

F. W. REEVES.  
ELECTRIC LIGHTING SYSTEM.  
APPLICATION FILED AUG. 23, 1909.

982,872.

Patented Jan. 31, 1911.

4 SHEETS—SHEET 1.

FIG. I.

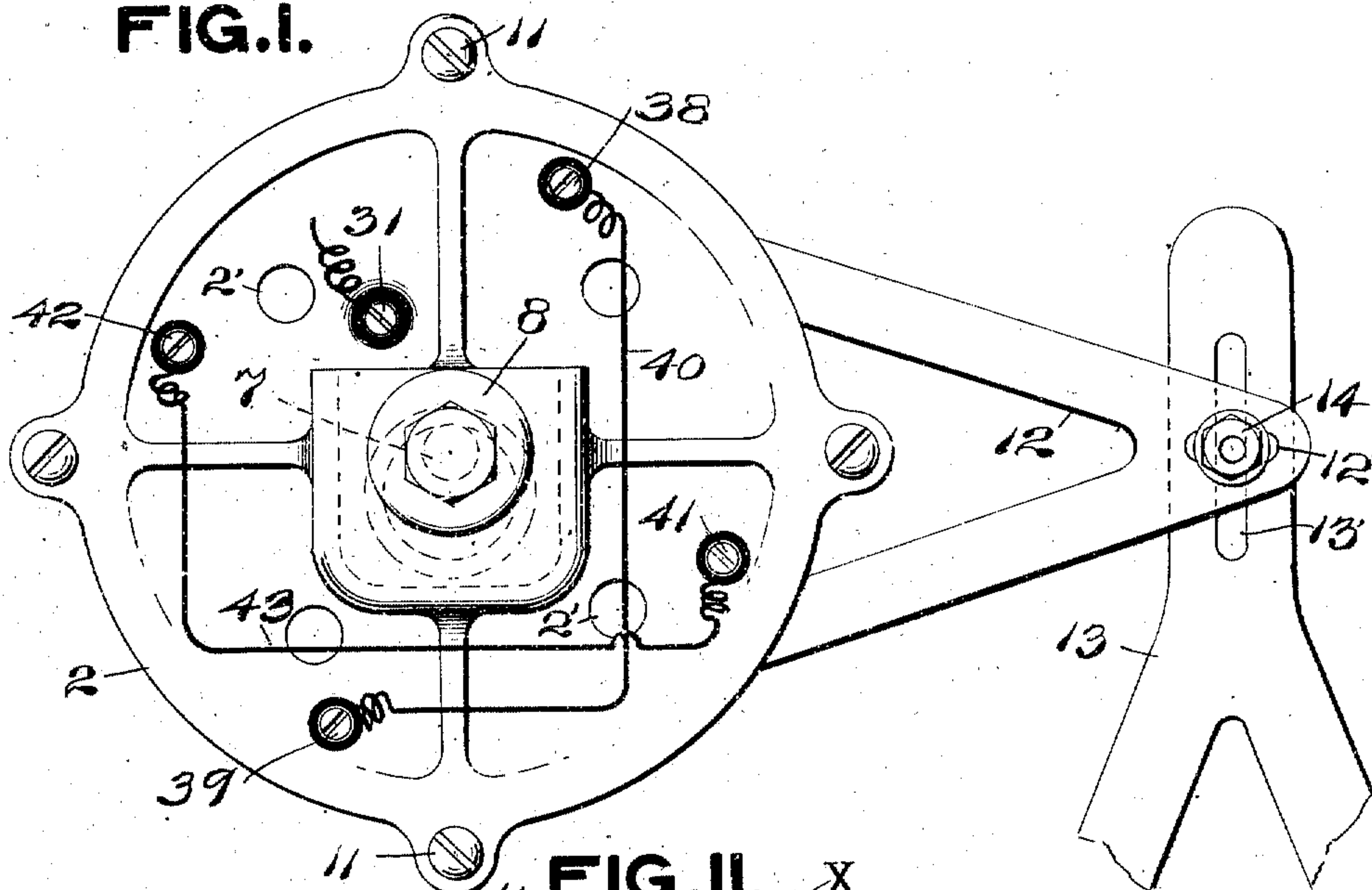
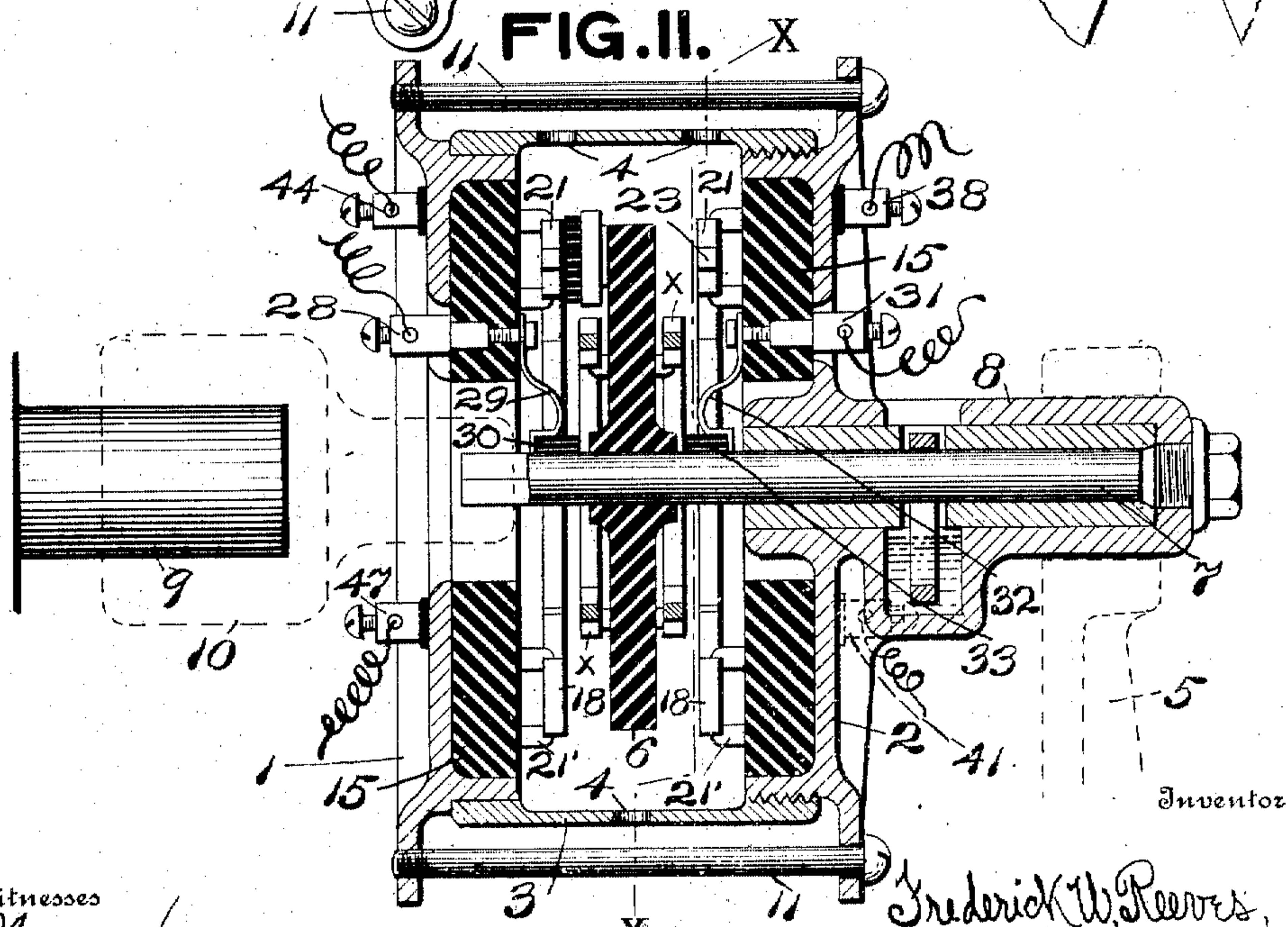


