No. 810,522. PATENTED JAN. 23, 1906.

G. N. EASTMAN.

VOLTMETER SWITCH.

APPLICATION FILED APR. 26, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

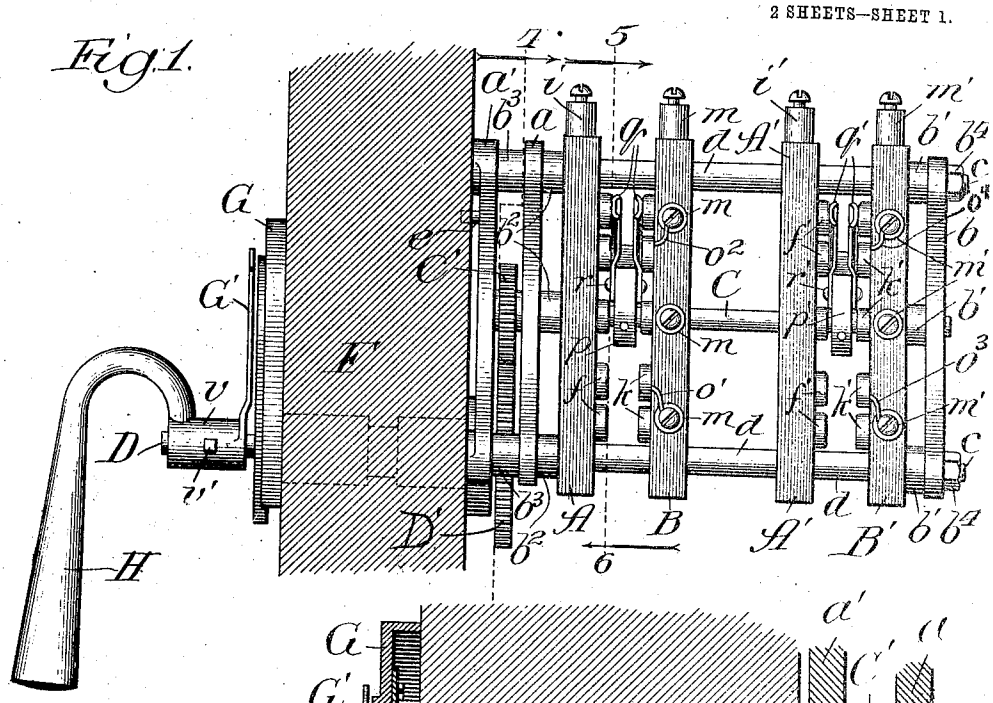
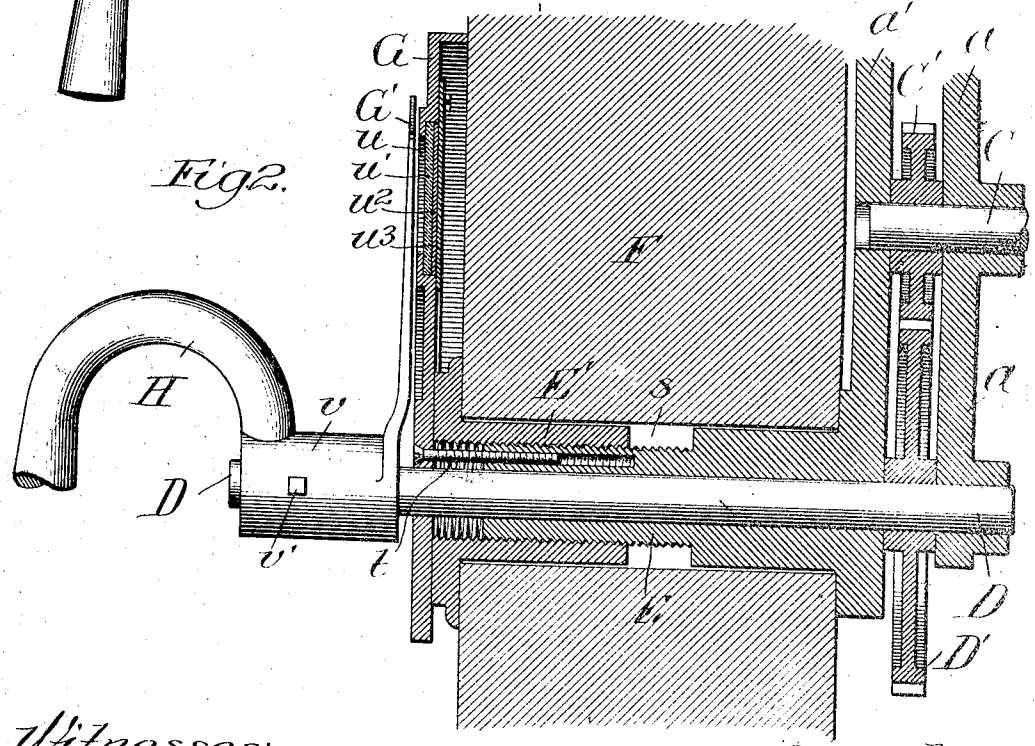


