No. 789,379. PATENTED MAY 9, 1905.

T. H. PATEE.

STATIC ELECTRIC MACHINE.

APPLICATION FILED JUNE 14, 1901.

4 SHEETS—SHEET 1.

Fig. 1.

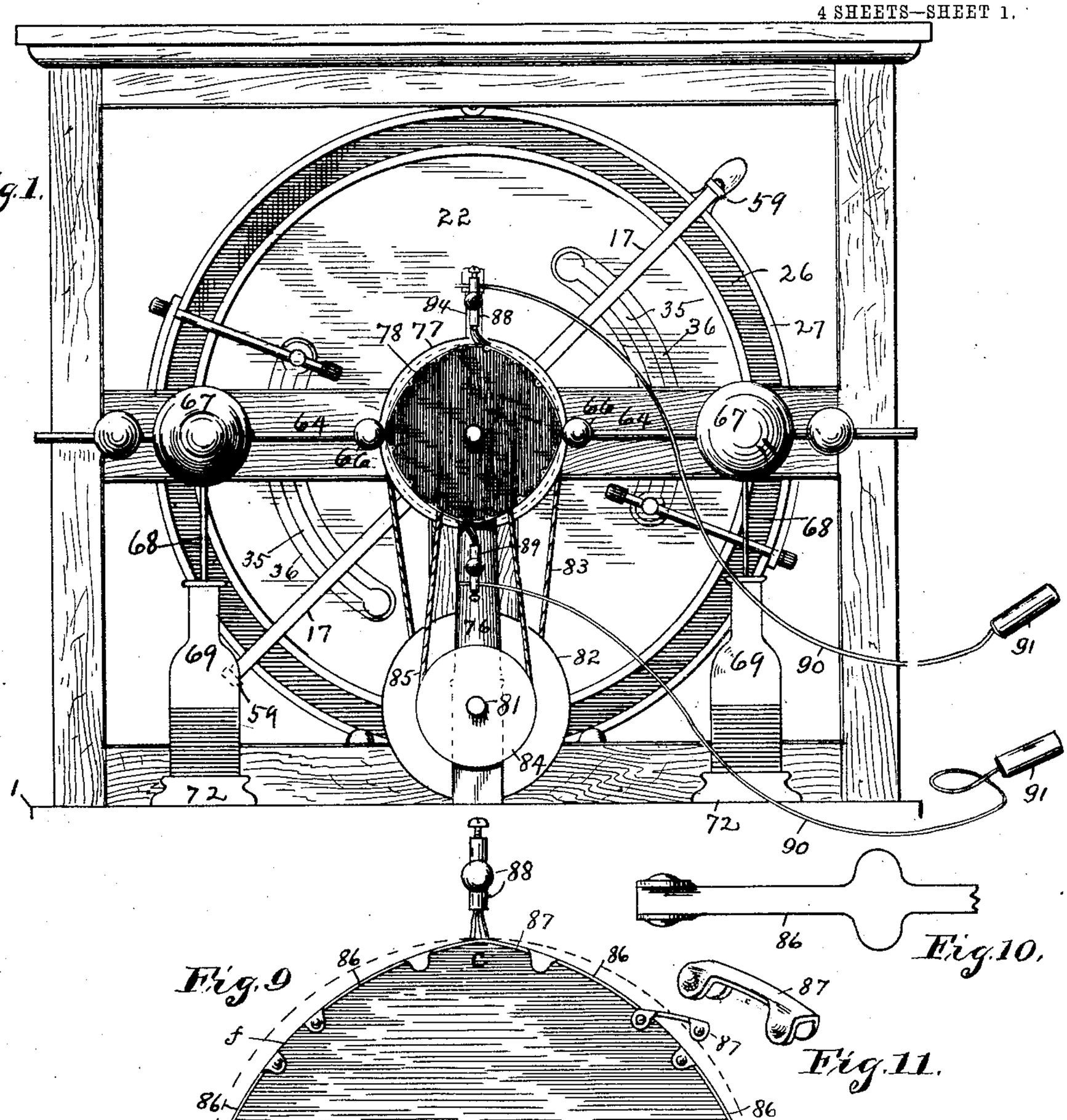

Fig. 10.

Fig. 9

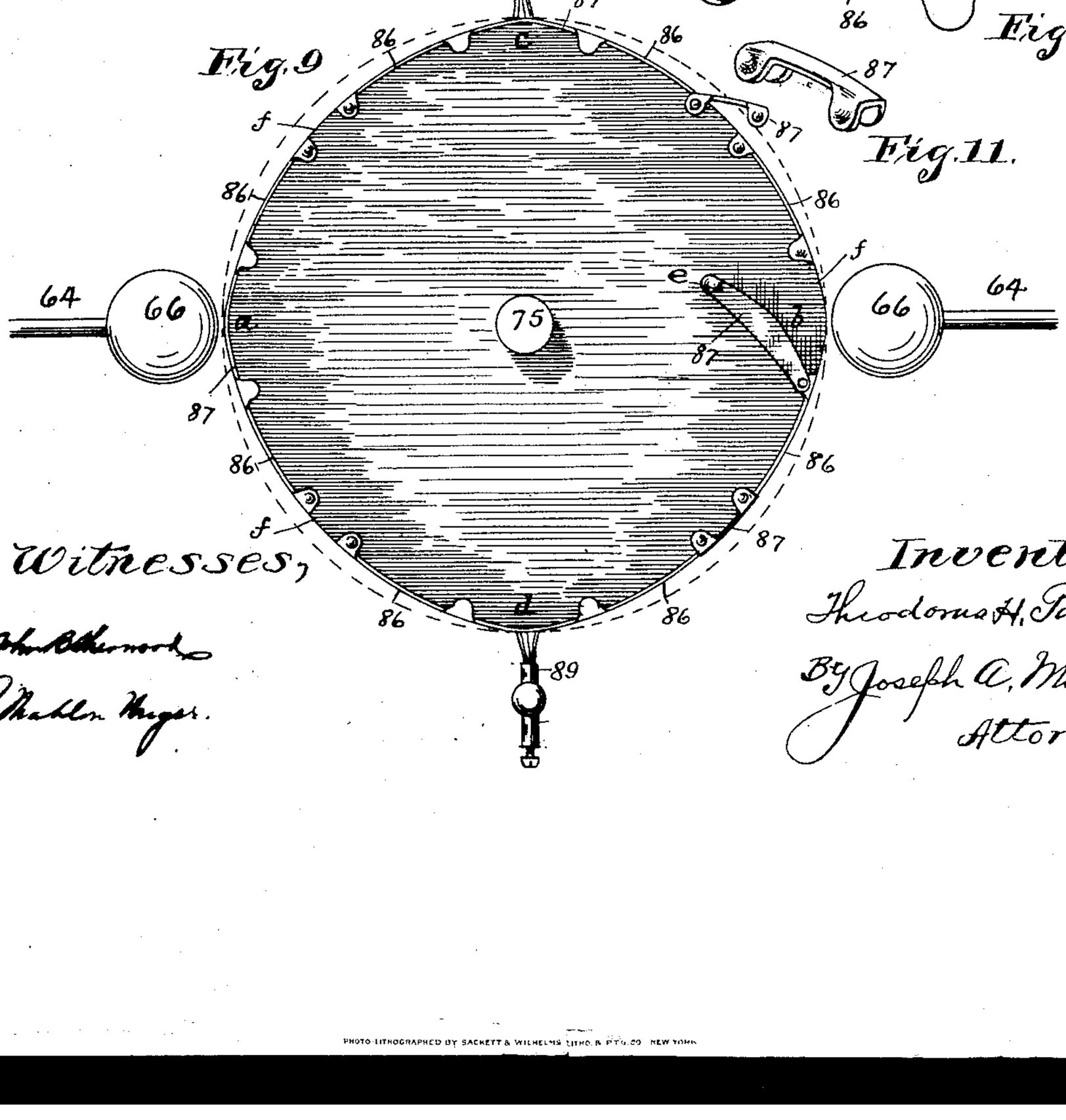

Fig. 11.

Witnesses,

John Wedderburn

S. Walter Hyer.

Inventor,

Theodorus H. Patee,

By Joseph A. Minturn,

Attorney.

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4 SHEETS—SHEET 2.

Fig. 2.