FIG. II.



Witnesses

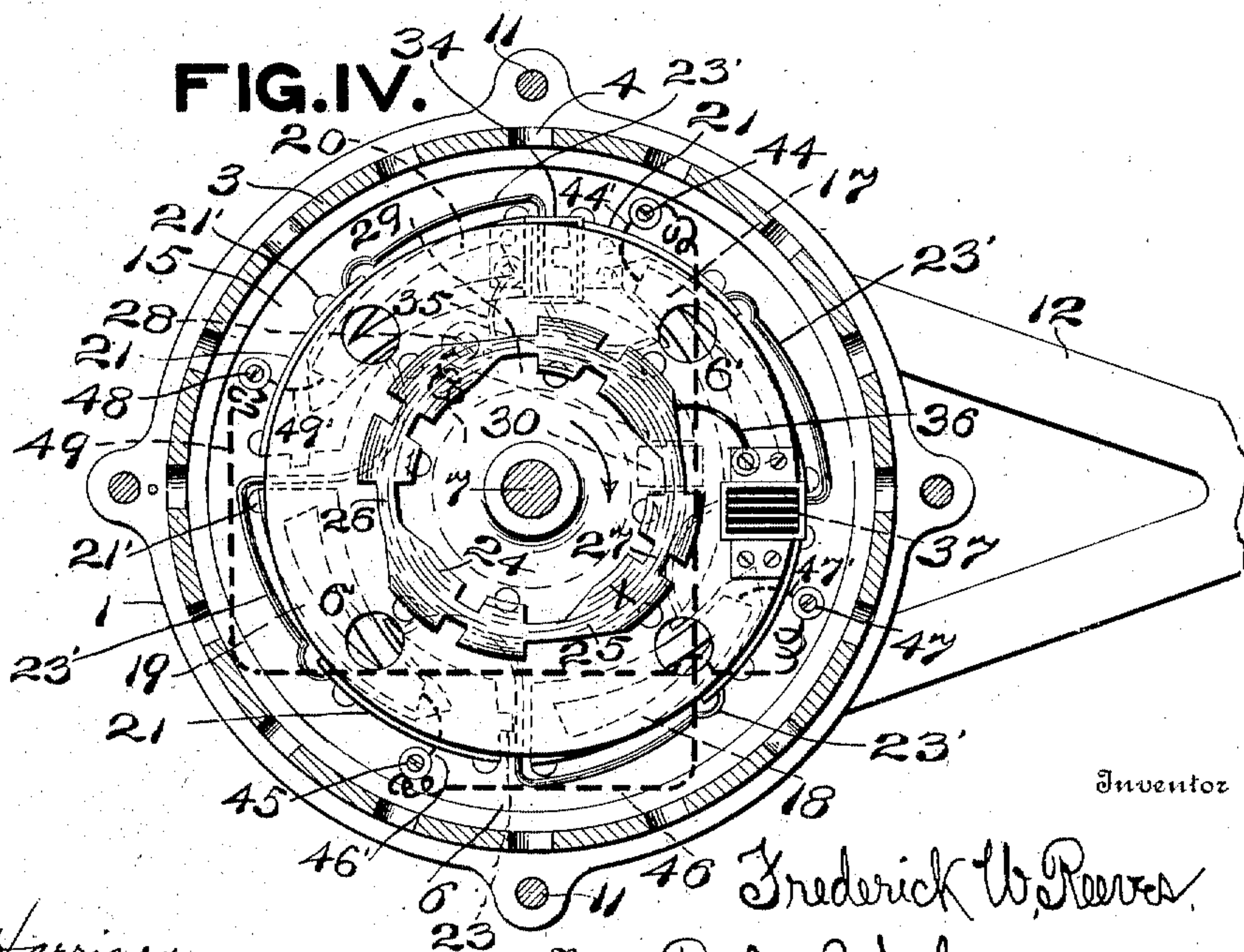
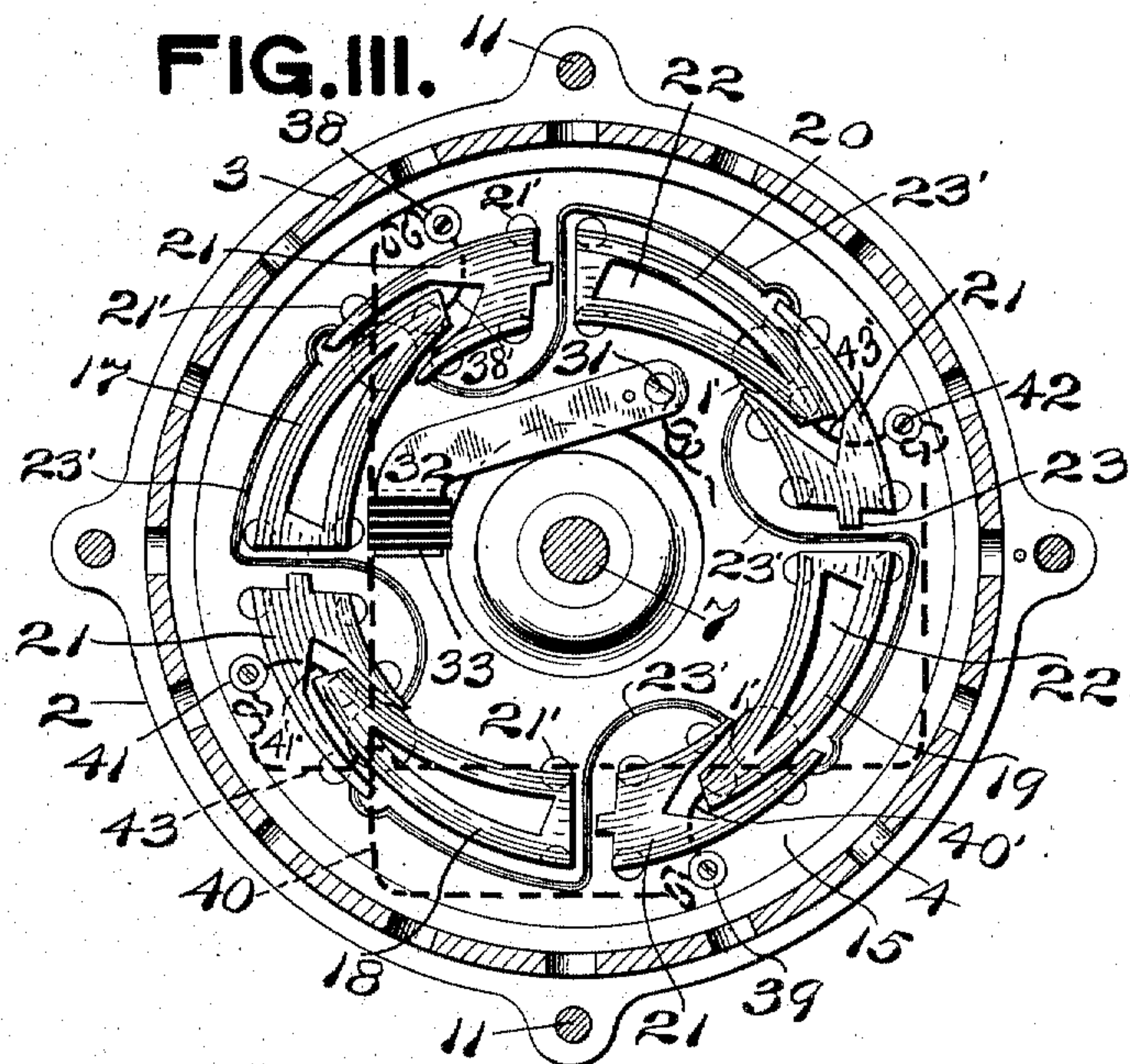
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982,872.

