No. 809,761. PATENTED JAN. 9, 1906.

E. THOMSON.

ELECTROSTATIC INFLUENCE MACHINE.

APPLICATION FILED JUNE 23, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

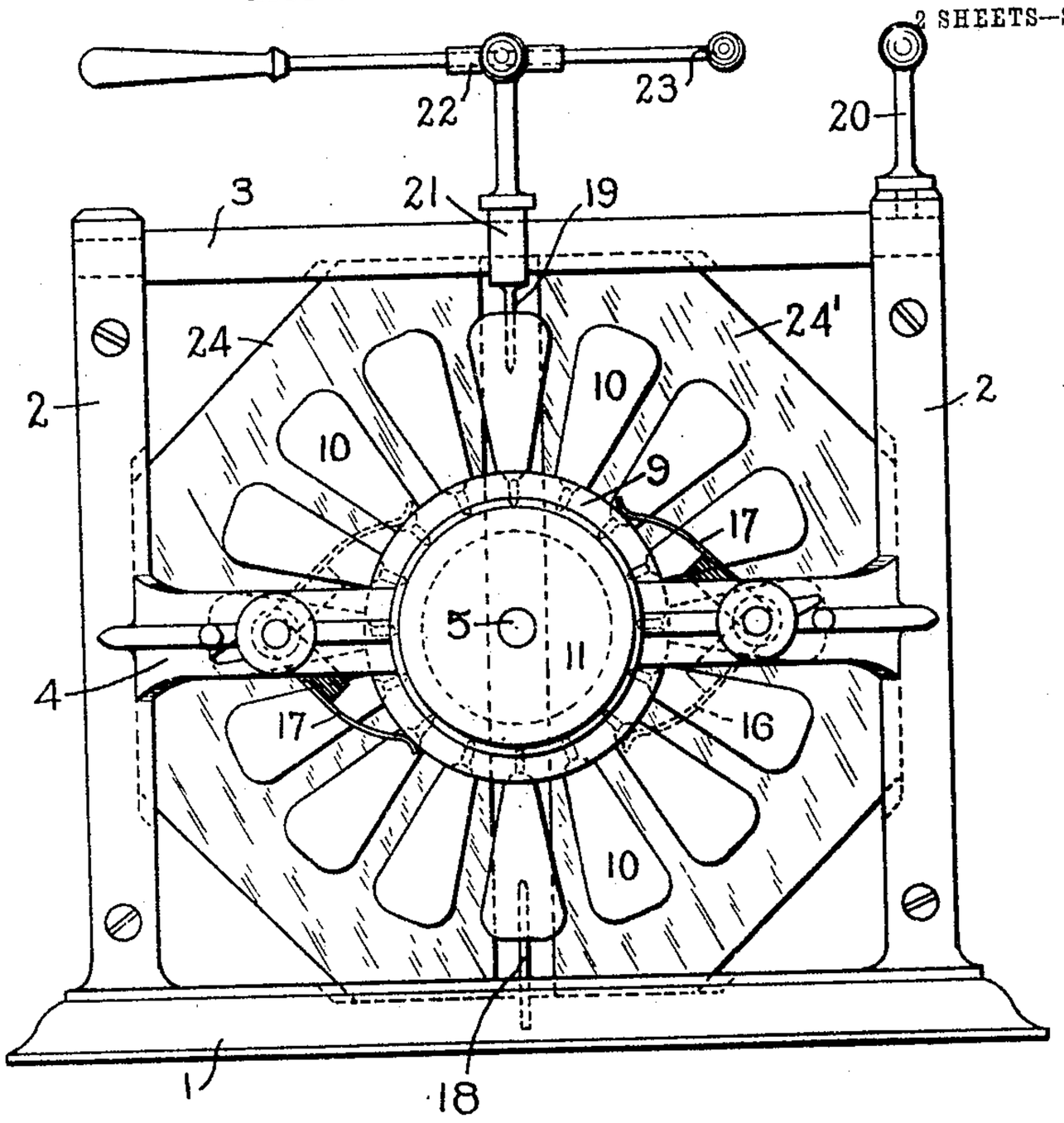



Fig. 2.

