No. 898,370. PATENTED SEPT. 8, 1908.

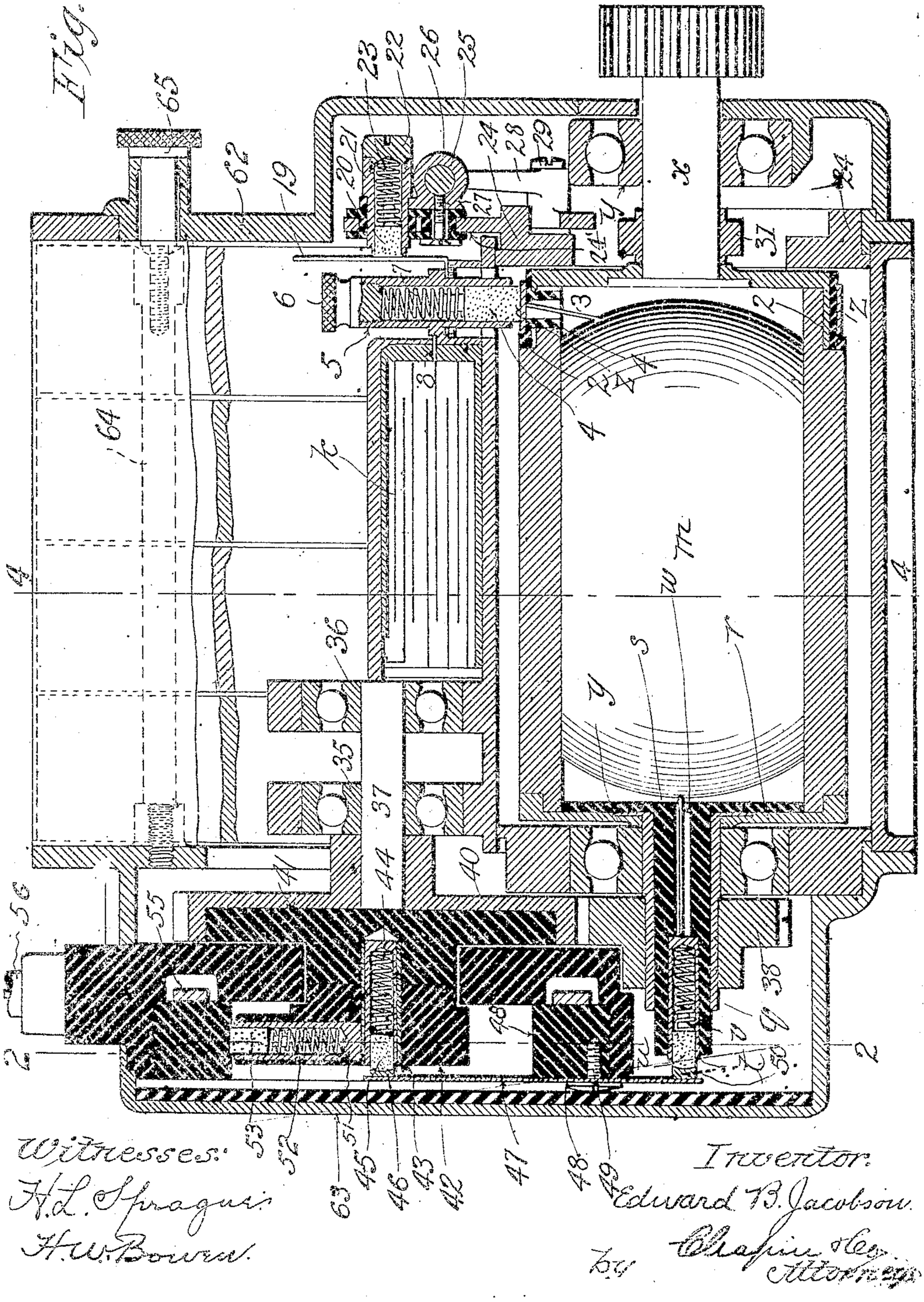
E. B. JACOBSON.

HIGH TENSION MAGNETO.

APPLICATION FILED JAN. 16, 1907.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
H. L. Sprague.
H. W. Bowen.

