(No Model.)

# J. VAN VLECK.

## ELECTRIC SWITCH.

No. 522,332. Patented July 3, 1894.

Fig. 1.

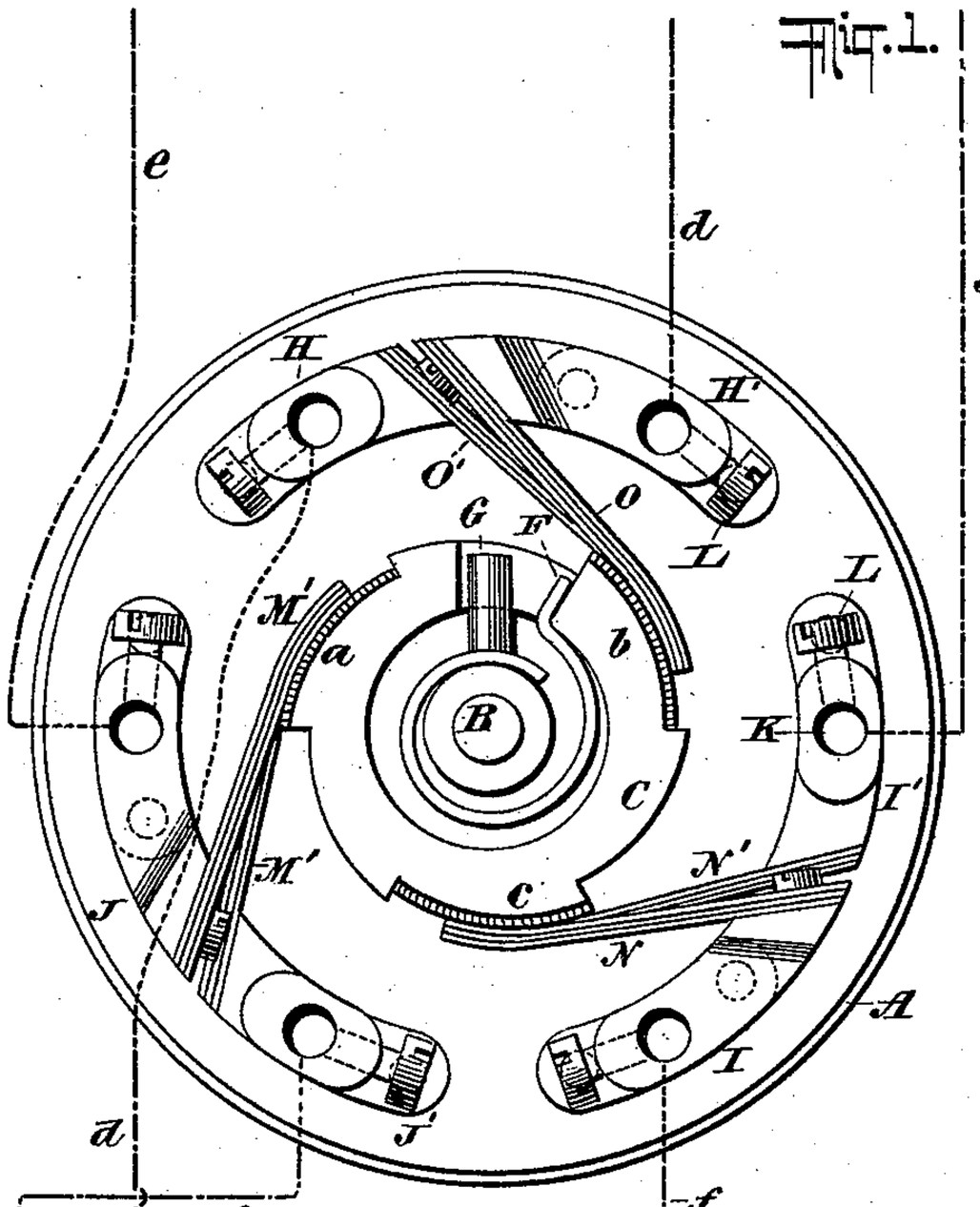



Fig. 4.