4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

FIG. V.

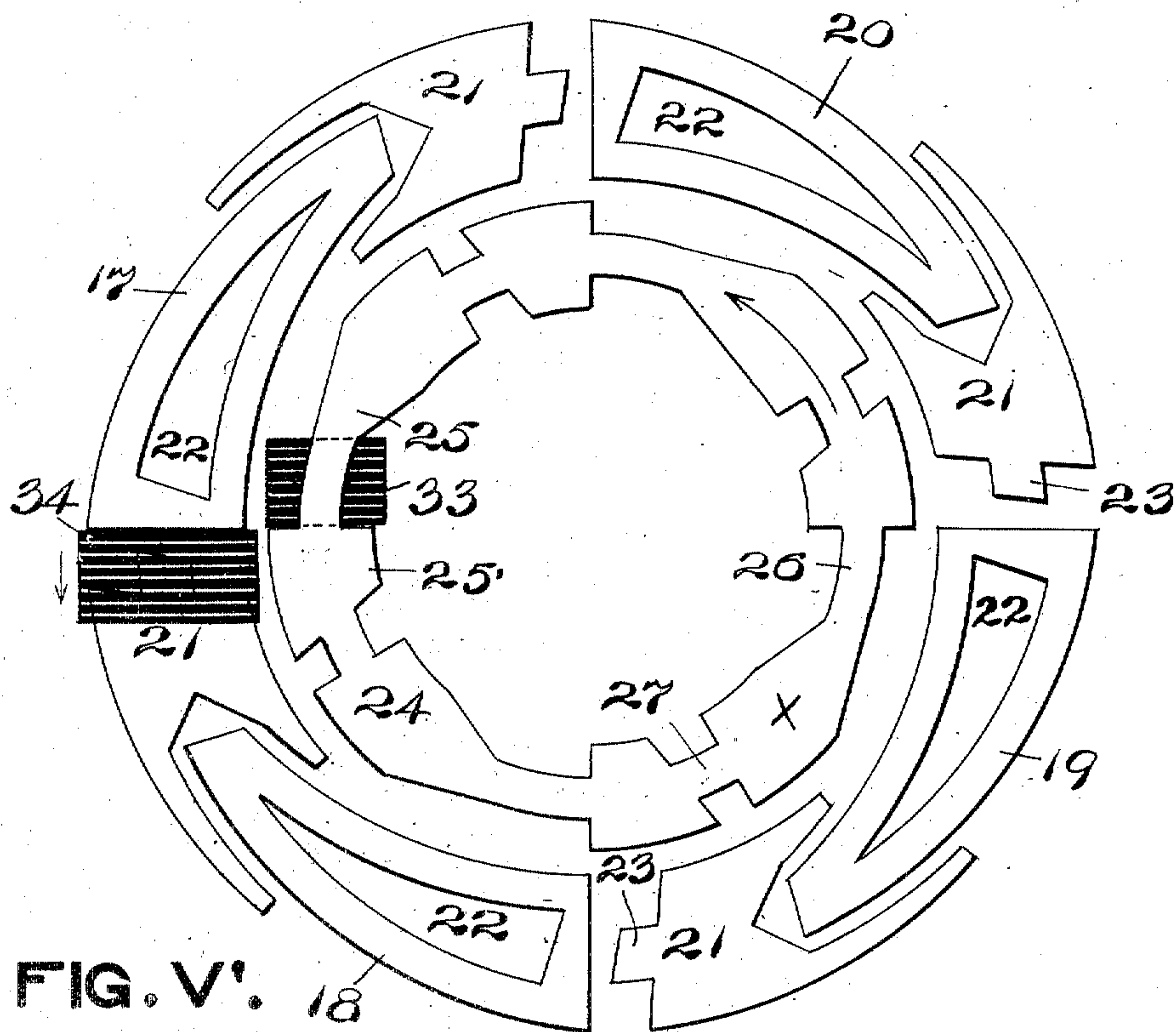
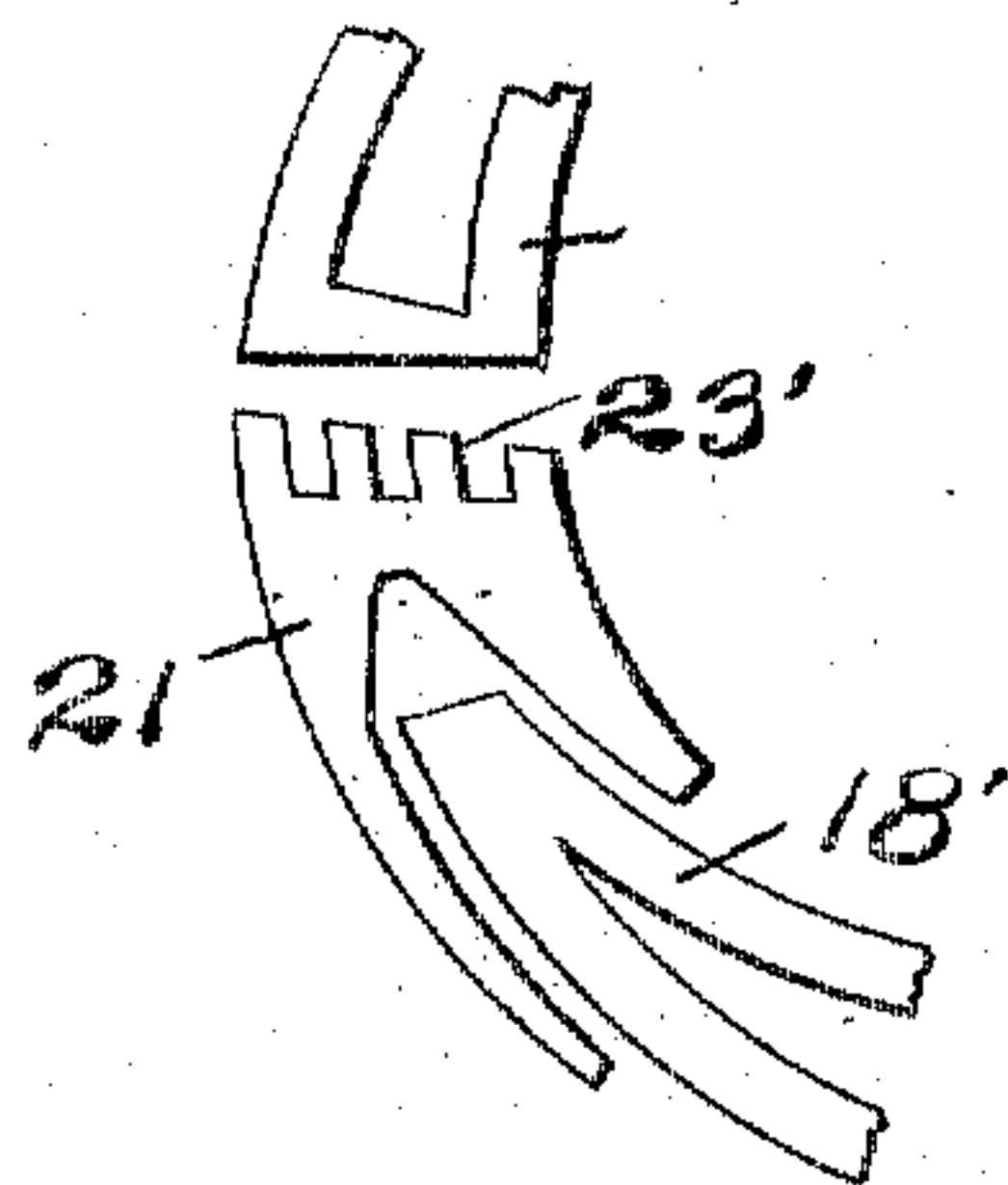