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

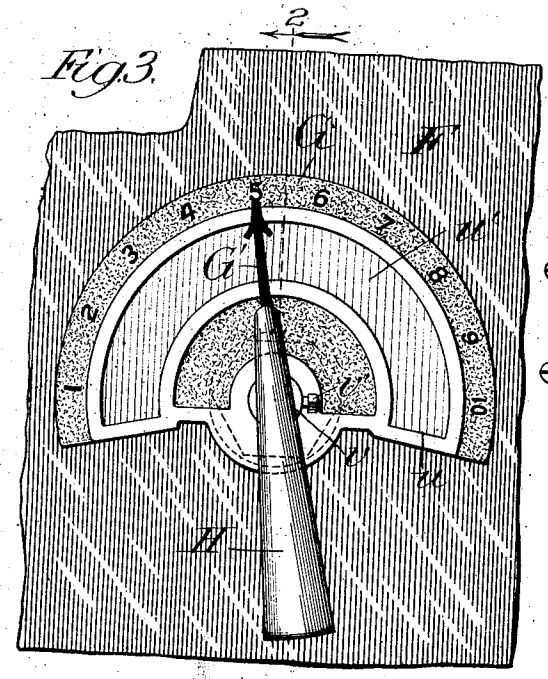


Fig. 4.

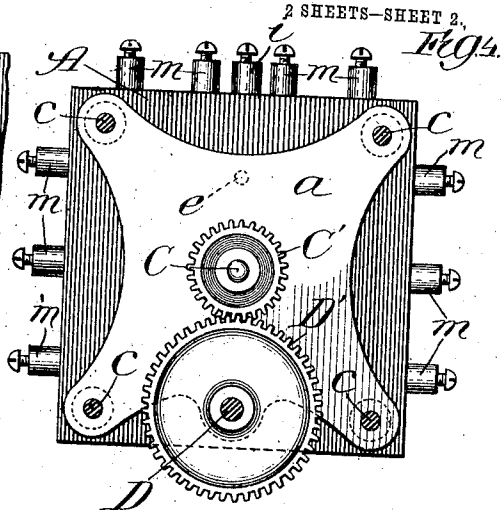


Fig. 5.

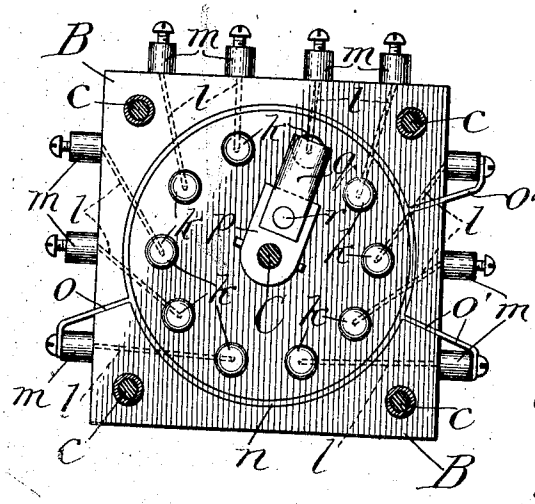
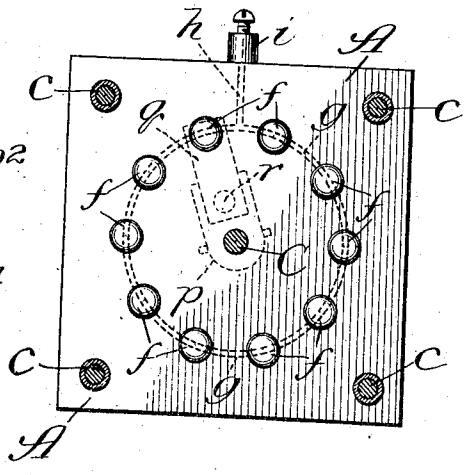


Fig. 6.