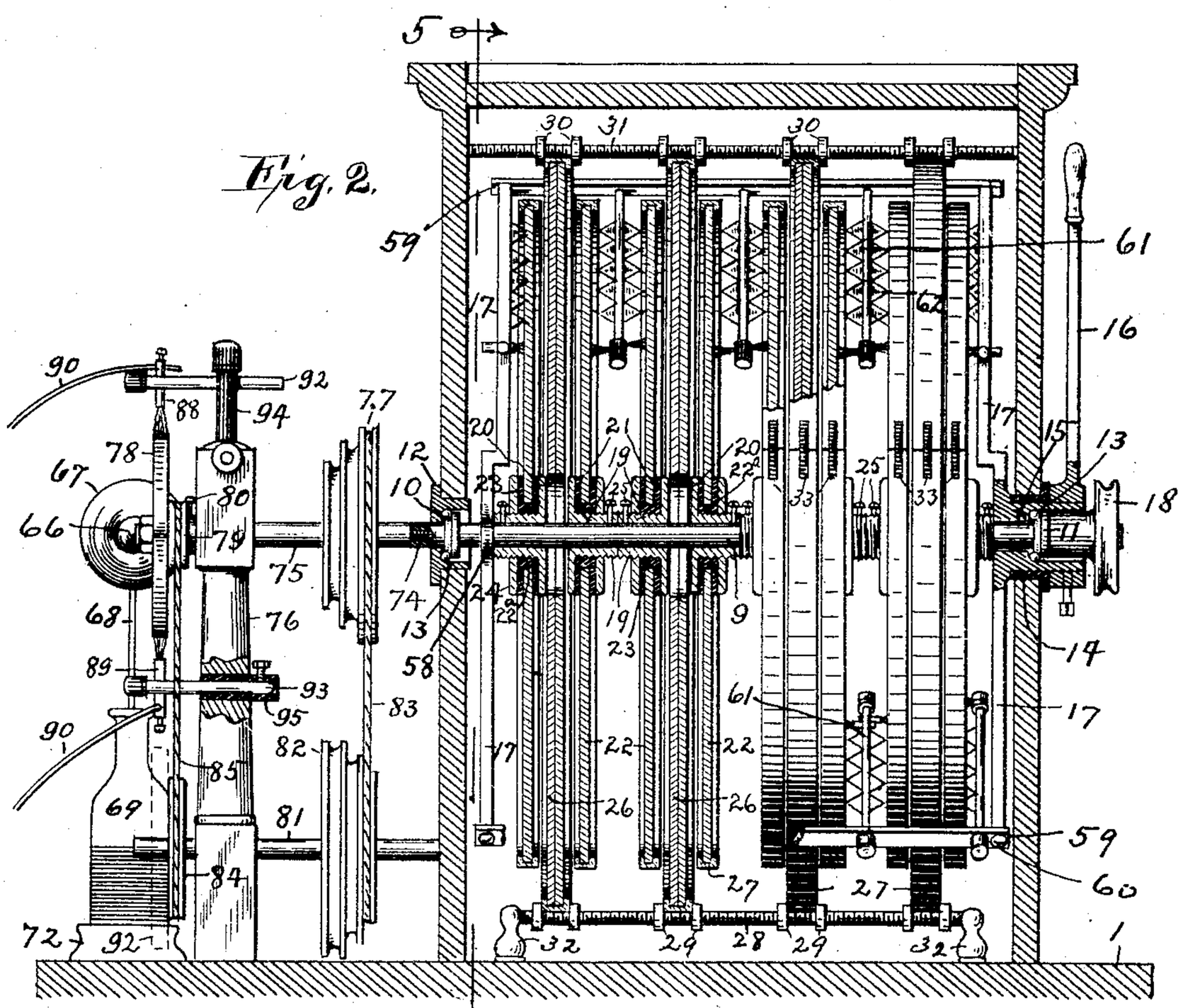
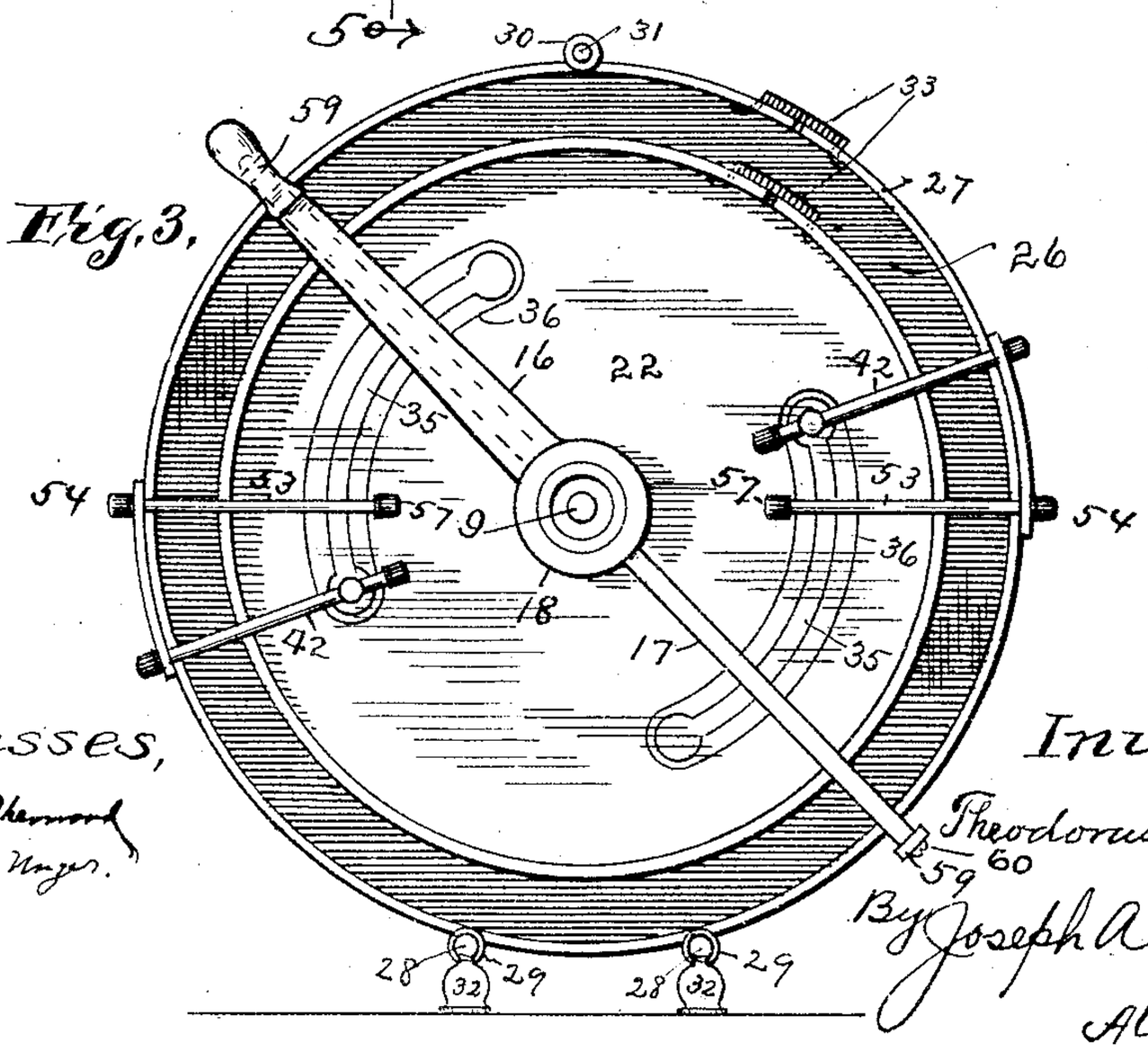


Fig. 3.



Witnesses,
John B. Sherwood
S. Maslor Unger.

Inventor,
Theodorus H. Patee,
By Joseph A. Minturn
Attorney.

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4 SHEETS—SHEET 3.

Fig. 4.