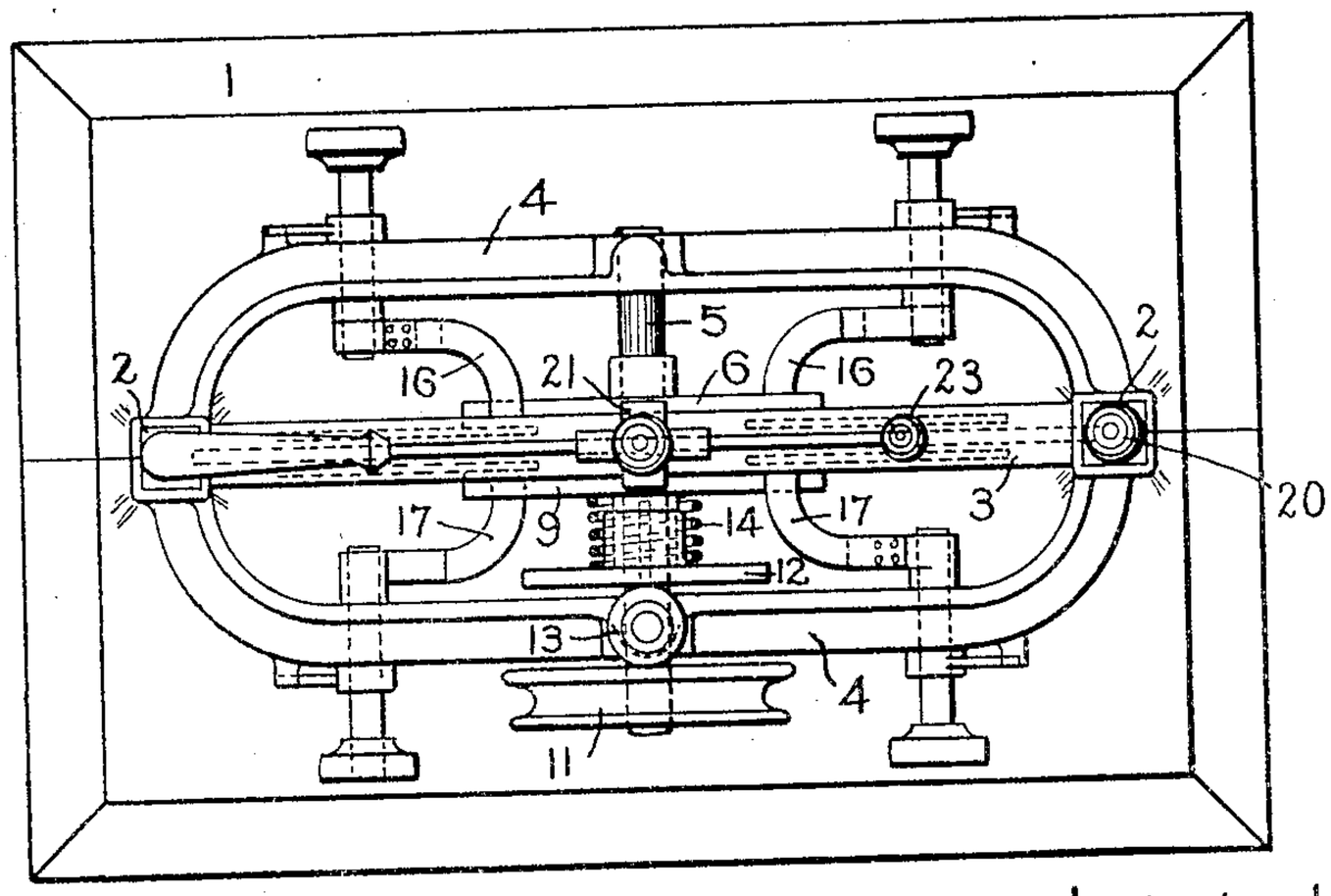
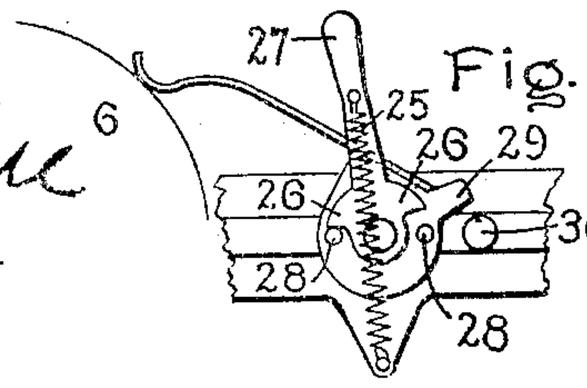



Fig. 3.




