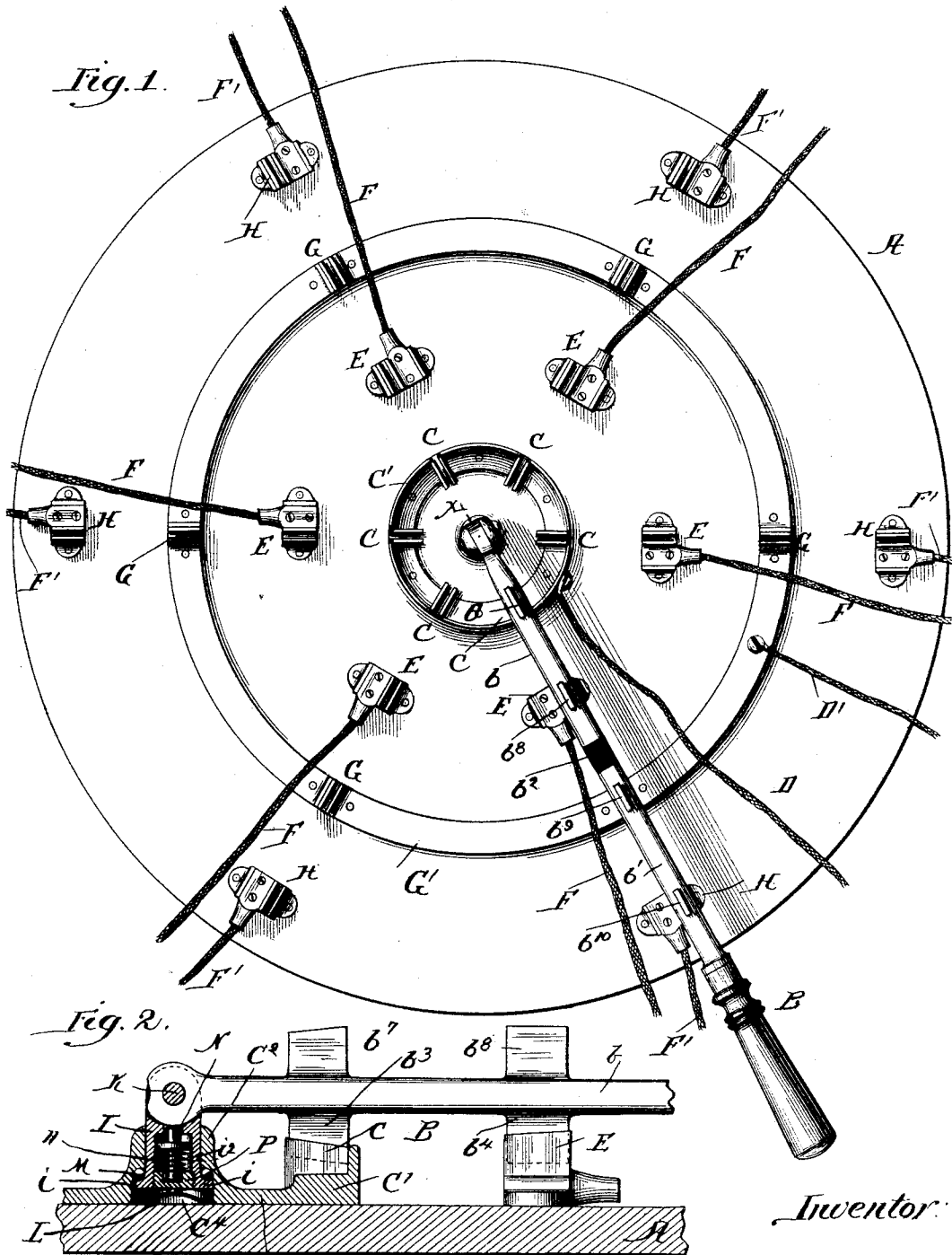


(No Model.)

F. H. SODEN.  
ELECTRIC SWITCH.

No. 473,134.

Patented Apr. 19, 1892.