FIG. V'. 18



Witnesses

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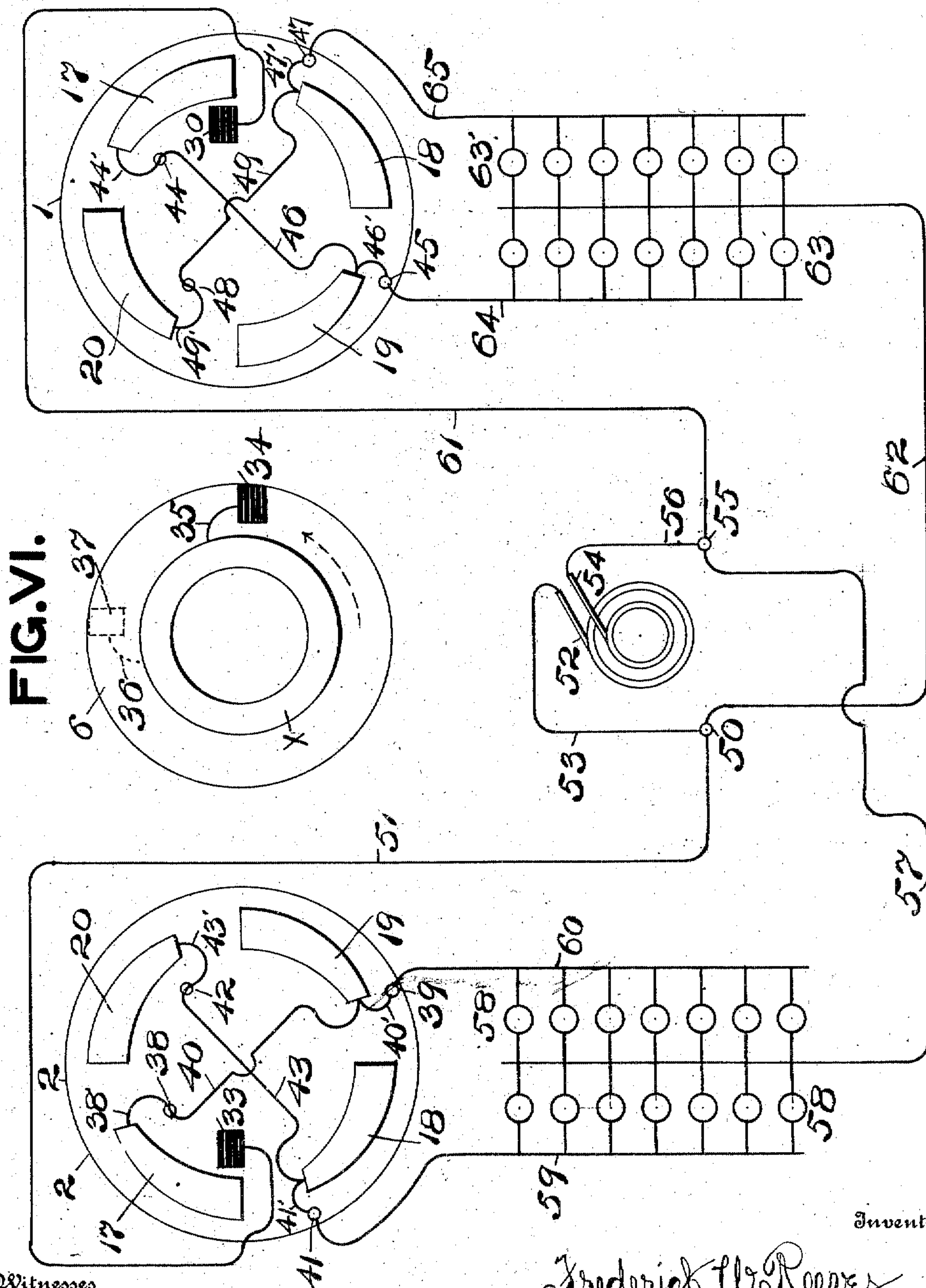
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4 SHEETS-SHEET 4.



Witnesses

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# UNITED STATES PATENT OFFICE.

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ELECTRIC-LIGHTING SYSTEM.

982,872.

Specification of Letters Patent.

Patented Jan. 31, 1911.

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*To all whom it may concern:*

Be it known that I, FREDERICK W. REEVES, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Electric-Lighting Systems; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to apparatus and systems for preventing current loss in incandescent lamps.

My invention has for its object to provide a simple and practical system for electric lighting, including a current interrupter for rapidly and periodically interrupting and directing the current from the source of supply to a plurality of lamp circuits for the purpose of attaining higher economy than is possible in the ordinary manner of uninterrupted current supply, said improvements being hereinafter more fully described in the accompanying specification and particularly pointed out in the appended claims.

In the accompanying drawings I have illustrated the system and apparatus and its application in practice, wherein,

Figure I, is an end elevation of the apparatus. Fig. II is a vertical section taken longitudinally of the axis of the same. Fig. III is a transverse section on line X—X of Fig. II showing a portion of the interior mechanism. Fig. IV is a like section on the same line showing the remainder of the interior mechanism. Fig. V is an enlarged plan of the interior contacts and attending brushes. Fig. V' is a modified form of dead contact. Fig. VI is a diagrammatic view illustrating the application of the apparatus to a lighting circuit, in all of which views like detail parts are designated by numerals of like character throughout the specification.

The apparatus as illustrated, comprises in its structure the two stationary heads 1 and 2 spaced apart by the shell 3 having peripheral vents 4 therein, and an interposed rotary member or disk 6, said heads and disk being provided with contacts and brushes as

hereinafter described, also with vent openings 1', 2' and 6'. The disk 6 is formed of insulating material and is rigidly secured upon the shaft 7 carrying the same, which shaft is mounted at one end in an extended bearing 8 formed upon the head 2, the other end extending within an opening formed centrally within the head 1, and is designed to be connected to suitable driving means, the driving means in this instance being that of the armature of a motor or the generator the shaft 9 of which is connected thereto by a suitable coupling 10. The heads 1 and 2 and shell 3 are rigidly clamped together by means of transversely disposed screws 11 and the casing structure thus formed held against movement by the arm 12 carried by the head 1 and connected to a fixed support, such as that designated as 13, and in order to permit the brushes hereinafter described being brought exactly to zero position, adjustment of the casing structure upon its axis is provided for, which in this instance consists of a vertically disposed slot 13' formed in the support and a transversely disposed slot 12' in the arm 12 through both of which a bolt 14 is passed.