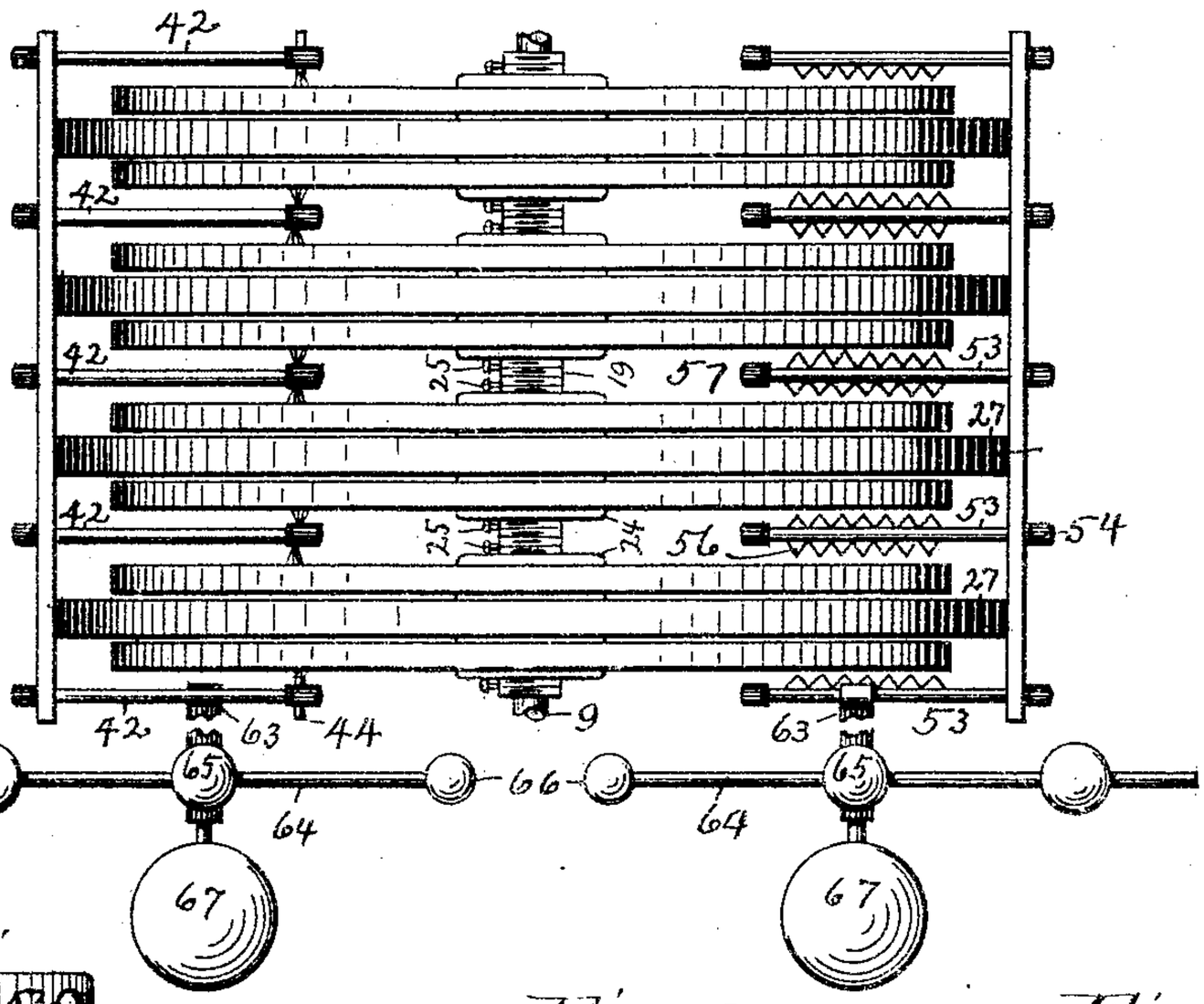


Fig. 12.

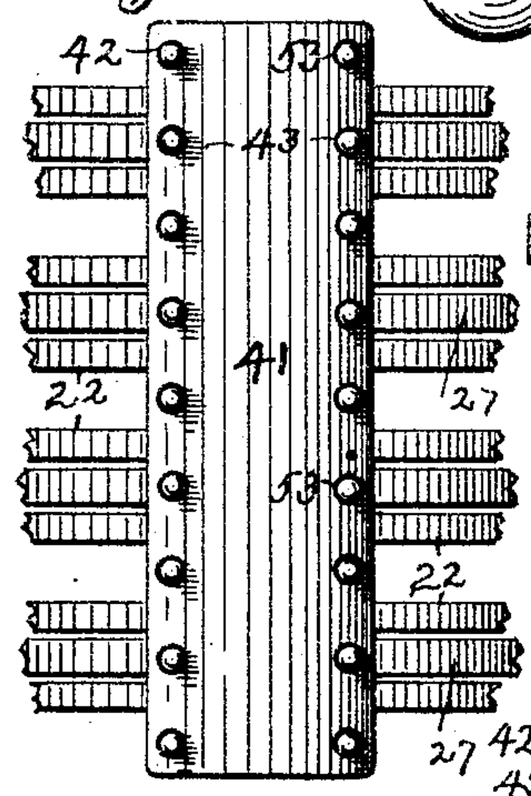


Fig. 13.

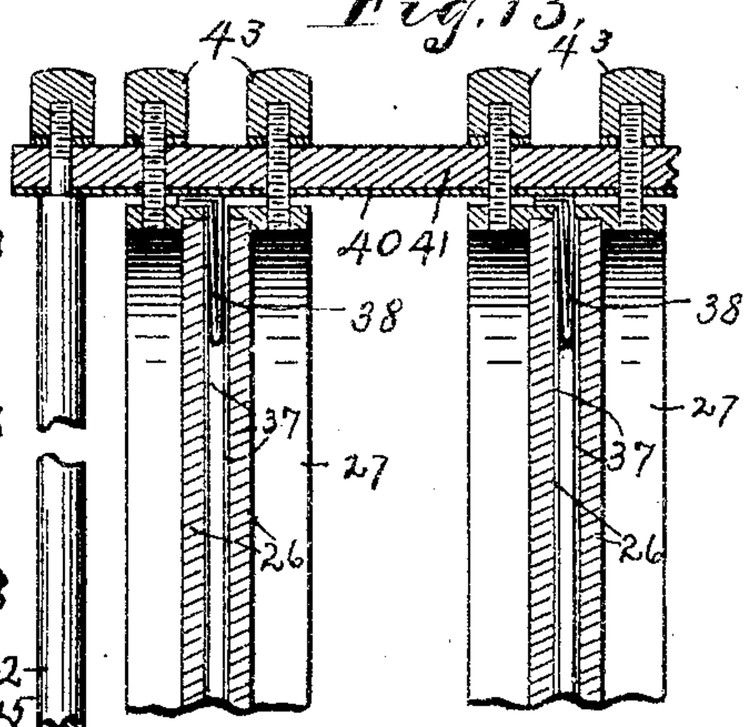


Fig. 14.

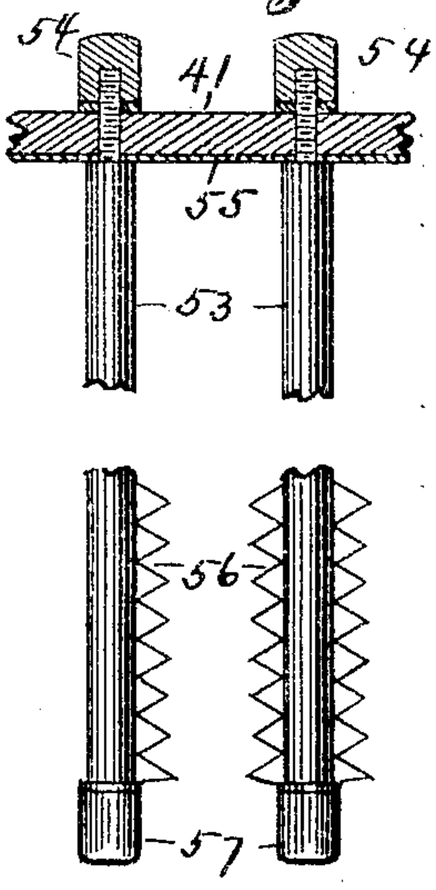


Fig. 15.

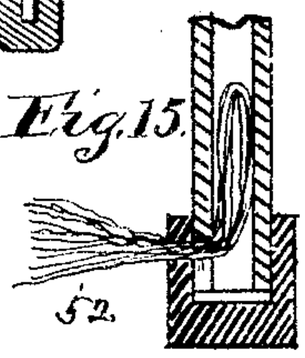
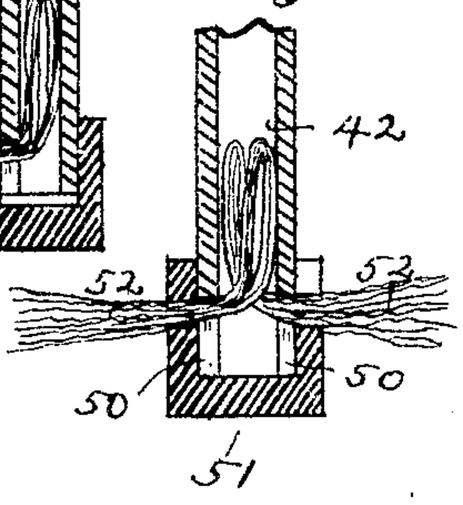


Fig. 16.



