

No. 768,199.

PATENTED AUG. 23, 1904.

I. B. SMITH.
RHEOSTAT.

APPLICATION FILED DEC. 9, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

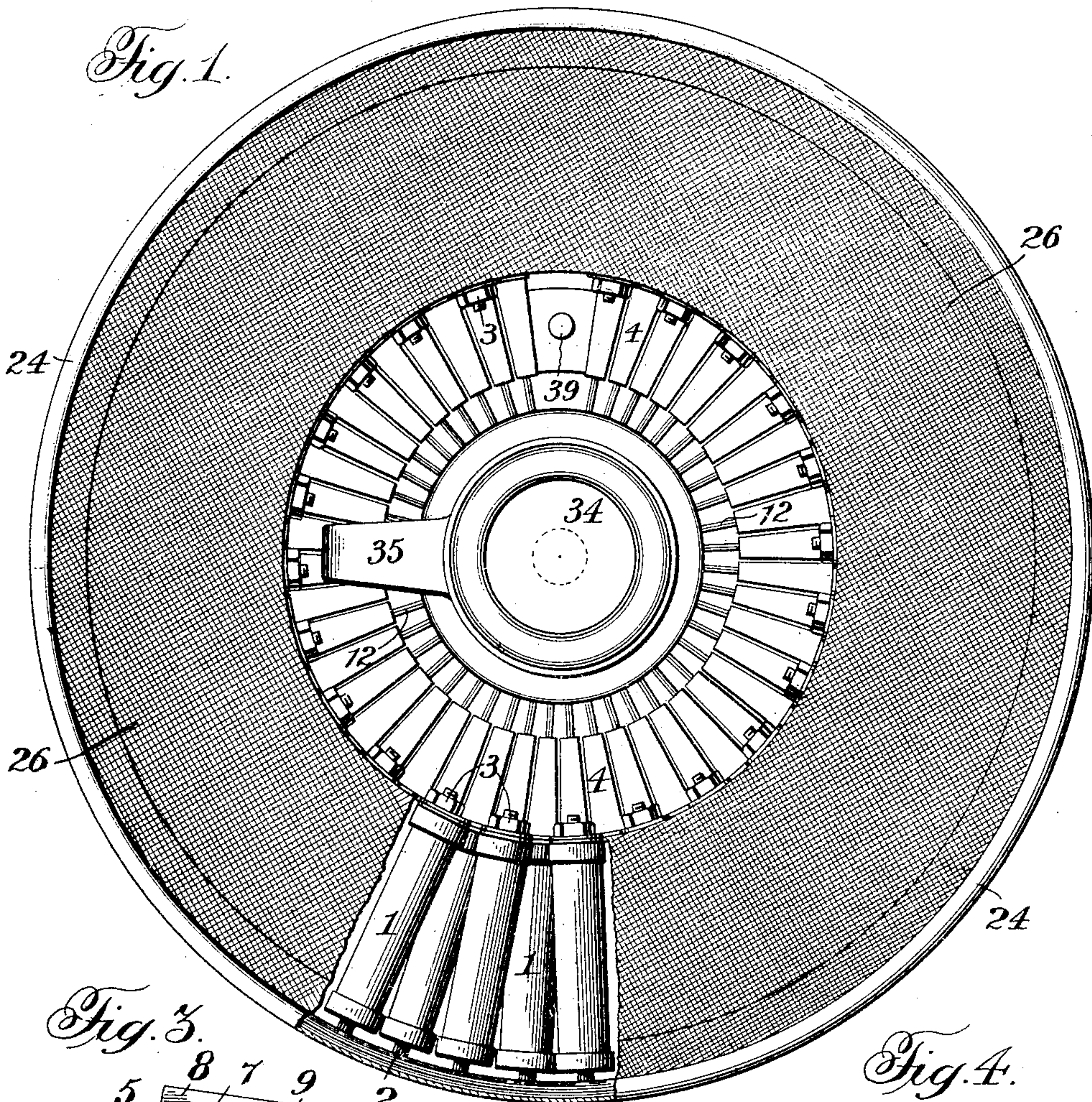


Fig. 3.

