Dec. 20, 1932. S. A. SHAPIRO 1,891,247

SWITCH

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Fig. 1.

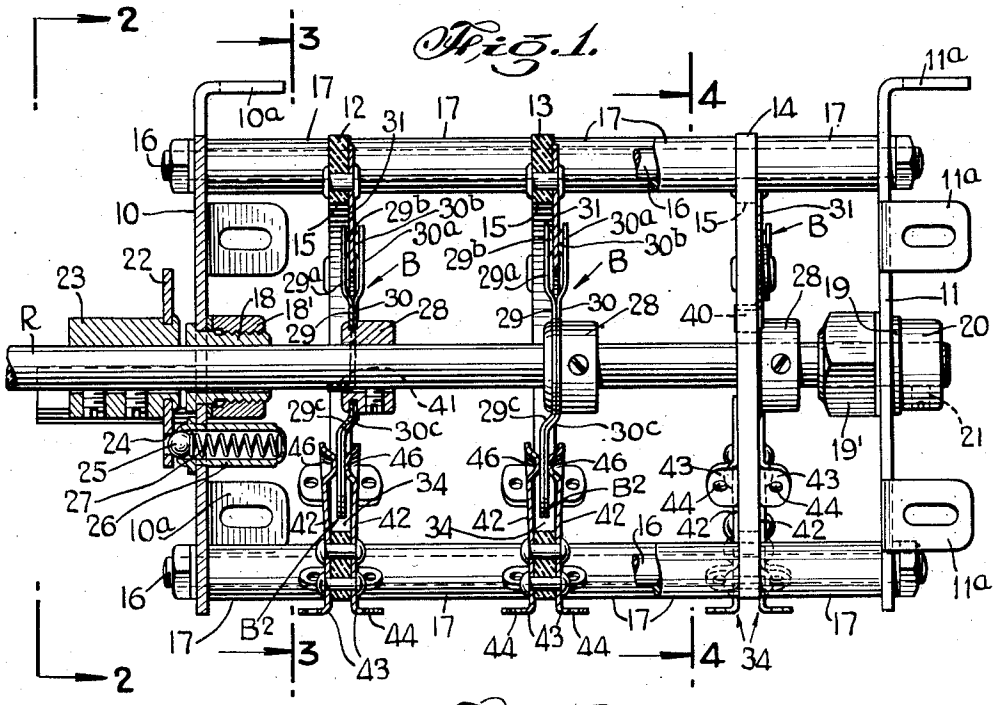
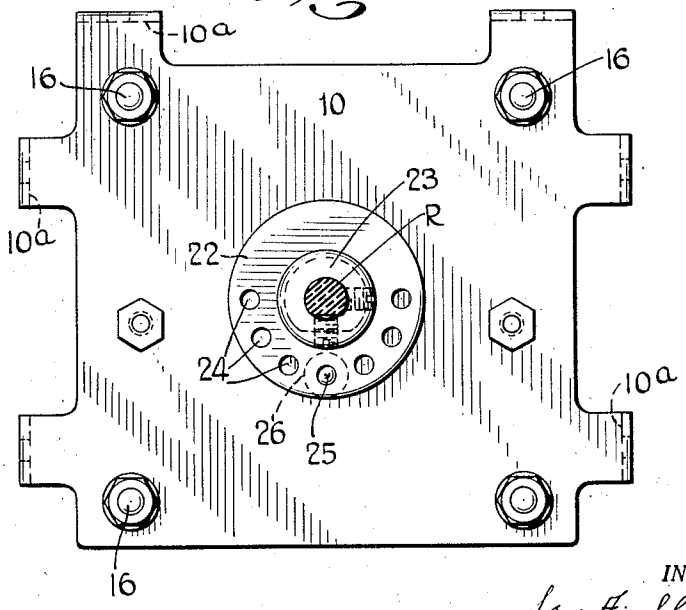


Fig. 2.



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Fig. 3.