Inventor:
Edward B. Jacobson.
By Chapin & Co.
Attorneys.

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4 SHEETS—SHEET 2

Fig. 2.

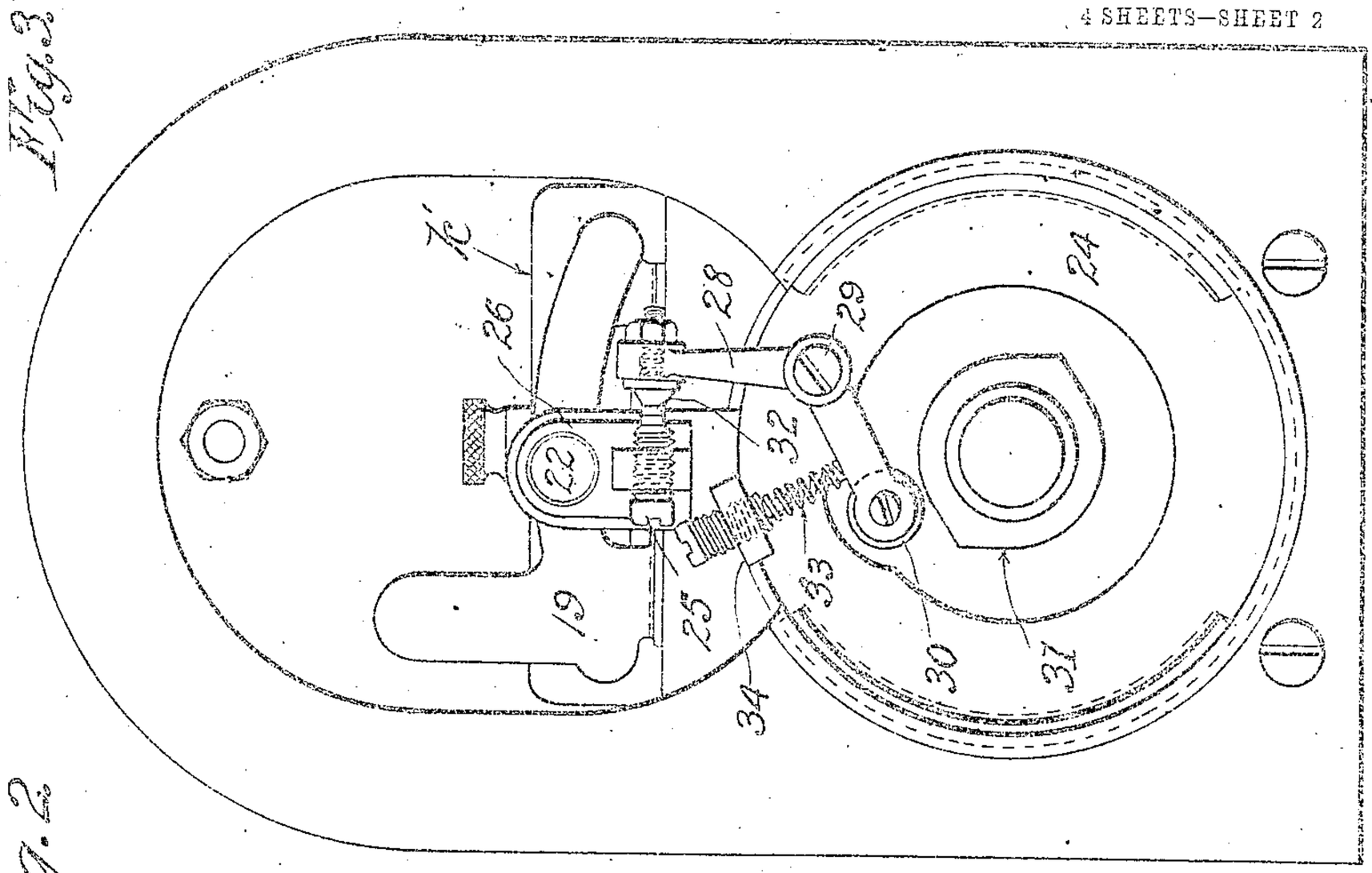

Fig. 3.