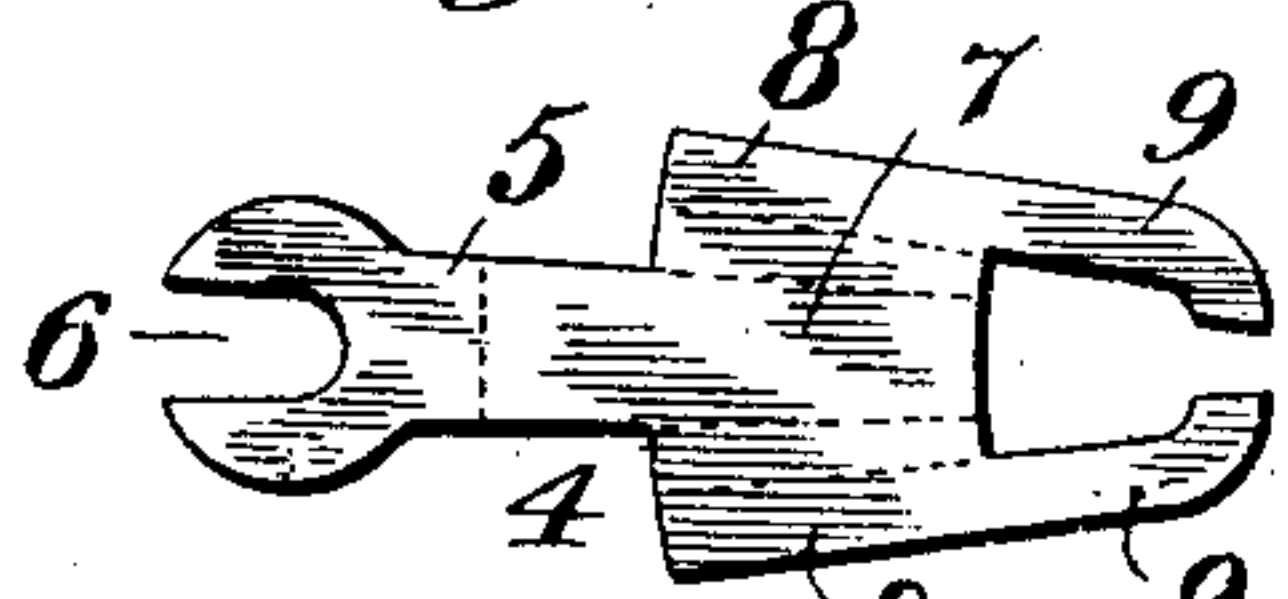


Fig. 2.

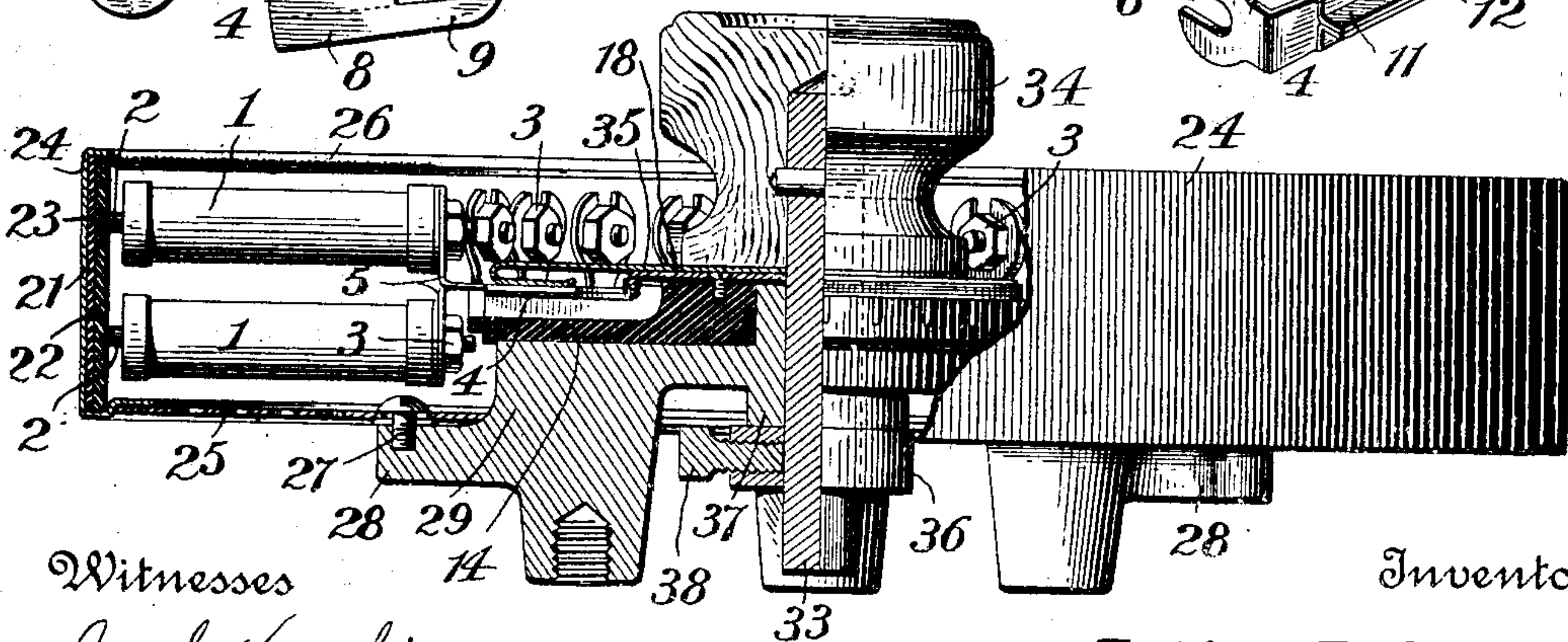
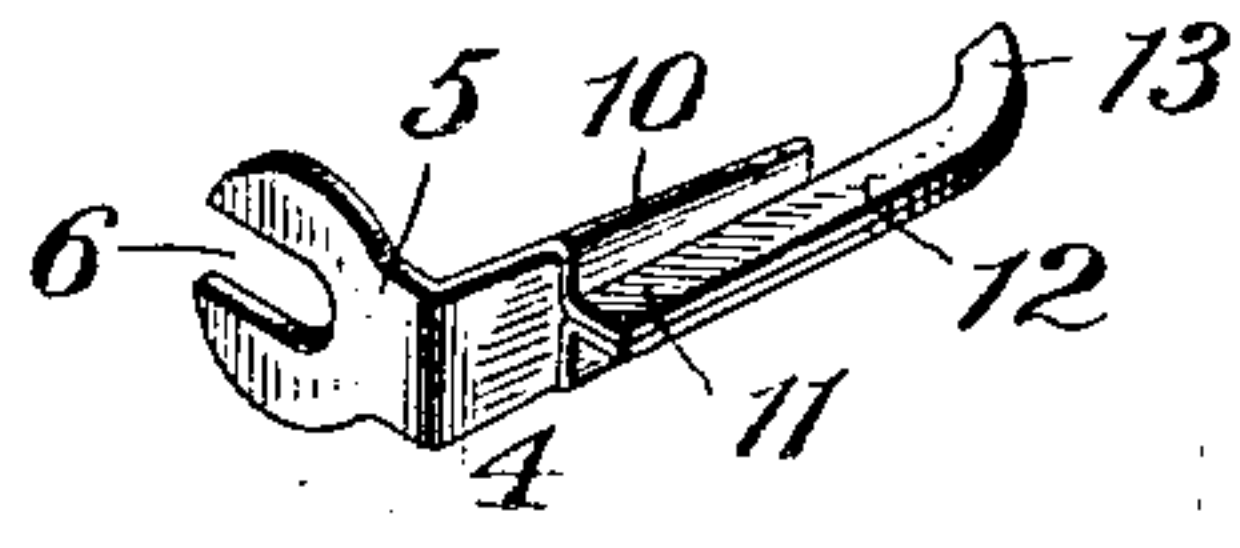


