Oct. 31, 1950

G. DE CHAMPS

MULTIPLE SWITCH

2,528,345

Filed Aug. 27, 1946

2 Sheets-Sheet 1

Fig. 1

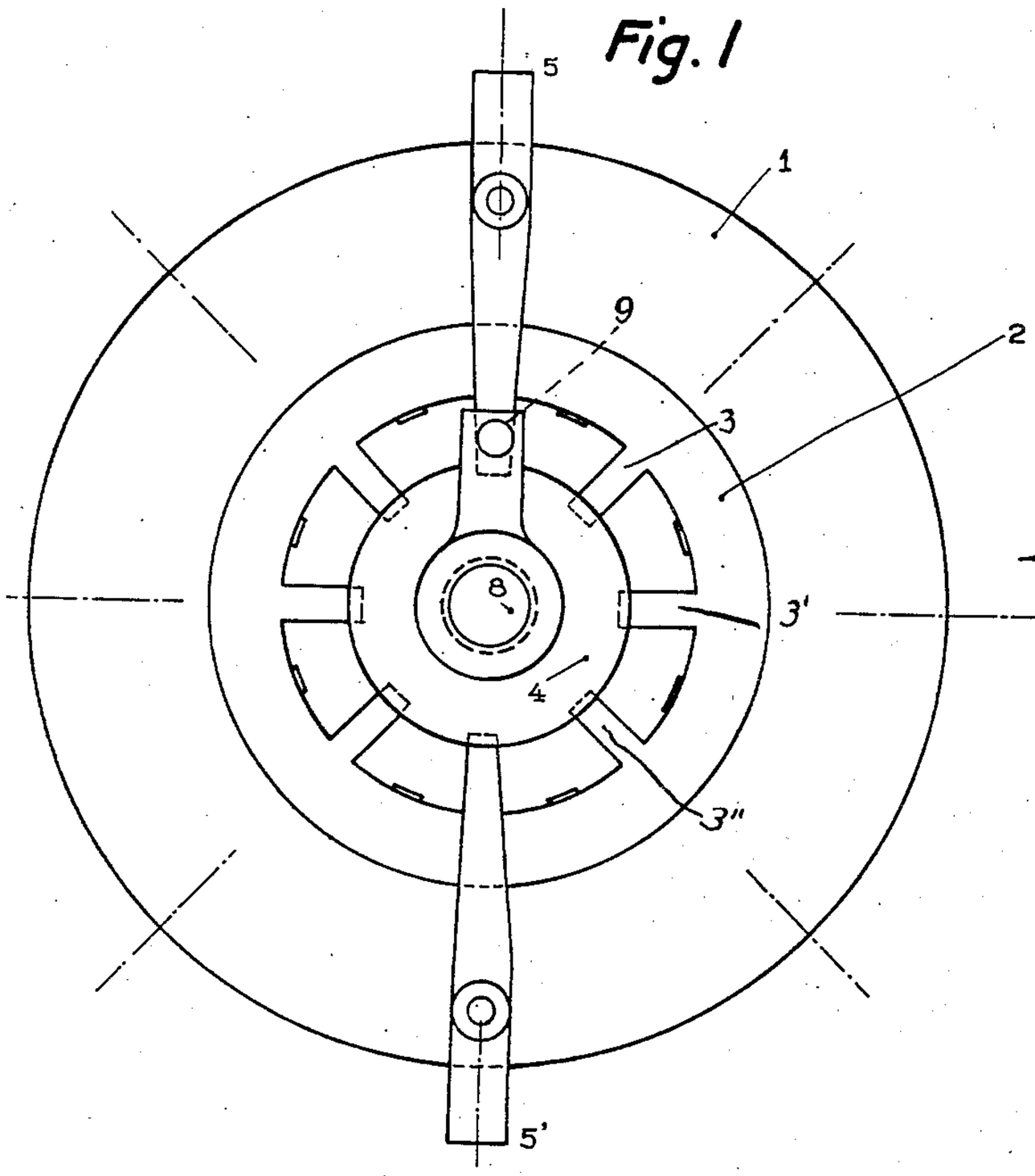


Fig. 2

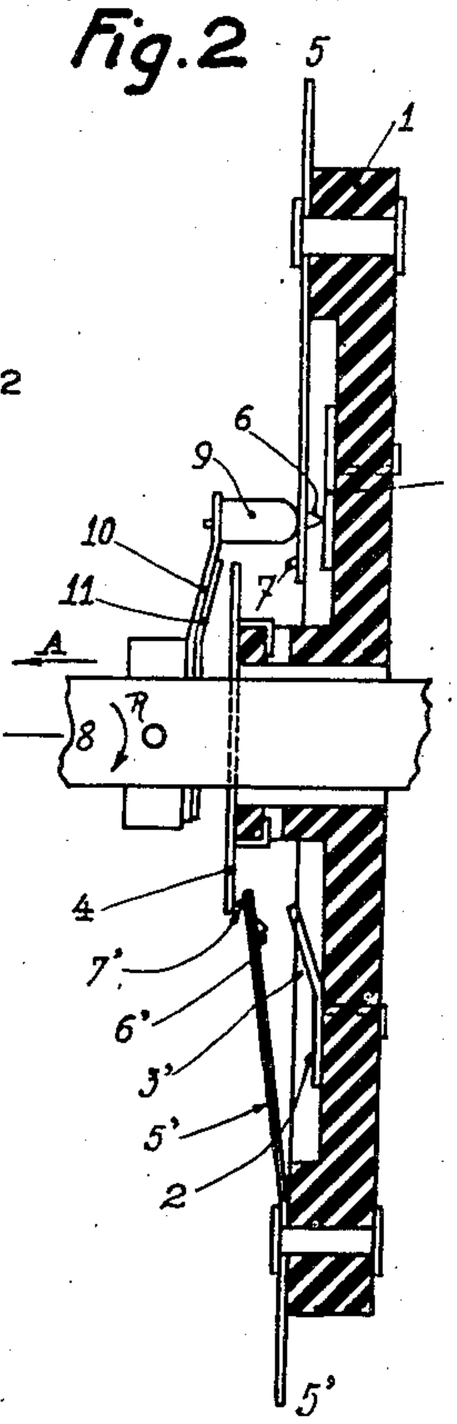


Fig. 3

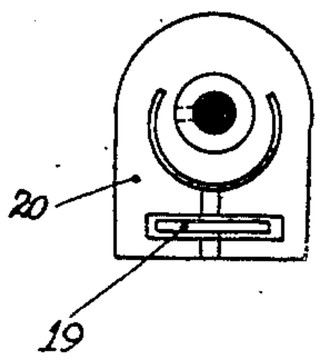


Fig. 4

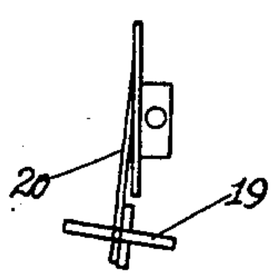


Fig. 5

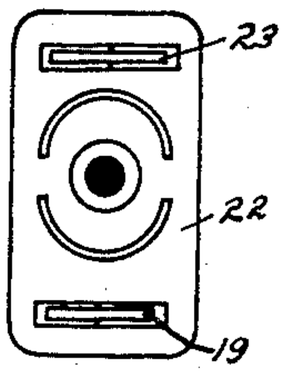
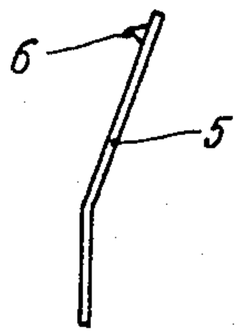


Fig. 6



INVENTOR
GONZAGUE DE CHAMPS
By John B Brady
Attorney.