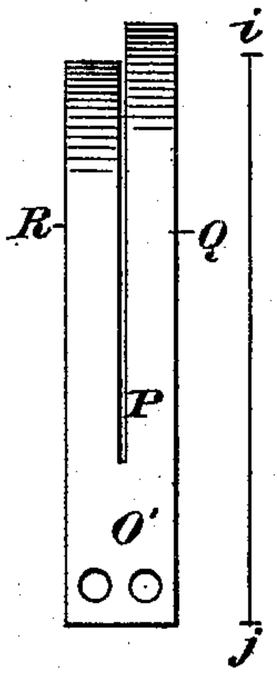



Fig. 3.

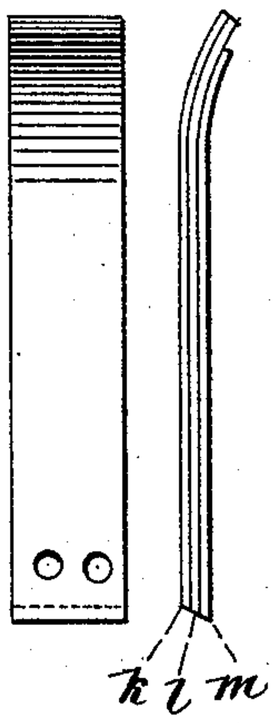



Fig. 5.

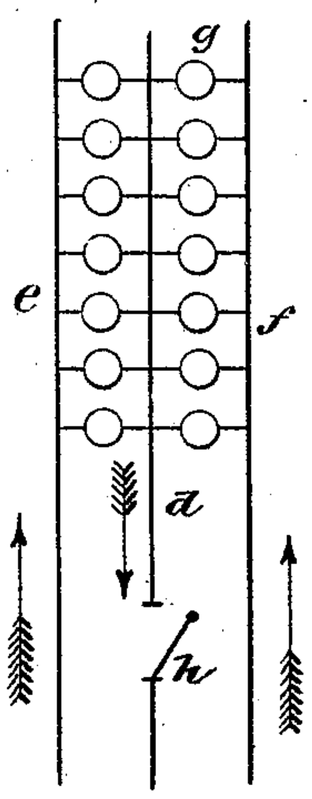
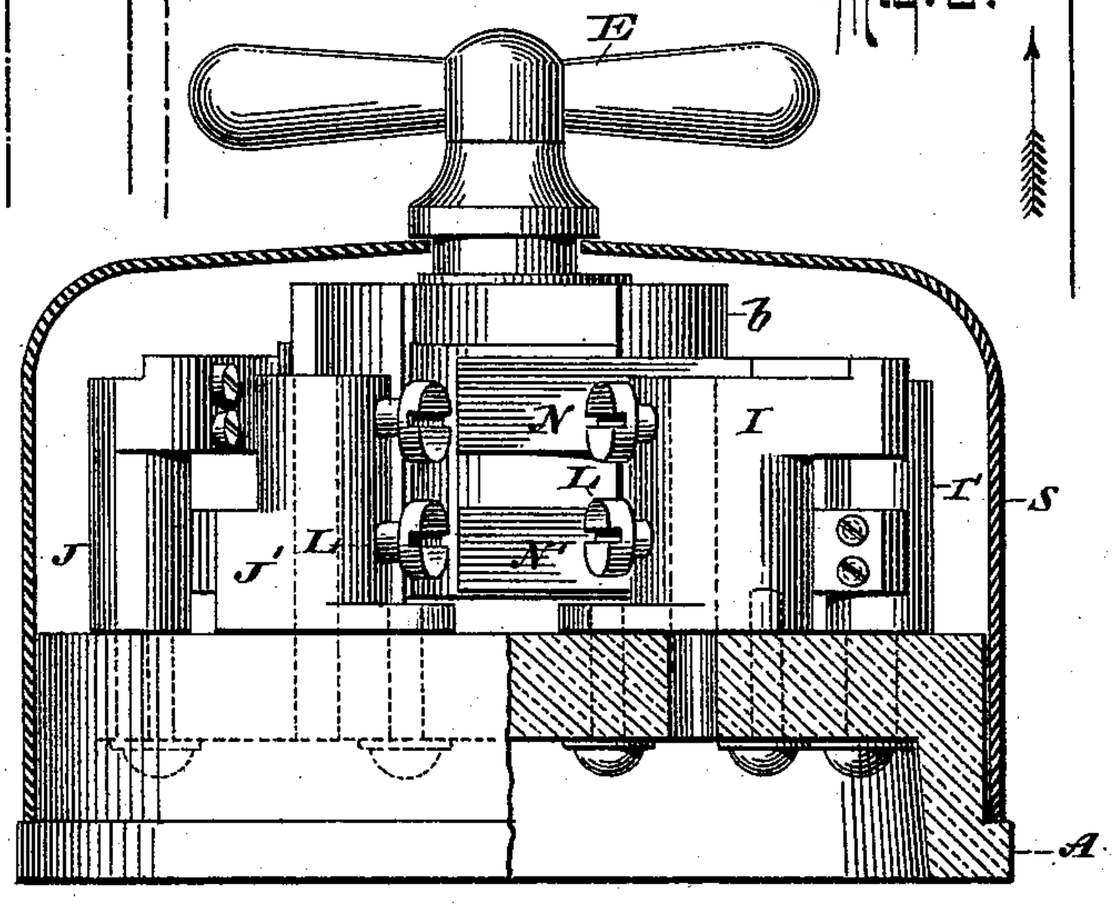