Fig. 4.



Witnesses

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2 SHEETS—SHEET 2.

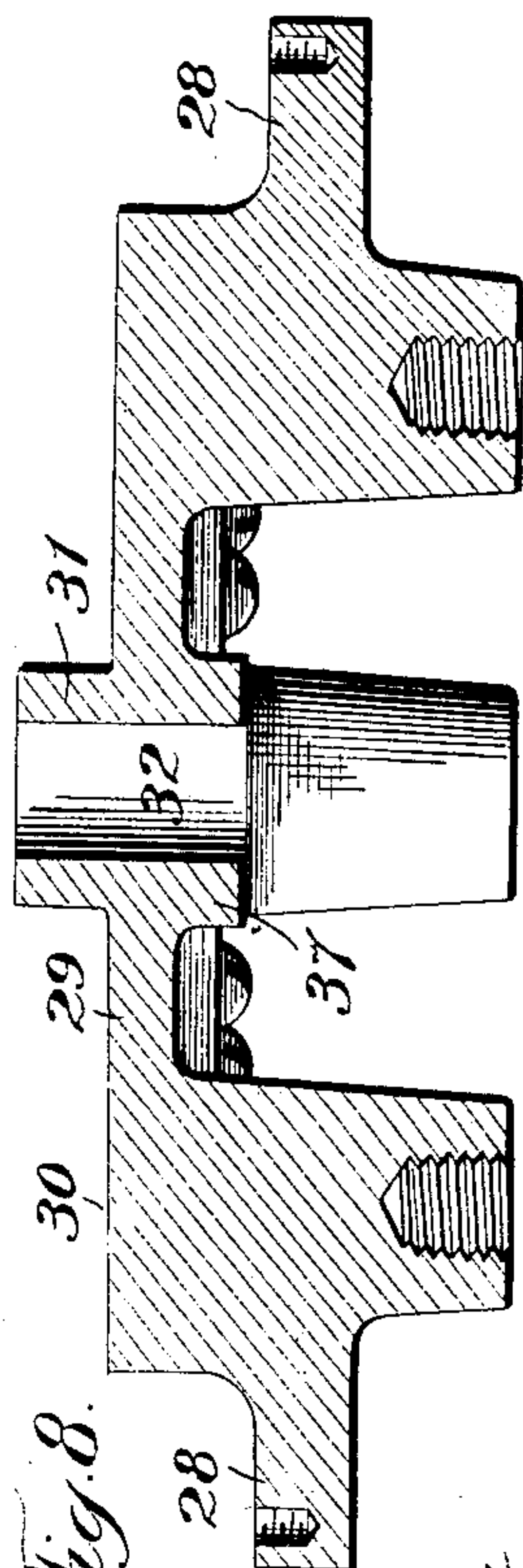


Fig. 8.

