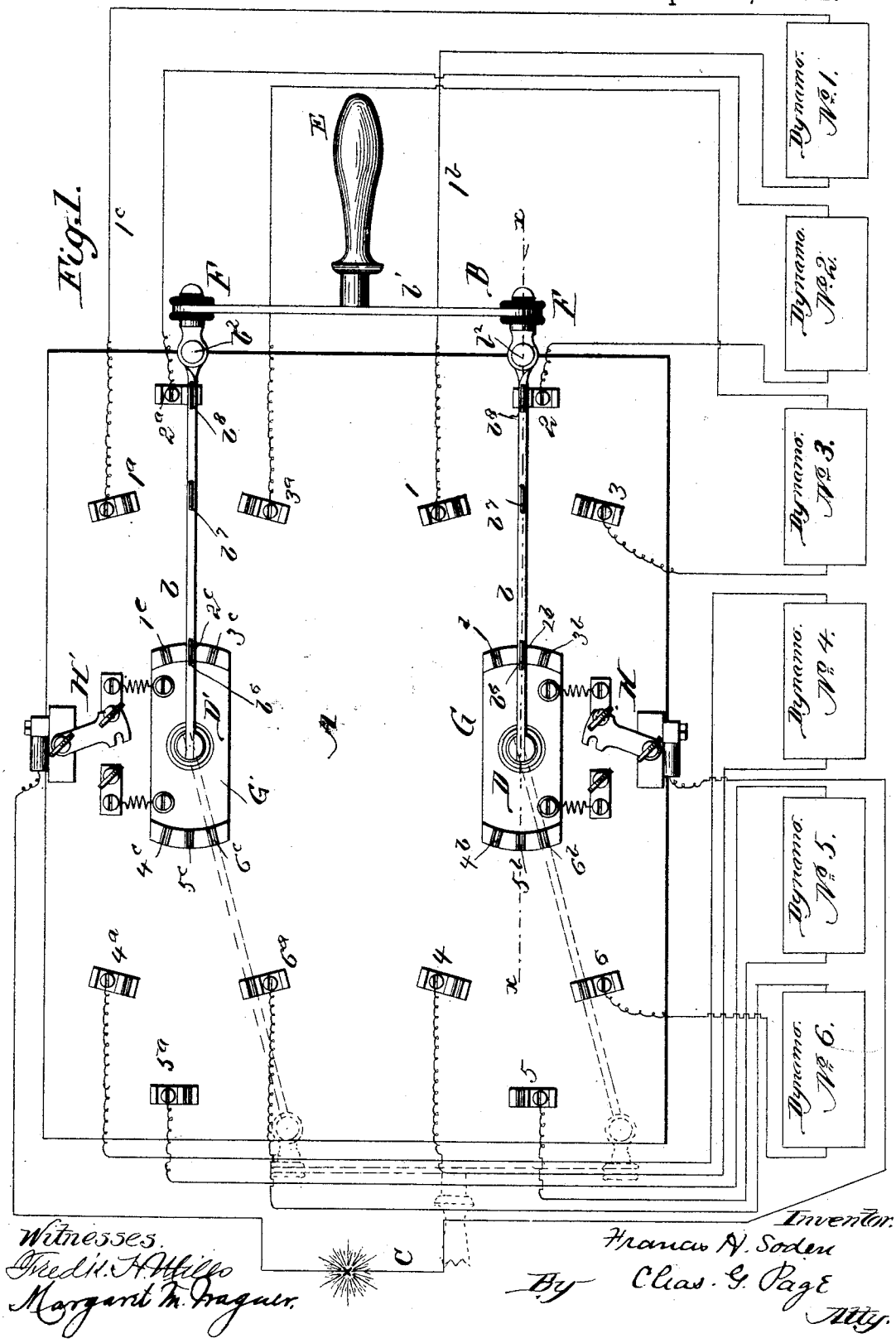
(No Model.) 2 Sheets—Sheet 1.

# F. H. SODEN.

## ELECTRIC SWITCH.

No. 473,132. Patented Apr. 19, 1892.

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(No Model.) 2 Sheets—Sheet 2.