Fig. 2.

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# UNITED STATES PATENT OFFICE.

JOHN VAN VLECK, OF NEW YORK, N. Y.

## ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 522,332, dated July 3, 1894.

Application filed May 28, 1894. Serial No. 512,595. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN VAN VLECK, of the city, county, and State of New York, have invented a new and useful Improvement in Switches for Electric-Lighting Circuits, of which the following is a specification.

My invention is an improvement in switches designed for use in connection with the three-wire system of distribution, so arranged that circuit through the neutral conductor is broken after and made before it is established through the positive or negative conductors.

The object of the invention is to insure that the current shall never pass directly between the positive and negative wires, the consequences of which might be highly injurious to the lamps or other receptive devices, as will hereinafter be more particularly pointed out.

In the accompanying drawings Figure 1 is a plan view of my switch. Fig. 2 is a side elevation with the cover in section. Figs. 3 and 4 show two forms of contact fingers. Fig. 5 illustrates diagrammatically the ordinary arrangement of lamps on a three-wire system. Similar letters of reference indicate like parts.

The form of switch to which my invention is applied is one which is well known and in common use. Hence only a brief description of its parts is necessary.

A is the base, circular in form and made of porcelain or other insulating material.

At the center of the base A is secured a metal rod, B, which is surrounded by a sleeve, C, of porcelain made in the shape here shown—that is, it is six-sided. Three sides, *a*, *b*, *c*, are covered with plates of conducting material. The remaining sides are uncovered. The post B is turned by the handle E against the action of the coiled spring F. On this post is a pin, G, which enters a recess in the upper portion of the sleeve C.

Supported upon the base A are three pairs of metallic supports, H H′, I I′ and J J′, each provided with an opening, as at K, for the reception of the circuit wires, and with screws, as L, for clamping said wires in said openings.

In Fig. 1 the neutral wire *d* is shown clamped in the support H′ and H. The wire *e* is clamped in the supports J and J′ and the wire *f* in the supports I and I′. From each support extends a contact finger bearing upon the periphery of the sleeve C. Thus, from the support J′ there extends a metal contact finger, M, and from the support J, a metal contact finger, M′. The finger M′ is therefore above the finger M, and is separated therefrom.