WITNESSES.

Benjamin B. Hull

Helen Orford

INVENTOR.

Elihu Thomson

by Albert G. Davis

Atty.

No. 809,761. PATENTED JAN. 9, 1906.

E. THOMSON.

ELECTROSTATIC INFLUENCE MACHINE.

APPLICATION FILED JUNE 23, 1904.

2 SHEETS—SHEET 2.

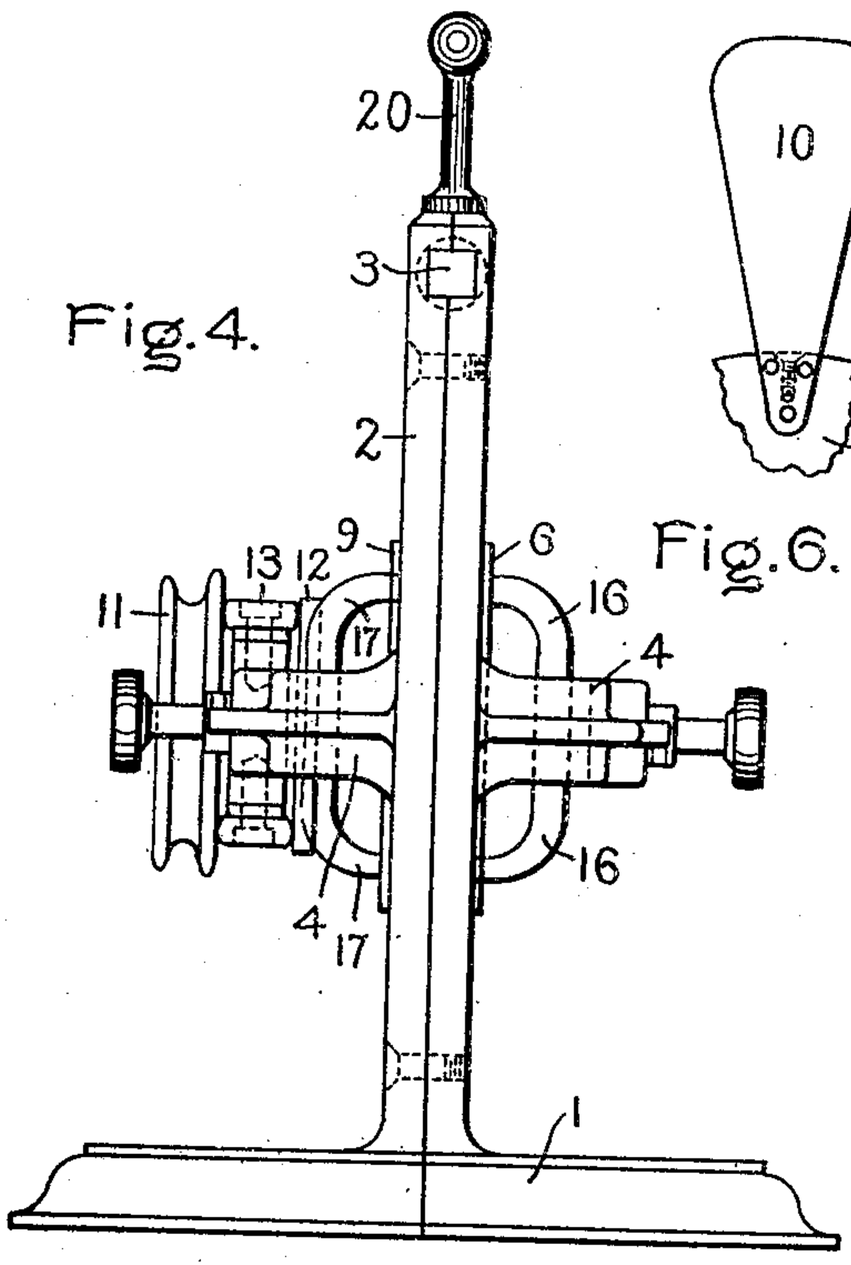



Fig. 4.