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UNITED STATES PATENT OFFICE.

GEORGE N. EASTMAN, OF CHICAGO, ILLINOIS, ASSIGNOR TO MINERALLAC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

VOLTMETER-SWITCH.

No. 810,522. Specification of Letters Patent. Patented Jan. 23, 1906.

Application filed April 26, 1905. Serial No. 257,523.

To all whom it may concern:

Be it known that I, GEORGE N. EASTMAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Voltmeter-Switches, of which the following is a specification.

My invention relates to an improvement in the class of multiple voltmeter-switches employed for connecting with the voltmeter any one of a number of circuits in use to enable its voltage to be denoted on the meter.

The object of my invention is to provide a novel construction of multiple switch in the class referred to, whereby as a primarily important advantage the voltmeter-pointer shall not be injuriously affected by the passage of the contact-brushes from one circuit to the other and the wear on the voltmeter shall be accordingly reduced and whereby the meter may be rapidly read and other advantages are afforded, as hereinafter explained.

Referring to the accompanying drawings, Figure 1 is a view in side elevation of my improved switch, showing the marble panel on which it is mounted in section; Fig. 2, a longitudinal vertical section through the switch, taken at the line 2 on Fig. 3 and viewed in the direction of the arrow; Fig. 3, a face view of the switch, presenting only the dial and its index-finger and operating-handle; Fig. 4, a section taken at the line 4 on Fig. 1 and viewed in the direction of the arrow; Fig. 5, a section taken at the line 5 on Fig. 1 and viewed in the direction of the arrow, and Fig. 6 a section taken at the line 6 on Fig. 1 and viewed in the direction of the arrow.

The body of the switch comprises four blocks A A′ and B B′ of insulated or insulating material provided with binding-posts on their edges connected with contacts projecting from their faces to be engaged by rotary brushes, as hereinafter described. The blocks are preferably square, of uniform size, and composed of insulating material, vulcanized fiber being the material I prefer to use, and they are connected together and spaced apart in pairs, the blocks A and B forming one pair and the blocks A′ B′ another pair. In front of the block A is a metal spider-plate *a*, and behind the block B′ is a similar plate *b*. Rods *c* are passed through the four corner portions of the spider-plates and those of the blocks between them, the end blocks being spaced from the respective plates by bosses b' b^2 and the blocks being spaced apart by sleeve-sections *d d* on the rods which are fastened at their rear projecting ends by nuts b^4. Forward of the spider-plate *a* is another similar plate *a′*, spaced from it by bosses b^3, into which the forward ends of the rods *c* are screwed, and from the face of the plate *a′* projects a stud *e* for a purpose hereinafter explained.

On the inner face of the block A is a circular series of contacts *f*, of which ten are provided, as shown in Fig. 6, though the number may be greater or less, these contacts engaging a metal ring *g*, let into the surface of the block and being connected by a wire *h* with a binding-post *i* on the upper edge of the block. A similar series of contacts *f′* is provided on the corresponding face of the block A′ to engage a ring thereon. (Not shown, but like the ring *g* and similarly connected by a wire with a binding-post *i′* on the upper edge of the block A′.) It is from the binding-posts *i* and *i′* that connection is made with a voltmeter. (Not shown.)

On the face of the block B which opposes the contact-equipped face of the block A is provided a corresponding circular series of ten contacts *k*, each connected by a wire *l*, extending on the opposite face of the block (and therefore shown dotted in Fig. 5) to a different binding-post *m*, these binding-posts being disposed about the edges of the block, as represented, and a metal ring *n*, let into the face of the block, surrounds the contacts *k* for connection by wires with different binding-posts, as represented at *o*, *o′*, and o^2, to electrical contacts *k*, that may be out of use or not in circuit with others that are in circuit, for the purpose hereinafter explained. On the face of the block B′ which opposes the contact-equipped face of the block A′ is provided a series of contacts *k′*, like the contacts *k* and similarly arranged, each being connected by a wire (not shown, but like the wire *l*) on the opposite face of the block with a different binding-post *m′*, disposed like the binding-posts *m*, the contacts *k′* being also surrounded, like those on the block B, by a

metal ring, like the ring n, connected with different binding-posts in correspondence with the described connections between the binding-posts m with the ring n through the medium of wires, of which two are shown at o^3 o^4 in Fig. 1.