Witnesses:
H. L. Sprague
H. W. Barron.

Inventor:
Edward B. Jacobson.
by Chapin & Co.
Attorneys

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4 SHEETS—SHEET 3.

Fig. 6.

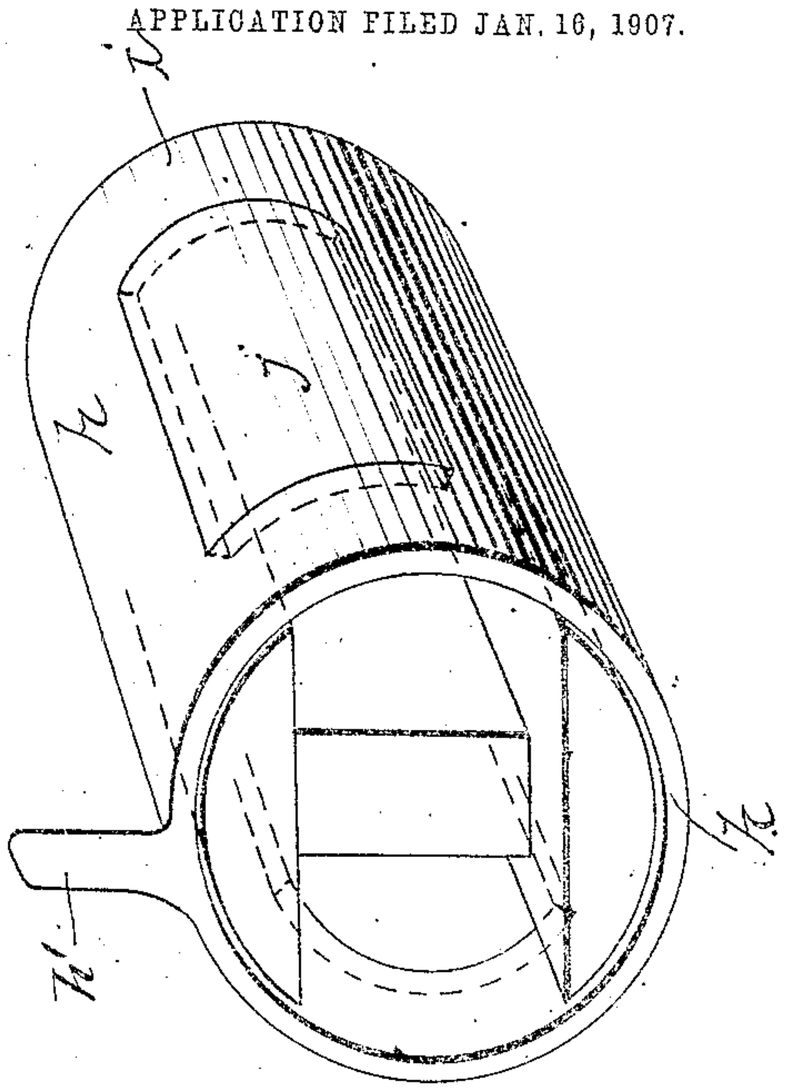
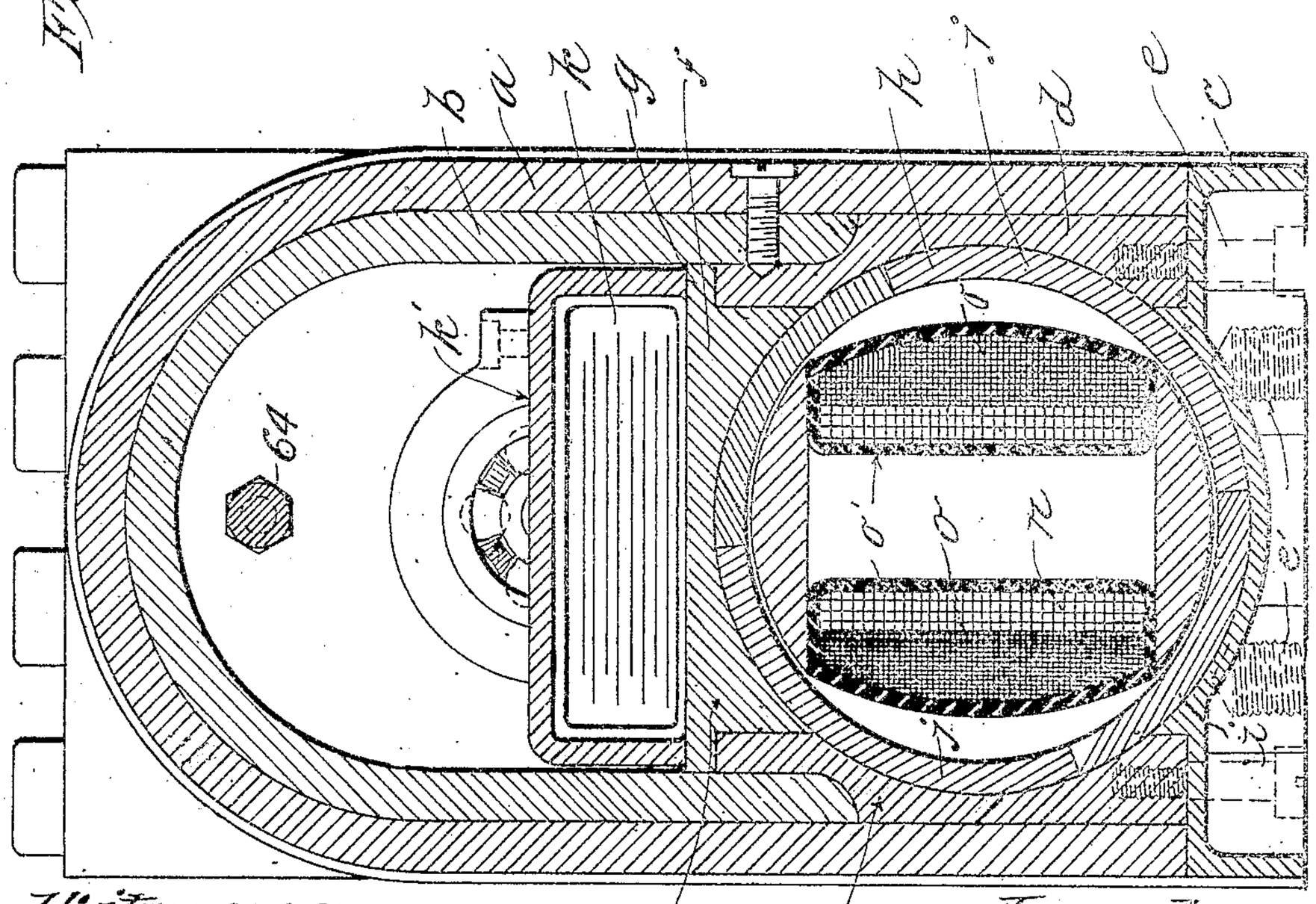