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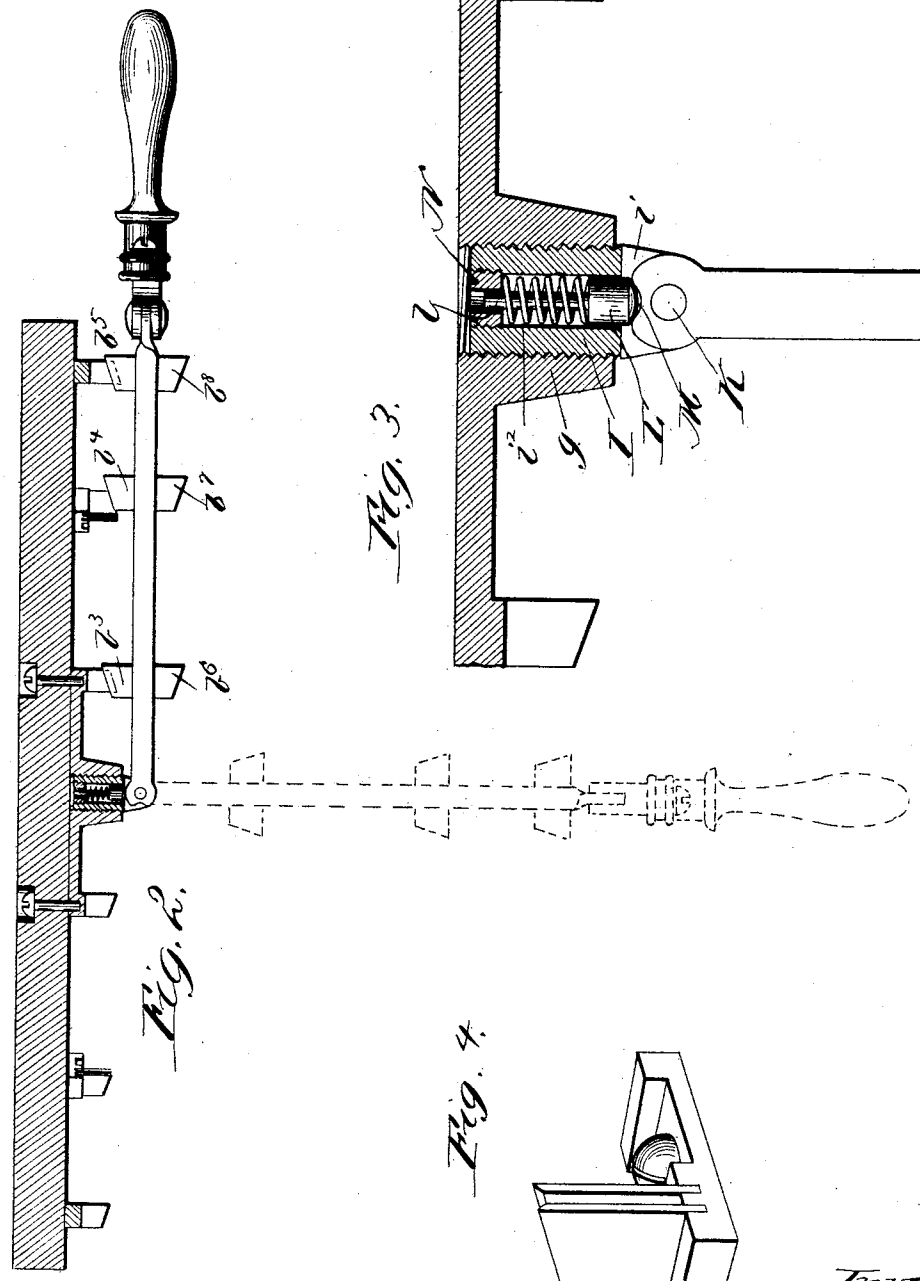

Fig. 2.



Fig. 3.



Fig. 4.

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# UNITED STATES PATENT OFFICE.

FRANCIS H. SODEN, OF CHICAGO, ILLINOIS.

## ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 473,132, dated April 19, 1892.

Application filed July 2, 1891. Serial No. 398,223. (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.

My invention relates more particularly to electric switches for placing any one of a number of dynamo-electric machines in circuit, although it may be used for other kindred purposes.

The objects of my invention are to permit the ready and convenient use of a hand-operated switching device in connection with any desired number of contacts, to provide an exceedingly simple and compact arrangement of contacts both upon the switchboard or base and upon the hand-operated switching device, and to provide certain novel and improved details, as hereinafter set forth.

In the accompanying drawings, Figure 1 is a plan view of an electric switch embodying my invention. This view also diagrammatically illustrates a series of dynamo-electric machines and connections. Fig. 2 is a section on line $x\ x$ in Fig. 1. Fig. 3 is a section on a larger scale through one of the plates G, and shows the yoke locked at right angles to the plate. Fig. 4 represents one of the contacts.

In said drawings, A indicates a base upon which the several contact-points are arranged. This base also affords a support for the universally-adjustable switch-yoke B, which is provided with two sets of contact-blades positioned thereon with reference to the arrangement of contact-points upon the base.

In Fig. 1 I have diagrammatically indicated six dynamo-electric machines, which can be respectively connected up with or cut out of a line-circuit C by adjusting the switch-yoke with reference to the dynamo which is to be used, it being understood, however, that either a greater or less number of dynamo-electric machines can be provided for use and that the number of contact-points and contact-blades can be either decreased or multiplied.