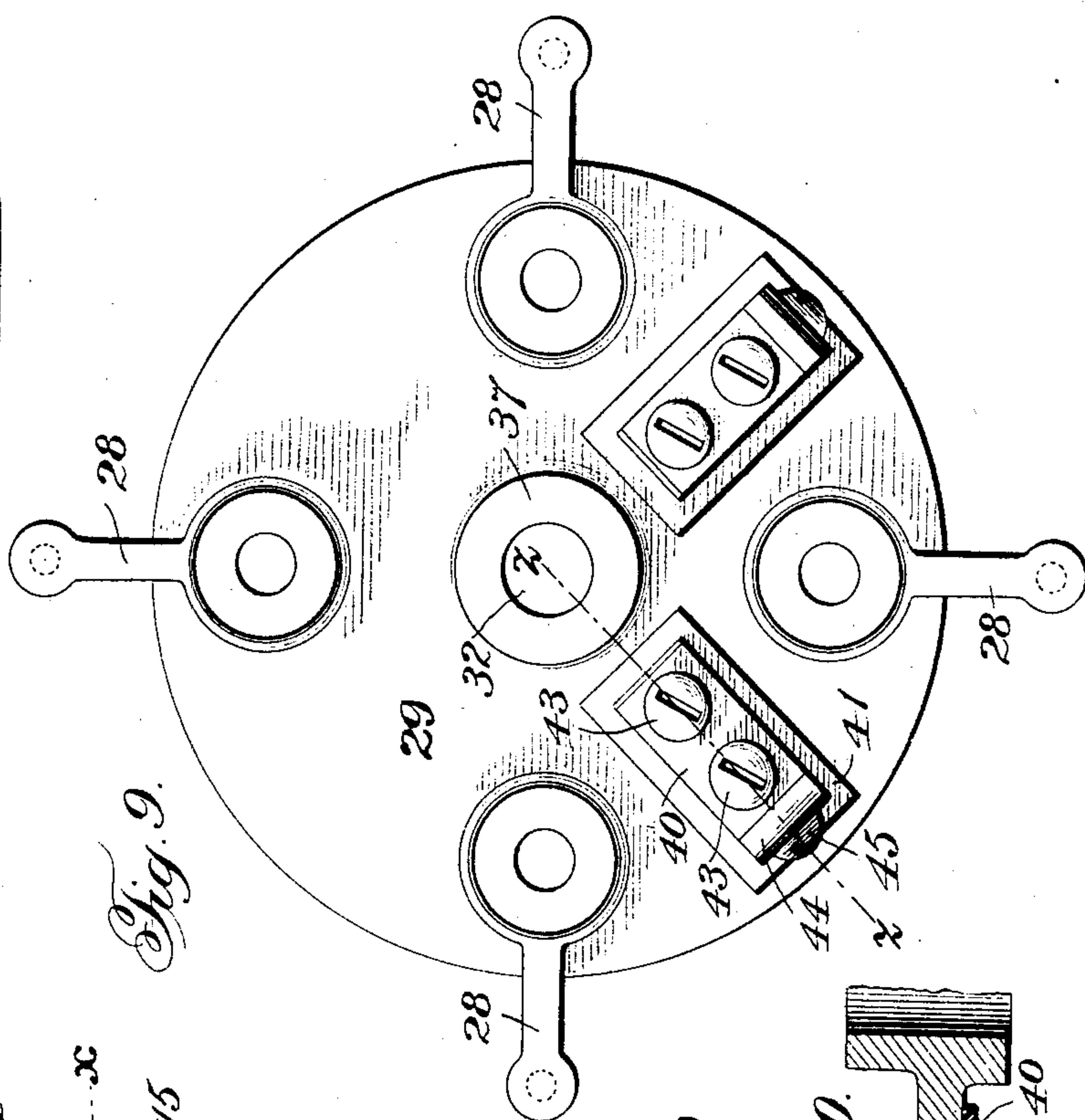


Fig. 9.

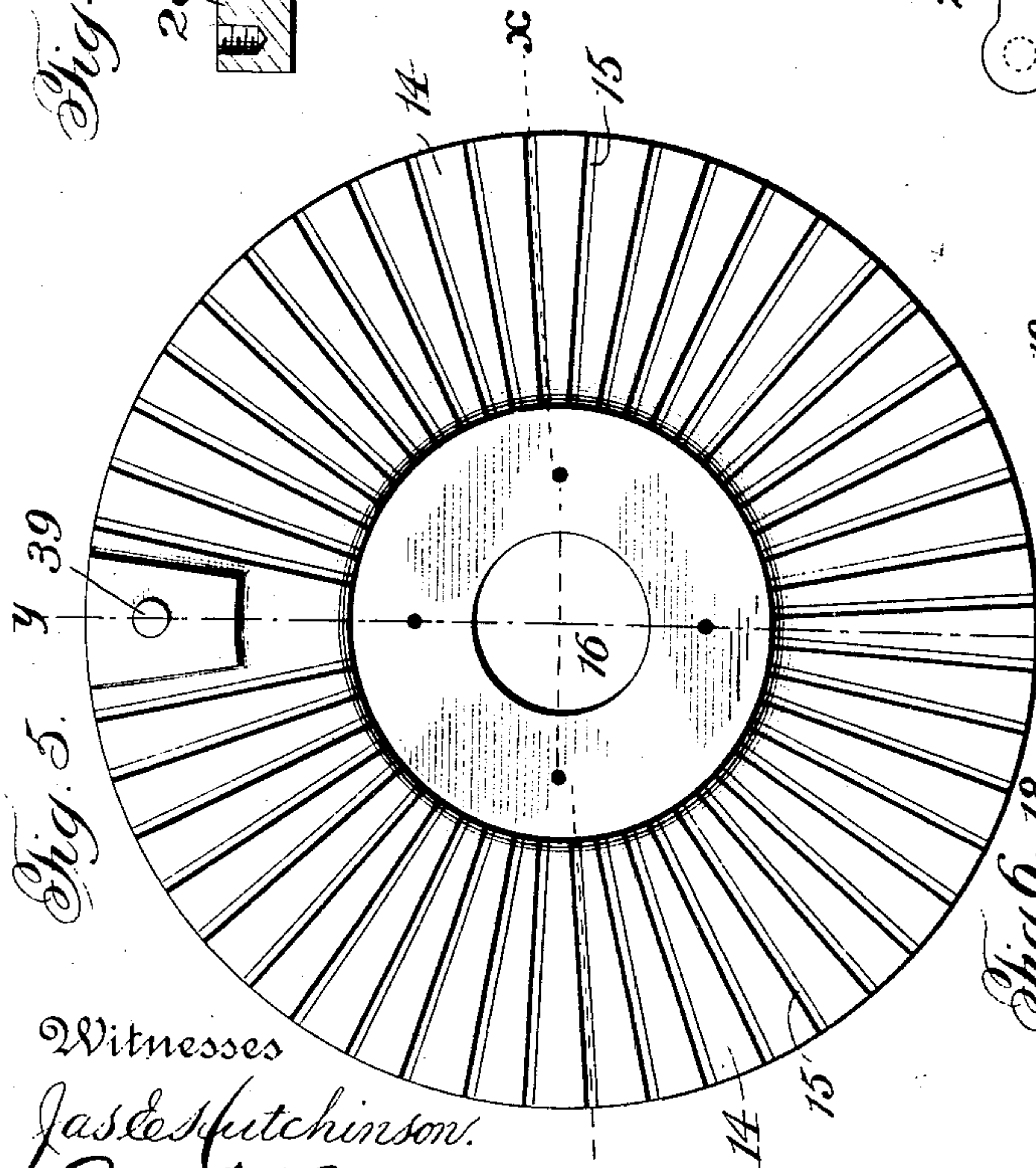


Fig. 5.