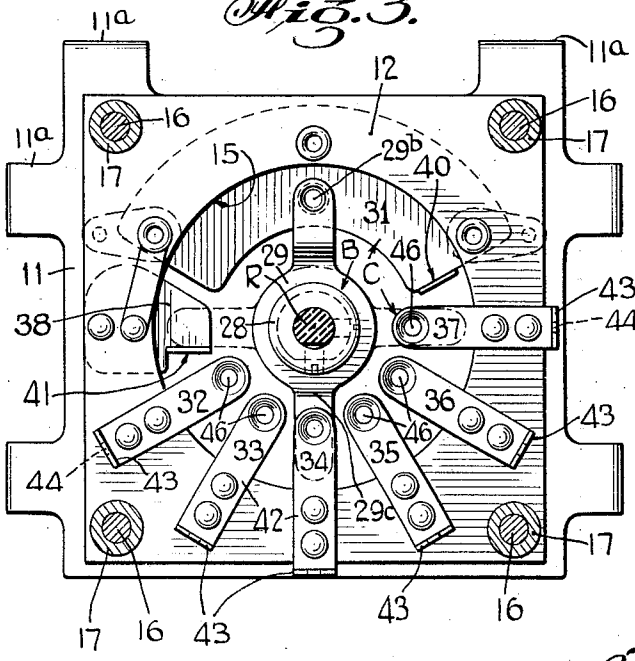


Fig. 5.

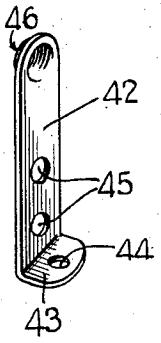


Fig. 4.

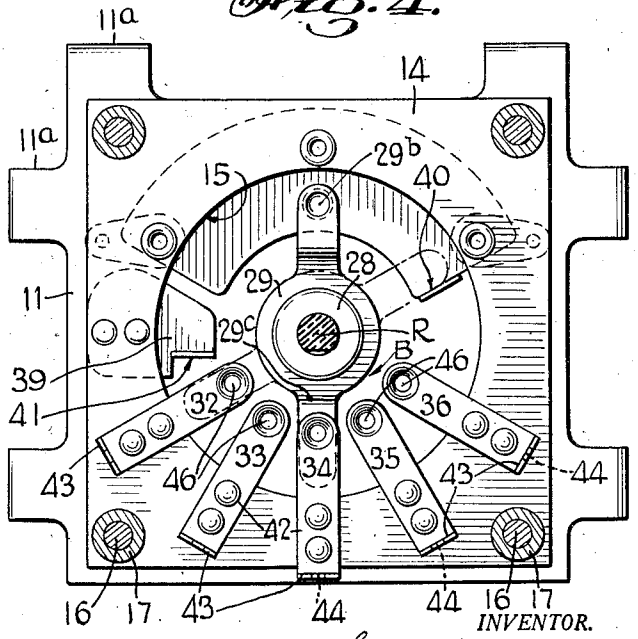
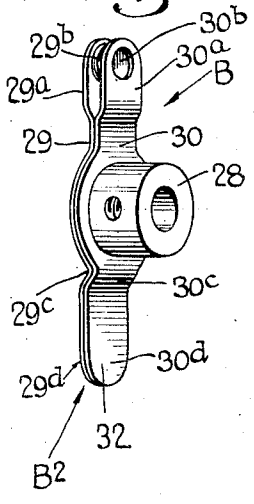


Fig. 6.



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SWITCH

Application filed December 10, 1931. Serial No. 580,019.

This invention relates to improvements in switches, being particularly directed to devices capable of application in radio and allied types of electrical circuits.

Broadly, it is an object of this invention to provide a switch for use in radio and allied fields where it is necessary to control tuned radio circuits wherein inductance, capacitance and resistance factors introduced by the elements forming the switch must be taken into consideration with respect to their tendency to affect the electrical conditions present in the elements forming part of such circuits.

Up to the present time it has been common practice in the radio field particularly, to employ the various types of well-known rotary tap, rotary snap, knife-blade and so-called anti-capacity switches, which switches, although they were efficacious in carrying out the requirements of lighting and power circuits, are of a nature and construction as to introduce unwanted and detrimental electrical circuits in the nature of resistance, inductance and capacitance factors which, when encountered in very delicate and sharply tuned radio circuits, have a tendency to cause sufficient variation of the conditions required in such circuits as to alter and hamper the introduction of the proper degree of selectivity and efficiency in such radio circuits.

