No. 666,940. Patented Jan. 29, 1901.

J. SORENSEN.

STATIC ELECTRIC MACHINE.

(Application filed Jan. 19, 1900.)

(No Model.)

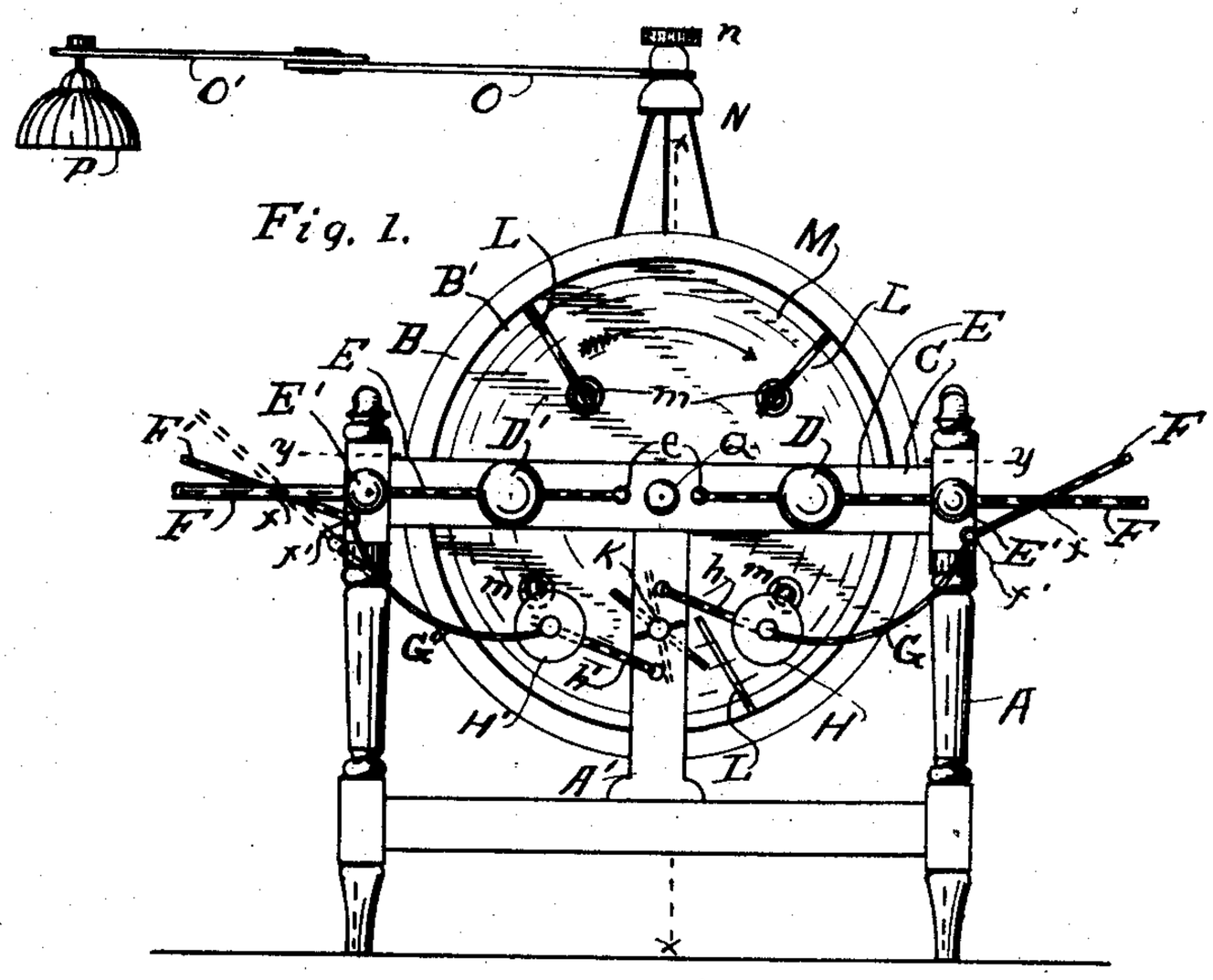

Fig. 1.