Fig. 6.

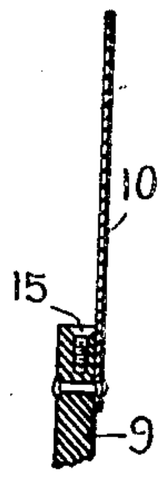



Fig. 7.

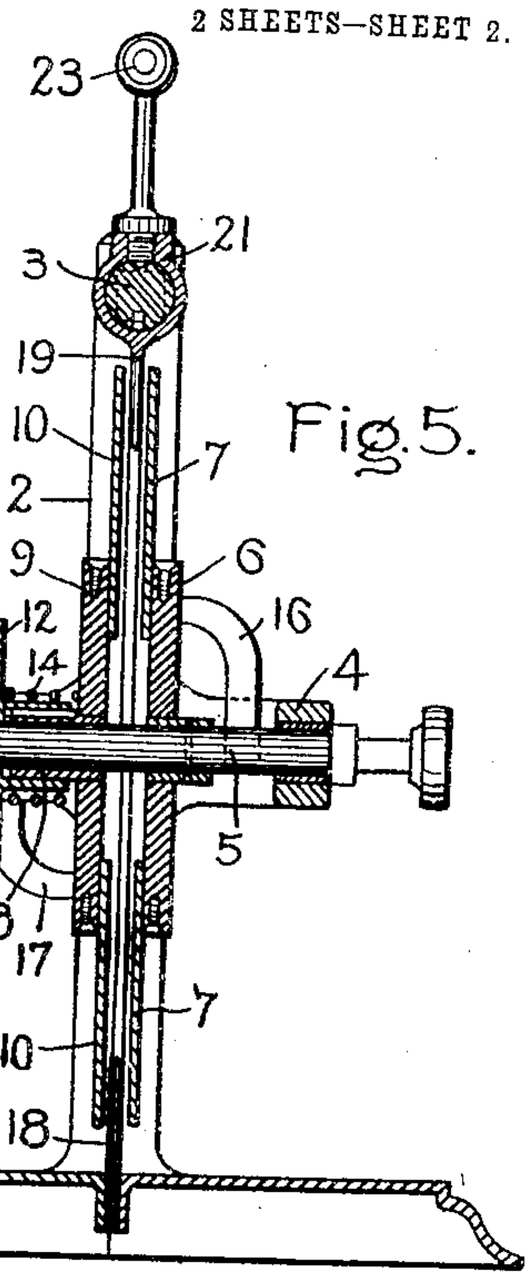



Fig. 5.

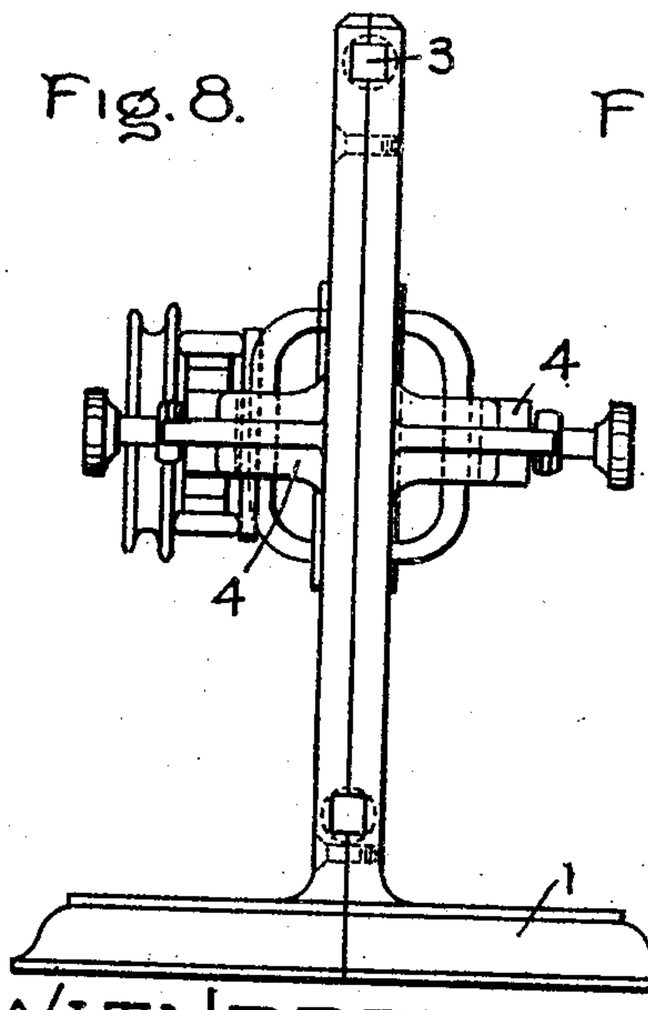



Fig. 8.