To obviate then, the various difficulties and detrimental effects above noted, in the application of the ordinary form of power and light switch in radio and allied circuits, the applicant has developed for use, particularly in short-wave receiving circuits, but having similar beneficial results in efficiency in all other types and forms of radio and allied circuits, a switch of the rotary type and embodying, in general, a wiping action in conjunction with a positive contact, the elements forming the contact plates and contact blades being of a nature and formation to eliminate corrosion and development of unwanted resistance and contact potentials, such elements being properly spaced to minimize capacity and directly connected to minimize and practically reduce to zero inductance effects.

In general, then, it is an object of this invention to provide a switch for use in radio and allied fields which, having the structural formation capable of providing proper wiping contact and, at the same time, eliminating the introduction of unwanted capacitance, inductance and resistance effects, which switch, when operated, due to its arrangement of cooperating contacts, will cause the introduction or removal of electrically functioning elements of varying nature and degree with respect to the circuits of which such switch is applied, it being particularly the object of this invention to apply a series of individual units operable from the same shaft, to provide the introduction of such electrically functioning elements, as above specified, in any or all of the several circuits involved in a radio or allied electrical apparatus.

These and other advantages, capabilities, and features of the invention will appear from the subjoined, detailed description of one specific embodiment therefor illustrated in the accompanying drawings, in which

Figure 1 represents a side elevation of a switch with some of the parts broken out in section.

Figure 2 is an end view along lines 2—2 of Figure 1.

Figure 3 is a side elevation taken along lines 3—3 of Figure 1.

Figure 4 is a side elevation taken along lines 4—4 of Figure 1.

Figure 5 is a perspective view showing a detail of a contact plate.

Figure 6 is a perspective view showing a detail of the blade member.

Referring to the reference characters in the drawings, numerals 10 and 11 represent end plates formed of stamped metal and having projecting lugs 10*a* and 11*a* formed thereon, there being adapted to be mounted on said projecting lugs various elements applied in the circuit in which such switch is present, particular elements mounted on the lugs being, in this case, inductance coils (not shown).

Between the end frames 10 and 11 are disposed in spaced relationship a series of contact carriers 12, 13 and 14, each in the form of

strips formed of non-conducting material, such as of a phenolic condensation product, and having central apertures 15, the said carriers being attached to the end frames by means of rods 16 passing through the same at the respective corners thereof, the said rods being threaded at their respective ends and bolted to the end frames 10 and 11; the said contact carriers being separated in spaced relationship one with respect to the other by means of collar section 17 mounted on the metal rods and resting against the faces of the respective carriers.

A rotor shaft R formed of a phenolic condensation product is adapted to pass through the apertures 15 of the contact carriers and through apertures formed in the end plates 10 and 11, the said rotor shaft being mounted for rotation within bearings 18 and 19 formed on the opposite end plates 10 and 11, the said bearings being formed of male and female members respectively, threaded so as to be locked by lock nuts 18′ and 19′ disposed respectively at the opposite sides of each end plate. On one end of the shaft, adjacent the end plate 11, there is disposed collar 20, which is fixed to said shaft by means of a set screw 21 to limit, in conjunction with the nut of the bushing element 19, the lateral displacement of rotor shaft R. At the other end of the shaft is mounted an index plate 22, carried on bushing 23, which bushing is fixed to the shaft by means of set screws shown in Figure 1, the said index plate having thereon a plurality of apertures 24 (see Figure 2), which are adapted to cooperate with the ball bearing 25 carried in ball casing 26 disposed in the end wall 10 below the shaft, the said ball bearing 25 being constantly pressed outwardly into one of the respective apertures on the index plate disposed adjacent thereto by means of spring 27 disposed within the casing and acting there against.

Referring particularly to the rotor shaft R (see Figures 1, 3 and 6), there are mounted thereon in spaced relationship, so as to be disposed for operation in the apertures of the various contact carriers, and disposed in the plane of said contact carriers a series of rotor blades B, the respective rotor blades being riveted to bushings 28 and mounted in spaced relationship, as specified, on the rotor shaft R, by means of set screws disposed in said bushings. As shown in detail in Figure 6, the rotor blades are formed of two stampings 29 and 30, preferably of springy phosphor bronze, riveted to the bushing 28 centrally of their length, as shown in Figure 1, and shaped with respect to their ends in the distinctive manner shown in Figure 6, wherein at one end of each of the blades there are formed offset arm portions 29*a* and 30*a*, so that such arms may form a bifurcation or yoke, while at their extremities of said arms inwardly disposed contact domes having flattened surfaces, 29*b* and 30*b* are formed, it being desirable to have the flattened surfaces of said domes in resilient contact one with the other. The other end of each contact blade is in the form of an offset laminated arm produced by offsetting both stampings 29 and 30, as at 29*c* and 30*c*, and causing the extremities 29*d* and 30*d* thereof to be disposed in parallelism and in resilient contact one with another.