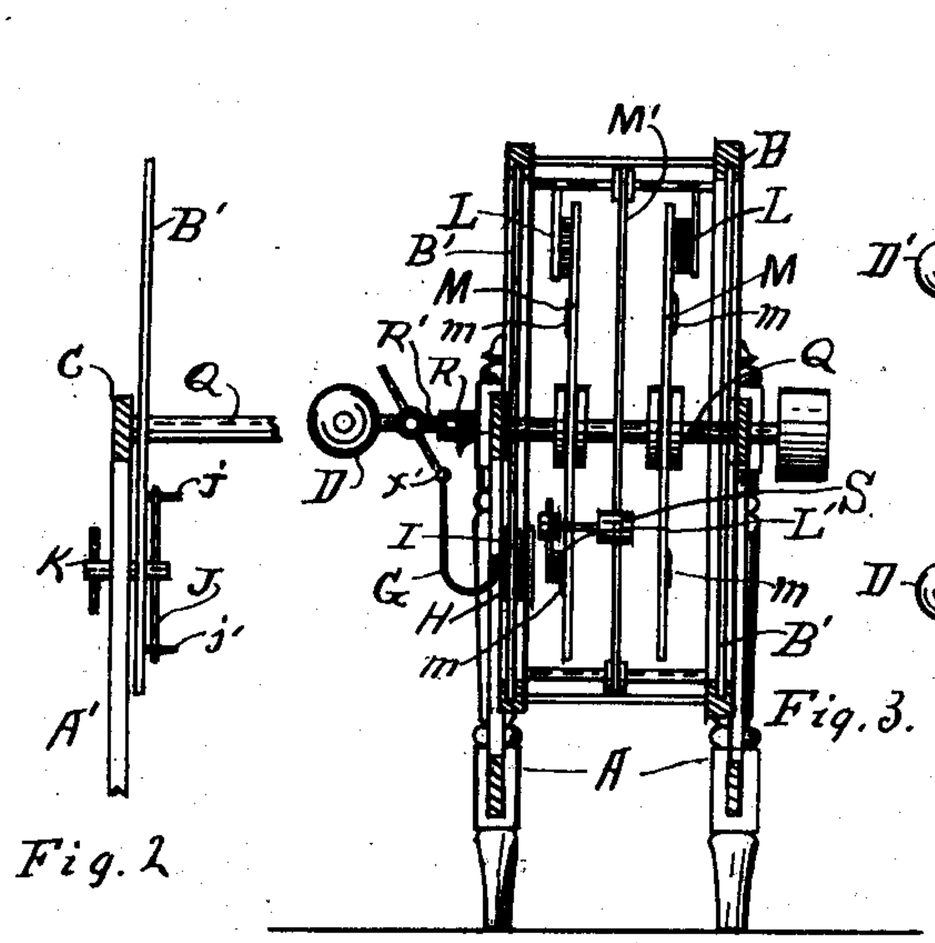

Fig. 2

Fig. 3.

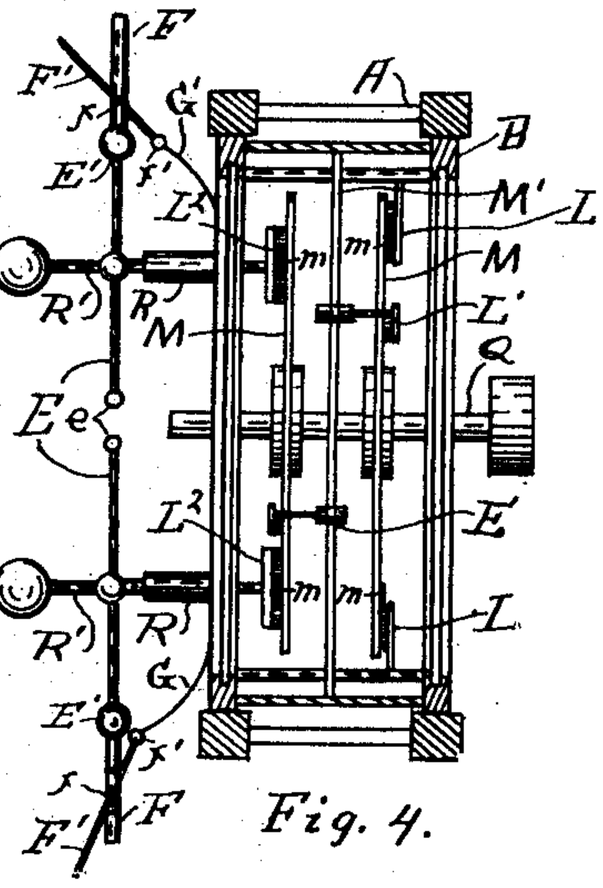

Fig. 4.

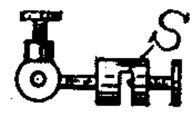

Fig. 5.