A shaft C is journaled in the centers of the spider-plates b, a, and a' and blocks, and it carries between the blocks A and B a head p, of insulating material, which may be the same as that composing the blocks, and from opposite sides of the head project brushes q q, formed, preferably, of spring-bronze to engage the contacts f and k by rotating the shaft, the brushes being electrically connected through the head, as by a metal pin r. Between the blocks A' and B' the shaft C carries a head p', like the head p, provided with brushes q' q', connected, through the head, by a pin r', as in the case of the brushes q, and adapted to engage the contacts f' k' by rotating the shaft.

In the space between the plates a and a' the shaft C carries a pinion C', meshing with a gear-wheel D', preferably of twice the diameter of the pinion and carried by the operating-shaft D, which is journaled in the lower parts of the plates a and a' and passes through and beyond an externally-threaded sleeve E, which extends part way through the marble panel F at an opening s therein to be engaged at its outer end by a headed internally-threaded sleeve E' for clamping the body of the switch on the panel, the clamping means shown being adapted by the headed sleeve E' to be applied to panels of different thicknesses. The stud e enters a recess in the back of the panel to hold the switch device against turning in operating it.

The shaft D passes at its forward end through the base of a dial-plate G, rigidly fastened in place, as by screws, one of which is shown at t in Fig. 2, and provided with a semicircular slot u, above which are arranged the dial-numbers ranging from "1" to "10" to correspond with the number of circuits which the multiple switch is adapted to control. In the slot is seated a glass cover u', through which to view the card or cards u^2, on which the different circuits are noted with reference to the numbers on the dial, the card or cards being held in place by a back w, removably fastened to the rear side of the dial-plate. G' is the index-finger on a sleeve v, mounted on the forward projecting end of the shaft D, to which it is secured, as by a set-screw v', and the sleeve carries a handle H, by means of which to turn the operating-shaft.

The operation is as follows: With the binding-posts i and i' properly connected with the terminals of a voltmeter and each pair of the binding-posts forming terminals of a different circuit by turning the shaft D at the handle H to cause the index-finger to point to any particular number or other indication on the dial the brushes q will connect the pair of contacts f k and the brushes q' the pair of contacts f' k', which through the respective binding-posts i m and i' m' connect with the voltmeter-terminals the circuit corresponding with the indication to which the index-finger points, thereby including the voltmeter in that circuit and enabling it to indicate the voltage thereof. By thus turning the shaft D the wheel D' by engaging the pinion C' turns the shaft C to move the brushes from the pairs of contacts they connect to other pairs of such contacts to bring the voltmeter into connection with any one of the circuits desired to be tested, of which the respective contacts k and k' form the terminals, the indicator, formed by the dial and index-finger, showing when the handle has been turned sufficiently far to make the desired connection. With the gearing afforded by the two-to-one relation between the gear D' and pinion C' the movement of the brushes from circuit to circuit is made so quickly by a slight turn of the handle that the pointer of the voltmeter is moved but slightly, since the time consumed by the brushes in traversing the dead spaces between contacts is insufficient to permit the inertia of the aforesaid pointer to be overcome sufficiently to enable it to turn far enough to jar it or strike it against any abutment at the end of its throw to the dead-point on the voltmeter. Moreover, the rapidity with which the transfer of the brushes from circuit to circuit may be made enables the reading of the voltages on the voltmeter to be performed expeditiously.

Where certain of the contacts on the switch device are not in use as circuit-terminals, the rings n come into use. As will be understood, when the brushes are swept across such dead contacts the dead space between live-circuit terminal contacts is accordingly increased, so that the time of movement of the brushes from circuit to circuit is augmented, with the result that the movement of the voltmeter-pointer is undesirably increased. To obviate this result, I connect the dead contacts with adjacent circuits through the medium of the rings by leading wires from the binding-posts of a pair of live contacts to the rings and leading from the latter other wires to the pair of binding-posts of the respective dead contacts, thereby including the latter in the circuit terminated by the live contacts, with the effect practically of avoiding increase in the dead space to be traversed by the brushes.

The described construction of my improved switch also renders it very compact and adapts it to be readily attached to and removed from the switchboard-panel. Where

the number of circuits to be controlled is larger or smaller than ten, the dimensions of the blocks for accommodating the different number of contacts may be greater or smaller accordingly.