Referring particularly to Figures 1, 3 and 5, there are mounted on the contact carriers 12, 13 and 14, two distinct forms of contacts C, the first an arcuate blade 31 of relatively considerable area, and a series of double or furcated contacts 32, 33, 34, 35, 36 and 37 of relatively small area, there being further provided on contact carriers 12 and 14, relatively small contact plates 38 and 39 respectively (shown in Figure 3).

Each contact plate 31 has an offset section 40 against which the yoked portion of the rotor blade may strike at the extreme position of displacement of the same along the contact plate, there being further formed on short contact plates 38 and 39 projections 41 to limit the displacement of the other laminated portion of the rotor blade. As shown in Figures 1 and 5, the double or furcated contact 32 comprises a plurality of stampings 42 of the nature disclosed in Figure 5, which stampings have offset portions 43 in which are formed apertures 44 for providing soldering points or contact points for leads for elements in the radio circuit in which the switch is adapted to be disposed, two contact plates being adapted to be disposed on opposite sides of the contact carrier and riveted to apertures 45, as shown in Figure 3, thereby to form a furcated element for cooperating with the offset laminated arm portion B2 of the rotor blade, there being formed at the end extremity of each of the said arms double or furcated contact 32 flat surfaced inwardly disposed domes 46, which contact with one another in a manner similar to the domes on the yoke B2 of the rotor blade, so that the offset laminated arm portion B2 of the rotor blade may be fully and properly contacted when it is transposed for wiping action thereagainst.

Referring now to Figures 1 and 2, it should be noted that every setting of the spring pressed ball in the respective apertures 24 of the index plate indicates the displacement of the arms of the rotor blade from one position to the next with respect to the contacts associated therewith, it being obvious that on the dial in front of a radio receiver associated with the aparatus, the respective readings of the index element will be readily translated.

Although in the showing in the drawings no connections have been illustrated indicating the elements related to the respective con-

tacts, be they rotor or the contact plates, it is to be understood that by means of a switch of the type described, proper electrical connections and changes of electrical connections may be made in tuned or other radio and allied circuits in a manner both positive as to the formation and breaking of such connections, and at the same time without introducing any deleterious effects involving introduction of capacitance, inductance and resistance factors into such circuits, all through the medium of the application of a switching mechanism of the nature described, wherein there is a constant wiping contact between flat surfaced portions of domes formed on a yoke contact cooperating with the opposite faces of a single contact strip disposed there between, irrespective of which of the two double or single contact surfaces is being displaced one with respect to the other.

Further, it should be noted that although the rotor blade is shown as having two interconnected blade portions of different natures, one having single and the other having a plurality of contact surfaces cooperating respectively with double and single fixed contacting surfaces on a carrier, it is within the province of this invention to vary the mounting arrangement and number of arms forming the rotor blade and likewise, the number and relationship of the arms forming the contact plates.

It is obvious that various changes and modifications may be made to the details of construction without departing from the general spirit of the invention as set forth in the appended claims.

I claim:

1. A switch of the class described, comprising a series of contact sections, some being in the form of single plates and the others in the form of yoked plates, and a rotor member cooperating simultaneously with a plurality of said contact plates, said rotor member having a plurality of blades, the blades cooperating with the single plate contact being formed of a yoked section surrounding and contacting with both sides of said single plate, and the blade cooperating with said yoked contact plates comprising a unitary section disposed to wipe between said yoked plates contact.

2. In a switch of the class described, a plurality of contact elements, some comprising of a single plate, others of a plurality of plates to form a yoke, and a rotor member cooperating with said contact elements and having a yoked blade between which is disposed the single plate of the respective contact elements, and a single blade disposed to wipe between the yoked contact plates, and domed projections stamped inwardly of each of the furcations of the yoked plates and blades, to provide positive contact with the single plates and blades associated therewith.