*Inventor:*

*Witnesses*  
*W. M. M. M. M. M.*  
*M. M. M. M. M.*

*Francis H. Soden*  
*by Chas. G. Page*  
*Attorney*

# UNITED STATES PATENT OFFICE.

FRANCIS H. SODEN, OF CHICAGO, ILLINOIS.

## ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 473,134, dated April 19, 1892.

Application filed October 26, 1891. Serial No. 409,859. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS H. SODEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electric Switches, of which the following is a specification.

The object of my invention is to provide in an electric switch a simple, compact, convenient, and efficient system of and arrangement for making and breaking circuit between the line and any desired number of dynamo-electric machines. My application for Letters Patent of the United States filed on or about July 2, 1891, and serially numbered 398,223, embodies a base provided with contacts distributed in arcs of circles about separate centers and lines radiating from said centers, and a universally-swinging switch-yoke constructed with a couple of parallel arms provided with contacts and insulated from one another by a cross-piece or connection, said arms being separately pivoted at one and the other of the said two centers by universally-jointed swivels.

In carrying out my invention forming the subject-matter of my present application I provide a single switch-arm, which is pivotally held by a universally-jointed swivel upon a base provided with contacts, and arrange along said arm a plurality of contacts or contact portions electrically disconnected or insulated from each other, so as to adapt them for making circuit connections with contacts upon the base. As a simple and convenient arrangement, each contact portion may comprise a pair of electrically-connected blades or contacts set apart with reference to the distance apart of the two contacts of any one pair of contacts on the base with which they are designed to make connection; or in place of such arrangement one long blade or contact, such as suggested in certain other proposed constructions of switches, can obviously be adopted, and hence in the term "contact portion" hereinafter employed I include either or both of said arrangements. The contacts are arranged upon the base in annular sets about the center, whereat the switch-arm is pivoted or about which it is arranged to swing, and said contacts are further ar-

ranged so as to form sets on lines radiating from the aforesaid common center, in which way each line may comprise a contact from each annular set and afford a set of contacts arranged in line and corresponding with the line of contacts on the swinging switch-arm.

Certain details constituting further matters of improvement are hereinafter set forth.

In the accompanying drawings, Figure 1 is a plan view of an electric switch embodying my invention. Fig. 2 represents a section on line *x* through a portion of the base with the switch-arm in elevation, on a slightly larger scale, the remaining portion of the arm being for convenience shown in elevation in Fig. 3.

The base A is provided with contacts arranged in concentric annular sets or series. These annular sets or series of contacts are distributed on concentric circles about a central point whereat the switch-arm B is pivotally held by a universally-jointed swivel upon the switchboard or base. The switch-arm comprises a couple of conducting sections or portions *b* and *b'*, insulated from one another, as at *b<sup>2</sup>*, and each provided with a couple of contacts, the four contacts thus carried by the arm in line along one side thereof being respectively indicated as *b<sup>3</sup>*, *b<sup>4</sup>*, *b<sup>5</sup>*, and *b<sup>6</sup>*. The contacts arranged upon the base in annular sets or series, as aforesaid, are also disposed in lines radiating from the center, whereat the switch-arm is pivotally held.

As herein shown, the contacts C of the inner annular series (that is to say, of the series nearest the point at which the switch-arm is pivoted) are all electrically connected, and hence are conveniently arranged upon a metallic ring C', to which a circuit-wire D is connected. The contacts E of the next succeeding or next outer series are electrically disconnected or insulated from one another and separately connected with wires F, understood to severally lead to separate dynamo-electric machines. The contacts G of the next succeeding or next outer series are electrically connected with one another, and to such end are conveniently arranged upon a metal ring G', with which the circuit-wire D' is connected. The contacts H of the next succeeding or next outer series are electrically disconnected or insulated from one another and are separately

connected with wires or connections E', severally leading to the dynamo-electric machines to which the wires or connections F are allotted. The contacts of said several sets are relatively disposed in lines radiating from the central point of the system, as hereinbefore mentioned; it being seen that each of said lines comprises one contact of each annular set, and hence involves four contacts, respectively indicated as C, E, G, and H. The contacts may therefore be described as being arranged in several concentric annular series and also arranged in radial sets or series, each comprising contacts C, E, G, and H, as aforesaid.