Within each of the casing heads is secured an annular ring of insulating material 15 to which the contacts and attending brushes are attached and as said contacts and brushes are exactly similar in form and registerably disposed in the same direction in both instances a description of one will suffice. Each of these heads has rigidly attached to the inner face portion of the insulating ring 15, four live contacts 17, 18, 19 and 20, respectively and four dead contacts each designated as 21 arranged therebetween, both sets of contacts being disposed in a circle about the face of the said ring and elevated therefrom upon pins 21' so as to permit free circulation of air therebeneath, said live contacts being each (see Fig. V) of general arc shape increasing in width from the forward end to and toward the rear or wide end, the forward or narrow end being formed on a line tangent with an imaginary inscribed circle having a radius equal to the width of the brush employed, the rear end being on a line radial with the center, each of which contacts are provided with a wedge shaped vent opening 22 the broad end of which is also formed upon a line tangent to the same imaginary



inscribed circle. The segmental dead contacts 21 arranged between the live contacts each has its end adjacent the broad end of said live contacts formed on a line tangent to that of the imaginary inscribed circle as is likewise the projected end proper 23, the opposite end being forked to straddle the narrow end of the live contact the outer leg of the fork being of greater length than the inner one and the extremity of each being on different radial lines, the longer leg of each contact being connected by a wire 23' to the shorter leg of the other, thus connecting them in series.

The rotary disk 6 of insulating material carries on each face a collector ring elevated upon pins to give vent space therebeneath and a brush, and as said rings are of peculiar formation and registerably disposed in the same relation but electrically unconnected a description of the structure of one will suffice. These collector rings (better shown at Fig. V) each comprise in their structure the four equally spaced and like broad portions 24, each having its forward end 25 tapered, which taper begins on a line radial with the axis of rotation decreasing to and meeting the narrow portion 26 on a line tangent to an imaginary inscribed circle having a radius equal to the width of the brush employed, the rear end of each of said broad portions 24 being on a line radial with the axis of rotation where it meets the narrow portion 27, the broad portions 25' of the collector ring each having its forward end formed on a line tangent to that of the imaginary inscribed circle where it meets the aforesaid narrow portion 27, and its rear end on a line radial with the axis of rotation.

The insulated binding post 28 upon the head 1 is electrically connected to the yieldable holder 29 of a carbon brush 30 carried by said head, which brush bears upon the collector ring on that side of the disk 6. Similarly, the insulated binding post 31, upon the head 2, is connected to a yieldable holder 32 of a carbon brush 33 carried by said head and bearing upon that side of the disk. A suitable carbon brush 34 is carried by one side of the rotary disk and connected by a wire 35 to the collector ring of that side and bears successively upon the live and dead contacts carried by the adjacent head during rotation of the disk. Similarly, the collector ring upon the opposite side of the rotary disk is connected by a wire 36 with a suitable carbon brush 37 carried by the disk and bearing successively upon the live and dead contacts carried by the adjacent head during rotation of the disk, said brush 37 being disposed 90 degrees in the rear of the other brush 34. The head 1 is further provided with two insulated binding posts 38 and 39, the former being connected to the

live contact 17 by a short wire 38', which contact is cross-connected to the opposite contact 19 through the medium of the wires 40 and 40' and said post 39. Two other insulated binding-posts 41 and 42 are carried by this head, the former being connected to the live contact 18 by a short wire 41', which contact is cross-connected to the opposite contact 20 through the medium of the wires 43 and 43' and said binding-post 42. Similarly, the head 2 is provided with two insulated binding posts 44 and 45, the former being connected to the live contact 17 by a short wire 44', which contact is cross-connected to the opposite contact 19 through the medium of the wires 46 and 46' and binding-post 45. In the other two binding-posts 47 and 48, the former is connected to the contact 18 by a short wire 47', which contact is cross-connected to the opposite contact 20 by means of the wires 49 and 49' and binding-post 48.

At Fig. VI, the apparatus described is shown diagrammatically as connected to supply a system having four independent lighting circuits, in which view the two heads and rotary disk are shown as separated, the collector ring disk in practice being disposed upon the head 2 and the head 1 turned over upon the said disk, in which instance the disk 6 and attending brushes will rotate in the direction to cause the said brushes to engage the arc shaped contacts small end first.

The brush 33 carried by the head 2 is connected to the binding-post 50 of a suitable pulsating current generator by a wire 51 and from this binding-post to the brush 52 of one of the collector rings of the generator by a wire 53, the other brush 54 of the generator being connected to the generator binding-post 55 by a wire 56, to which binding-post is connected a wire 57 extending up between and connecting with the lamps 58 and 58' arranged between the two wires 59 and 60 which are attached to the binding-posts 41 and 39 of said head 2 thus forming two independent circuits in multiple. The brush 30 carried by the head 1 is connected to the said binding-post 55 of the generator by a wire 61, and connected to the other binding-post, 50 of the generator is a wire 62 extending up between and connecting with the lamps 63 and 63' connected between the two wires 64 and 65 attached to the binding-posts 45 and 47 of the head, thus forming two independent lamp circuits in multiple.

The device being thus connected to the generator to form four independent lamp circuits the operation and flow of current therethrough would be as follows: Assuming that the disk and attending collector rings and brushes rotate in synchronism with the current impulses of the generator, then, at each rotation, as the brushes 37 and 34,