The universally-adjustable switch-yoke comprises a couple of parallel arms $b$, which are pivotally supported at their inner ends upon the base and at their outer ends connected together by a link or cross-bar $b'$. These arms of the switch-yoke are supported upon the base by universal joints at D D', which said joints permit the yoke to be swung to the right and to the left with reference to the contact-points arranged at one side of a right line between the two universal joints and which also permit the yoke to be swung out from the base and thrown over into position for making contact with the contact-points arranged at the opposite side of said line. The arms of the yoke are held parallel with one another by the link or cross-bar $b'$, and in order to preserve such parallelism and at the same time allow the yoke to be swung both to the right and to the left the arms are articulated near their outer ends, as at $b^2$, in which way, when the yoke is swung in either of said directions from its position in Fig. 1, its arms will remain parallel, while the link $b$ will be brought into a position oblique to the arms. The link or bar $b'$ is provided with a suitable handle E, and while constituting a mechanical connection between the yoke-arms is insulated from the same, it being understood that said link may be of some suitable insulating material, or that it can at its points of connection with the arms F F be insulated from the same. The contact-points are arranged in pairs on lines radiating from the centers, about which the yoke-arms can be swung to the right and left, and the contact-blades are positioned upon the yoke-arms with reference to such arrangement of contact-points, whereby when it is desired to place a dynamo in circuit the yoke can be adjusted so that a couple of contact-blades on each yoke-arm shall make contact with the proper contact-points upon the switch-base.

With reference to the arrangement herein shown, the dynamo designated as "No. 1" is connected with the two contact-points 1 and $1^a$ on the switch-base by circuit-wires $1^b$ and $1^c$. The contact-points 1 and $1^a$ are set apart at a distance equal to the space between the two yoke-arms, so that when the yoke is in position to place one of its contact-blades on one of its arms in contact with the contact-point 1 one of the contact-blades on the remaining yoke-arm will be brought into register and contact with the contact-point

$1^a$. The contact-point 1 constitutes one of a pair of contact-points on a line radiating from the pivotal center at D, about which one of the yoke-arms is arranged to swing, the remaining contact-point $1^d$ of said pair being arranged somewhat nearer said pivotal center. In like manner the contact-point $1^a$ and its companion contact-point $1^e$ are both on a line radiating from the pivotal center at D′, about which the remaining one of the yoke-arms is arranged to swing. The contacts $1^d$ and $1^e$ can be connected in any suitable way with the line-circuit C—as, for example, they can be arranged upon conducting bases G G′, herein shown connected with the line-circuit by adjustable fuse connections H and H′. When, therefore, the yoke is in position to place a contact-blade on one of its arms in contact with the contact-point 1 and a contact-blade on its remaining arm in contact with the contact-point $1^a$, a circuit will be established from dynamo No. 1 through one of the yoke-arms, thence to and through the line-circuit, thence to and through the remaining yoke-arm, and thence back to the dynamo.

From the foregoing description of the contact-points allotted to dynamo No. 1 the disposition and service of the remaining contact-points with relation to the remaining dynamo-machines will be readily understood, it being observed that in indicating said remaining contact-points I have adopted the method employed in indicating the contact-points to which dynamo No. 1 is allotted—that is to say, dynamo No. 2 is connected with the contact-points 2 and $2^a$, to which are allotted contact-points arranged at $2^b$ and $2^c$ on plates G and G′, but concealed by the yoke-arms in Fig. 1. In like manner the contact-points 3 $3^a$ $3^b$ $3^c$ can be employed for placing dynamo No. 3 in circuit, and so on.

With reference to the set of contact-points shown to the right in Fig. 1, each yoke-arm is provided on one of its sides with three contact-blades, as illustrated in Fig. 1, wherein one of the yoke-arms is shown provided on one of its sides with the three contact-blades $b^3$, $b^4$, and $b^5$ for the set of contact-points shown to the left. Each yoke-arm is also provided at its opposite sides with three contact-blades $b^6$, $b^7$, and $b^8$. It will also be observed that the contact-blade $b^3$ on one arm is to be used for any one of the three contacts $1^d$ $2^b$ $3^b$ and that a corresponding contact-blade on the other yoke-arm is to be used for any one of the contact-points $1^e$ $2^c$ $3^c$; also, that the single contact-blade $b^6$ on one yoke-arm can be used for any one of the contact-points $4^b$ $5^b$ $6^b$ and that the corresponding contact-blade $b^6$ on the other yoke-arm can be used for any one of the three contact-points $4^c$, $5^c$, and $6^c$; also, that the single contact-blade $b^4$ on one yoke-arm can be used for the contact-points 1 and 3, alternately, and that in like manner a corresponding contact-blade on the other yoke-arm can be used for the contact-points $1^a$ and $3^a$. Likewise the contact-blades $b^6$ can be used for the contact-points $4^b$ $5^b$ $6^b$ $4^c$ $5^c$ $6^c$, as will be understood without further explanation. The foregoing arrangement therefore permits the use of a comparatively few contact-blades upon the universally-swinging yoke in connection with a large number of contact-points upon the base, it being seen that by arranging the contact-points on the arcs of circles described by the contact-blades on the yoke when the latter is swung to the right and left the number of contact-points can be multiplied without increasing the number of contact-blades. It will also be seen that by arranging the switch-yoke so that it can be swung from its position at the right of the center of the base, as in full lines, Fig. 1, to a position at the left of such center, as indicated in dotted lines, the number of contact-points can be multiplied without multiplying the number of contact-blades. Thus while a limited number of contact-blades on one side of the yoke are adapted for a set of contact-points on one end portion of the base a corresponding number of contact-blades on the other side of the yoke can be adapted for a set of contact-points on the opposite end portion of the base.