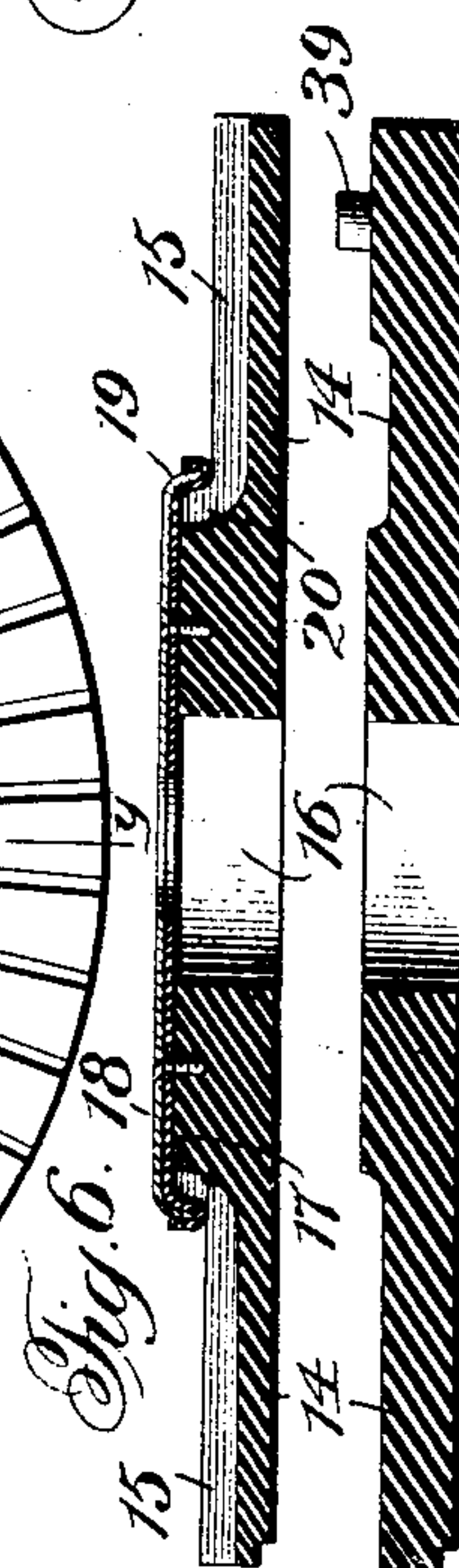


Fig. 6.