Oct. 31, 1950

G. DE CHAMPS

2,528,345

MULTIPLE SWITCH

Filed Aug. 27, 1946

2 Sheets-Sheet 2

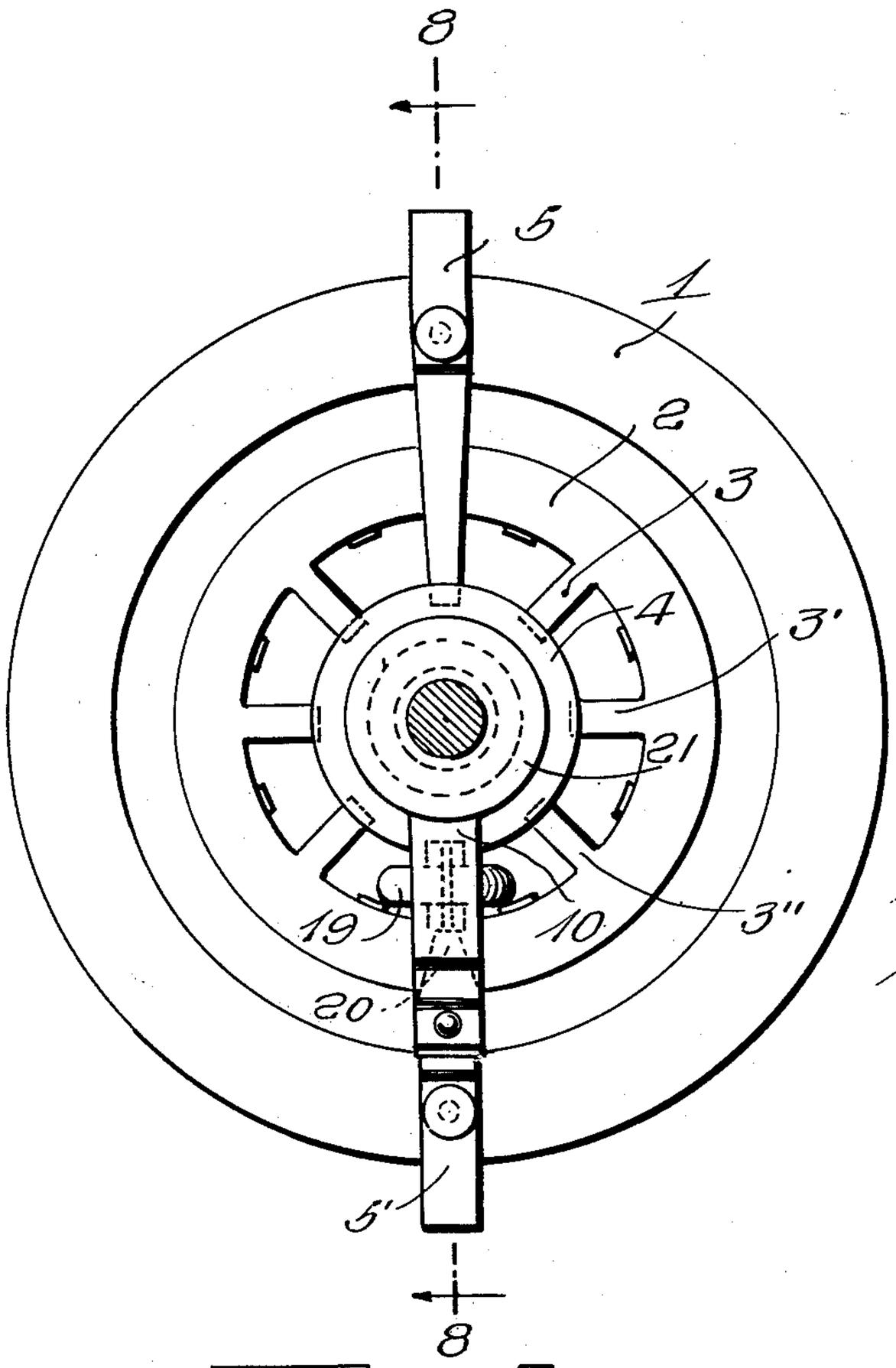


FIG. 7

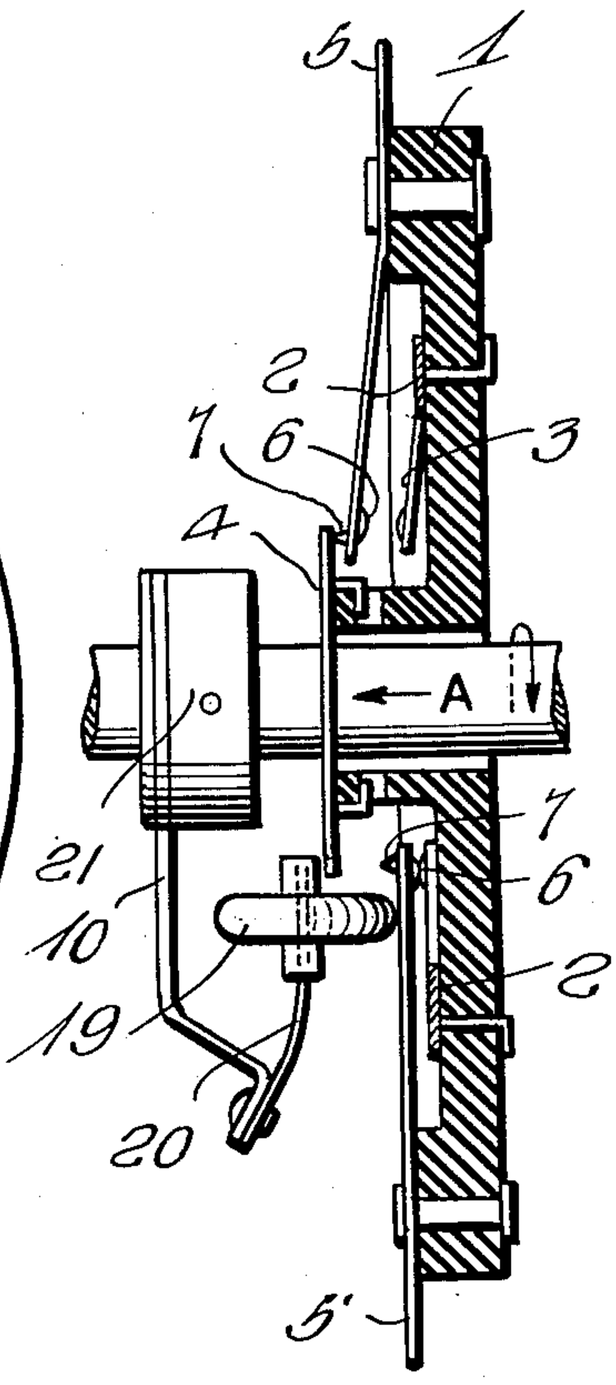


FIG. 8

INVENTOR.
GONZAQUE de CHAMPS,
BY
John B Brady
ATTORNEY

Patented Oct. 31, 1950 2,528,345

UNITED STATES PATENT OFFICE

2,528,345

MULTIPLE SWITCH

Gonzague de Champs, Paris, France, assignor to Societe Francaise Radio Electrique, a corporation of France

Application August 27, 1946, Serial No. 693,281
In France July 13, 1943

Section 1, Public Law 690, August 8, 1946
Patent expires July 13, 1963

3 Claims. (Cl. 200—11)

1

My invention relates broadly to electric circuit controllers and more particularly to a new type of multiple switch.

In radio equipments, frequent use is made of multiple switches of the type known as the disk or wafer form, the principle of which is well known and which may be described briefly as follows: a rotor carrying one or more contacts successively establishes an electric connection between one or more electrically conductive strips radially arranged with respect to sectors which are integral with a fixed part (the stator).