simultaneously engage and pass over, say contacts 17 and 20, respectively, the current will flow simultaneously through the two sets of lamps 58' and 63'. Passing on to the next succeeding contacts 18 and 17 the current will then flow through the lamps 58 and 63. Leaving these contacts and passing onto the next succeeding contacts 19 and 18, the current will again pass through the lamps 58' and 63' and after leaving these contacts and passing onto the next succeeding contacts 20 and 19 the current will then again pass through the lamps 58 and 63. Thus the current is caused to pass successively from one set of lamps to the other. The brushes 37 and 34 in passing from one live contact to the other engage the intermediately disposed and connected dead contacts 21, which thus support the same during the interval of open circuit and permitting a raise of voltage to occur. The brushes 37 and 34 which are disposed 90 degrees apart and carried by the rotary disk, each has the forward side on a line tangent to an imaginary circle having a radius equal to the width of the brush and the rear side on a line radial with the axis of rotation and as the live contacts have their forward and rear ends formed on lines corresponding thereto, as previously set forth, it is evident that as the brush engages and leaves said live contacts their identical lines will coincide in both instances. Again, the brush in engaging each dead contact will likewise coincide at the point 23 and shoulder of the plate proper in the same manner and as the opposite forked end of each of these dead contacts embraces the narrow end of the live contact the brush will be supported in passing from the dead plate to the live contact to such extent as to lighten the contact on that end of the live contact even after passing off of the short leg and thus have a tendency to reduce the line voltage until the lamps can again assume their normal resistance. The general arc shapes given the elevated live contacts together with the central opening causes the brush operating thereon to shift its point of engagement in traversing the same as well as to permit free circulation of air to the surface of the brush during such movement. The brush also engages on different points of the surface of the dead contacts in the beginning and leaving the same than it does at its broadest portion, and as there is also an air space between the forked end of each and the small end of the live contact as well as at their opposite ends, the brush changes its point of contact in passing thereover, and is more or less cooled in passing over the said air spaces. The irregularity of surface in the collector rings also permit the brushes acting thereon to increase and diminish surface engagement with the same and be cooled in passing over the narrow portions, it being

understood that the disk 6 in rotating at a high velocity induces a constant flow of air in and out through the vents 1', 2', 4 and 6' and central orifice in the head 1. By having the ends of the intermediate dead plates forked and straddling the forward ends of the live contacts the brush bears very lightly on that end of said contact plate, assisting the brushes to pass over the narrow ends of the live contacts, taking up the wear on the same, etc.

It has been found that by having the dead plates connected in series, by means of the wires 23', the sparking otherwise occurring as the brush leaves the longer forked portions of the dead plates is obviated and the efficiency of the apparatus is greatly increased. These metallic dead plates connected in series act as a closed circuit or path in which a current is seemingly induced by the reaction of breaking the circuit as the brush leaves the broad end of the live contact. Substitution of non-metallic plate for the metallic dead plates has been attempted with the result that it caused intense arcing on breaking the circuit.

At Fig. V', a slight variation in the form of the dead contacts 21 is shown, wherein the vent space between the forward end of the live contacts 18' and said dead contacts is increased and the forward end of the dead plate provided with a plurality of projections 23' to permit and more effectually diffuse the circulation of air.

By forming the contacts and collector rings irregularly and permitting a free circulation of air to the same and brushes, and employing brushes formed of carbon, a lower temperature is maintained than would be otherwise with a consequent reduction in resistance.

At Fig. II, a suitable fixed support 5, shown by dotted line is arranged at the elongated bearing 8 of the apparatus to assist in supporting the same in position and at the same time permit any longitudinal adjustment as may be occasioned or desired.

Having thus shown and described my invention, what I claim is:

1. An electric lighting system, comprising an interrupter including a plurality of spaced live contacts disposed in a circular path, a like number of dead contacts disposed in alternate relation with and extending beyond the forward ends of the live contacts, a supply circuit, a rotary brush connected to the supply circuit and operating on said contacts, and a lamp circuit connected to the said live contacts and supply circuit.

2. An electric lighting system, comprising an interrupter including a plurality of live contacts disposed in a circular path, a like number of connected dead contacts disposed in alternate relation with the live contacts, a



supply circuit, a rotary brush operating on said contacts and connected to the supply circuit, and a lamp circuit connected to the live contacts and supply circuit.

5 3. An electric lighting system, comprising an interrupter including a plurality of spaced live contacts disposed in a circular path, a like number of connected dead con-  
10 tacts disposed in alternate relation with and extending beyond the forward ends of the live contacts, a supply circuit, a rotary brush operating on said contacts and con-  
15 nected to the supply circuit, and a lamp circuit connected to the live contacts and supply circuit.

4. An electric lighting system, comprising an interrupter including a plurality of spaced live contacts disposed in a circular path, a like number of dead contacts dis-  
20 posed in alternate relation with the live contacts, a supply circuit, a rotary brush operating on said contacts and connected to the supply circuit, and a lamp circuit connected to the live contacts and supply circuit, said  
25 contacts being formed irregularly so as to cause the brush to shift its surface engagement in traversing the same.

5. An electric lighting system, comprising an interrupter including a plurality of spaced live contacts disposed in a circular path, a like number of connected dead con-  
30 tacts disposed in alternate relation with the live contacts, a supply circuit, a rotary brush operating on said contacts and connected to the supply circuit, and a lamp circuit con-  
35 nected to the live contacts and supply circuit, said contacts being irregularly formed so as to cause the brush to shift its surface engagement in traversing the same.

6. An electric lighting system, comprising an interrupter including a plurality of spaced live contacts disposed in a circular path, a like number of connected dead con-  
40 tacts disposed in alternate relation with and extending beyond the forward ends of the live contacts, a supply circuit, a rotary brush operating on said contacts and connected to the supply circuit, and a lamp circuit con-  
45 nected to the live contacts and supply circuit, said contacts being irregularly formed so as to cause the brush to shift its surface engagement in traversing the same.

7. An electric lighting system, comprising an interrupter including a pair of fixed  
55 heads each carrying a plurality of live contacts disposed thereabout, a like number of dead contacts alternately disposed between each set of live contacts, a supply circuit, a rotary member arranged between said heads  
60 and carrying a pair of brushes each operating on one set of said contacts and connected to the supply circuit, and a lamp circuit connected to each set of live contacts and the supply circuit.

65 8. An electric lighting system, comprising

an interrupter including a pair of fixed and spaced heads each carrying a plurality of spaced live contacts disposed thereabout, a like number of dead contact plates alter-  
70 nately disposed between each set of live contacts, a supply circuit, a rotary member arranged between said heads and carrying a pair of brushes each operating on one set of said contacts and connected to the supply  
75 circuit, and a lamp circuit connected to each set of live contacts and the supply circuit, said contacts being irregularly formed so as to cause the brush operating thereon to shift its surface engagement in traversing the  
80 same.