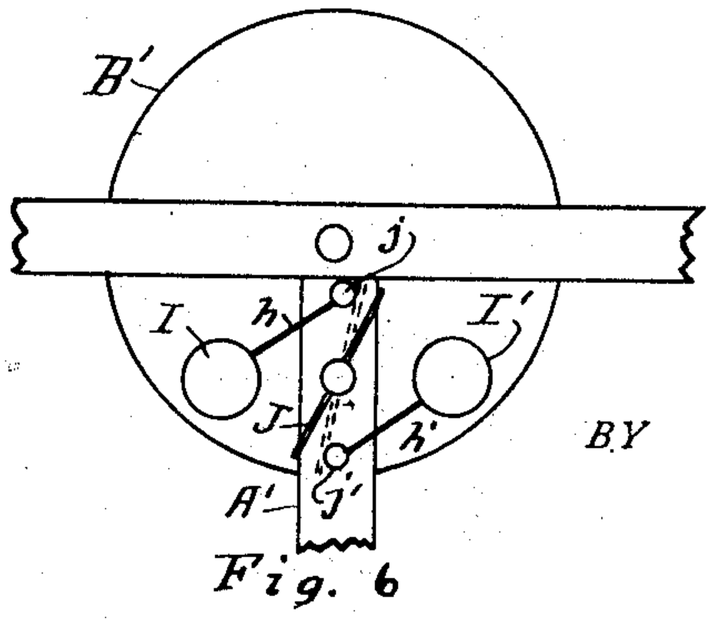

Fig. 6

WITNESSES:

Byron & Parks
Louie Cilley.

INVENTOR.

Jens Sorensen
Ethiel J. Cilley
ATTORNEY.

UNITED STATES PATENT OFFICE.

JENS SORENSEN, OF GRAND RAPIDS, MICHIGAN.

STATIC ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 666,940, dated January 29, 1901.

Application filed January 19, 1900. Serial No. 2,068. (No model.)

To all whom it may concern:

Be it known that I, JENS SORENSEN, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Electric Machines, of which the following is a specification.

My invention relates to improvements in machines for producing static electricity; and its objects are, first, to avert the danger of suddenly changing the polarity of the machine; second, to enable me to change the passing current from a spark to a spray, and vice versa; third, to increase and diminish the tensity of the electric current without changing the motion of the machine, and, fourth, to retain the polarity when idle. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of my machine. Fig. 2 is a sectional edge view of a portion of the front side of the frame and inclosing glass, showing the construction of the portion of the machine that regulates the nature of the current of electricity—*i. e.*, as to changing it from a spark to a spray, and vice versa. Fig. 3 is a transverse vertical section of the machine on the line *x x* of Fig. 1. Fig. 4 is a sectional plan of the same on the line *y y* of Fig. 1. Fig. 5 is a detail of the brush-holder; and Fig. 6 is an inside view of the front of the machine, showing the position and action of the mechanism that regulates the nature of the current of electricity as it passes from pole to pole.

Similar letters refer to similar parts throughout the several views.

The first and most important feature of my invention is the form of the inclosing case B. I find by actual test that the more closely confined the air can be kept in frictional electric machines the more effective will be the spark produced and the current passing through the machine, and for this purpose I find that a circular case, as shown, wherein the corners of an ordinary square machine are eliminated and the consequent dead space is avoided, the efficiency of the machine is greatly increased.

The second important feature of my invention consists of my means of, first, insuring the polarity of the machine when active and retaining it when not active, and, second, in the manner of changing the nature of the electric current as it passes from pole to pole. This is accomplished as follows: I place upon the inner surface of the side glass of the case B′ two or more thin metallic sheets I I′, that are wholly insulated from every portion of the electric producing or conducting portions of the machine, and on the outer surface of the glass plate I place corresponding plates H H′, which are connected with the auxiliary poles or governor-balls *f′* by the metallic cords G G′. The handles F to the adjustable poles E *e* of the machine are made of an absolute non-conductor of electricity and the auxiliary poles *f′* are supported upon similar handles F′, which are pivoted to the pole-handles, as at *f*, so that they may be made to approach to or recede from the metallic bulbs or poles E′ to increase or diminish the flow of electricity to the plates H H′ at the will of the operator. The plates H and I and H′ and I′ are perfectly insulated from each other. The plates I and I′ receive electricity, first, by direct contact with the electrically-charged air within the case B of the machine, and, second, by induction from the influence of the electricity passing into the plates H H′.

The plates I and I′ are connected with the pins *j* and *j′* by the wires *h* and *h′*, the pins *j* and *j′* being supported in the front rail A′ of the frame and perfectly insulated from any conductor of electricity, except as hereinbefore stated. I place a metallic rod J in the case in position to be disconnected from the pins *j j′*, as indicated by the solid lines in Fig. 1, or to be placed in contact with both of said pins, as indicated by the dotted lines in said figure. We will suppose that the machine is revolving in the direction of the arrow in Fig. 1 and that the pole D is positive and D′ is the negative pole of the battery. With the rod J in contact with the pins *j j′*

the current of electricity passing from D to D′ through the adjustable poles E *e* will be in the form of a spark and will pass with a loud report, while with said rod disconnected from said pins and the electric current thereby interrupted between the plates I I′ the current of electricity between the poles D D′ will be in the form of a spray and will pass comparatively noiselessly. The rod J may be manipulated by means of a hand-lever, as K, or by any other convenient means.