This type of switch offers following advantages: a reduced size for a great number of contacts; the possibility of effecting various electric combinations according to the number of sectors (the number of the strips remaining generally equal to 12); the possibility of short circuiting the non-utilized strips; and an easy and inexpensive construction.

On the contrary, it is possible to find in such switches the following defects: the drawback of having two contacts in series for one operating contact, which increases the probability of bad contact points; a rapid wear; insecure contacts in the course of time either after insufficient cleaning, or owing to a variation of the resilience of the strips, or for any other mechanical cause, such as seizing of the contact stud integral with the rotor; the impossibility of cleaning a dirty contact; a high capacitance between the utilized strip and the other grounded strips, especially when an arrangement is used, that provides for the short-circuiting of the non-utilized contacts; the variation of the resistance of the contact at a given position when the control knob of the switch is turned in one or the other direction.

The present invention provides a multiple switch based on a new principle which avoids the above enumerated defects.

The new switch is represented in the accompanying drawings, where Figure 1 is an elevation view perpendicularly to the rotation axis; Fig. 2 is a sectional view on this axis of the whole of the device; and Figs. 3, 4, 5 and 6 represent detailed elements of a modified form of switch control mechanism embodying my invention; Fig. 7 is an elevational view of a modified form of my invention embodying the elements shown in Figs. 3–6; and Fig. 8 is a sectional view taken substantially on line 8—8 of Fig. 7.

The multiple switch comprises the following parts: an insulating disk 1, a thin metallic blank

2

2, which has been cut out with fins 3, 3′, 3″, etc., and riveted on 1 at the bottom of a groove worked into the thickness of the insulating disk 1, a metallic blank 4 also fixed on 1, metallic springs or resilient strips, such as 5, 5′, 5″, etc., riveted on 1 and carrying on each face of the extremity thereof the pointed contacts 6 and 7, one on each face. In Figs. 1 and 7 of the total number of eight blades, six are removed in order not to obscure the representation of the metallic blank 2 with fins 3, 3′; two blades only, 5 and 5′, having been shown in the drawing. In the actual assembly eight blades similar to 5, 5′ are provided. The control spindle 8 passes freely through disk 1 and carries a combiner consisting of an insulating thrust 9 adapted to press successively against springs 5, 5′, 5″, etc., when spindle 8 is rotated.

The springs 5, 5′, 5″, etc., are so curved before being mounted that when in place, contacts 7, 7′, 7″, etc., have to "set" against the metallic blank 4 which is fixed on an extra-thick portion surrounding the center of disk 1; blank 4 constitutes then a short-circuit for all the springs. On the contrary, when thrust 9 presses against one spring (for example against 5 in the arrangement shown), contact 6 presses against fin 3; the same is elasticity deformed and bears afterwards on disk 1. Thrust 9 is mounted on a springy blade 10 tending to press against the disk; the pressure of the contact is determined by the strength of this blade (taking into account, naturally, the reaction of strip 5). This construction provides for compensating for mechanical defects that may have been caused by a faulty mounting, for instance an axle which is not rigorously perpendicular to the disk. By disposing mechanical control means that allow the axle an axial displacement (arrow A) followed by a rotating movement (arrow R) it will be possible to bring thrust 9 to press against springs 5, 5′, 5″, etc., under the condition that a stop 11 limits the movement of the blade 10. It is possible to pass from spring 5 to spring 5″ without actuating the intermediate ones, by means of a suitable mechanical device not described herein; it permits of reducing to a minimum the wear of the switch.

For purposes of decreasing manufacturing costs the combiner consisting of thrust 9 may be replaced by an insulating roller 19 mounted on a blade 20, made of resilient steel cut out as it is represented in Fig. 3, and in side elevation in Fig. 4. Blade 20 is secured to blade 10 extending from hub 21 secured to spindle 8. Spin-

dle 8 is capable of axial movement as indicated by arrow A simultaneously with the rotation thereof. Fig. 4 shows the manner of providing two thrusts wherein blade 22 extends in opposite radial directions from spindle 8 and provides journaling means for the insulating roller 19 adjacent one extremity thereof and roller 23 adjacent the opposite end thereof. Thus, springs 5, 5', etc., are controlled twice for each revolution of spindle 8. A click stop device of a conventional type permits of fixing the positions of the multiple switch; when the control spindle is rotated the roller passes and rolls on all springs. It will be remarked that there is no need of a precise stopping, for a small variation of the rotation angle of the thrust or roller will exert practically no influence on the quality and capability of the contact.