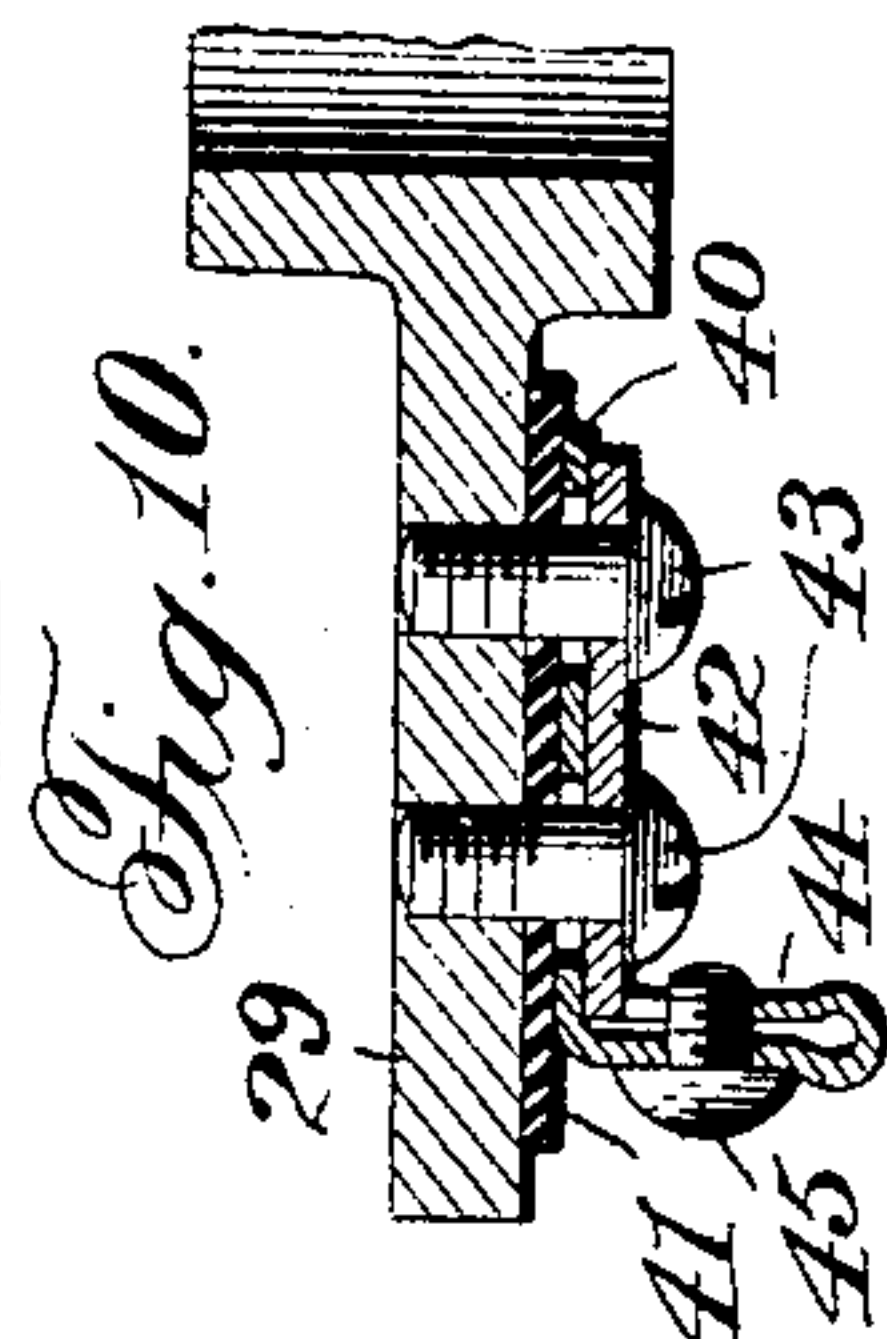


Fig. 10.

Fig. 7.

Witnesses

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UNITED STATES PATENT OFFICE.

IRVING B. SMITH, OF PHILADELPHIA, PENNSYLVANIA.

RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 768,199, dated August 23, 1904.

Application filed December 9, 1903. Serial No. 184,430. (No model.)

To all whom it may concern:

Be it known that I, IRVING B. SMITH, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Rheostats, of which the following is a specification.

This invention relates more especially to improvements in that class of rheostats in which the resistance elements are in a form of removable units, and has for its object the production of a rheostat in which these resistance units may be most readily removed, renewed, or exchanged and in which the said units may be most easily and positively connected to the switch contact-segments.

A further object of this invention is the production of a rheostat in which the switch contact-segments are simply and firmly held in place and readily removable for renewal or repairs and in which a very large number of said segments may be placed about a comparatively small circle and held securely without adopting such methods as would weaken the support upon which said segments are mounted.

A further object of this invention is to provide switch contact-segments which necessitate a minimum amount of metal in their formation, and yet secure a large contact-surface and a stiff construction which prevents warping, bending, or twisting at such surface.

A further object of the said invention is to secure the utmost area of contact between the brush or other movable switch contact and the switch-segments.

With the above objects in view the said invention consists in the combination and arrangement of parts herein described, and more particularly pointed out in the claims.

An embodiment of the said invention is illustrated in the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a top plan view of the rheostat with a portion of the top thereof broken away to show the resistance units; Fig. 2, a side elevation of the rheostat, partly in vertical central section; Fig. 3, a top plan view of one of the switch contact-blanks before it

is bent to form the finished segment; Fig. 4, a perspective view of one of the contact-segments after it has been bent into its finished shape; Fig. 5, a top plan view of the plate or base upon which the contact-segments are mounted; Fig. 6, a section of the said plate along the line *x x*, Fig. 5, with an insulated contact-plate, hereinafter described, upon its upper face; Fig. 7, a section along the line *y y*, Fig. 5; Fig. 8, a central vertical section of the casting which forms the base or support of the rheostat; Fig. 9, a bottom plan view of the same; and Fig. 10 is a section along the line *z z*, Fig. 9, showing one of the terminal connections.

In the accompanying drawings, 1 represents the resistance units, which are preferably of the tubular type—that is, of a type in which the resistance material forms a part of or is supported upon a tube which is in turn preferably carried by a rod 2, extending longitudinally through said tube. In the accompanying drawings the resistance material of the units is inclosed in a cover. Any resistance unit, however, which is adapted to this form of rheostat may be used.

One end of the rod 2 of each unit is screw-threaded and receives a nut 3. This end of the rod and nut form both the binding-post for the electrical connections between successive units and the mechanical means for securing said units to their support. The manner of supporting these units forms an important part of this invention and it is believed is essentially new in rheostat construction. For each resistance unit there is a corresponding brush contact-segment 4, and each contact-segment is provided with an extension 5, which forms both the electrical connecting means between the contact-segment and the unit and the mechanical support for one end of said unit. The connecting end 5 of the contact-segment is provided with a slot 6, which engages one end of the rod 2, while the connecting end 5 is held firmly against the head of the unit by the nut 3. This manner of supporting the units admits of their being readily removed and replaced or others substituted for them. By causing the ends 5 of alternate contact-segments to extend in op-

posite directions, as shown, the resistance units are arranged in a double row, which admits of a very large number of units being placed around a given circle. The resistance elements may be connected up in series in any well-known or desired manner, the connecting ends tapping the series connection at each unit.

The form of the contact-segments and the manner of supporting them constitute, it is thought, a distinct departure in the art. These segments are stamped out of sheet metal in the form of a blank, (shown in Fig. 3,) having the extension 5, main body portion 7, wings 8, and hooked extensions 9. This blank is then put through a bending process, after which it assumes in its finished form the shape shown in Fig. 4. In this finished form the wings 8 are bent in and under the main body portion to form a segmental portion 10 of a double thickness of metal and a central flange 11, substantially normal to the contact-surface of the segment, while the hooked extensions 9 are brought together, as shown, to form a single extension 12 of a double thickness of metal with an upturned end or lip 13, (see Fig. 4,) the connecting end 5 being bent at right angles to the main body portion. A segment constructed in this manner requires a minimum amount of metal, has a large contact-surface, and by its stiffness is prevented from warping at its contact-surface.