It will be noted, as a particularly desirable feature of my improvement, that the contacts on each block-face are separated each from the other by dead spaces and that the contact-arms of each brush spread resiliently to engage opposite contacts. Thus when a brush is turned it entirely clears the contacts it is caused to leave by the turning and passes through the dead space to the next pair of contacts without encountering frictional resistance. The brush in engaging a pair of contacts is frictionally held by them to retain the brush positively and indicate to the sense of feeling of the operator when contact is made.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a multiple voltmeter-switch, the combination of blocks provided on corresponding faces with series of contacts, with a binding-post, for connection with a voltmeter, on each said block connected with the contacts thereon, blocks alternating with and spaced apart from said first-named blocks and provided on corresponding faces with series of circuit-terminal contacts connected with binding-posts, and a rotary shaft carrying brushes in the spaces between successive blocks, for the purpose set forth.

2. In a multiple voltmeter-switch, the combination of blocks provided on corresponding faces with series of contacts, with a binding-post, for connection with a voltmeter, on each said block connected with the contacts thereon, blocks alternating with and spaced apart from said first-named blocks and provided on corresponding faces with series of circuit terminal contacts connected with binding-posts, a rotary shaft carrying brushes in the spaces between successive blocks, a dial having an index-finger, and means for turning said finger and shaft, for the purpose set forth.

3. In a multiple voltmeter-switch having circular series of circuit-terminal and voltmeter-terminal contacts, respectively, on the opposing faces of blocks, the combination with said blocks of a rotary brush-carrying shaft to engage the contacts between said opposing faces, an operating-shaft and means for speeding the movement of the brush-shaft relative to that of the operating-shaft by turning the latter, comprising a gear connection between said shafts producing a greater extent of movement of the brushes by a relatively lesser extent of turning the operating-shaft, for the purpose set forth.

4. In a multiple voltmeter-switch having circular series of circuit-terminal and voltmeter-terminal contacts respectively on the opposing faces of successive blocks, the combination with said blocks of a rotary shaft carrying brushes to engage the contacts between said opposing faces, a dial, an operating-shaft, an index-finger actuated by the operating-shaft, and means for speeding the movement of the brush-shaft relative to that of the operating-shaft by turning the latter, comprising a gear connection between said shafts producing a greater extent of movement of the brushes by a relatively lesser extent of turning the operating-shaft, for the purpose set forth.

5. In a multiple voltmeter-switch, the combination of series of circuit-terminal and voltmeter-terminal contacts, a movable brush device for connecting opposite said contacts, and means for connecting at will a dead-circuit-terminal contact with a live one, for the purpose set forth.

6. In a multiple voltmeter-switch, the combination of blocks provided on corresponding faces with series of contacts, with a binding-post, for connection with a voltmeter, on each said block connected with the contacts thereon, blocks alternating with and spaced apart from said first-named blocks and provided on corresponding faces with series of circuit-terminal contacts connected with binding-posts and with means for connecting different said contacts on their respective supporting-blocks, and a rotary shaft carrying brushes in the spaces between successive blocks, for the purpose set forth.

7. In a mulitple voltmeter-switch, the combination of blocks provided on corresponding faces with series of contacts, with a binding-post, for connection with a voltmeter, on each said block connected with the contacts thereon, blocks alternating with and spaced apart from said first-named blocks and provided on corresponding faces with series of circuit-terminal contacts connected with binding-posts and with metal rings through the medium of which to connect together contacts on each face, and a rotary shaft carrying brushes in the spaces between successive blocks, for the purpose set forth.

8. A multiple voltmeter-switch, comprising, in combination with a frame, blocks provided on corresponding faces with circular series of contacts, with a binding-post, for connection with a voltmeter, on each said block connected with the contacts thereon, blocks alternating with and spaced apart from said first-named blocks and provided on corresponding faces with series of circuit-terminal contacts connected with binding-posts, plates between which said blocks are confined, a rotary shaft carrying brushes in the spaces between successive blocks and a pinion, a rotary operating-shaft carrying a gear-wheel meshing with said pinion and passing through

an opening in the panel, a threaded sleeve extending from a forward plate about the operating-shaft through said panel-opening, a headed sleeve engaging said threaded sleeve at the front side of the panel to clamp the switch thereon, a dial at the front side of said panel, and an index-finger provided with a handle and supported on said operating-shaft, for the purpose set forth.

GEORGE N. EASTMAN.

In presence of—
J. H. LANDES,
A. U. THORIEN.