In any case, it is obvious that the thrust or roller will have to press against contact 6 or, if it is not so, it will have to be as close thereto as possible, so as to avoid any deformation of the spring.

Figs. 7 and 8 show elevational and cross sectional assembly views, respectively, of the modified form of my invention employing the elements illustrated in Figs. 3–6. The roller 19 executes 360° of movement in controlling the movement of the springs 5, 5', etc., with respect to contacts 6, 6', etc., and metallic blank 4.

According to the quality required for the contacts and the utilization considered, one may choose different modifications in the mounting; for instance the fins 3, 3', etc., are silvered or even carry riveted studs made of precious metals; or blank 4 is cut out in a star form so as to give more elasticity to the standing-by contacts, this blank being or not silvered or even provided with studs; or the pointed contacts 7 are replaced by a simple incurvation of the springs 5, 5', etc. (Fig. 6); or the contacts 6, 6', etc., are replaced by a punching in the springs.

Of course it is possible to achieve electric combinations at least as varied as with the type working on the disk principle. It is sufficient to cut out blank 2 into two, three, four, etc., insulated parts, as well as, also, blank 4. There must be then provided as many thrusts or rollers as there are electrically distinct parts of blank 4.

The present device offers the following advantages: one single contact in series for one operating contact; a reduced size; the possibility of making varied electrical combinations; a resistance and capacitance of contact which are most constant even with a mechanical stopping of little precision; a small capacity between contacts (especially when use is made of the short-circuiting blank); an extreme smoothness and easiness of manipulation in spite of very high contacting pressures, not depending upon the elasticity of the spring, at least for the operating contacts; a reduced wear; the possibility

of cleaning the contacts; and an easy mounting.

While I have described my invention in certain preferred embodiments I realize that modifications may be made and I intend no limitations upon my invention other than may be imposed by the scope of the appended claims.

What I claim is:

1. A combiner for selectively controlling predetermined electrical connections for the establishment of corresponding electrical contacts, comprising, a disk of insulation material, radially disposed fixed contact members arranged at circumferentially spaced intervals on said disk, the widths of said contact members being substantially less than the spaced intervals therebetween, mobile contact pieces consisting of resilient sheets fixed on one of their ends and disposed relatively to the fixed contact members to coact therewith, a central rotatable shaft, a resilient support fixed on said shaft, an insulating roller carried by said resilient support, the diameter of the said insulating roller being so selected that rotation of the said shaft starting at the moment that said insulating roller occupies a position in one of the said spaced intervals between said contact members causes said roller to mount on the next successive resilient contact sheet, and in taking support against the edge of the latter effects a bending thereof whereby the free end of the said sheet is displaced into normal contact position with the corresponding fixed contact member, the contact pressure being made independent of the resiliency of the sheet.

2. A combiner as set forth in claim 1, in which the resilient sheets which are not in operation at a given moment are carried on a conductive crown serving to put them into short circuit.

3. A combiner as set forth in claim 1, in which the fixed contact members consist of short wings cut in a metal crown and folded to undergo resilient restoration when they are not in operation in forming an angle with the plane of the crown, the normal contact position being located in the plane of the crown.

GONZAGUE DE CHAMPS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
105,697	Kidder	July 26, 1870
523,865	O'Neill	July 31, 1894
1,031,863	Palmer	July 9, 1912
1,092,266	Howe	Apr. 7, 1914

FOREIGN PATENTS

Number	Country	Date
253,601	Switzerland	Nov. 16, 1948