Witnesses

S. Mahlon Unger.

John B. Ellenwood

Inventor,

Theodorus H. Patee,

By Joseph A. Minturn

Attorney.

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T. H. PATEE.

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4 SHEETS—SHEET 4.

Fig. 5

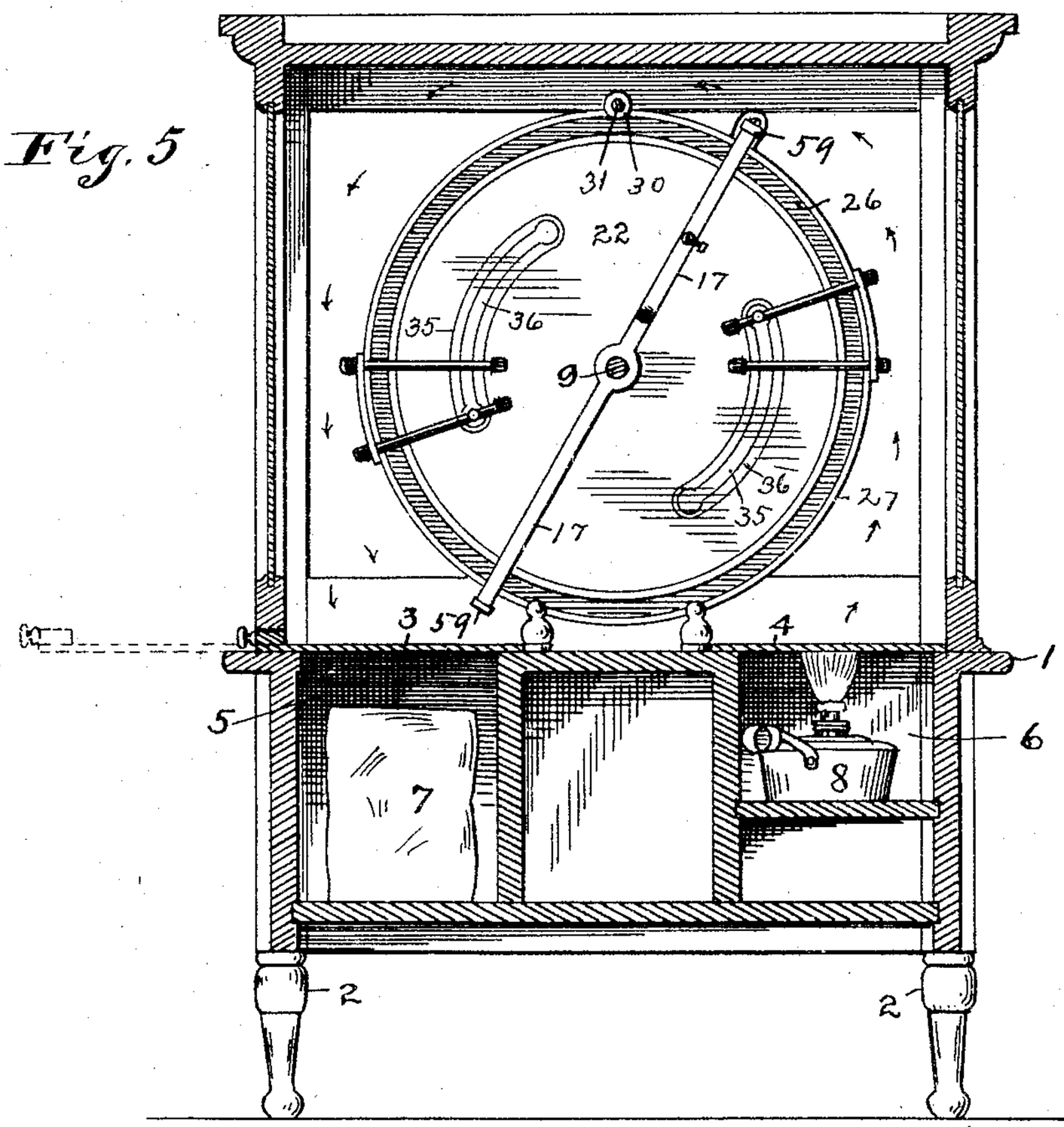


Fig. 6.

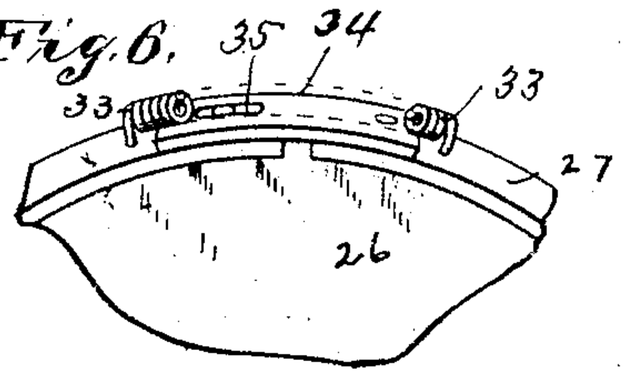


Fig. 7.

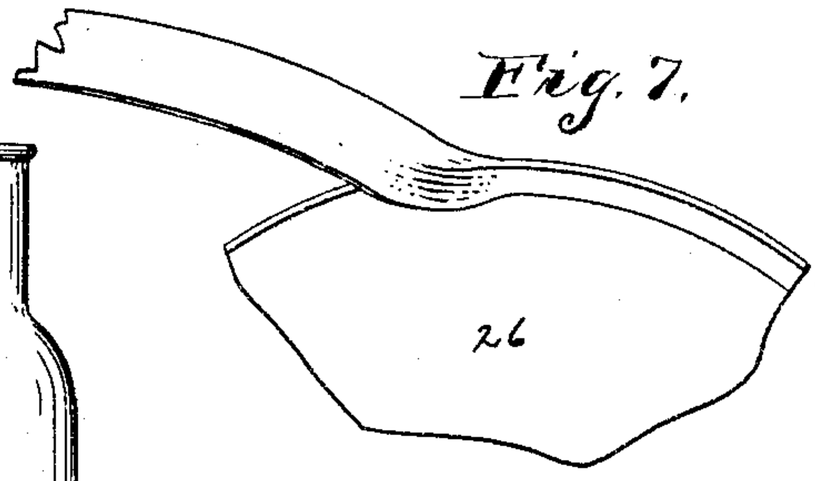
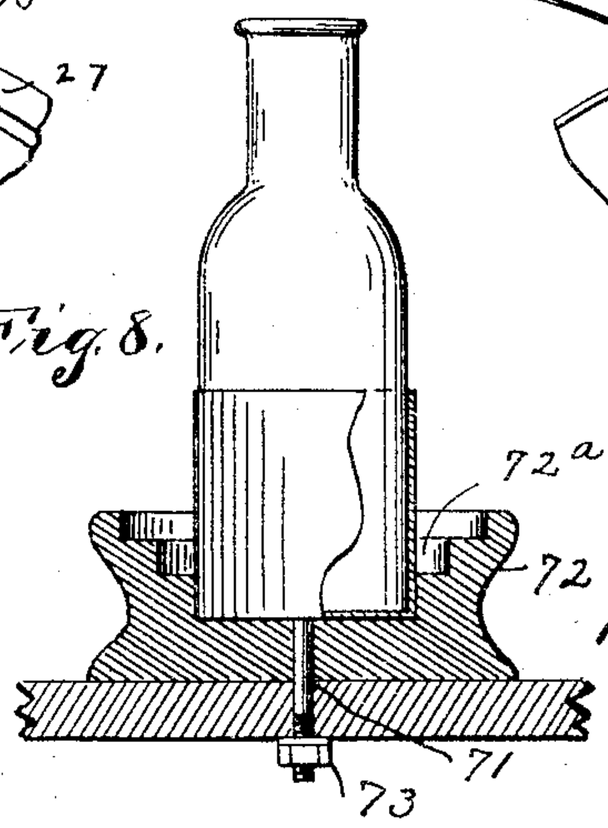


Fig. 8.



Witnesses,

S. Whalen Unger.

John B. Sherwood.