From the support I extends a finger, N, which is above the finger N′ extending from the support I′, and from the support H′ extends a finger, O, above the finger O′ extending from the support H. It follows, therefore, that when all of the several fingers rest upon the metal plates *a b c* of the sleeve C, circuit is made through the switch, and the current passes from J′ to J by way of the fingers M M′ and plate *a*, from I to I′ by way of the fingers N N′ and plate *c* and from H to H′ by way of the fingers O O′ and plate *b*. This is the arrangement of the switch when the current is turned on.

In order to turn the current off, the handle E is turned to the right of the drawings, Fig. 1, so rotating the post B and moving the pin G in its recess to bear against the sleeve C, so as to carry said sleeve with it in its rotation. Then, as the sleeve C is rotated, the metal plates *a b c* move from beneath the fingers which rest upon them, and the fingers fall upon the intermediate portions of the sleeve C, which, as already stated, present a surface of insulating material. Therefore circuit is broken between each pair of fingers M M′, N N′ and O O′.

The difference between the construction above detailed and that already known resides in the fact that in the old form of switch the sleeve C has but four sides with but two plates of metal thereunto applied, and there are but two pairs of supports and contact fingers instead of three pairs of supports and contact fingers, as in my aforesaid construction. It will therefore be apparent that my switch as above described is especially designed for a three-wire system of distribution.

Now, what I propose to accomplish by my invention is to prevent a current of any kind from passing by wire *e* to wire *f*, and vice versa, the result of which might be injurious to the lamps in circuit; and this result would of course follow if the switch in the neutral wire *d* were open before circuit was broken in the wires *e* and *f*, or closed after circuit had been made in said wires *e* and *f*. Thus, in

Fig. 5, I show seven lamps in parallel between the wires *d* and *e* and *d* and *f*. But suppose that the conditions of the circuit were such that, while seven lamps existed between *d* and *e*, but one lamp, *g*, existed between *e* and *f*. Then, instead of the current which feeds the seven lamps between *d* and *e* coming back by way of the neutral wire *d*, all of it, if the switch at *h* in said wire were open, would pass through the lamp *g*, probably destroying the filament or doing other injury. It is clear that this could not happen if the circuits in *e* and *f* were broken before interruption was made in the wire *d*. Conversely it is clear that the same consequences would happen if the circuit was closed through *e* and *f* before it was closed through *d*. What I do, therefore, is to arrange the switch, the construction of which I have before detailed, in such a way that circuit is made through the neutral wire *d* before it is made through the wires *e*, *f* and broken in *d* after it is broken in the wires *e*, *f*. This is done in the following manner: The fingers M M′ and N N′ are all alike—that is, all of the same length and general construction. Because they are of the same length and operate at the same time, circuit is made and broken in the wires *e* and *f* simultaneously. The fingers O and O′, however, are differently made, and the preferable construction for each of them is shown in Fig. 4. Each finger is slit lengthwise, as shown at P, and thus is composed of two parts, one of which, Q, is longer than any one of the fingers M M′, N N′, and the other part, R, is shorter than any one of the fingers M M′ N N′. I have indicated this in Fig. 4 by drawing on the side of said figure a line, *i j*, which represents the length of any one of the fingers M M′ or N N′ in comparison with the lengths of the parts R Q of the finger O′.

Now considering the parts as they appear in Fig. 1, it will be obvious that as the sleeve C is turned to the right by the handle E, the fingers M M′, N N′ and the parts R of the fingers O O′ will all leave the contact plates before the parts Q of the fingers O O′; this simply because the parts Q are longer than the other fingers. Therefore, although circuit is broken through the wires *f* and *e*, it remains closed through the neutral wire *d* until after the part Q of the fingers O O′ pass from the contact plate *b;* therefore, in breaking the circuit through the whole system, it is obvious that I interrupt the circuit in the wires *e* and *f* before I do so in the wire *d*. Now considering the fingers as all resting on the uninsulated intermediate sides of the sleeve C, and that the handle E be turned still to the right for the purpose now of making the circuit through the system. Plainly the short contact R of the fingers O O′ will pass from the uninsulated portion of the sleeve C and meet the plate *a* before the longer portion, Q, of the fingers O O′ and before the longer fingers M M′, N N′. Therefore circuit will be established through the neutral wire *d* before it is established through the wires *e* and *f*.

