

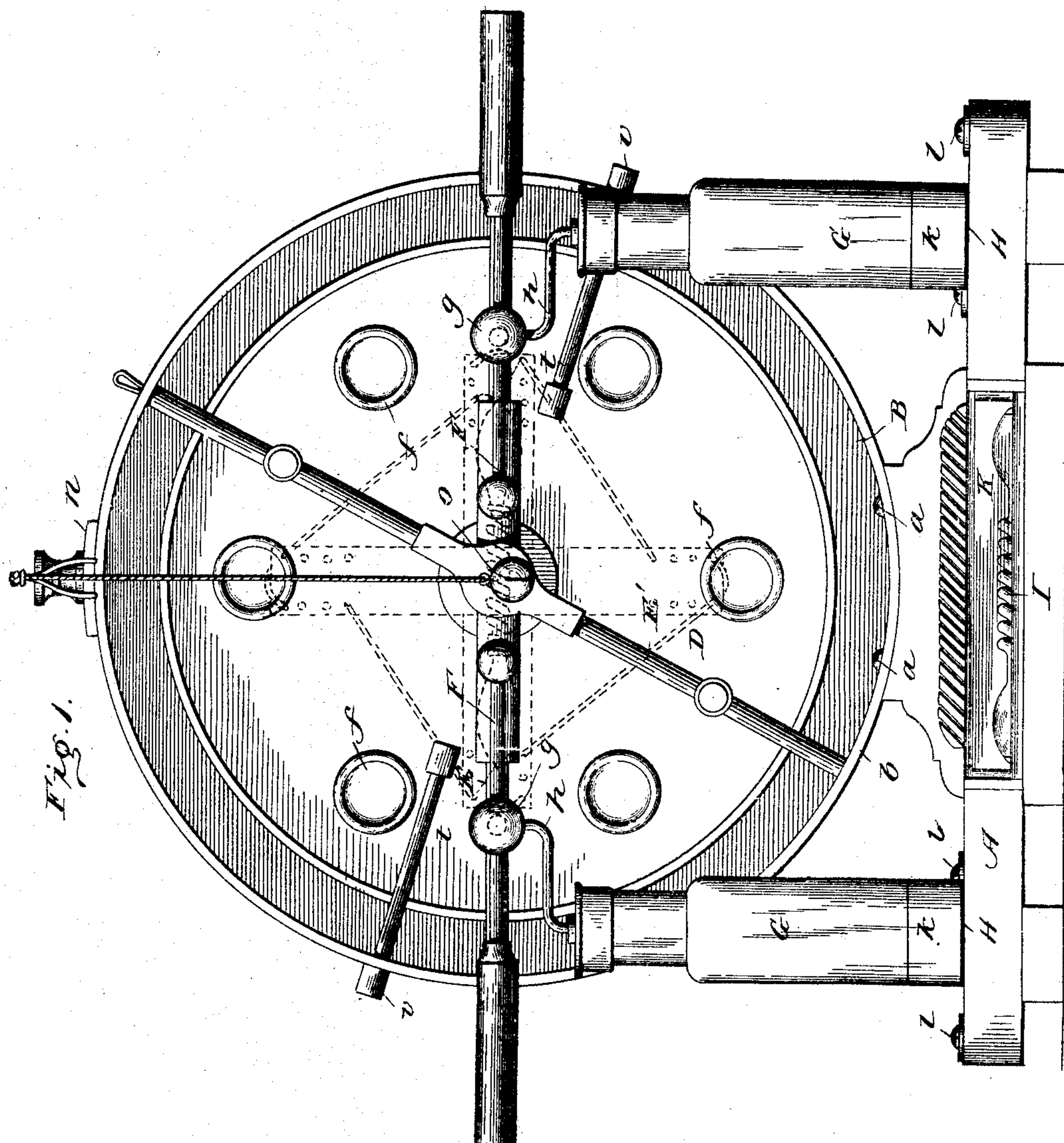
(No Model.)

4 Sheets—Sheet 1.

T. H. PATEE.
PORTABLE STATIC ELECTRIC MACHINE.

No. 504,740.

Patented Sept. 12, 1893.



Witnesses Theodore H. Patee Inventor
Curtis Lammond
Edwin L. Bradford By J. M. C. W. Squire
Attorney

(No Model.)