It is understood that the wires or conductors D and D' are portions of a circuit and that the two wires or conductors F and F' allotted to any two contacts E and H on a line radiating from the center of the system connect with one and the same dynamo. Thus in Fig. 1 the switch-arm is understood to be in position to place its contacts  $b^3$   $b^4$   $b^5$   $b^6$ , respectively, in connection with contacts C E G H, arranged along a line radiating from the center of the system, and hence one of the dynamo-electric machines will be placed in circuit, while the remaining dynamo-electric machines will be cut out. With the arm in position, as in Fig. 1, the circuit may readily be traced through the conductors E and F', respectively connecting one and the other sections of the switch-arm with a dynamo, (not shown,) and a couple of contacts C and G, respectively connecting said sections of the switch-arm with the circuit-wire D D' through the medium of plates C' and G'.

The switch-arm is pivotally held by a universally-jointed connection, so that it can be swung laterally toward and from the base, in order to make and break connection with the contacts thereon, and also so that it can be swung round over the base, so as to bring it opposite any desired set of contacts. The switch-arm can by such arrangement be swung out from the base and then swung round over the base, so as to make connection with any one of the several radially-arranged sets of contacts C E G H; but as a more convenient mode of operation in many instances the operator will swing the switch-arm about an axis parallel with the plane of the base, and thus swing the arm directly across the board or base in place of swinging it round over the same. The arm is therefore provided with a second series of contacts  $b^7$   $b^8$   $b^9$   $b^{10}$ , corresponding with and arranged diametrically opposite the contacts  $b^3$   $b^4$   $b^5$   $b^6$ , hereinbefore described. By such arrangement, therefore, the arm can be swung over or across the base, so as to permit either of its two series of contacts to be used.

For certain purposes of my invention I may use any known or suitable construction of jointed swivel; but as a special and preferred construction the switch-arm is pivoted to

a rotary swivel I by a pintle K. The pintle K is arranged parallel with the plane of the base and the swivel I is arranged perpendicular to said plane. The swivel is arranged to turn in a raised bearing C<sup>2</sup>, which is conveniently formed by a plate C<sup>3</sup>, cast to provide the ring C', whereon the contacts C are positioned. The swivel has its lower end enlarged or flanged, as at  $i$ , and the socket-bore formed in bearing C<sup>2</sup> for the swivel is enlarged, as at C<sup>4</sup>, to receive the enlarged end of the swivel and provide room for a spring L, which tends to press the swivel outwardly. The flange or enlargement  $i$  of the swivel and a portion of the wall of the enlarged portion of the socket-bore form bearing-faces for a set of anti-friction balls M, in which way the swivel will be kept steady by the spring L and at the same time be permitted to work easily by thus providing ball-bearings. The swivel is provided with a bore or chamber  $i^2$ , wherein the spring catch-pin N is arranged. When the switch-arm is at right angles to the base, the catch-pin will engage in a notch in the arm, and thereby lock the same, and as a means for both adjusting the tension of the spring  $n$ , which controls the catch or catch-pin, and the spring L, which regulates the degree of pressure of bearing  $i$  on the anti-friction balls, the wall at the inner end portion of bore  $i^2$  in the swivel is threaded and engaged by a nut P. The springs  $n$  and L, respectively, bear against opposite sides of this nut, and hence by adjusting the same the tensions of the springs can be varied. The spring L acts to press the swivel outwardly or upwardly from the base-board, and hence tends to press the swivel against the anti-friction balls, as aforesaid, and the stop, which is provided by the nut P, serves as a means for regulating such pressure against the balls. The enlargement C<sup>4</sup> of the socket-bore provides space for the spring L and allows plate C<sup>3</sup> to be secured directly upon the switch-board, and by providing plate C<sup>3</sup> with the raised bearing C<sup>2</sup>, wherein the socket-bore is formed, said plate can also be conveniently provided with ring C', on which the contacts C are arranged, the whole constituting, therefore, a simple, compact, and efficient mechanical construction and arrangement.