The contact-segments are all mounted in a circle upon a preferably circular plate 14, of insulating material, provided upon its upper face with a plurality of radial grooves 15 and a central opening 16. Each of these grooves engages the flange 11 of a contact-segment, while the upturned lips 13 of the extension 12 of said segments engage insulation 17 on a metal plate 18, having an annular flange 19, around which the said insulation 17 extends, as shown. When the segments are in place, the lips 13 thereof are held between the insulation on the flange 19 and the end 20 of the grooves 15. (See Figs. 2 and 6.) This arrangement holds the segments securely against endwise play or slipping. The said segments are further held against displacement endwise and the units further supported by supporting the outer ends of the rods 2 of said units in a series of holes 21 in an annulus or ring 22, of insulating material, which is surrounded by a backing of insulation 23, against which the ends of the rods 2 abut. In view of this latter construction the lips 13 of the segments may, if desired, be omitted, since the rods 2 abutting against the backing 23 will, as will be readily seen, prevent any endwise displacement of the segments.

The members forming the flange or rib 11 of the segments may be flared outward to form an inverted V and the grooves 15 provided with an undercut to receive them. Owing, however, to the difficulty of giving a

groove an undercut or dovetail formation the straight side form of flange and slot, as shown, is preferred.

The manner of attaching the segments to their supporting-plate, herein described, admits of a very large number of segments being placed around a comparatively small circle and also of their being attached thereto without materially weakening the said support.

The ring 22 and backing 23 are held firmly together and inclosed by a metal casing 24, provided, preferably, with a perforated metal back 25 and wire-netting front 26, which latter is open around the switch-knob, as shown. The back of the metal casing is secured by screws 27 to lugs 28 upon a casting 29, forming the base of the rheostat. This base 29 is provided with a flat face 30, upon which the plate 14 is supported, the central opening 16 of the said plate fitting snugly over a central extension 31 on said base. The base 29 is provided with a central opening 32, through which passes a stud 33, carrying the switch-knob 34 and switch 35, the latter being held between said knob and the upper face of the plate 18, as shown. This switch-arm may be of any desired construction, but is preferably in the form of the resilient metal strip, as shown. The manner of mounting this switch-arm against the upper face of the contact-plate 18 secures an especially smooth action and good electrical contact. The stud 33 is held in place by a collar 36, which engages a shoulder 37 and is held with a set-screw 38. The rotation of the switch-arm is limited by a stop 39 upon the plate 14.

The terminal connectors or binding-posts of the rheostat are shown most clearly in Figs. 9 and 10. These are mounted upon the back of the base 29 and consist each of a plate 40, insulated by insulation 41 from the base and clamped against said insulation by plate 42, held by screws 43. One end of the plate or strap 40 is bent to form a loop 44, in which the cable end or wire is clamped by means of the screw 45.

The electrical connections from these terminal connectors to the switch-arm and the last resistance unit may be made in any desired or well-known way.

Having thus described a form of my invention, the same may be modified in many respects without departing from the spirit of the invention; but

What I claim is—

1. In a rheostat, a plurality of switch-segments, a plate to which said segments are attached, each by a tongue-and-groove connection, and a plurality of resistance units connected to said segments.

2. In a rheostat, a plate provided with a plurality of grooves, a plurality of switch-segments mounted on said plate and each provided with a tongue or flange adapted to en-

gage one of said grooves, a plurality of resistance elements, and means for connecting said elements to said segments.

3. In a rheostat, a supporting-plate of insulating material provided upon one of its faces with a plurality of radial grooves, a plurality of switch-segments mounted on said plate and each provided with a flange or tongue adapted to engage one of said grooves, means adapted and arranged to prevent displacement of said segments, and a plurality of resistance elements connected to said segments.

4. In a rheostat, a plate of insulating material, provided upon one of its faces with a plurality of radial grooves, a plurality of switch-segments mounted on said plate and each engaging one of said grooves, retaining means common to all of said segments adapted and arranged to prevent displacement thereof, and a plurality of resistance elements connected to said segments.

5. In a rheostat, a supporting-plate of insulating material provided upon one of its faces with a plurality of radially-disposed grooves, a plurality of switch-segments having each a flat contact portion and a tongue or flange extending longitudinally thereof, the said tongue or flange of each of said segments engaging one of said radial grooves, an insulated retaining-plate constructed and arranged to engage extensions of all of said segments and to thus hold the latter against displacement, and resistance elements connected to the said segments.

6. In a rheostat, an insulating supporting-plate, provided upon one of its faces with a plurality of radial grooves, a plurality of switch-segments mounted on said plate and each provided with a flange adapted to engage one of said grooves, a metal retaining-plate common to all of said segments, insulated therefrom and adapted and arranged to prevent displacement thereof, a switch-arm adapted to make electrical contact with and move over the upper face of said retaining-plate.

7. In a rheostat, a supporting-plate of insulating material provided upon one of its faces with a plurality of radially-disposed grooves, a plurality of switch-segments having each a flat contact portion and a tongue or flange extending longitudinally thereof, the flat portion of said segments resting upon the face of said supporting-plate and the tongue or flange of each engaging one of said radial slots, an insulated retaining-plate provided with an annular flange constructed and arranged to engage extensions of said segments to hold the latter against displacement, and resistance elements connected to said segments.

