with joint switching and notching means. When disposed in superposition, a common switch shaft may be provided which has insulation pieces at intermediate points. In this case, the arrangement could also be modified in this way that the shaft of each step condenser does not represent a straight line, but a part of a circular ring, with the various condensers being mounted one behind the other upon the circular ring, while the switch pillar passed through all of them is also a circular ring.

Moreover, the arrangement could, of course, also be modified in this manner that the rod-shaped switch pillar is immobilized, while the hollow cylinders carrying the springs are shifted.

Finally, the following modified embodiment is feasible in which, upon the exterior of a cylinder, a row of contact springs is disposed in circular symmetry in such a fashion that the springs form a circle while above this circle is shifted a metallic axially shiftable hollow cylinder in such a way that it compresses the springs.

What is claimed is:

1. A short wave radio frequency switch for

switching a group of electrical units in circuit comprising a metallic casing member, an insulating cover secured to said casing, a metallic slidable switch member arranged to slide through said insulating cover, a plurality of metallic blocks having a central bore with radially extending slots, a plurality of conductively interconnected contact springs arranged in said radially extending slots, said blocks arranged in a tier within said casing and serving with said springs as switch contact means equally distributed over the periphery of said metallic slidable switch member so that there remains an opening in which said metallic member acts as the cooperating contact to close said switch, said contact springs arranged in a plurality of superimposed groups, said group of electrical units being interposed between said casing and each group of contact springs, said slidable member arranged to connect each group of said electrical units together in parallel as it is moved through said cover.

2. A short wave radio frequency switch comprising a cylindrical metallic casing member, an insulating cover secured to one end of and completely enclosing said casing member, a rod-like metallic switch member slidably arranged to pass through the axis of said insulating cover, a plurality of metallic blocks having a central bore and radially extending slots, a plurality of contact springs serving as switch contact means located in said slots, said contact springs arranged so that when said switch member is telescoped within said springs the switch is closed.

3. In means for switching a plurality of electrical units into a circuit, a metallic casing member, an insulating cover secured to said casing member, a plurality of metallic hollow bodies having apertures therein supported by said casing, one of the end faces of said hollow bodies having formed thereon a plurality of radially extending slots, a plurality of hook-shaped springs secured in said slots, a plurality of pressure plates secured to one end of said hollow bodies for retaining said hook-shaped springs thereto, and a metallic slidable switch member arranged to slide through said insulating cover, said electrical units being interposed between said hollow bodies and said casing member, the slidable switch member arranged to connect said electrical units together by telescoping one of its ends through and contacting said springs.

4. In means for switching a plurality of electrical units into a circuit, a circular metallic casing member, an insulating cover secured to said casing member, a plurality of metallic hollow bodies having apertures therein supported by said casing, one of the end faces of said hollow bodies having formed thereon a plurality of radially extending slots, a plurality of hook-shaped springs secured in said slots, a plurality of pressure plates secured to one end of said hollow bodies for retaining said hook-shaped springs thereto, a plurality of bent contact plates interposed between said hollow bodies and said spring members, a metallic slidable switch member arranged to slide through said insulating cover, said electrical units being interposed between said bent contact plates and said casing member, the slidable switch member arranged to connect said electrical units together by telescoping one of its ends through and contacting said springs.

5. In means for switching a plurality of electrical units into a circuit, a metallic cas-

ing member, an insulating cover secured to said casing member, a plurality of groups of superimposed rectilinear contact members having apertures therein and supported by said casing, each group of contact members arranged in a tier, one of the end faces of said rectilinear contact members having formed thereon a plurality of radially extending slots, a plurality of hook-shaped springs secured in said slots, a plurality of pressure plates secured to one end of said contact members for retaining said hook-shaped springs thereto, a metallic slidable switch member arranged to slide through said insulating cover, said electrical units being interposed between said superimposed rectilinear contact members and said casing member, the slidable switch member arranged to connect each group of superimposed rectilinear contact members together in parallel.

6. In means for switching a plurality of electrical units into a circuit, a metallic casing member, an insulating cover secured to said casing member, a plurality of hollow bodies having a cylindrical bore supported within said casing member, a metallic slidable switch member, one of the end faces of said hollow bodies having formed thereon a plurality of radially extending slots, a plurality of hook-shaped springs located in said slots, a plurality of pressure plates secured to one end face of said hollow bodies to retain said springs in said slots, said metallic slidable switch member arranged to be capable of telescoping within said hollow bodies to connect said electrical units together in parallel.

7. A short wave radio frequency switch for switching electrical units comprising a cylindrical

metallic casing member having an opening at one end thereof, an insulating cover having an aperture therein and secured to the opening in said casing member, a rod-like metallic switch member slidably arranged to pass through the aperture in said insulating cover, a plurality of metallic blocks having a central bore and radially extending slots, a plurality of contact springs serving as switch contact means located in said slots, and a clamp plate secured to said central bore for retaining said contact springs thereto, said contact springs and metallic blocks being arranged so that when said switch member is telescoped within said springs the switch is closed.

8. A short wave radio frequency switch for switching electrical units comprising a cylindrical metallic casing member having an opening at one end thereof, an insulating cover having an aperture therein and secured to the opening in said casing member, a rod-like metallic switch member slidably arranged to pass through the aperture in said insulating cover, a plurality of rectilinear metallic blocks serving as a central abutment member for retaining a plurality of electrical units which are interposed between said casing and said rectilinear blocks, a plurality of contact springs serving as switch contact means located within said rectilinear metallic blocks, said contact springs arranged so that when said switch member is telescoped within said contact springs the electrical units are connected together in parallel.

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