The action of the machine, and more especially of the plates H H′ and I I′, may be very much modified by the manipulation of the lever or handle F′. Thus with the balls *f′* in contact with the balls E′ the polarity of the machine, and especially of the plates, is much more pronounced and positive than with them removed, as indicated by the dotted lines.

The shaft Q is supported in the rails C, and the revolving plates M, of glass, are mounted thereon in the usual manner, with one or more stationary plates M′ between them.

L represents insulated combs. L′ indicates insulated brushes, and *m* indicates metallic bosses in the revolving plates common in this class of machines and needing no further explanation here.

The poles D D′ are brought within the influence of the electrified plates by means of the combs L^2, which are metallically connected therewith by means of the arms R′, which pass through the insulating-supports R.

N represents a standard or support having a thumb screw or nut *n*, with which to secure the supporting-arm O, and O′ is an extension of said arm, upon which is supported the crown-piece P, common in static electrical machines when used for medicinal treatment.

With the use of the cylindrical case I dispense with the large square corners of the ordinary case and the consequent surplusage of air. By this means I am enabled to reduce the humidity of the air contained in the case to the minimum, thus rendering it far more susceptible to the electric influence and enabling me to place my revolving plates farther from the stationary plates, and thereby produce the desired current of electricity with a less number of plates than in a square case, as the plates may be made to revolve much faster without danger of coming in contact with each other and breaking.

I find the regulating-lever F′ and its metallic end *f′* particularly desirable when using the machine for giving electric treatments and when used for X-ray purposes. In X-ray work the wires that connect the tube in the electric circuit may be attached to the balls *f′* and the current of electricity therethrough easily governed by the relative position of these balls with the active poles of the machine. Thus with these balls in close contact with the poles E′ the full charge of the machine will pass through the tube, but if the balls *f′* are removed from the poles the charge may be diminished, as desired, until comparatively no current passes. The same principle lies when using the machine for electric treatment. The current may be passed directly through the poles D D′ or indirectly through the plates H H′, or it may pass directly through one pole and indirectly through one plate, or the tensity of the current may be varied without producing a shock upon the patient.

S represents a wooden support for holding my metallic brushes, hereinbefore described and shown.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a static electrical machine, a cylindrical inclosing case, revoluble plates, combs and brushes within said case, metallic poles outside of said case, metallic arms extending from said poles through the insulating-supports R into the case and to position to receive and conduct electricity and adjustable poles acting with said poles, substantially as and for the purpose set forth.

2. In a static electrical machine, revoluble plates, metallic brushes and combs inclosed within a cylindrical case having sheet-glass sides, two or more metallic plates secured to the inner surface of glass sides of the case, corresponding metallic plates on the outside of the glass, and wires electrically connecting said outer plates with the poles of the machine substantially as and for the purpose set forth.

3. In a static electrical machine, revoluble plates, metallic brushes and combs, and conductors within the case, poles leading from the plates to the open air, metallic plates secured to the inner surface of the front of the case, an adjustable metallic rod by means of which these plates may be electrically connected and disconnected, corresponding plates on the outer surface of the case immediately opposite the inner plates, said outer plates electrically connected with the poles of the machine, insulated handles to the poles of the machine, and adjustable insulated handles pivoted thereto and adapted to connect and disconnect the outer plates and the poles, as shown and described.

4. In a static electrical machine, revoluble plates, metallic brushes and combs adjacent to said plates, and a case for inclosing the same electric poles outside of the case and connected with the electric influence of the plates by metallic conductors, sliding auxiliary poles, insulating-handles on said slides, an insulated handle pivoted to each of the first-mentioned handles, metallic plates secured to the outer surface of the front wall of the case, wires connecting said plates with the pivoted handles in position to be brought in contact with the poles, corresponding plates secured to the inner surface of the front wall

of the case directly opposite the outer plates, metallic pins projecting onwardly from the surface of the case, a wire connecting each of the inner plates with one of said pins, and an adjustable contact-rod in position to connect and disconnect said pins, substantially as and for the purpose set forth.

Signed at Grand Rapids, Michigan, January 15, 1900.

JENS SORENSEN.

In presence of—
JELIPO ENGSTRAUL,
ITHIEL J. CILLEY.