8. In a rheostat, a supporting-plate of insulating material provided upon one of its faces with a plurality of radially-disposed grooves, a plurality of switch-segments having each a flat contact portion and a tongue or flange extending longitudinally thereof and forming

an extension at one end of said segment, the said tongue or flange of each of said segments engaging one of said radial grooves, an insulated retaining-plate mounted upon said supporting-plate and provided with an annular flange constructed and arranged to engage the said extensions of all of said segments, and resistance elements connected to said segments.

9. In a rheostat, a supporting-plate of insulating material provided upon one of its faces with a plurality of radially-disposed grooves open at their outer ends but terminating at their inner ends within said plate, a plurality of switch-segments having each a flat contact portion and a tongue or flange normal thereto and extending longitudinally thereof to form an extension having an upturned retaining-lip, the said tongue or flange of each of said segments engaging one of said radial grooves and extending to the inner thereof, an insulated retaining-plate provided with an annular flange constructed and arranged to engage the flange extensions and retaining-lips of all of said segments for preventing displacement thereof, and resistance elements connected to the said segments.

10. In a rheostat, a supporting-plate, a plurality of switch-segments secured to said plate and provided each with a longitudinal extension forming a conducting-support, a plurality of resistance units, and means for detachably securing one of said units electrically and mechanically to each of said supporting-segments.

11. In a rheostat, a supporting-plate, a plurality of switch-segments secured to said plate and provided each with a longitudinal extension of its contact portion adapted and arranged to form a conducting-support, a plurality of resistance units, and means for detachably securing one of said units electrically and mechanically to each of said supporting extensions.

12. In a rheostat, a supporting-plate, a plurality of switch-segments mounted on said plate and provided each with a flat longitudinal extension slotted at its end and bent to form an angle with the body of the segment, a plurality of resistance units provided each with a supporting member adapted to engage said slots in said extensions, and retaining means operating in conjunction with said members for securing said extensions to said units.

13. In a rheostat, a supporting-plate, a plurality of switch-segments mounted thereon and provided each with a longitudinal extension slotted at one end and extending at such end in a direction substantially normal to the contact-face of said segment, a plurality of tubular resistance units each provided with a supporting-rod screw-threaded at one end, the screw-threaded end of said rods passing through the slot in the end of each of said

segment extensions, and a nut carried upon each of the screw-threaded ends of said rods and adapted to bind the said segment extensions against the heads of said units.

14. In a rheostat, a plurality of switch-segments, having each a flange or tongue extending longitudinally thereof, a slotted extension at one end of said segment forming a continuation of and bent substantially at right angles to the contact-surface of said segment, and an extension at the other end of said segment forming a continuation of said flange or tongue, a plate having upon one of its faces a plurality of radial grooves each of which engages the flange or tongue of one of said segments, and a plurality of resistance units provided each with means for securing the same to the slotted end of said segment extension.

15. In a rheostat, a central supporting-plate, a plurality of radially-disposed switch-segments mounted thereon, a double row of radially-disposed resistance units arranged around the periphery of said supporting-plate, and means for connecting said units each electrically and mechanically to the end of one of said segments.

16. In a rheostat, a central supporting-plate, a plurality of radially-disposed switch-segments mounted thereon, a double row of radially-disposed resistance units arranged around the periphery of said supporting-plate, means for connecting said units each electrically and mechanically to the end of said segments, and an annulus extending around the other end of said units and supporting the same.

17. In a rheostat, a central supporting-plate, a plurality of radially-disposed switch-segments mounted thereon, a double row of radially-disposed resistance units arranged around the periphery of said supporting-plate, means for connecting said units each electrically and mechanically to the end of one of said segments, an annulus extending around the other end of said units and supporting the same, and a metal casing inclosing said annulus and resistance units.

18. In a rheostat, a central supporting-plate, a plurality of radially-disposed switch-segments mounted thereon, said segments being provided each with a longitudinal extension, the extensions of alternate segments extending in substantially opposite directions beyond the edge of said plate, tubular resistance units, each having one end mechanically and electrically secured to one of said segment extensions,

and means for supporting the other ends of said units.

19. In a rheostat, a circular supporting-plate, a plurality of radially-disposed switch-segments mounted thereon, said segments being provided each with a longitudinal extension, the extensions of alternate segments extending in substantially opposite directions beyond the edge of said plate, tubular resistance units, each having one end mechanically and electrically secured to one of said segment extensions, and an annulus or ring in which the other ends of said units are supported.

20. In a rheostat, a circular supporting-plate, a plurality of radially-disposed switch-segments mounted thereon, said segments being provided each with a longitudinal extension, the extensions of alternate segments extending in substantially opposite directions beyond the edge of said plate, tubular resistance units, each having one end mechanically and electrically secured to one of said segment extensions, an annulus or ring in which the other ends of said units are supported, a metal casing inclosing said annulus or ring, supporting-base upon which said circular plate is mounted, and means for securing said metal casing to said base.

21. In a rheostat, a switch-segment consisting of a sheet-metal blank having a main body portion and wings bent back thereupon to form a segmental portion of a double thickness of metal, and bent again to form a central flange extending longitudinally of said segment and beyond one end thereof, and a longitudinal extension formed upon the other end of said segment and terminating in a connecting end.

22. In a rheostat, a switch-segment consisting of a sheet-metal blank, having a main body portion and wings bent back thereupon to form a segmental portion of a double thickness of metal, and bent again to form a central flange extending longitudinally of said segment and beyond one end thereof and terminating in an upturned lip, and a longitudinal extension formed upon the other end of said segment and terminating in a slotted connecting end.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

IRVING B. SMITH.

Witnesses:

LINDA COPE SMITH,
WM. O. HOWELL.