Inventor,

Theodorus H. Patee,

By Joseph A. Minturn

Attorney.

No. 789,379. Patented May 9, 1905.

UNITED STATES PATENT OFFICE.

THEODORUS H. PATEE, OF GREENFIELD, INDIANA.

STATIC ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 789,379, dated May 9, 1905.

Application filed June 14, 1901. Serial No. 64,589.

To all whom it may concern:

Be it known that I, THEODORUS H. PATEE, a citizen of the United States, residing at Greenfield, in the county of Hancock and State of Indiana, have invented certain new and useful Improvements in Static Electric Machines, of which the following is a specification.

For therapeutic uses of the static electric machine as commonly made it is impracticable to obtain observable physical effects if the patient is in direct electric connection with both poles of the prime conductors. The conductivity of the patient's body equalizes the poles and prevents the essential condition of polarity. Some resistance, some insulation between the positive and negative, is necessary to any apparent action and results, and a make and break is necessary in order to obtain pulsations of current. For these purposes the common method is to electrically connect the patient to the outer coatings of Leyden jars and to apply the induced current thus obtainable by means well known. The pulsations thus produced are of sharp decisive character, more or less painful, and not always suited to a patient's physical and nervous condition.

One object of my invention is to modify the current pulsations by making them more elastic and vibratory in character.

Another object is to provide means for utilizing the electrostatic current when taken direct from the prime conductors by causing pulsations and vibrations of current suited to therapeutic uses either with or without the aid of Leyden jars.

Another object is to produce rapid alternations of the currents generated by an electrostatic-influence machine.

Another object of the invention is to inclose the generating mechanism within a case that will exclude air-currents and in a large measure protect said mechanism from the deteriorating influence of external variations of temperature and humidity.

Another object is to provide means for drying the atmosphere contained within the inclosing case to a degree favorable to the conservation of electrical energy, it being well understood that the condensation of moisture on a machine of this character frequently occurs on damp days to an extent that destroys the practical utility of the machine.

Another object is to dispense with the exciter usually required to start the generation of electricity and provide means whereby without such exciter a powerful supply of electricity will begin to flow immediately after the machine is set in motion.

Another object is to modify the distance between the equalizer and collectors, whereby the power of the current will be quickly and powerfully modified. These last two objects are attained by providing an equalizer whose position can be instantly modified and adjusted by means extending outside of the case, and another object of the invention is to provide such means.

Another object of the invention is to provide an elastic connection between the revolving glass disks and their supporting-shaft to lessen the liability of breakage of the disks from jars and strains.

A further object of my invention is to provide the outer edges of the glass disks with an insulating shield or guard for preventing loss or escape of the electric current as it is being generated by the machine and to provide a flexible or yielding shield which will adapt itself to strains due to expansion or contraction or to jars without danger of breakage. These bands have heretofore been made exclusively of hard rubber, with rigid connections for the ends, and they frequently break through the contraction incident to the changes of temperature.

The further object of the invention is to simplify the construction and render the machine more efficient and durable and more economical to construct in numerous respects besides those hereinabove named, all of which will be hereinafter fully described and claimed.

I accomplish the objects of the invention by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a detail in front elevation of all of the mechanism of my complete invention to be found above the table on which the machine sets. Fig. 2 is a vertical section of the part of the machine shown in Fig. 1 on a vertical plane through the axial line of the

main shaft; Fig. 3, a rear elevation of one of the revolving disks, also showing the projecting portions of the larger stationary disk behind it and the lever for actuating the equalizer; Fig. 4, a plan of the disks, the shaft on which they are mounted, and the accompanying parts; Fig. 5, a vertical section of the machine and entire case in which it is contained on the line 5 5 of Fig. 2; Fig. 6, a detail in perspective showing the means for uniting the ends of the hard-rubber rims on the disks; Fig. 7, a detail in perspective of a modified form of band for binding the periphery of the disks; Fig. 8, a detail in perspective of the Leyden-jar holder; Fig. 9, a detail view, on a larger scale than shown in Fig. 1, of the revolving appliance to make and break the electric current; Fig. 10, a detail view showing the manner of constructing the metal current-conductor for the margin of the make-and-break appliance. Fig. 11 shows a removable circuit-closer removed from the make-and-break appliance. Fig. 12 is a detail view showing parts of the rubber rims of the disks and the rubber plate by which the rims of the stationary disks are joined together and to which the comb and brush rods are attached. Fig. 13 is a horizontal section of two pairs of stationary disks and the connection between them and one brush, the brush-rod being shown in plan and partial longitudinal section; Fig. 14, a plan of two electrical collectors and the means for connecting and supporting them, parts of this figure and of preceding Fig. 13 being broken away; Fig. 15, a detail in section of a rod with one brush in it, and Fig. 16 a detail of a rod in section with two brushes in it.

Like figures of reference indicate like parts throughout the several views of the drawings.

1 represents a table or stand top which is supported by suitable legs 2. Under the top 1 are compartments with doors, the purposes of which will be hereinafter explained.

Resting upon the table 1 is a cabinet, preferably rectangular in shape, within which the electrogenerative mechanism of the machine is contained. The interior of this cabinet will be excluded from the external atmosphere by walls which are as near air-tight as it is practicable to make them in any usual and well-known manner in order to exclude moisture and other general atmospheric changes which would interfere with the operativeness of the machine. Preferably the front and sides will contain panels of glass in order that a view of the interior may be readily obtained.

Inasmuch as the precipitation of moisture on days of more than usual humidity of the atmosphere interferes with and frequently destroys the operativeness of the machine regardless of the existence of the surrounding cabinet-walls, I have devised means whereby the moisture within the cabinet may be practically eliminated. This consists in providing thin metallic covers 3 and 4 to two of the compartments 5 and 6, previously referred to as being under top 1, and in compartment 5 I place a block of ice 7, which lowers the temperature of the plate 3, causing the moisture in the atmosphere of the cabinet to be precipitated thereon. To assist this action, I place a lighted alcohol-lamp 8 in the compartment 6, which sets the air in motion toward the cold plate in the manner indicated by the arrows. (See Fig. 5.) The plate 3 is in the form of a slide, which can be withdrawn in the manner shown in dotted lines and the moisture condensed thereon removed by wiping or otherwise drying the plate. This can be repeated until practically all of the moisture has been eliminated.

9 is the main or disk shaft. It has the bearing-cones 10 and 11. Supported by the front of the cabinet-frame is the bearing-sleeve 12, having a ball-race for the balls 13, and supported by the back of the cabinet-frame is a sleeve 14, in which is seated the hub 15 of the equalizer of the machine. This hub has a ball-race to receive additional balls 13. The hub extends through the sleeve 14 to the outside of the cabinet, and upon its external portion the hand-lever 16 is secured. The equalizer-rods 17 are attached to the inner end of the hub, whereby it will appear that by changing the position of the hand-lever 16 on the outside of the cabinet the equalizer on the inside will be correspondingly changed in position. The front bearing-cone 10 may be fixed permanently to the shaft; but to allow the assemblage of the parts it is required that the bearing-cone 11 be removably secured. Mounted on the disk-shaft outside of the hand-lever is the pulley 18, by means of which, through the agency of a crank-wheel or other motor (not shown) and a belt (also not shown) connecting said motor and pulley, the said shaft 9 will be rotated.

It is not desired to limit the invention to the use of the hand-lever for changing the position of the hub, as any other appliance adapted to transmit a rocking adjustment to it may be used.