4 Sheets—Sheet 2.

T. H. PATEE.
PORTABLE STATIC ELECTRIC MACHINE.

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Fig. 2

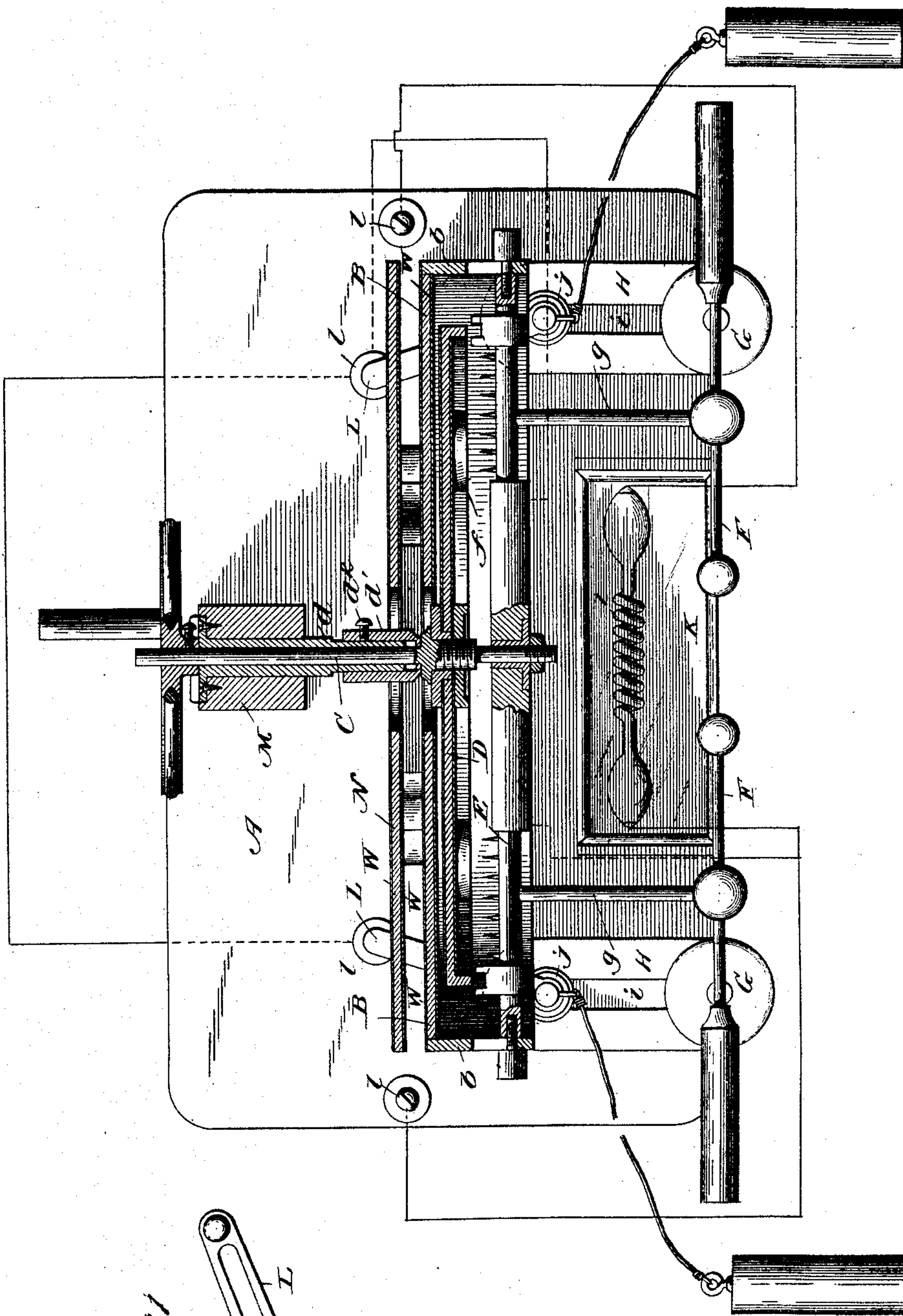
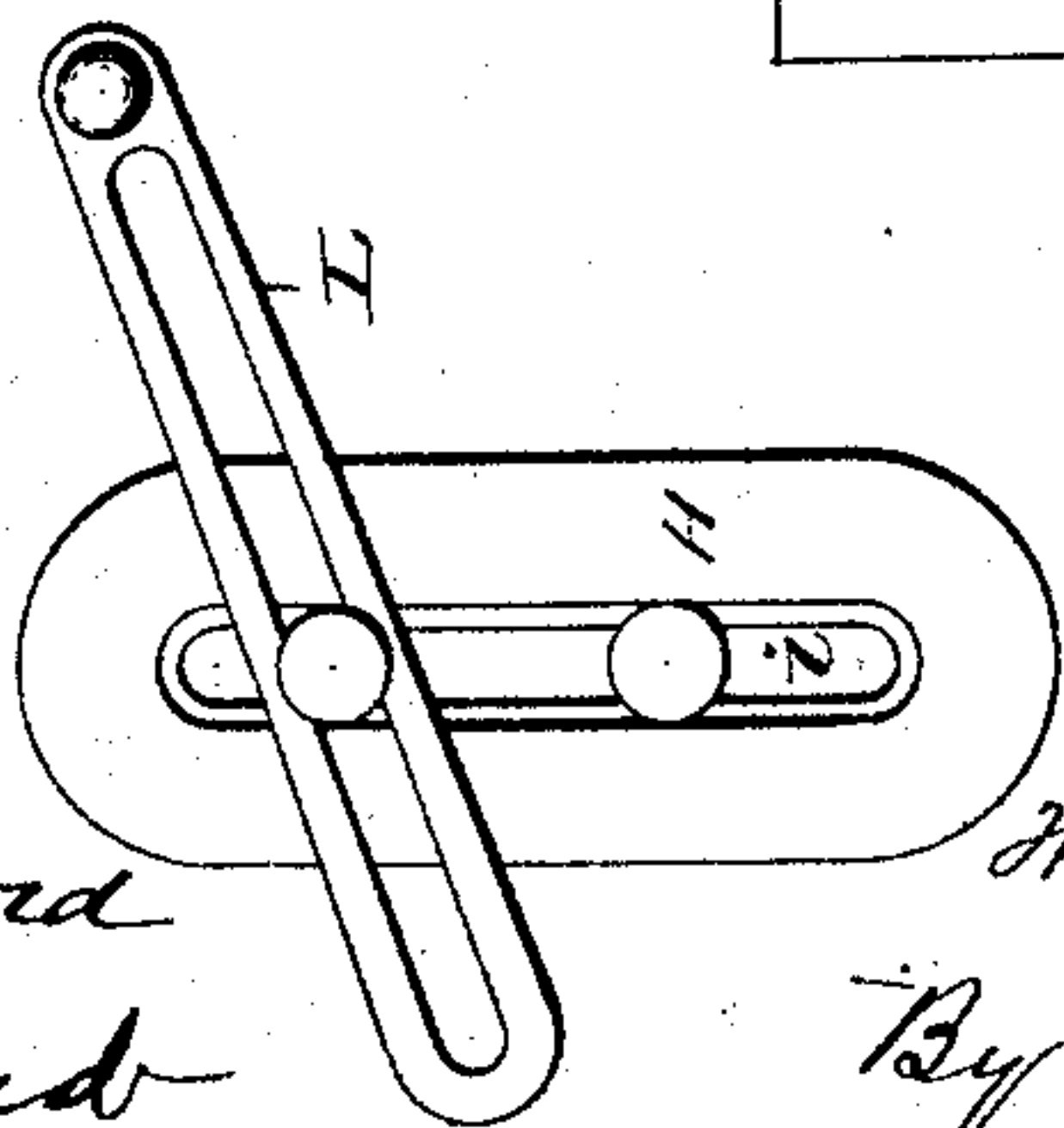