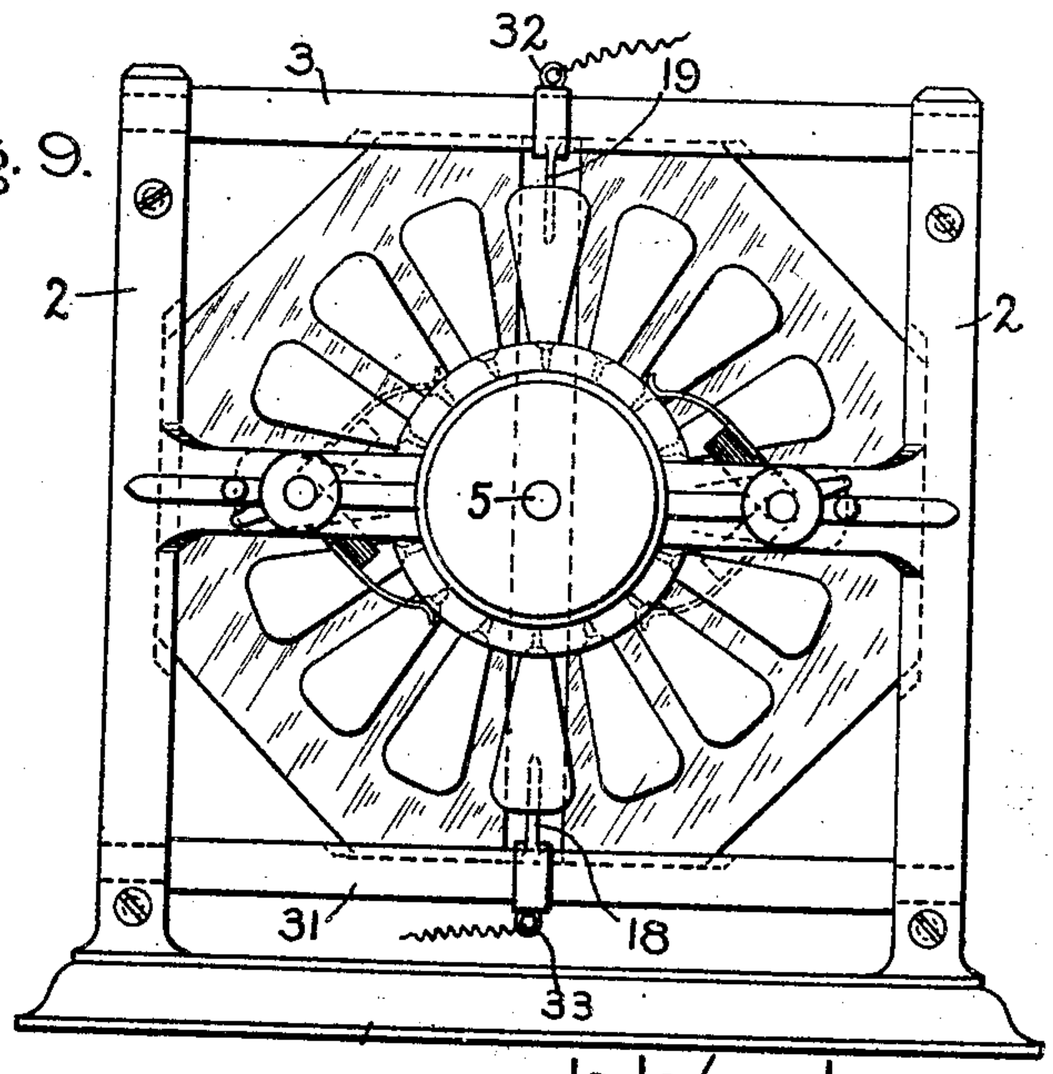



Fig. 9.