On the shaft 9 the disks are mounted in groups as follows: On the shaft for each group is a short sleeve of brass 19, having the annular flange 20 on the end which is next to the back of the machine. The sleeve is externally screw-threaded. Mounted on the sleeve next to the flange is a soft-rubber washer 21, then a soft-rubber ring 22^a of less diameter, then a revoluble glass disk 22, which fits over the soft-rubber ring, then another soft-rubber washer 23, and then a metal or hard-rubber nut 24, having internal screw-threads whereby it is screwed upon the threaded sleeve to tighten up the parts just named. The sleeve, with its parts above enumerated, is retained in a fixed position on the shaft 9 by the set-screw 25. The group previously referred to

comprises a second revoluble glass plate, which is mounted on the shaft 9 in the same manner as described for the plate or disk 22, except that the threaded sleeve 19 is turned in the opposite direction with its flange toward the front of the machine. This is to allow of ready access to the set-screws, by which said sleeves are fixed to the shaft. The two revoluble disks are set far enough apart to allow room for a pair of stationary glass disks 26, having large central openings, so they do not touch the flanges of the brass sleeves. The disks 26 are provided with a rim 27, that is supported on the two rods 28 on the lower side between the rubber nuts 29 and held between the rubber nuts 30 on the upper side that screw on the threaded rod 31, which extends from one side of the cabinet-frame to the other. The rods 28 are supported by the stands 32, and the rods 28 and 31 are threaded, so that the washers 29 and 30 may be moved in any direction to secure any desired adjustability in the position of the stationary disks. There are four of these groups of disks, each group consisting of two revoluble disks 22, and between them two stationary disks 26, all similarly mounted on shaft 9. Both classes of disks 22 and 26 have hard-rubber rims whose width is considerably greater than the thickness of the disks. The ends of each rim are fastened together by means of an elastic coupling, which in the drawings is shown as a spiral spring 33. Heretofore a rigid joint has been made, with the result that contraction of the rims due to variations of temperature would cause the brittle rubber to break, and the flexible coupling avoids this danger. To preserve the symmetry of the rim at the joint, a splicing-plate 34, of hard rubber, overlapping the joint and riveted to the adjacent ends of the rim, but having a longitudinal slot 35 in one end to allow longitudinal movement on one of the rivets, may be used in conjunction with the spring to draw the ends together. The purpose of this rim is to prevent leakage of electricity from the edge of the disk and also to strengthen and support the disk against breakage. This is particularly desirable in small portable sizes of my machine, which I make suitable for transportation in a buggy to the place where it is to be used. One of the most serious difficulties to be overcome in the construction of an efficient static electric machine, and especially when the machine is within a closed case, is the strong tendency of the static current to escape from the machine and to equalize with surrounding objects. The case itself from this cause often limits the efficiency of the machine by drawing upon and equalizing a portion of the electric current generated within its influence. The non-conducting rims or flanges which surround the plates act as conservators or barriers and to a considerable degree guard against this wasteful leakage to the case. These rims on the stationary electric plates are utilized as a support to said stationary electric plates and also as a support for the brush and comb rods, and they add very much to the resistance against the breakage of glass or the warping of rubber generating-plates when the latter is used instead of glass. The prime purpose of the soft-rubber bearings for the disks at the center shaft is to relieve the disk from jolting and other strains which would have a tendency to break the brittle glass. Each stationary disk is provided with oppositely-located strips of tin-foil 35, that are curved concentric with the disk, as shown in Figs. 1, 3, and 5, where they are seen through the glass disk 22. These are placed on said stationary disks on the adjacent sides, so as to be between said disks. The tin-foil strip 35 is first placed on the disk, and over that is placed a paper strip 36. The strips are correspondingly placed on the two adjacent faces of the stationary disks. This feature of construction is old. From the ends of the strips 35 of the tin-foil there is another tin-foil strip 37, extending to the periphery of the disks. This is shown in Fig. 13. The outer end of the tin-foil strip 37 extends flush to the edge of the glass disk, and the two strips of tin-foil for the two adjacent sides of each pair of stationary disks have between them a copper strip 38. (Shown in Fig. 13.) Said copper strip has its end turned laterally and clamped between the rim 27 of the disk and the horizontal thin copper strip 40, that lies against the hard-rubber plate 41. The strips 38 and 40 may be of any metal or conducting material, as they are to connect all of the stationary disks. The rubber plate 41 supports the brush-rods 42, as seen in Fig. 13, that extend in between the revoluble disks 22 and also on the outside of the disks in the series, and the plate also carries the electrical collectors between each set of disks, hereinafter to be described. The plate is secured to the rims 27 of the stationary disks by the hard-rubber bolts 43. By making the support for the brush-rods and the electrical collectors in one plate (see Fig. 12) instead of separate cross-strips I obtain a more stable construction in that I more firmly unite the rims of the stationary disks and provide a stronger and more unyielding support for the said brush and collector rods. The brush-rods 42, that are on the outside, are formed as shown in Fig. 13 and carry one brush 44, which consists of a small tube, with a bundle of small brass wires bent double around a doubled wire and drawn into the open end of the tube by the doubled wire and fastened by soldering or otherwise. The other end of the tube is provided with a felt washer 45 and a rubber cap 46 to prevent leakage of electrical current at the end of the tube. This small tube is inserted through a transverse hole in

the brush-rod 42 and is adjustably secured by clamping against it a screw 47. The screw 47 has rubber head 48 and a felt washer 49 between the head and the end of the rod. The brush-rods 42 that are between the glass disks have two brushes extending in opposite directions. These are secured in the manner shown in Fig. 16. The end of the rod 42 is hollow, and the walls have diametrically opposite slots 50 50. The rubber cap 51 is is adapted to fit over the end of the rod. It has diametrically opposite holes or slots, through which the folded ends of brass-wire brushes 52 are inserted and drawn through, so that a considerable length of brush extends to the inside of the cap. These extensions of the brushes are passed through the slots in the hollow end of rod 42, the rubber cap at the same time being slipped upon the end of said rod and the brushes made fast by giving the cap a rotary turn, which clamps the brush. This affords a ready means for adjustment or removal of the brushes. Single brushes can obviously be made in the same manner by the simple omission of one set of the duplicate parts. There are two of these brush-rods located diametrically opposite to each other for each set of disks, as shown in Figs. 3, 4, and 5. There are also two electrical collectors, previously referred to, between each set of disks, consisting of a rod 53, secured to the plate 41 by rubber nuts 54, the same as brush-rods 42 are secured, having felt washers, as shown. A copper strip 55 electrically connects the rods 53. The rods 53 of the collectors have the metal combs 56, which are held in place by the hard-rubber knobs 57, which screw on the threaded end of the rod 53.

Referring now to the details of construction of the equalizer, there is shown on the rear side of the series of disks the hub 15 and on the front side the bearing-ring 58. Integral with the hub 15 and the bearing-ring 58 there is a pair of oppositely-extending metal rods or arms 17, which extend diametrically across the disk, as appears in Figs. 1, 3, and 5, and their ends are connected by the brass cross-bars 59, secured in place by the screws 60. From said cross-bars 59 a short equalizing-rod 61 extends between each set of disks, as appears in Fig. 2, there being two series of these diametrically opposite each other. The equalizing-rods 61 have brass combs 62 soldered or otherwise secured to them. The arms 17, as shown in the upper series in Fig. 2, may be utilized as comb-carriers and brush-holders, or a separate outside rod may be used, as shown in the lower series of Fig. 2; but whichever construction is adopted the outside rods each have one brass comb and one brush projected toward the adjacent disk, while each of said inner rods has two oppositely-extended combs and two oppositely-extended brushes. The construction of these equalizing-rods and the arrangement of the combs and brushes therein are the same as that shown in Figs. 13 and 14 for the brush-rods and the collectors. It will thus be seen that the equalizing-rods are supported by a double frame connected to hub 15 in a manner to be oscillated by the rocking of said hub. The extent of this oscillation is only restricted by the collector-rods 53 and is therefore nearly ninety degrees in amplitude. The equalizer is oscillated by means of the hand-lever 16, attached outside of the cabinet to the protruding end of the hub 15.

Projecting from the collector-rods 53 on either side of the machine are metal rods 63, that extend through the cabinet-walls to the outside and through which the electrodes 64 reciprocate, there being, preferably, a ball 65 at the intersection of the electrodes and rods. The electrodes have balls 66 on their adjacent ends and suitable handles on their outer ends. The conducting-rods 63 will also have the terminal balls 67, which by means of movable connections 68 may be connected with the lids of the Leyden jars 69 or disconnected at will. The jars will be set in a metal shell, to which the threaded bolt 71, Fig. 8, is electrically connected. The shell sets in a cavity in the wooden base 72, and the bolt is projected through the base and through the top of the table and is fastened by nut 73. Electrical connection to complete the electrical circuit is made to the bolt in the usual manner. The base is provided with a depression 72^a of three different diameters to receive three sizes of jars, as the requirements may demand.

I will now describe the current make-and-break mechanism, which will be understood, in connection with the foregoing description of the rest of the machine, more fully than would have been possible with an earlier description, although I regard this as one of the most important features of my invention.

The front end of the main or disk shaft 9 has a screw-threaded bore in which the reduced threaded end 74 of the shaft extension 75 is screwed, as shown in Fig. 2. The outer end of the extension 75 has a bearing in the post 76, supported on the table 1. Mounted on the shaft extension 75 between the cabinet and the post 76 are the cone-pulleys 77, and loosely mounted on the end of said shaft extension projecting past the post 76 is the hard-rubber disk 78, the hub 79 of which is grooved to serve as a pulley. By means of the set-screw 80, however, the hub and disk may be tightened to the shaft extension, so as to revolve with it.