The switch-arm herein shown practically comprises a couple of contact portions insulated from one another and each involving a set of electrically-connected contacts—as, for example, contacts  $b^3$  and  $b^4$ , electrically connected by a conducting body or surface extending along or forming a portion or section of the switch-arm—and as a preferred arrangement each set of contacts on one side of the arm is duplicated on the opposite sides of the same.

In order to provide a greater number of dynamo-electric machines, the system of contacts on the base could obviously be multiplied or extended and the contact portions of

the switch-arm also multiplied or extended, as will be understood without special illustration.

What I claim as my invention is—

5 1. In an electric switch, a single switch-arm pivotally held by a universally-jointed swivel upon a base provided with contacts and provided at points along its length with contact portions insulated from one another, substantially as set forth.

10 2. In an electric switch, a base provided with contacts arranged in concentric annular sets about a common center, and a switch-arm pivotally held by a universally-jointed swivel so as to swing about said center and provided with contact portions insulated from one another and arranged with reference to the annular sets of contacts, substantially as set forth.

20 3. In an electric switch, a base provided with contacts on lines radiating from a common center, and a switch-arm pivotally held by a universal joint so as to operate about said center and provided at points along its length with contact portions insulated from one another, substantially as set forth.

25 4. In an electric switch, a base provided with contacts arranged in concentric annular sets about a common center and further disposed on lines radiating from said center, so that each line shall comprise one contact from each annular set, and a switch-arm pivotally held by a universal joint and provided at points along its length with contact portions insulated from one another, substantially as set forth.

30 5. In an electric switch, a base provided with contacts arranged in annular concentric sets alternately composed of electrically-connected and electrically-disconnected contacts, and a switch-arm held upon the base by a universally-jointed swivel and comprising contact portions insulated from one another, substantially as set forth.

35 6. In an electric switch, the combination of the annular sets of contacts C E G H, for the purpose set forth, distributed to also form sets of contacts on lines radiating from a common center, conductors C' and G', respectively

connecting contacts C and contacts G, 50 and the switch-arm B, held at said center by a universally-jointed swivel and provided with the two pairs of contacts  $b^3 b^4$  and  $b^5 b^6$ , one of said pairs of contacts being insulated from the other, as at  $b^2$ , substantially as described. 55

7. In an electric switch, the combination of the base provided with contacts, substantially as set forth, of the switch-arm B, pivotally held by a universally-jointed swivel and provided with conducting portions  $b$  and  $b'$ , insulated from one another and each provided with oppositely-arranged couples of contacts, substantially as described. 60

8. In an electric switch, the combination of 65 the swivel carrying the switch-arm at one end and having its opposite end enlarged to provide a ball-bearing surface, a bearing for the swivel having its socket-bore, in which the swivel is arranged to work, provided with an enlarged portion to receive the enlarged end of the swivel and provide a ball-bearing surface, anti-friction balls arranged between said ball-bearing surfaces, a spring applied to press the swivel outwardly and against the anti-friction balls, and an adjustable stop applied for varying such spring-pressure, substantially as described. 70 75

9. In an electric switch, the combination of the swivel I, carrying at one end the switch-arm and arranged to work within a socket-bore, a spring applied against the opposite end of the swivel and arranged to press the swivel outwardly, so as to tighten up a bearing connection between the swivel and wall of the socket-bore, a spring-catch, for the purpose set forth, arranged within and carried by the swivel, and a nut arranged within the swivel and providing an adjustable stop against which the spring for said catch and the spring acting to press the swivel outwardly, respectively, bear at opposite sides, substantially as described. 80 85 90

FRANCIS H. SODEN.

Witnesses:

CHAS. G. PAGE,  
W. D. MIDDLETON.