Fig. 11



Witnesses

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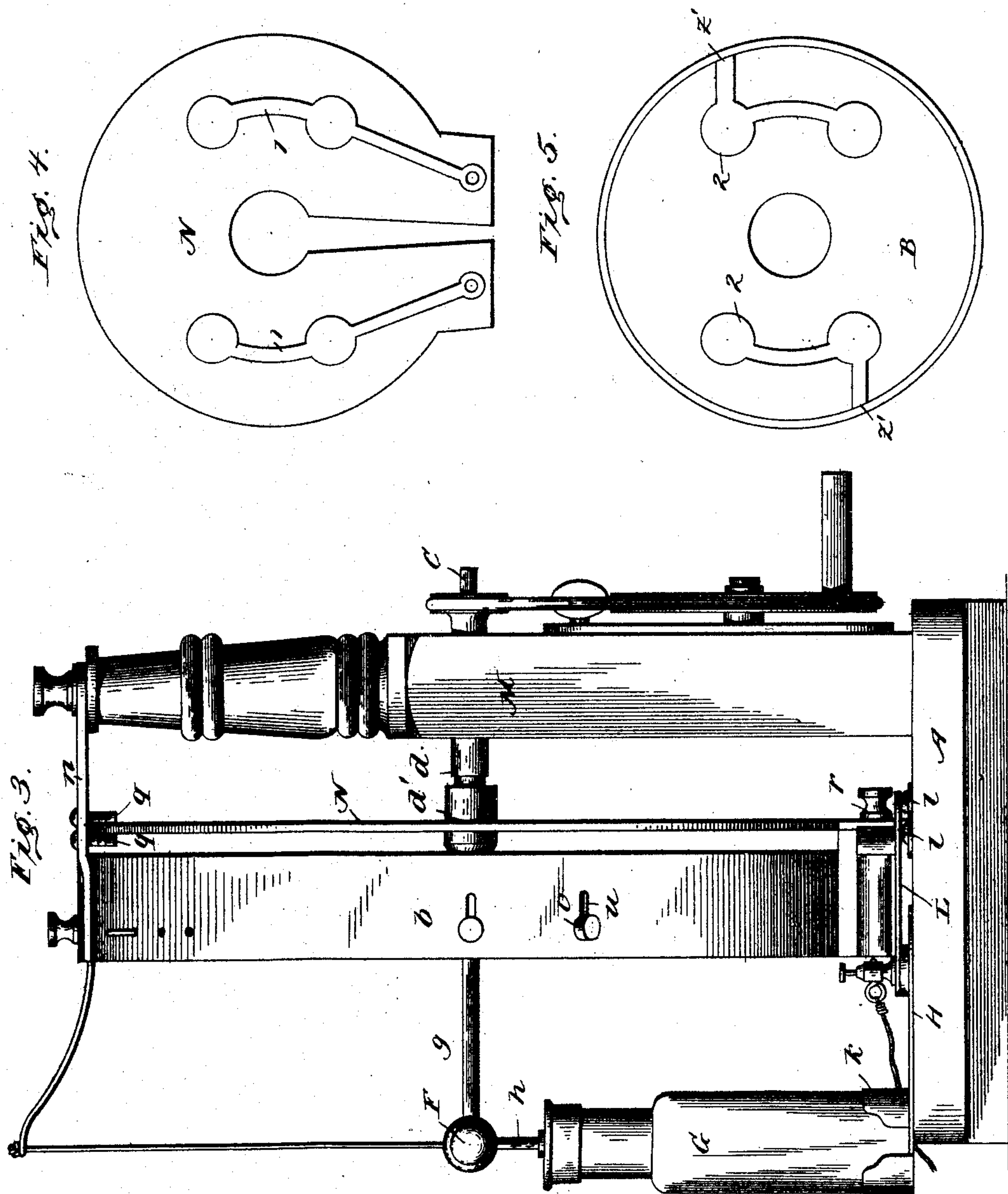
(No Model.)

4 Sheets—Sheet 3.

T. H. PATEE.
PORTABLE STATIC ELECTRIC MACHINE.

No. 504,740.

Patented Sept. 12, 1893.



Witnesses
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(No Model.)

4 Sheets—Sheet 4.

T. H. PATEE.
PORTABLE STATIC ELECTRIC MACHINE.

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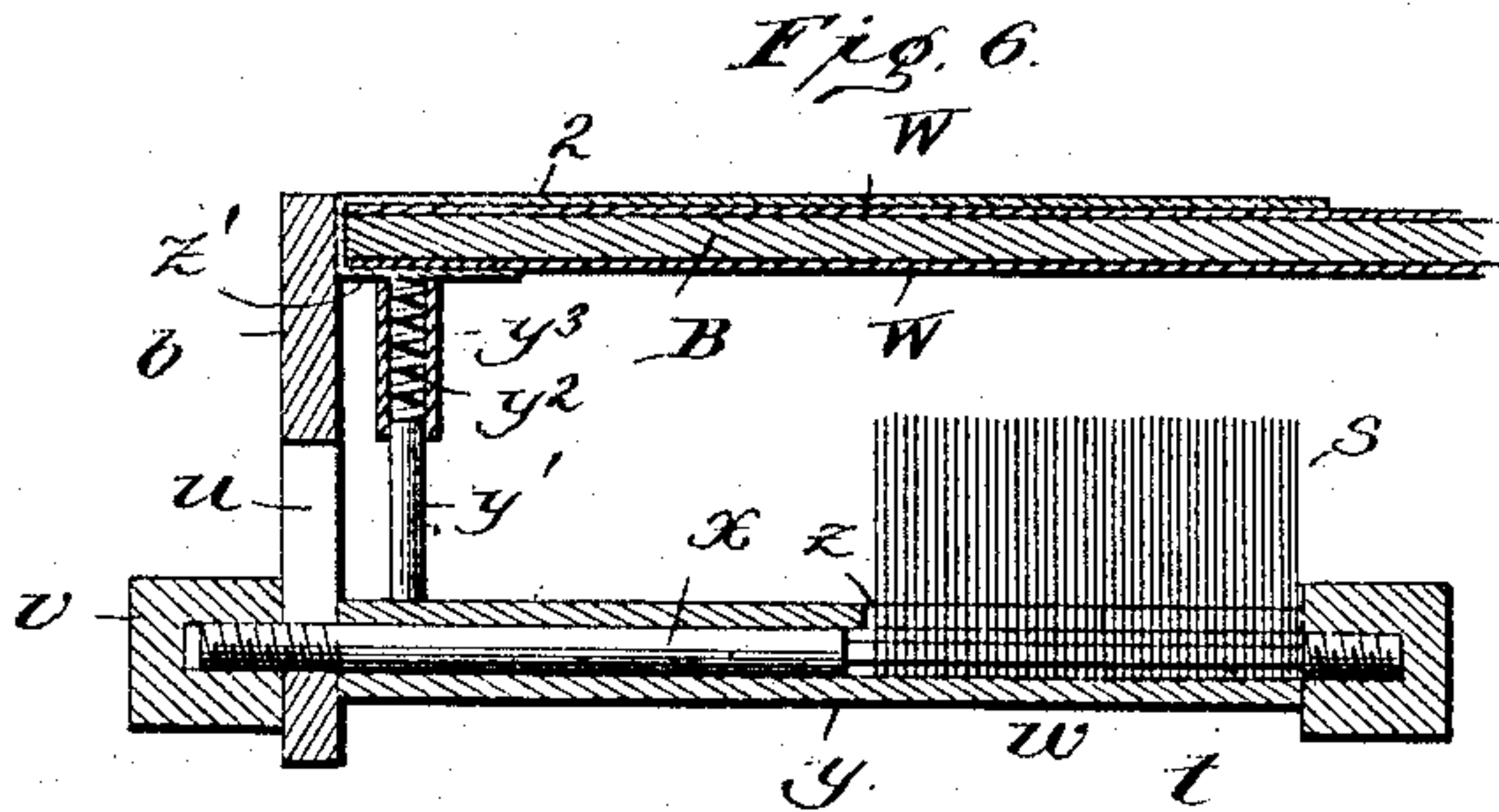


Fig. 7.