Supported by the front of the cabinet and the post 76 is a counter-shaft 81, on which is mounted the cone-pulleys 82, and connecting pulleys 82 with the pulleys 77 above is belt 83.

The cones enable the belt to be shifted to change the relative speed of the two shafts bearing said cones.

Mounted on the outer side of post 76 on a projection of the counter-shaft 81 is the belt-pulley 84, which is connected by belt 85 with the hub of disk 78. The purpose of the counter-shaft, pulleys, and belts is to enable the disk 78 to be run at a higher rate of speed than the shaft 9 and its extension 75, but when it is desired to have the disk travel at the same speed as shaft 9 the belts will be thrown off and the disk will be secured to its shaft by the set-screw 80.

The peculiar shape of the disk 78 is illustrated in Fig. 1 and on a larger scale in Fig. 9. The dotted line outside of the disk represents a circle, from which it will be seen that the rim of the disk is flattened between the four terminals of two right-angled diameters *ab cd*, Fig. 9. It must not be presumed, however, that the flattening of the disk at four places is arbitrary, as many irregularities of outline of the disk may be adopted for various special results. This disk is preferably placed a little inside of the vertical plane through the longitudinal axes of the electrodes 64, (see Fig. 2,) so in its major diameter it will just miss the balls 65, the latter being adjusted by properly moving the rods 64.

Fixed in the margin of the rubber disk 78 are metal conductors 86, which are connected by removable conductors 87, whereby when the sections are removed, either by swinging them back from the margin into the body of the disk, as shown at *e*, or by completely removing a section, such as is shown in Fig. 11, leaving a blank, as shown at *f* in Fig. 9, the conducting-circuit will be broken. By the irregular shape of the margin of the disk the resistance to the passage of the current from the balls 65 to the metal conductors of the disk will vary, the resistance increasing from the major to the minor axis of the disk as the latter, revolving, is presented to the balls. The electricity is taken off of the metal margin of the disk by the brushes 88 and 89, which are connected by conducting-cables 90 with the two hand-electrodes 91 91. The person having hold of the electrodes will experience a more violent contortion of the muscles as the point of greatest resistance on the disk is reached.

The sections of the revolving current-break should be evenly graduated and distributed so that the points of greatest diameter should on opposite sides nearly touch the positive and negative poles of the machine simultaneously. As each carrier passes the poles it gradually lengthens and increases the current until the point of least diameter is reached, after which it as gradually decreases the length of spark and strength of current. By this means sinuous, creeping, vibratory, rhythmic currents are developed and can be so gaged as to produce writhing contortions of the muscles, accompanied by little or no pain. In order to obtain these currents in one continuous direction, all of the switches may be open. In this case as each metal-carrier passes the positive pole it equalizes and carries forward a charge which is deposited on touching the brush ahead. Simultaneously the opposite carrier receives a charge from the negative pole, which is deposited on the opposite brush, and from thence through suitable conductors to the accomplishment of its work. Another modification of a current of one direction is produced by closing all of the switch-gaps, disconnecting the electrode-cable from one of the brushes and connecting it direct with one of the prime conductors, and having the opposite brush in electric connection with the other electrode-cable. To leave two only of the switch-gaps on opposite sides of the disk closed will produce alternating vibrations of current. The carriers are so lengthened by the closed switches as to cause them to approach the — — pole while yet in touch with the brush from which they are receding, and before fully passing the ball they reach and send another charge from the same pole to the brush ahead. A carrier, we will say, leaves the — — pole and as it reaches the — — pole it sends a charge from that pole back to the same brush which but an instant before was — —. Meantime the opposite carrier is of course following and simultaneously changing the polarity of each brush. For an alternating current, if the open switches are located at opposite points of the greatest diameter of the disk the pulsations will be more rhythmic in rise and fall. By throwing off the belt 85 and tightening the screw 80, the disk may be run at the same rate as the shaft 9, and by leaving the belt 85 off and loosening the set-screw 80, then rotating bar 92 so as to bring the end of tube 88 opposite the brush downward, and then lowering the post 94, which supports the bar 92, so the end of tube contacts with the disk 78 and holds the latter in immovable position, the latter can be used as a pole-changer. To illustrate: The disk can be set so the positive current from one of the electrodes 66 will pass through the metal margin of the disk to the top cable 90 and thence to the hand-electrode, while the negative current goes to the other hand-electrode from the opposite machine-electrode 66 through the opposite rim of the disk and lower cable 90. To change the poles of the hand-electrodes from positive to negative, it is only necessary to rotate the disk 78 far enough to cause its conducting-rim to make reverse connections with the cables leading to the two hand-electrodes. This is an important feature of my invention. The action of the disk would be the same by mounting it on the counter-shaft between the

two Leyden jaws, as shown in dotted lines 92 in Fig. 2, the jars being moved into electrical-transmission distance of the disk. In fact, the points of electrical action might be remote from the current-generator—say in the next room from the machine—and the disk, if placed between the two points of energy, would give the same results, as hereinabove specified.

The brushes 88 and 89 are adjustably mounted in the rods 92 and 93 in the manner described for the brushes in the body of the machine. The rod 92 is adjustably mounted in the rubber post 94, and the post 94 is adjustably mounted in post 76, the adjustments being held by set-screws, as shown. The rod 93 is adjustably mounted in a rubber sleeve 95, supported by post 76, whereby it is insulated from said post.

In the modification shown in Fig. 7 the edge of the glass disk is bound by a silk or other flexible insulating material, which will prevent electrical leakage and strengthen the disk without liability of itself being broken. A strip of strong flexible binding material may be bound around the hard-rubber insulating-rim to keep the latter from bursting.

When the machine is started by the means heretofore described, the equalizer is brought down close to the two series of collectors 53. This shortens the distance between the equalizer and said collectors, so that the passage of electricity from one to the other takes place immediately and without difficulty when the machine is started, and without any external exciter, with these close together, a large supply of electricity is at first not required to effect the interchange of the electric current between them that is necessary in the initial charge. The generation of electricity thus begins immediately, and with powerful rapidity it increases, and as it increases the equalizers can be moved away from the collectors 53 as far as desired, the position shown in the drawings being a common position during the use of the machine after it is started. As the equalizer is moved away from the collectors the length of the spark and the output of the machine are increased proportionately. When the machine is being started, the electrodes should be separated, for if together the currents would pass through them.

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 electric machine having the electric-current generators within a closed cabinet, an equalizer, and means extending outside of the cabinet for changing its position.

2. In a static electric machine having the electric-current generators mounted within a closed case, an equalizer rotatably mounted around the center shaft of the machine, and means extending from the outside of the closed case for oscillating said equalizer.

3. In a static electric machine, an equalizer, a closed case surrounding same, a hub on the central shaft of the machine to which the equalizer is secured, said hub extending to the outside of the case, and means on the outside of the case for rocking said hub.

4. In a static electric machine, an equalizer, a closed case surrounding same, a sleeve through the wall of said case, a hub on the central shaft of the machine to which the equalizer is secured, said hub extending to the outside of the case, and means on the outside of the case for rocking said hub.

5. In a static electric machine, an equalizer including a rod extending diametrically across the plates, a laterally-extending cross-bar from each end of said rod near the edge of said plates, rods secured to the cross-bars between each pair of plates and a metal brush secured to each of said rods so as to engage the surface of the disks.

6. In a static electric machine having a series of plates, an equalizer including side rods extending diametrically across the series of plates in said machine, cross-bars connecting the ends of said rods, short rods extending from said cross-bars between each series of plates, and a metal brush secured to each of said rods adjacent to the plates.

7. In a static electric machine having the electric-current generators within a closed cabinet, an equalizer, and means for changing the distance between the points of equalization of the equalizer and collectors without opening the case.

8. In a static electric machine having the electric-current generators within a closed cabinet, an equalizer, and means extending outside of the cabinet for changing the distance of the points of electrical transmission of the equalizer from the points of electrical transmission on the collectors.

9. In a static electric machine, an equalizer comprising two side rods extending diametrically across the disks, conducting cross-bars connecting the ends of said side rods, the short rods extending from said cross-bars between each series of disks on the opposite sides of the machine, combs secured to said short rods adjacent to the disks in the machine, and brushes secured in said rods that contact with said disks.