9. An electric lighting system, comprising an interrupter including a casing formed of a pair of fixed and spaced heads each carry-  
85 ing a plurality of spaced live contacts disposed thereabout, a like number of connected dead contacts alternately disposed between each set of live contacts and each ex-  
90 tending beyond the forward end of the succeeding live contact, a supply circuit, a rotary member arranged between said heads and carrying a pair of brushes each operat-  
95 ing on one set of contacts and connected to the supply circuit, and a lamp circuit connected to each set of live contacts and the supply circuit, said contacts being irregu-  
larly formed so as to cause the brush to shift its surface engagement in traversing the same.

10. An electric lighting system, comprising an interrupter including a casing formed  
100 of a pair of heads spaced apart by an intermediate shell, a plurality of spaced live contacts disposed about the inner face of each of said heads, a plurality of connected dead  
105 contacts alternately disposed between each set of live contacts, a supply circuit, a rotary member arranged between said heads and carrying a pair of brushes each operat-  
110 ing on one set of contacts and connected to the supply circuit, and a lamp circuit connected to each set of live contacts and the supply circuit, said contacts being irregu-  
115 larly formed so as to cause the brush to shift its surface engagement in traversing the same, said casing being ventilated.

11. An electric lighting system, comprising an interrupter including a casing formed of two heads spaced apart and so held, a  
120 plurality of spaced live contacts arranged upon the inner face of each head, a supply circuit, a brush carried by each head and connected to the supply circuit, a plurality of dead contacts alternately disposed be-  
125 tween each set of live contacts, a rotary member arranged between said heads and provided upon each side with a collector ring each engaged by one of the brushes carried by the heads, a brush arranged on  
130 each side of the rotary member connected up to the collector ring on that side and each



engaging a set of contacts carried by the heads, and a lamp circuit connected to each set of live contacts and the supply circuit.

12. An electric lighting system, comprising an interrupter including a casing having two spaced heads, a plurality of spaced live contacts arranged upon the inner face of each head, a supply circuit, a brush carried by each head and connected to the supply circuit, a plurality of connected dead contacts alternately disposed between each set of live contacts and each extending beyond the forward end of the succeeding live contact, a rotary member arranged between said heads and provided upon each side with a collector ring each engaged by one of the brushes carried by the heads, a brush carried by each side of the rotary member each connected to one of the collector rings and operating on a set of contacts carried by the heads, and a lamp circuit connected to each set of live contacts and the supply circuit.

13. An electric lighting system, comprising an interrupter including two sets of spaced live contacts each disposed in a circular path opposite one another, a like number of connected dead contacts disposed in alternate relation with each set of live contacts, a supply circuit, a pair of rotary brushes each operating on one set of said contacts and connected to the supply circuit, and lamp circuits connected to the live contacts and supply circuits, said contacts being irregular in form so as to cause the brush to shift its surface engagement in traversing the same.

14. An electric lighting system, comprising an interrupter including plural sets of irregularly formed live contacts each set disposed in a circular path opposite one another upon fixed members, a like number of irregularly formed and connected dead contacts arranged upon said members in alternate relation with the live contacts, a brush carried by each of said members, a rotary member arranged between said fixed members and provided with a plurality of irregularly formed collector rings engaged by the brushes carried by the fixed members, a plurality of brushes carried by the rotary member each connected to one of the collector rings and operating on a set of contacts, a supply circuit connected to said fixed brushes, and lamp circuits connected to each set of live contacts and the supply circuit.

15. An electric lighting system, comprising an interrupter including plural sets of irregularly formed live contacts each set disposed in a circular path opposite one another upon fixed members, a like number of connected dead contacts arranged upon said members in alternate relation with the live contacts and each extending beyond the forward end of the succeeding live contact, a brush carried by each of said members, a

rotary member arranged between said fixed members and provided with a plurality of irregularly formed collector rings, a plurality of brushes carried by the rotary member each connected to one of the collector rings and engaging a set of contacts on the fixed member, a supply circuit connected to the fixed brushes, and lamp circuits connected to the supply circuit and live contacts.

16. The combination of a generator, a current interrupter having a plurality of alternately disposed live and dead contacts and a brush operating on the contacts and connected to one terminal of the generator, and a lamp circuit connected to the live contacts and the other terminal of the generator.

17. The combination of a generator, a current interrupter having plural sets of contacts and brushes operating thereon, the brush for each set being connected to a terminal of the generator, and multiple lamp circuits, each circuit being connected to one set of contacts and to the other terminal of the generator.

18. The combination of a generator, a current interrupter having plural sets of contacts and brushes operating thereon, each set of contacts being connected in series and each brush connected to a terminal of the generator, and multiple lamp circuits, each circuit being connected to one set of contacts and to the other terminal of the generator.

19. An electric lighting system, comprising a supply circuit, an interrupter including plural sets of spaced live contacts each set having alternately disposed dead contacts therewith which are connected to one another, means for conducting the current from the supply circuit to and operating on the contacts, and lamp circuits connected to the live contacts and supply circuit.

20. An electric lighting system, comprising a supply circuit, an interrupter including plural sets of irregularly shaped live contacts, plural sets of irregularly shaped dead contacts disposed in alternate relation with the live contacts and connected to one another in a closed circuit, a plurality of collector rings and brushes for conducting the current from the supply circuit to and operating on the live contacts, and a plurality of lamp circuits connected to the supply circuit and live contacts.

21. An electric lighting system, comprising a supply circuit, an interrupter including plural sets of irregularly shaped live contacts, plural sets of irregularly shaped dead contacts disposed in alternate relation with the live contacts and connected to one another in a closed circuit, a plurality of collector rings and brushes for conducting the current from the supply circuit to and operating on the live contacts, and a plurality of lamp circuits connected to the supply circuit and live contacts, said collector rings being irregular in form.



22. An electric lighting system, comprising a generator, plural sets of lamps, a wire connecting one terminal of the generator with one terminal of each lamp in the plural sets, an interrupter having a plurality of contacts for each set of lamps and a rotary member operating on the contacts, a wire connecting the rotary member with the other terminal of the generator, and a wire connecting the other terminals of the lamps in

each set with its individual set of interrupter contacts, the lamps in each set being connected in multiple.

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

FREDERICK W. REEVES.

Witnesses:

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R. S. HARRISON.