For the broader purpose of my invention the yoke-arms can be held by any suitable construction of universal joint, (such, for example, as a ball-and-socket joint;) but as a matter of further improvement in details of construction I provide each of the plates G and G′ with a socket *g* and arrange within the same a swivel I, which has preferably a threaded connection with the wall of the socket, so as to keep it in place, but allow it to turn. Each swivel I is at its outer end notched or provided with a couple of lugs or ears *i*, which serve as bearings for the end of one of the yoke-arms which is held within the space between such bearings by a pivot K, arranged at right angles to the axis of the swivel, by which arrangement the yoke can be swung over toward either end of the base and also operated so as to make and break contact. Each swivel I is provided with an axially-arranged bore for a spring-latch or stop L, arranged to engage in a notch M in the inner end of one of the yoke-arms, so that the yoke can be locked in position at right angles to the plane of the base A, as in full lines in Fig. 3, and dotted lines, Fig. 2. The stop L is arranged upon one end of a pin *l*, which at its other end passes through a nut N. A spring P is arranged between the nut and stop, and the nut is adapted to engage a threaded portion of the wall of the bore $i^2$, which is formed through the swivel. By said arrangement the spring can be adjusted by adjusting the nut 1. As a matter of course the arms of the yoke could be multiplied, but I prefer forming it with two.

The contacts or contact-points on the switch-board or base A can be constructed as in Fig. 4, in which the contact-point comprises a couple

of lugs or side plates arranged to rise from a base, and in connection with such construction the contacts or contact-blades on the universally-swinging switching device can be formed by plates or blades adapted to be brought between the lugs or side plates of the contact-points. I do not, however, confine myself to such construction of contacts, since other known forms can obviously be employed.

What I claim as my invention is—

1. An electric switch comprising a base provided with contacts and a universally-swinging yoke, having its arms provided with contacts and supported upon the base by universal joints, the yoke being articulated so as to permit its arms, while maintaining a condition of parallelism with one another, to swing about their respectively-allotted centers, substantially as set forth.

2. In an electric switch, a universally-adjustable yoke provided with contacts and having its arms separately held by universal joints but maintained in condition of parallelism with one another, so that while the yoke can be moved to cause its arms to swing, respectively, about separate centers said arms shall remain parallel with one another, substantially as described.

3. In an electric switch, a universally-adjustable yoke provided with contacts and having its arms separately held by universal joints, said arms being at their outer ends connected by a link with joints between the link and said arms, substantially as set forth.

4. In an electric switch, a swinging yoke having the ends of its arms supported upon a base by universal joints and provided with contacts upon said arms, combined with contacts arranged in pairs on lines radiating from the points at which the yoke-arms are pivotally held, and further arranged on lines corresponding with the arcs described by the contacts on the yoke when the latter is swung to the right and left, substantially as set forth.

5. In an electric switch, a base provided with contacts arranged in sets at opposite sides of its middle portion, and a universally-swinging yoke provided with contacts and pivotally supported at the middle portion of the contacts, so that it can be swung over toward either side of the same and then adjusted with reference to the portions, substantially as described.

6. In an electric switch, the combination, with a base A, provided with contacts, and further provided with sockets *g*, of the yoke provided with contacts and having its arms pivoted to swivels arranged to turn in said sockets, substantially as set forth.

7. The combination, with a swinging switch device, of a stop L, arranged upon a pin *l*, a spring arranged to act upon the stop, and a nut arranged for adjusting the tension of the spring, substantially as set forth.

8. The universally-adjustable switch-yoke provided with contact-blades and arranged for service in connection with a base provided with contact-points, said yoke being at the ends of its arms attached to the base by universal joints, each comprising a threaded swivel I, fitted to turn in a threaded socket on the base, and a pivotal connection between the arm and said swivel, substantially as set forth.

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