It will be seen that these results are accomplished without changing the ordinary and well-known operation of the type of switch here illustrated, and therefore involve no complication of the device whatever, while greatly increasing its value. In Fig. 1 I have shown the fingers as made of laminated plates of metal, and it will be understood, therefore, that each plate of the three here shown as composing one finger O or O′ is formed in the manner shown in Fig. 4.

As a modification in the construction of the fingers O and O′ I may make them as represented in Fig. 3, each finger being then composed of three plates of metal, *k l m*, of which *m* is similar in length to the part R of the form of finger shown in Fig. 4 and *k* and *l* to the part Q of the aforesaid form of finger. The curved face of the end of the finger meets the curved side of the sleeve C, as shown in Fig. 1. Obviously the same results already detailed will be produced by a finger of this shape, the part *m* first meeting the plate on the sleeve C in making contact, and the parts *k l* leaving that plate last when contact is broken. The apparatus is provided with the ordinary form of cover, as shown at S, Fig. 2.

I claim—

1. In combination with a three-wire distributing system, three pairs of contact fingers respectively connected to the terminals of each conductor, a rotary support, and three circuit-closing plates on the periphery thereof with each of said plates each pair of fingers makes contact; the fingers connected with the neutral conductor of the system being of such length relatively to the fingers connected with the other two conductors as that when said contact plates are moved by the rotation of said support into contact with said fingers, circuit shall be closed through said neutral conductor before it is closed through the remaining conductors, substantially as described.

2. In combination with a three-wire distributing system, three pairs of contact fingers respectively connected to the terminals of each conductor, a rotary support, and three circuit-closing plates on the periphery thereof with each of said plates each pair of fingers makes contact; the fingers connected with the neutral conductor of the system being of such length relatively to the fingers connected with the other two conductors as that when said contact plates are moved by the rotation of said support out of contact with said fingers circuit shall be broken through said neutral conductor after it is broken through the remaining conductors, substantially as described.

3. The combination in a switch for electric-lighting circuits of a base A, a rotary support, C, thereon, having contact plates, *a b c*, on its periphery, and three pairs of independently-supported fingers, M M′, N N′, O

O′, each pair of said fingers being arranged to bear upon one of said contact plates; the fingers O O′ being of different length from the fingers M M′ and N N′.

4. The combination in a switch for electric-lighting circuits of a base A, a rotary support, C, having contact plates, *a b c*, on its periphery, and three pairs of independently-supported fingers, M M′, N N′, O O′, each pair of said fingers being arranged to bear upon one of said contact plates; the fingers O O′ having a portion greater in length than the fingers M M′, N N′.

5. The combination in a switch for electric-lighting circuits of a base A, a rotary support, C, having contact plates, *a b c*, on its periphery, and three pairs of independently-supported fingers, M M′, N N′, O O′, each pair of said fingers being arranged to bear upon one of said contact plates; the fingers O O′ having a portion less in length than the fingers M M′, N N′, substantially as described.

6. The combination in a switch for electric-lighting circuits of a base A, a rotary support, C, having contact plates, *a*, *b*, *c*, on its periphery, and three pairs of independently-supported fingers, M M′, N N′, O O′, each pair of said fingers being arranged to bear upon one of said contact plates; each finger O or O′ being formed with a portion, Q, greater in length than the fingers M M′, N N′, and a portion, R, less in length than said last-named fingers, substantially as described.

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Witnesses:
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