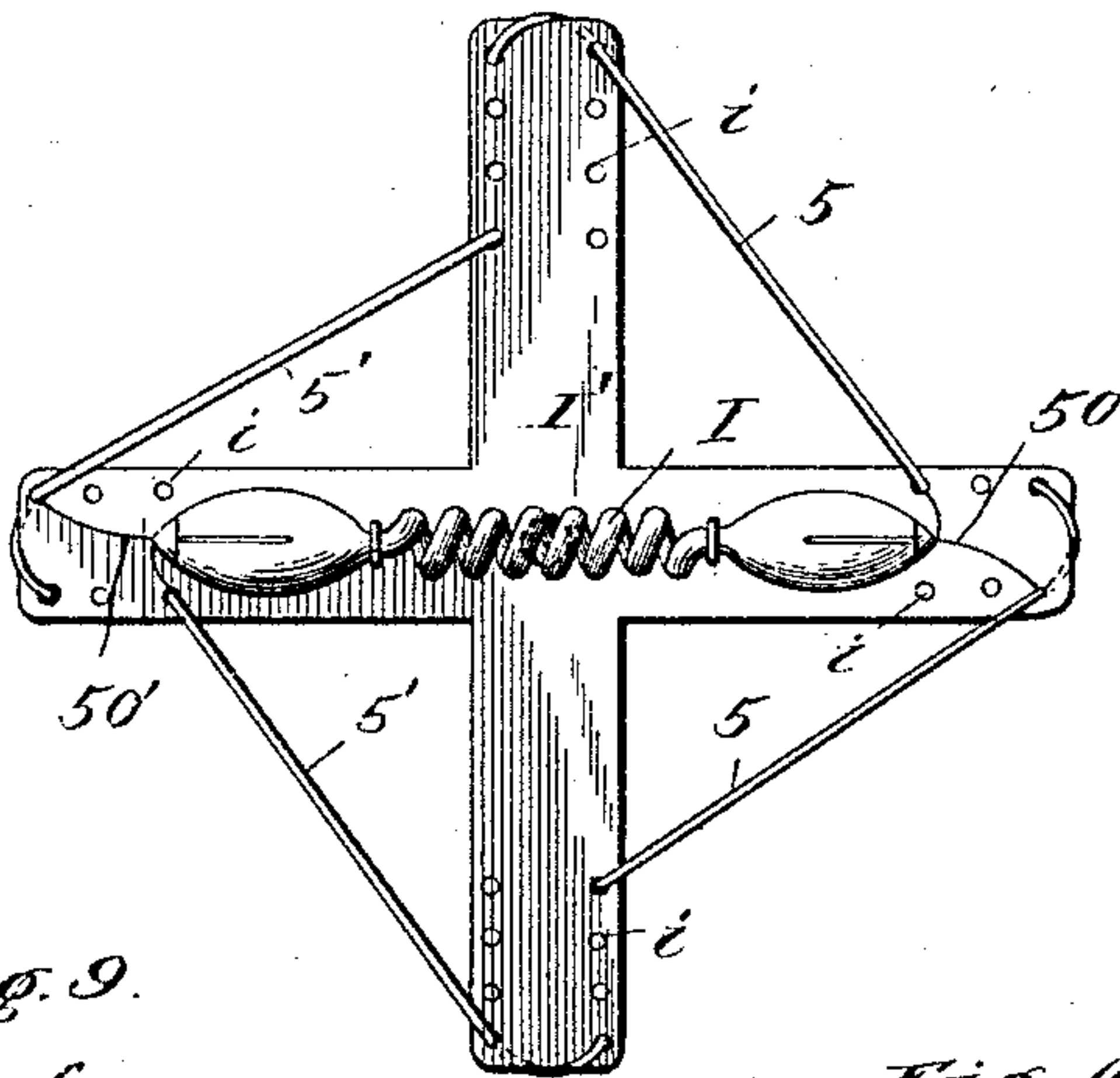


Fig. 8.

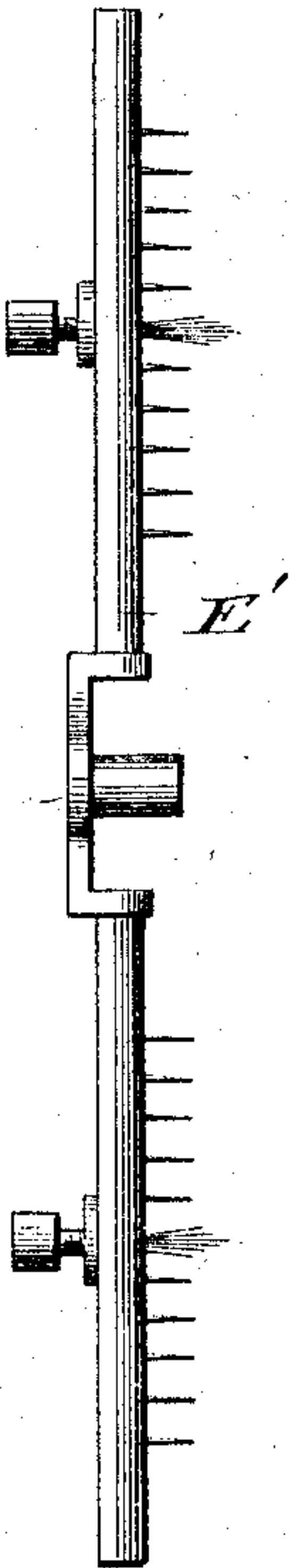


Fig. 9.