3. In a switch of the class described, end frames, a plurality of contact carriers disposed in spaced relationship between said end plates and having central apertures, contact plates disposed on the surface of said contact carriers adjacent the apertures therein, a shaft carried in said end plates and passing through the apertures in said contact carriers, some of the contact plates on the contact carriers being unitary strips, and others combined in the form of yoked strips, and rotors disposed on the shaft and adapted to contact with the respective contact plates of each contact carrier, the said rotors comprising a plurality of arms respectively in the form of a unitary blade and yoked blades to cooperate respectively with the yoked and unitary contact plates.

4. In a switch of the class described, end frames, a plurality of contact carriers disposed in spaced relationship between said end plates and having central apertures, contact plates disposed on the surface of said contact carriers adjacent the apertures therein, a shaft carried in said end plates and passing through the apertures in said contact carriers, some of the contact plates on the contact carriers being unitary strips, and others combined in the form of yoked strips, and rotors disposed on the shaft and adapted to contact with the respective contact plates of each contact carrier, the said rotors comprising a plurality of arms respectively in the form of a unitary blade and yoked blades to cooperate respectively with the yoked and unitary contact plates, and means on said unitary contact plates for restricting movement of said rotor member.

5. In a switch of the class described, end frames, a plurality of contact carriers disposed between said end plates and having central apertures, contact plates disposed on the surface of said contact carriers adjacent the apertures therein, a shaft carried by said end plates and passing through the apertures in said contact carriers, some of the contact plates on the contact carriers being unitary strips and others in the form of yoked strips, and rotors disposed on the shaft and adapted to contact with the respective contact plates of each of the contact carriers, the said rotors comprising a plurality of arms respectively in the form of a unitary blade and yoked blades to cooperate respectively with the yoked and unitary contact plates and a control member on one end plate and operable from said shaft for determining the step by step displacement of said rotors.

6. A switch of the class described, comprising fixed contacts and movable blades, some of the fixed contacts being unitary and others being yoked, some of the movable contacts being unitary and others yoked, the yoked blades of the movable contact being adapted to surround and contact with the unitary

portion of the fixed contacts, and vice versa.

7. A switch of the class described, comprising fixed contacts and movable blades, some of the fixed contacts being unitary and others being yoked, some of the movable contacts being unitary and others being yoked, the yoked blades of the movable contact being adapted to surround and contact with the unitary portion of the fixed contacts, and vice versa, and inwardly disposed resilient domed projections formed on the yoked contacts and blades to provide positive wiping contact of the unitary plate and blades between said yoked blades and plates.

8. A switch of the class described, comprising a series of contacts, some in the form of single plates and others in the form of a plurality of plates in the form of a yoke, and a rotor member comprising a plurality of strips of springy metal stamped to form a unitary blade at one end and a yoked blade at the other end, the said unitary blade of the rotor member being adapted to wipe between the yoked contact plates and the yoked blade of the rotor member wipe against the opposite faces of the unitary contact plate, thereby to provide a two-faced contact and wiping area.

9. A switch of the class described, comprising a series of contacts, some in the form of single plates and others in the form of a plurality of plates in the form of a yoke, and a rotor member comprising a plurality of strips of springy metal stamped to form a unitary blade at one end and a yoked blade at the other end, the said unitary blade of the rotor member being adapted to wipe between the yoked contact plates and the yoked blade of the rotor member wipe against the opposite faces of the unitary contact plate, thereby to provide a two-faced contact and wiping area, each of the elements of the yoked portions of the rotor member and the contact plates having inwardly disposed resilient contact domes.

10. A switch of the class described, comprising a series of contacts, some in the form of single plates and others in the form of a plurality of plates in the form of a yoke, and a rotor member comprising a plurality of strips of springy metal stamped to form a unitary blade at one end and a yoked blade at the other end, the said unitary blade of the rotor member being adapted to wipe between the yoked contact plates and the yoked blade of the rotor member wipe against the opposite faces of the unitary contact plate, thereby to provide a two-faced contact and wiping area, and means for controlling the displacement of said rotor member to align the blade portions thereof with the contact plates.

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