WITNESSES.

Benjamin B. Hull

Arlen Orford

INVENTOR.

Elihu Thomson.

By Albert G. Davis

Atty.

# UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## ELECTROSTATIC INFLUENCE-MACHINE.

No. 809,761. Specification of Letters Patent. Patented Jan. 9, 1906.

Application filed June 23, 1904. Serial No. 213,780.

*To all whom it may concern:*

Be it known that I, ELIHU THOMSON, a citizen of the United States, residing at Swampscott, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Electrostatic Influence-Machines, of which the following is a specification.

This invention relates to static electricity-machines; and its object is to provide an electrostatic influence-machine having in its revolving parts the minimum diameter of insulating material, but so disposed that it can be made massive and strong.

A further object is to simplify the structure of the stationary parts and reduce as far as possible the thickness of the dielectric through which the inductive action is produced.

The machine is particularly adapted to the production of moderate potentials and is also capable of being run at a high speed, so as to increase the output.

The invention consists in certain features of construction hereinafter set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a front elevation of a machine embodying my invention. Fig. 2 is a top plan view of the same. Fig. 3 is a detail elevation of a brush and its holder. Fig. 4 is an end elevation of the machine. Fig. 5 is a vertical cross-section through the shaft. Fig. 6 is a detail front elevation, and Fig. 7 a longitudinal section, of one of the vanes. Fig. 8 is an end view of a modified construction, and Fig. 9 is a front elevation of the same.

Referring first to Figs. 1 to 7, the frame of the machine is composed of duplicate castings meeting on a median plane and suitably fastened together. The frame comprises a base 1, from which rise two parallel columns 2, connected at the top by a cross-bar 3 and at about their centers by two outwardly-curved horizontal brackets 4, one on each side of the vertical plane of the columns and both lying in the same horizontal plane. In each bracket is a bearing for a horizontal shaft 5, which extends perpendicular to the vertical plane of the columns. Carried upon and driven by this shaft is a disk 6, of insulating material, such as hard rubber, to the edge of which are secured radiating wings or vanes 7, sector-shaped with rounded corners. These vanes are preferably made of aluminium for the sake of lightness and are fastened to the front face of the disk 6, which may be made thick and massive enough to be amply strong. Sleeved upon the front portion of the shaft is a rotatable quill 8, on which is secured a disk 9 of insulation similar to the disk 6 and similarly provided with aluminium vanes 10. The number of vanes on the two disks may be the same or different, as desired. Means are provided for revolving the two sets of vanes in opposite directions, preferably consisting of a friction-disk 11 on the shaft driving a friction-disk 12 on the quill through one or more intermediate stationary friction-rolls 13, journaled on studs fixed in the front bracket. The friction-disk 11 may also serve as the main driving-pulley of the machine. The friction-disk 12 is preferably not rigidly secured to the quill, but is splined thereon and provided with a compression-spring 14 for keeping it pressed against the rolls 13. It will be seen that a belt upon the pulley 11 will rotate the shaft and the vanes 7 in one direction, while the friction-rolls will cause the disk 12 and the vanes 10 to revolve in the opposite direction. Arrangement is made whereby as the vanes revolve they come in electrical contact with stationary brushes carried on the frame of the machine and connected together or grounded. To this end each vane has a sort of commutator segment or extension on the edge of its supporting-disk, preferably a small screw 15, inserted into the disk, the head of which touches the vane and lies flush with the outer periphery of the disk. Upon this periphery bears a pair of spring-brushes 16 17, one pair carried by the rear bracket for the disk 6 and the other carried by the front bracket for the disk 9. The brushes in each pair are preferably directed in the direction of rotation of their disk, and their length is sufficient for them to make contact with the disk at diametrically opposite points. The arrangement is such that the line joining one pair of brushes is substantially perpendicular to that joining the other pair, as clearly shown in Fig. 1. A pointed wire 18 is fixed in the base 1 and projects up between the two sets of revolving vanes. A similar pointed wire 19 is supported on the cross-bar 3, projecting down into the space between the vanes opposite to the wire 18. The cross-bar is made of insulation, such as hard rubber or paraffined wood, so that the two wires 18 and 19 are not electrically connected. Fastened to the top of one of the col-

umns is a terminal 20, while the wire 19 is carried by a metallic collar 21, on which is mounted a sleeve 22, in which slides a terminal 23 to coöperate with the terminal 20. When the vanes are revolved in opposite directions, the machine becomes electrostatically charged and delivers high-tension electricity to the terminal 23, the maximum tension obtainable being governed by the leakages and by the distance apart of the several vanes in each set.