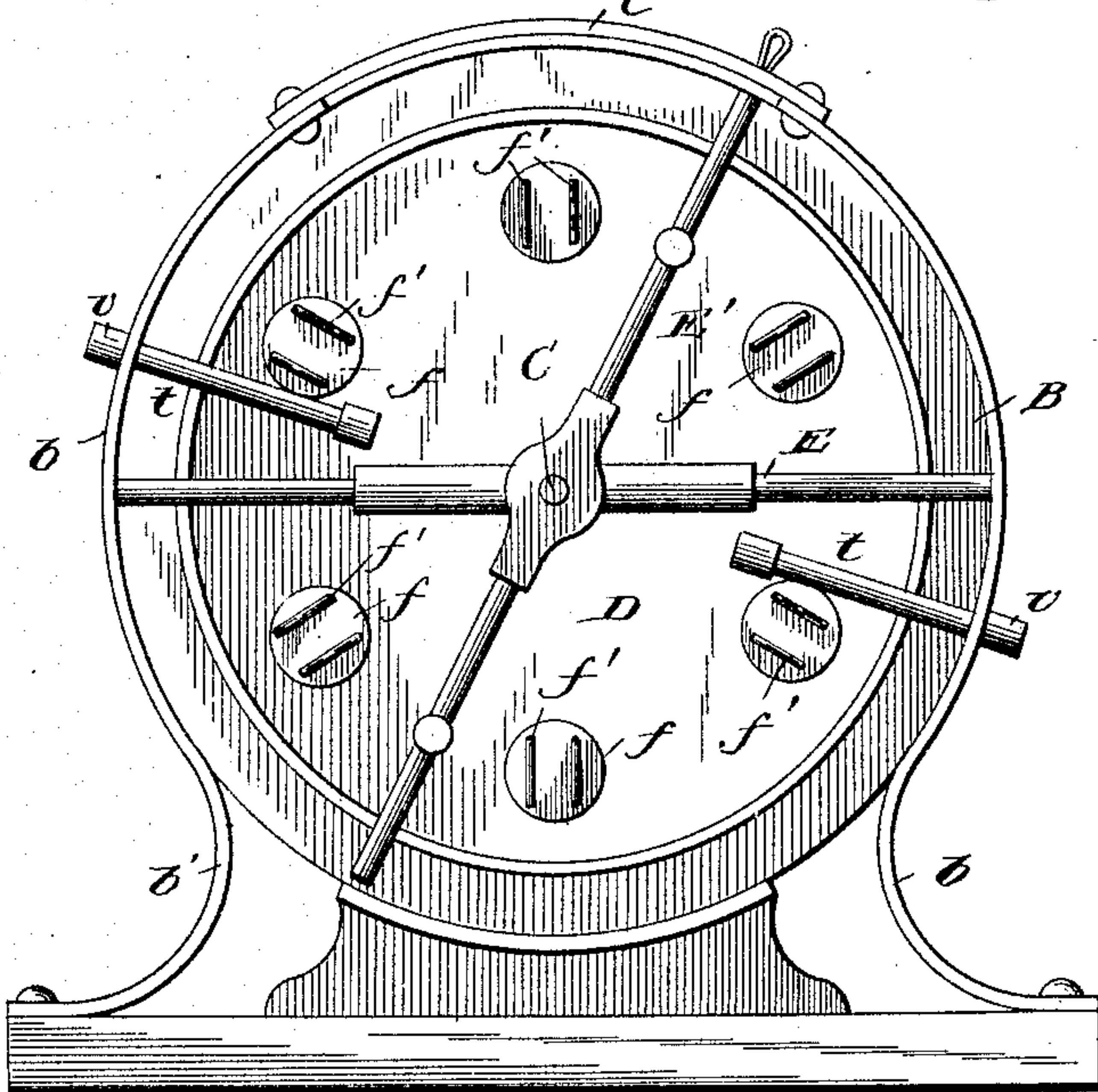
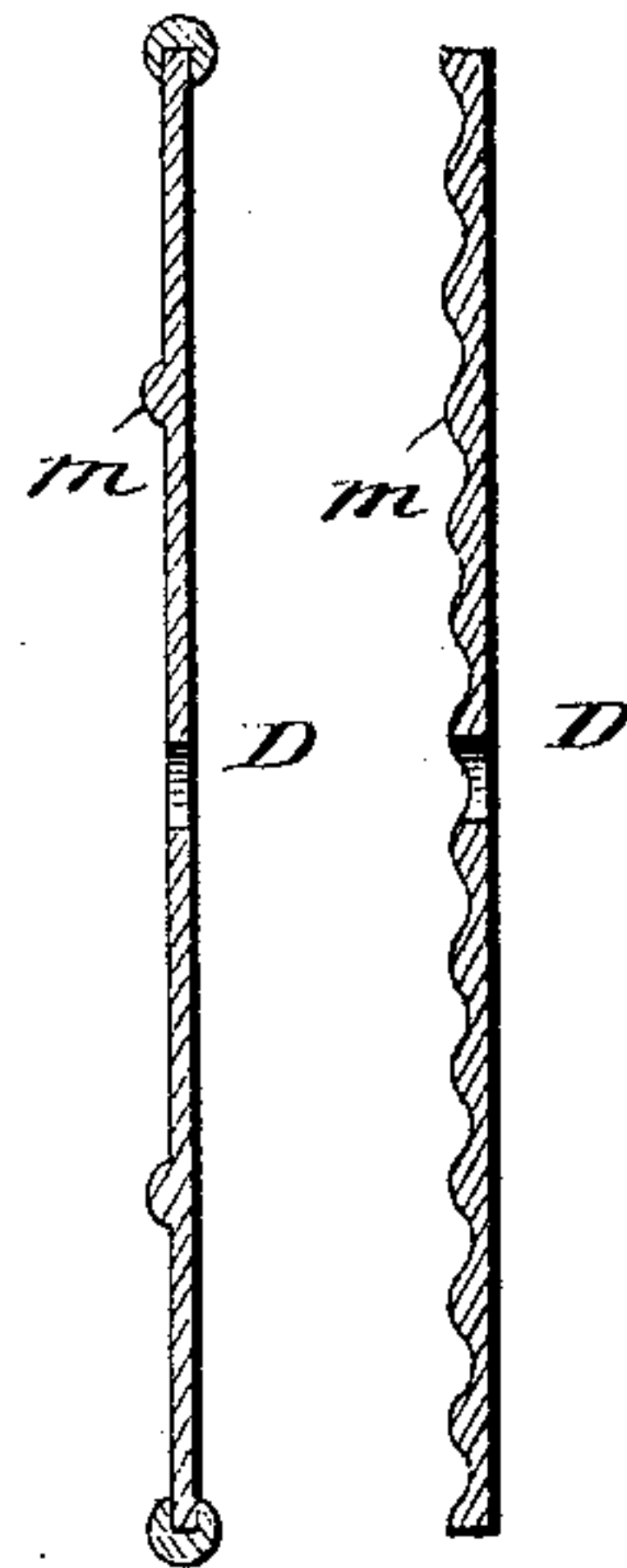


Fig. 10.



Witnesses

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UNITED STATES PATENT OFFICE.

THEODORUS H. PATEE, OF CHICAGO, ILLINOIS.

PORTABLE STATIC ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 504,740, dated September 12, 1893.

Application filed December 9, 1892. Serial No. 454,574. (No model.)