10. A static electric machine having inclosed electric generators and practical means for precipitating the moisture in said inclosure upon a predetermined portion of the inclosing case.

11. A static electric machine having inclosed electric generators and means outside of said closure for precipitating the moisture in said interior.

12. A machine having an electric generator,

an inclosing case for the generator having means for opening said case to permit access to said generator and having a smaller opening, a refrigerant located outside of the case, and a removable portion separating the refrigerant from the interior of the case, said removable portion being inserted or withdrawn from said smaller opening and forming a closure therefor when inserted.

13. In a static electric machine a cabinet containing the electric generators and means for cooling a limited portion of said cabinet to cause a precipitation of the moisture of the interior thereon.

14. In a static electric machine a cabinet containing the electric generators, an ice-box outside of said cabinet and a metal plate separating the interior of the cabinet from the ice-box.

15. In a static electric machine, a cabinet containing the electric generators, a portion of said cabinet made of a material that is a good conductor of heat, and means for lowering the temperature of said portion below the temperature of the interior of the cabinet.

16. In a static electric machine a cabinet containing the electric generators, a sliding bottom portion of said cabinet made of a material that is a good conductor of heat, and means for lowering the temperature of said slide below the temperature of the interior of the cabinet.

17. In a cabinet containing an electric generator, a means for warming one portion of the cabinet interior while cooling another portion.

18. In a static electric machine, a cabinet containing the electric generators, metal plates in the bottom of said cabinet and means for heating one portion of said bottom and cooling the other, substantially as described and shown.

19. In a static electric machine, a rod having a hollow end, a cap on the hollow end of the rod and a brush impinged between the rod and the cap.

20. In a static electric machine, a rod having a hollow end, an opening through the wall of said hollow portion, a brush with one end introduced into the hollow rod through the opening in its wall and a cap on the hollow end of the rod to clamp and hold the brush.

21. In a static electric machine, a brush consisting of a tube, a bundle of fine metal wire bent at the middle, and having said middle drawn into the tube and an insulating knob on the end of the tube from the brush to prevent electrical leakage, in combination with a rod-holder and a cross-plate to which the rod is fastened.

22. In a static electric machine, a rod having a hollow end, an opening through the wall of said hollow portion, a cap on the hollow end of the rod having a portion of its side wall removed, and a bundle of fine metal wire having one of its ends introduced into the hollow rod through the openings in the walls of the rod and cap.

23. In a static electric machine inclosed within a case, a static electric generating-disk provided with a non-conducting rim.

24. In a static electric machine an electric plate provided with a marginal shield of non-conducting material and a case inclosing said plate and generative mechanism.

25. In an electric machine, a plurality of electric disks having insulating-rims, a series of brush-rods and another series of comb-rods between and at the sides of the disks, said brush-rods and comb-rods and a plate secured to the said rims to which plate the brush-rods and comb-rods are secured.

26. In a static electric machine comprising generating-disks, stationary comb-rods and brush-rods, and a plate to which the stationary comb-rods and brush-rods on the same side of the generating-disks are secured.

27. In a static electric machine, a suitable electric plate, an insulating-rim around the same and automatic means for varying its length to meet changed conditions due to expansion and contraction.

28. In a static electric machine a suitable electric plate and a flexible rim of insulating material around the edge of said plate.

29. In a static electric machine, a suitable electric plate, a hard-rubber rim around the same and an elastic coupling connecting the meeting ends of the rim.

30. In a static electric machine a suitable electric plate, a hard-rubber rim around the same, a plate of hard rubber overlapping the joint and fastened to the ends of the rim one of the fastenings being through a longitudinal slot permitting adjustment in diameter of the rim and a spring to draw the ends of the rim together.

31. In a static electric machine, a main shaft, a series of groups of plates mounted on the shaft, externally-threaded sleeve or sleeves mounted on the shaft, having flanges, suitable rings and washers around said threaded sleeve separating it from its disk, a nut screwing on the sleeve to tighten the washers and disk against the flange and means for securing the sleeve to the main shaft.

32. In a static electric machine, a main shaft, a series of sleeves secured thereon, said sleeves having a flange at one end and an external screw-thread from the other end to the flange, said sleeves being arranged in pairs as to their flanged ends which are placed adjacent to each other, a revolving plate mounted on each sleeve and a pair of stationary plates at the flanged ends of the sleeves between the revolving plates.

33. In a static electric machine, a main shaft, a series of sleeves mounted thereon, glass

plates mounted on the sleeves and elastic bearings between the plates and the sleeves.

34. In a static machine, a main shaft, ball-bearings to support said shaft, a series of plates mounted on the shaft, an equalizer diametrically surrounding the series of plates with rods extending between the plates, said equalizer being mounted on the shaft.

35. In a static electric machine, the generators, the electrodes, the Leyden jars and the bases for said jars having a series of sockets of different diameters.

36. In an electrostatic machine a current make-and-break device moving between the positive and negative electric forces generated by the machine and means to take the current from said device.

37. In a static electrical machine, the stationary and the revolving glass disk, the operating-shaft, the combs and the conductors through which the electricity generated passes off, a revolving electric-current make-and-break device adapted to be carried by the said shaft and make and break contact with said conductors as the device is revolved and means to take the current off of the revolving device.

38. In an electric machine of the class described, a current make-and-break device revolving between the poles of the machine, said device consisting of a plate with marginal conductors of electricity having switches to break the circuit, and means to take the electricity off of the plate.

39. In an electric machine of the class described, a current make-and-break device revolving between the poles of the machine, said device consisting of a disk with an irregular outline, said plate having marginal conductors of electricity and brushes to take the electricity off of the plate.

40. In an electric machine of the class described, a current make-and-break device revolving between the poles of the machine, said device consisting of a plate with an outline that is not a true circle, said disk having marginal electric conductors, switches to make and break the circuit in said conductors and brushes to take the electric current off of the plate.

41. In a static electric machine, the main shaft, an extension removably secured thereto, a current make-and-break device loosely mounted on the shaft extension, a cone-pulley mounted on the shaft extension, a cone-pulley separately mounted adjacent thereto, a connecting-belt, a pulley on the same shaft as the second cone-pulley connected with a belt to the make-and-break device.

42. In a static electric machine, a main shaft, an extension removably secured thereto, and a current make-and-break device mounted on the extension.

43. In a static electric machine a cabinet containing the electric generators and means for simultaneously heating and cooling different portions of the interior of the cabinet.

44. In a static electric machine a cabinet containing the electric generators, a compartment outside of the cabinet having communication with the interior of said cabinet and a removable partition between said cabinet and the said outside compartment.

45. In a static electric machine, an equalizer, and means extending outside of the machine for changing its position.

46. In a static electric machine, an equalizer rotatably mounted around the center shaft of the machine, and means extending from the outside of the machine for oscillating said equalizer.

47. In a static electric machine, an equalizer including a rod extending diametrically across the disks, a laterally-extending cross-bar from each end of said rod near the periphery of said disks, short rods extending from said bars between the disks, and a metal brush secured to each of said rods so as to engage the surface of the disks.

48. In a static electric machine having a series of disks, an equalizer including side rods extending diametrically across the series of disks in said machine, cross-bars connecting the ends of said rods, short rods extending from said cross-bars between each series of disks, and a metal brush secured to each of said rods and short rods adjacent to the disks.

49. In a brush, a rod having a hollow end, adjustable brush-wires each of which has one end inserted in and the opposite end protruding from said hollow, and means for removably and adjustably securing said brush-wires within said hollow.

50. In a static electric machine having electric generators located within a case, a movable conducting medium to serve between the positive and negative parts as a means for modifying and regulating the electric current while said current is passing from the generators to the sliding electrodes or other terminals, said conducting medium having means available from outside of the case for changing its position.

51. In a static electric machine having electric generators located within a case, a movable conducting medium to serve as a means for modifying and controlling the electric current while said current is passing from the generators to the sliding electrodes or to other terminals, said conducting medium having means available from outside of the case for changing its position.

52. In a static electric machine having electric-current generators located within a case, a movable conducting medium acting upon and regulating the polarized current while

the current is flowing from the generators to the combs, brushes or other receiving or distributing mechanism for passing said current to the sliding electrodes or other terminals, said conducting medium having means available outside the case for changing its position.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 11th day of June, A. D. 1901.

THEODORUS H. PATEE. [L. S.]

Witnesses:

J. A. MINTURN,

S. MAHLON UNGER.