The machine will operate with merely an air-space between the two sets of vanes; but as air is a poor dielectric so far as resistance to sparks is concerned it is best to provide between the sets of vanes a layer or diaphragm of good dielectric, which occupies nearly all the available space. Hard rubber may be used; but I prefer glass or built-up mica. A single plate may be used, if desired, with an opening at the center for the passage of the shaft and openings at the top and bottom for the wires 18 and 19; but as there is no especial advantage in this I find it simpler to employ two pieces 24 24′, having approximately the form of half-octagons or semicircles, supported at their edges by grooves in the frame, where they can be either cemented in place or embedded in felt or otherwise secured. Their adjacent edges are spaced apart to let the shaft pass through and also to give space for the collectors 18 and 19.

The operation of the machine is very much the same as that of the well-known Wimhurst machine, except that owing to the absence of rotating plates of dielectric a very much higher speed may be sustained, especially as the disks 6 and 9 may be made as thick and strong as desired.

While it is desirable to have the brushes make a firm contact with the vanes at the start, this contact may be almost or wholly removed after the machine is running and charged. This effect may be accomplished by the device shown in Fig. 3, where the spring 25 causes the lugs 26 on the loosely-pivoted handle 27 to abut against the pins 28, and thus either hold the brush down upon the disk or on passing the center it will pull the brush-carrier 29 against a stop 30, and thus relieve the pressure on the brush.

The machine shown in Figs. 8 and 9 has both collectors 18 and 19 supported on insulating cross-bars 3 and 31. Either or both of the terminals 32 33 may be used for obtaining the output.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. An electrostatic influence-machine, comprising two sets of vanes revolving in parallel planes but in opposite directions, and stationary collectors projecting into the space between the two sets.

2. An electrostatic influence-machine, comprising two sets of vanes revolving in parallel planes, and a stationary dielectric diaphragm between them.

3. An electrostatic influence-machine, comprising two strong disks of insulating material, metallic vanes radiating from said disks, and means for rotating said disks in opposite directions in parallel planes.

4. An electrostatic influence-machine, comprising a shaft, a strong disk of insulating material secured thereon, a quill sleeved on said shaft and carrying a second disk of insulating material, a set of radiating metallic vanes on each disk, and means for rotating said disks in opposite directions.

5. An electrostatic influence-machine, comprising a shaft, a strong disk of insulation secured thereon, a quill sleeved on said shaft and carrying a second disk of insulation, radiating metallic vanes on each disk, and gearing connecting said shaft and quill to cause them to rotate in opposite directions.

6. In an electrostatic influence-machine, the combination with two strong disks of insulation, of metallic vanes radiating therefrom and having metallic extensions on the peripheries thereof, and brushes touching said peripheries at diametrically opposite points.

7. In an electrostatic influence-machine, the combination with two sets of insulated metallic vanes revolving in opposite directions, of two collectors located at opposite points between said sets, and two pairs of grounded brushes for touching the outside of said vanes just before they pass the collectors.

8. In an electrostatic influence-machine, a frame composed of a base, columns and horizontal brackets connecting said columns, said frame being cast in integral similar halves.

9. In an electrostatic influence-machine, the combination with a frame comprising a base, columns, connecting-brackets and a cross-bar, of two plates of dielectric secured in said frame with a space between their adjacent edges.

10. In an electrostatic influence-machine, the combination with a stationary dielectric diaphragm, of two sets of insulated vanes rotating in opposite directions on opposite sides of the same, collectors projecting between the sets in an opening in said diaphragm, and two grounded brushes for each set adapted to touch the outside of said vanes just before they reach the collectors.

In witness whereof I have hereunto set my hand this 21st day of June, 1904.

ELIHU THOMSON.

Witnesses:
DUGALD MCK. MCKILLOP,
HENRY O. WESTENDARP.