To all whom it may concern:

Be it known that I, THEODORUS H. PATEE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Portable Static Electric Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain new and useful improvements in machines for developing static electricity; and it consists substantially in such features of arrangement, construction, and combinations of parts as will hereinafter be more particularly described and claimed.

The object of the invention is to provide a machine of the character referred to which shall be capable of ready transportation without liability to breakage; and one also which shall much more effectually prevent accumulation of precipitated moisture than many machines heretofore invented for a similar purpose.

A further object of the invention is to provide a machine of the character referred to which shall be materially strengthened in every part so as to resist strain and displacement of the parts during the working operation of the machine.

A further object of the invention is to provide an adjustable jar-holder for the support of the Leyden jars by which such jars can be readily moved outward a sufficient distance from the revolving disk to prevent any escape of the electric force between the two, or any undesirable influence of the one upon the other.

A further object of the invention is to provide a suitable switch in connection with the jar holders or supports so as to enable the electric current to be carried off or transmitted in any direction desired.

A further object of the invention is to enable the jars to also be moved back or inward toward the disks so as to monopolize less space in transportation, and to render them less liable to breakage or destruction.

A further object of the invention is to provide the top of the jars with a movable support for the sliding electrodes which shall enable the jars to be moved in or out without disturbing the position of such electrodes, the said movable supports also constituting the conductors which convey the electric current to the interior of the jars.

A further object is to provide for the disconnection of the electrodes from their supports so as to enable the electrodes to be turned down or lowered out of the way during transportation.

A further object of the invention is to provide a machine of the character referred to which shall possess a single revolving disk or plate and a single stationary plate of peculiar construction, the two plates or disks constituting the plates by which the generated force is obtained through the friction of the brushes and the action of the combs upon the metal carriers or armatures arranged at suitable distances apart on the said revolving disk.

A further object of the invention is to provide an improved and simplified support for the stationary plate or disk.

A further object of the invention is to so construct the said stationary plate or disk as to materially strengthen the same and lessen the liability of bending, breaking or warping thereof.

A further object of the invention is to provide the outer side or back of the stationary plate or disk with an induction shield or guard for preventing loss or escape of the electric current as it is being generated by the machine.

A further object of the invention is to provide conducting friction brushes having an adjustable character with reference to the disk against which said brushes work; and also to provide for the detachment of said brushes when worn so as to enable them to be repaired or substituted by others.

A further object of the invention is to provide a rotating "Geissler" tube or other similar device between the electrodes so as to produce a variety of visible effects from the sparks which are generated.

A further object of the invention is to pro-

vide a stationary "Geissler" tube or other display devices between the Leyden jars, and so connect the ends of said tubes or devices with the switches as that by turning the latter
 5 more or less a variable degree of electric force will be had and consequently a variable effect; a suitable mirror or reflective surface being arranged to so inclose or cover the tube as to reflect or magnify the effects of the
 10 electric spark produced.

The above objects I attain by the means illustrated in the accompanying drawings wherein—

Figure 1 represents a front view of a static
 15 electrical machine constructed and arranged according to my invention; and Fig. 2 is a top or plan view thereof partly in horizontal section. Fig. 3 is an end elevation of the machine; and Figs. 4 and 5 are detail views of
 20 the outer guard or shield and the stationary generating plate respectively. Fig. 6 is a sectional detail view to illustrate the manner of constructing the electric brushes, and showing the manner in which such brushes are
 25 attached and adjusted. Fig. 7 is a view in detail representing the construction of the revolving display device or Geissler tube. Fig. 8 is a detached view of the brush or comb rod. Fig. 9 is a front view representing a modification in the form of stationary disk and the
 30 manner of its support. Fig. 10 is a sectional view representing different forms of strengthening ribs with which the revolving generating plate or disk is formed; and Fig. 11 is a
 35 detail view representing the form of adjustable switch employed.

In carrying my invention into effect I provide a suitable bed or base plate upon which the several operative parts of the machine
 40 are supported, and secured. Upon such base or bed plate is secured or mounted a stationary electric generating plate through the center of which passes the axle which serves to operate a revolving generating plate which is
 45 provided at suitable distances apart with a series of armatures or carriers which are successively brought into contact with a number of electric conducting brushes.

To the back or outer side of the stationary
 50 plate or disk a stationary induction guard or shield is supported in such manner as to through induction concentrate and hold the generated electric force to the armatures of the stationary plate and thus cause it to pass
 55 without loss to the brushes, combs, jars and electrodes as intended. The presence of such guard or shield also enables the main supporting post of the machine to be brought much nearer to the stationary generating disk
 60 without liability or danger of attracting any of the electric force from such disk, and thus can the machine be made much more compact and closely arranged. Heretofore owing to the absence of such a guard in this class of
 65 machines the supporting post has necessarily been placed quite a distance away from the

generating disks as otherwise much of the electric force would be attracted to the post. The said stationary generating plate is formed or provided with a flange or support which
 70 may be continuous or not, and which incloses or partially incloses, as it were, the revolving generating plate, as well also as the brushes and combs with their rods.

Secured to the horizontally arranged comb
 75 rod are two projecting arms which are capable of being turned with the rod so as to be brought down in such manner as to be out of the way during transportation. Carried in the ends of the said arms are movable or slid-
 80 ing electrodes which may be moved toward or away from each other so as to lessen or increase the electric spark generated between the two. I employ a couple of Leyden jars which are held by supports which are capa-
 85 ble of being moved or swung around so as to carry such jars out of the way or bring them inside the boundaries of the base plate and thus are such jars made less liable to break-
 90 age while the machine is being carried about or transported. In connection with the movable supports of the jars an adjustable switch is also employed by which means the force and effect of the electric current may be varied so as to give to the display devices be-
 95 tween the jars a greater or less effect according to the direction or degree of movement to which such switches may be brought.

Provision is made for enabling the two generating plates or disks to be adjusted away
 100 from or toward each other to conform to varying requirements in use, and the whole structure is so arranged as to be easily and effectually adjusted and held in place at such times as occasion may require.
 105

Reference being had to the accompanying drawings by the letters and numerals marked thereon, A represents the base or bed-plate of the machine, the same being so constructed as to be conveniently placed upon a table or other
 110 support to admit of the proper operation of the machine. Mounted or secured upon such bed or base plate in a vertical manner is a stationary generating plate B, preferably of hard rubber, the said plate being supported by ad-
 115 justing screws *a, a*, so as to admit of the same being adjusted or moved in or out as occasion may require. The said plate B is formed or provided with a supporting rim or flange *b* which projects outwardly sufficiently far from
 120 its front face to inclose or partially protect the revolving generating plate hereinafter referred to, together with its appurtenances. Instead of supporting said plate B in the manner described, it may be supported as
 125 shown in the modification Fig. 9, wherein the said plate or disk is shown to be supported by a pair of legs *b', b'*, which form a continuation or part thereof, while at the top is an overlapping portion *c* which fits over the rim
 130 of the plate and is secured by means of screws or otherwise. It makes no difference how the

plate is supported, so long as such support coincides wholly or to a considerable extent with the contour of the plate to produce the strengthening effect. Passing centrally through the said plate B, but not in contact therewith, is the revolving shaft C upon which is fixed the revolving generating disk or plate D which operates in conjunction with plate B. The said shaft C passes through a tubular bearing d which is provided with a sleeve d' and adjusting screw d^2 , so as to enable the shaft to be moved or adjusted and set to whatever point it may be brought. The outer end of the shaft is also supported in suitable bearings and is provided with a similar collar or sleeve and set screw to enable the said shaft to be properly held in its bearings after being adjusted the desired degree. In this way the revolving disk or plate D is also made adjustable with respect to the plate B, the intention being either to make one or both of said disks or plates adjustable with respect to each other, and thereby bring such disks nearer together or farther apart to produce variable effects. The said disk B is formed with the proper metal pieces 2, 2, and the revolving disk is formed or provided with the metal armatures or carriers f , arranged at suitable distances apart. These carriers or armatures are provided with ribs or beads f' which project outward therefrom and they are so disposed that the brushes which contact therewith make two separate contacts with each carrier or armature as it passes the brush, in a manner to be presently described. In the construction of the machine shown in Fig. 1 the rib or bead is continuous and circular extending around the edge of the armature, and in its passage by the brush the latter engages with the rib f' on one side, then breaks this contact and immediately thereafter contacts with the rib on the side opposite that where the first contact was made. In the form of apparatus shown in Fig. 9 the armatures or carriers have each two ribs or beads f' which are so disposed that the contacts with the brush are the same as in the construction just described.

E represents one of the comb and brush rods, and E' represents the other, both being made movable and adjustable, as shown, and E being arranged horizontally between the rim of the disk B, and adapted to be clamped to the said supporting rim so as to stiffen and strengthen the machine and to hold the plates in contact when so desired. Projecting outward from the rod E are two arms g , g , which constitute holders for the sliding or movable electrodes F, F, the said rod E being capable of being turned so as to enable the arms to be carried downwardly when desired, and thus enable the parts to be brought into much smaller compass for transportation. When the arms are in their upward or outward position they are supported in such position by means of a movable connection h held in the

tops or lids of the Leyden jars G, G, the said arms being capable of being disconnected therefrom so as to enable such jars to be also turned or moved around out of the way. By so disconnecting the parts referred to, the said jars are permitted to be moved back or swung around by means of their supports H, H, which latter are provided with oblong slots or openings i , i , which work upon the supporting posts or pins j , j . The jars themselves may be of the ordinary kind and they are placed in position within the cups k , k , carried by the movable supports referred to. Located intermediate of or at any convenient point with respect to the jars is a Geissler tube I, set within the base or bed plate and being in electrical connection with the Leyden jars G, G, and through the switches hereinafter referred to the said tube may be made to produce a variety of visible effects from the electric sparks produced between the electrodes. The said tube I is inclosed or covered by a mirror or reflecting medium K so that such effects will be greatly increased or magnified.

L, L are movable switches which are connected in any suitable manner with the adjustable jar supports, but preferably as shown in Fig. 11. Contact pieces l , l , are arranged for such switches by means of which the force or intensity of the electric current may be varied by simply turning the switches from one to the other so as to produce the variable effects desired. Suitable conductors are employed, as shown, so as to enable the proper conveyance or transmission of the electric current generated.

As shown in Fig. 10 it will be observed that for the purpose of strengthening the disk or plate, and to also increase the surface and frictional capacity of the plates B and D whereby a greater quantity of electricity is generated, I form the same with a series of ribs m which may be made to lie across the same in either a diametrical, concentric or any other desired direction.

The operating shaft hereinbefore referred to is supported or held by a post M, standing at the rear of the machine, and projecting outward from the top of said post so as to overlap the generating disks is a piece n , suspended from which by a suitable cord is a metal or other ball o , or equivalent device, which when allowed to hang down falls into position between the two movable or sliding electrodes referred to, the purpose of which ball is to bridge as it were, by induction, the space between the electrodes, and by which means longer and more frequent sparks can be obtained. The said piece n also serves as an upper support for a guard or shield N which is arranged in any manner to the rear or outer side of the stationary disk B. One way of supporting said shield or guard is by screws q , q , which pass through the piece n , as shown. If desired additional fastening

screws r, r , may be employed at the bottom or base of the said guard or shield as shown.

Both the guard or shield and the disk B have set into, placed upon, or adjacent to their bodies, suitable metallic pieces 1, 1, and 2, 2, respectively, and the effect of the whole construction and arrangement is such that any of the electric force tending to escape from the disk B will be controlled in the manner hereinbefore stated. The said guard or shield may be constructed in a variety of ways, and I therefore do not wish to be understood as limiting myself to the precise construction shown.

The friction brushes s are provided with holders t , which pass through slots or oblong openings u, u , in the rim of the disk B, which also are adjustably held in position by means of nuts v, v , preferably of non-conducting material.

By referring to Fig. 6, at w , it will be seen that the brushes are made by slightly reducing a rod x for a portion of its length and then wrapping such reduced portion with wire in such manner as to leave the ends of the wire projecting outwardly in the form of a brush. A tube y is then passed over the rod, which tube is slotted at z so as to allow the projecting ends of the wire or brush to pass through. The outer end of said rod is screw threaded, as shown, and by loosening the nut thereon the brush and its holder may be moved in or out or adjusted with respect to the revolving disk. By this construction it will be seen that the brush can be readily removed and substituted by another when worn.

The tube y has attached to or formed with it a projecting pin y' which works against a spring y^2 contained in a small tube y^3 formed with and projecting from a strip or piece of sheet metal z' which is made to embrace the disk B and connects with or is made a part of the armatures or metal pieces 2 hereinbefore referred to; the purpose of which construction and arrangement is that a more perfect equalization will be had between the armatures of the stationary plate and the carriers of the revolving plate between which connections are formed through the brush conductors by which the beaded edge of the carrier comes in contact with the brush by which means the carrier receives a charge of electric force which on the breaking of the contact is repelled and taken up by the receiving combs; this is again repeated as the opposite beaded edge strikes the brush and by this means each carrier as it passes receives and gives off to the receiving combs a second charge thereby more fully utilizing the entire force accumulated on the armature of the stationary plate. The pin and tube are resorted to for obtaining the proper contact with the sheet metal referred to, as well as for permitting a proper changing of the brush holder in or out without interfering with the adjusting devices, &c.

To decrease the troublesome precipitation of moisture so common to machines of this character, I preferably apply to the plates soft surfaces of pliable or flexible material W, using for the purpose silk, soft rubber or other suitable non-conducting material and applying such material adhesively with any suitable non-conducting cement. If for economy it is so preferred these soft surfaces can be applied in strips between the various armatures on the revolving or stationary plates and it may also be applied to any other portions of the machine where there seems to be a tendency for the electricity to creep or escape by reason of moisture through precipitation on the surfaces of the hard insulating material. This idea may be advantageously applied to other electrical devices.

The frame I' (Fig. 7, and dotted lines Fig. 1) is adapted to be slipped on to the end of the shaft and there secured in any suitable way. This frame carries a Geissler tube I or any other form of display or reflecting device, and when a Geissler tube is used its opposite ends are connected by the wires $50, 50'$ with the conductors $5, 5'$, which are carried by the arms of the frame I' and are so arranged that they will intermittently come into contact with the arms g, g , as the frame is carried around with the tube. As shown the conductors $5, 5'$, are wires, which pass through holes i in the arms of the frame and are properly secured thereto, the wires being carried over the ends of the arms of the frame so that they will contact with the arms g to cause the passage of an electrical current through the tube. It will be understood that any other suitable form of make and break device may be used in lieu of that shown.

In the operation of the machine the frame will be carried around or rotated and the electricity generated by the machine will so influence the tube or display device as that a varied and most beautiful effect will be had from the electric spark generated. For convenience this display device is arranged intermediate of the electrodes, but it is evident that the same may be adjusted on the shaft and thus be brought to any desired position. I have shown in the present instance this display device to consist primarily of a revolving frame, but I desire to be understood as not limiting myself to this precise form of device, since it is evident that the slightest possible change in the attachment or arrangement of the device would result in the greatest change in display or reflective effect produced. I therefore contemplate the use of any such device for effecting the desired result.

From the foregoing description it is thought that the construction, arrangement, and operation of the parts of my improved machine will be fully understood.

I do not desire to be understood as limiting myself to the precise details shown and described, since it is evident that various imma-

terial changes therein could be resorted to and still be within the scope intended to be covered.

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

1. In a static electrical machine, a stationary generating plate provided with a non-conducting strengthening flange or rim of the form described, substantially as and for the purpose set forth.

2. In a static electrical machine, a generating plate provided with a continuous non-conducting annular flange or rim, substantially as described.

3. In a static electrical machine, a stationary generating plate provided with a non-conducting annular flange or rim such as described, said plate having means for adjusting the same on its supports, substantially as hereinbefore set forth.

4. In a static electrical machine, a stationary generating plate provided with a non-conducting annular flange or rim such as described, in combination with a revolving plate inclosed or protected by said rim and supported and operated by a shaft free from contact with said stationary plate, substantially as described.

5. In a static electrical machine the combination of two generating disks one of which is adjustably supported whereby they may be moved toward or from each other, substantially as and for the purpose set forth.

6. In a static electrical machine, the stationary generating disk, the revolving disk, the operating shaft for the latter, a support for the shaft, and suitable means for enabling both the adjustment of the shaft and the movable disk upon the shaft, substantially as described.

7. In a static electrical machine, the combination with the generating disk, of a guard or shield arranged at the back of the same, substantially as described.

8. In a static electrical machine, the combination with the generating disk, having the projecting flange, of the guard or shield arranged at the back or rear of said disk and being secured in place by suitable means, substantially as described.

9. In a static electrical machine, the stationary generating plate provided with the annular rim in which slots are formed, the revolving plate, and brushes which are adjustably held or supported in said slots, substantially as described.

10. In a static electrical machine, the brush holder and brush composed of the rod supporting the wire, the ends of which are allowed to project outwardly, and the tube which surrounds said rod, the said tube being slotted so as to permit the passage of said projecting wires, substantially as described.

11. In a static electrical machine, the com-

bination of the stationary generating plate and revolving plate, the metal strips embracing the edge of said stationary generating plate, the adjustable brushes, and a movable electric connection between said brushes and strips, whereby the said connection is maintained whenever the brushes are adjusted substantially as described.

12. In a static electrical machine, the combination with the stationary plate, of the embracing metallic strips formed with the projecting tubes, springs contained in said tubes, the brush holders and brushes, and the pins projecting from said holders and working in said tubes, substantially as described.

13. In a static electrical machine, the combination of the movable or sliding electrodes, their movable holding arms, the Leyden jars, the adjustable supports for said jars, and a movable and detachable connection for supporting said arms, substantially as described.

14. In a static electrical machine, the jar support provided with a swinging and adjustable slide, substantially as described.

15. In a static electrical machine, the combination with the Leyden jars and switches, of a display device, and suitable supports therefor constituting a portion of the machine substantially as described.

16. In a static electrical machine, the combination with the generating plate and the operating shaft, of a revolving display device connected by conductors, substantially as described.

17. In a static electrical machine, the combination with a revolving plate, the operating shaft, the combs and the conductors through which the electricity generated passes off, of a revolving display device adapted to be carried by the said shaft and having electric terminals which are caused to make a break contact with the said conductors as the device is revolved by the shaft, substantially as described.

18. In a static electrical machine, a plurality of generating plates, one or more of which plates is made of rigid non-conducting material and has adhesively applied to the surface thereof a soft or pliable non-conducting material, substantially as described.

19. The combination in a static electrical machine of a shield or guard having suitable conducting armatures, and a stationary generating plate also provided with conducting armatures, the latter being insulated from those of the shield or guard, but in such relation thereto as to act upon them by induction, substantially as described.

20. In a static electrical machine, a generating plate of hard rubber or other suitable material, the same being formed or provided with a rib or projection extending in any direction across the same, substantially as shown and for the purpose described.

21. In a static electrical machine, the re-

volving plate provided with rigid armatures
or carriers which have projecting ribs or beads
which are disposed substantially as described
whereby two contacts are made with the brush
5 as each carrier or armature passes the same,
substantially as described.

22. In a static electrical machine, the com-
bination with the revolving plate, of the at-
tached rigid metal armatures, having a de-

pressed central portion and projecting sur- 10
rounding rib or raised portion, substantially
as and for the purposes described.

In testimony whereof I affix my signature in
presence of two witnesses.

THEODORUS H. PATEE.

Witnesses:

CURTIS LAMMOND,
D. G. STUART.