Fig. 4.



Witnesses:

H. L. Sprague.

H. T. Bowen.

Inventor

Edward B. Jacobson.

By Chapin & Lee.

Attorneys.

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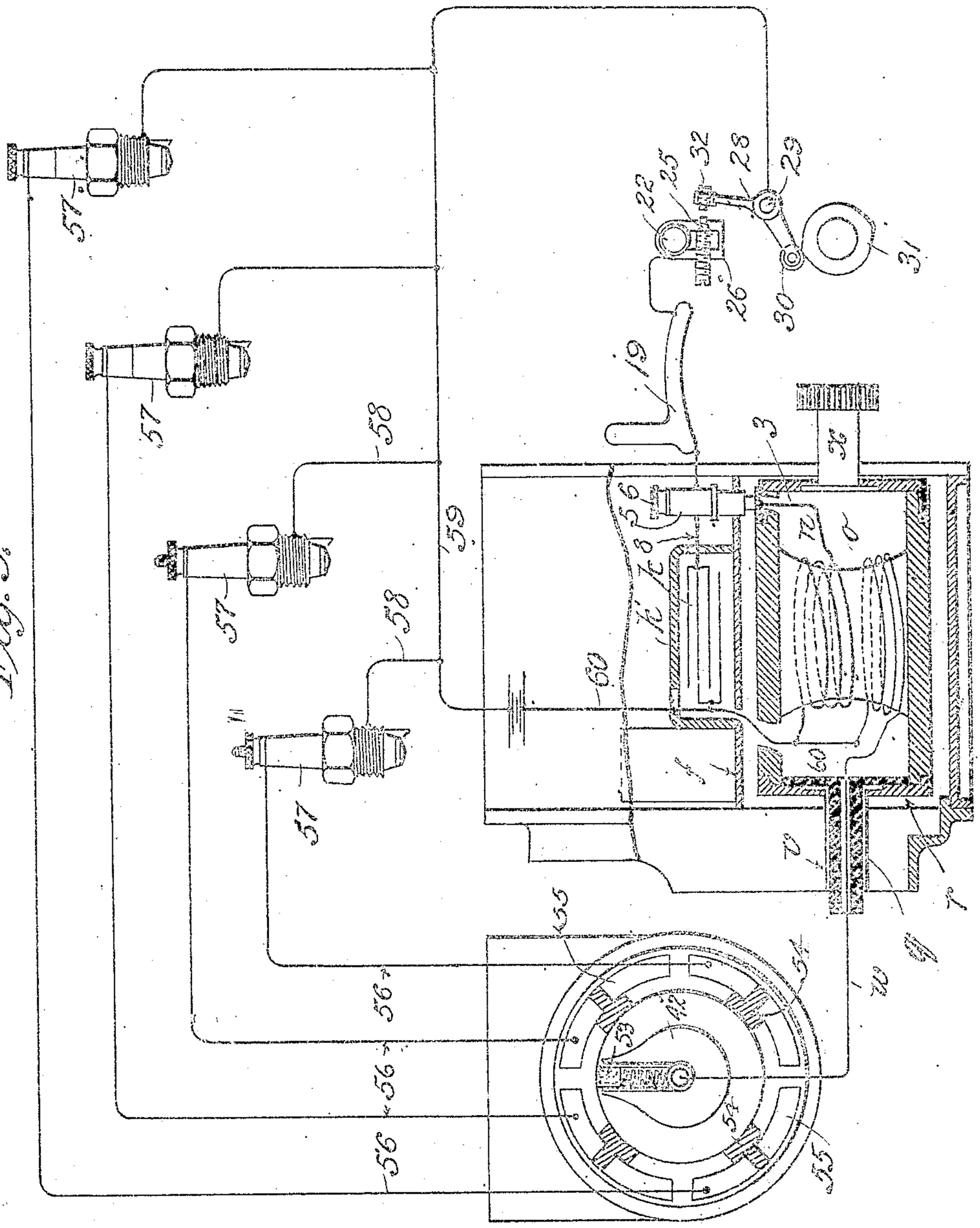
4 SHEETS—SHEET 4.

Fig. 5.



Witnesses:
H. L. Ofrague.
H. C. Bowen.

Inventor.
Edward B. Jacobson.
By Chapin Neal.
Attorneys.

UNITED STATES PATENT OFFICE.

EDWARD B. JACOBSON, OF PITTSFIELD, MASSACHUSETTS, ASSIGNOR TO PITTSFIELD SPARK COIL COMPANY, OF PITTSFIELD, MASSACHUSETTS, A CORPORATION.

HIGH-TENSION MAGNETO.

No. 898,370. Specification of Letters Patent. Patented Sept. 8, 1908.

Application filed January 16, 1907. Serial No. 352,648.

To all whom it may concern:

Be it known that I, EDWARD B. JACOBSON, a citizen of the United States of America, residing at Pittsfield, in the county of Berkshire and State of Massachusetts, have invented new and useful Improvements in High-Tension Magnetos, of which the following is a specification.

This invention relates to improvements in electric generators of the type known as magneto-generators for producing alternating currents of high voltage, and is designed particularly for igniting the charge of an internal combustion engine where it is highly desirable and absolutely necessary that every charge should be thoroughly ignited in order to obtain the best results.

The object of the invention is therefore to provide a magneto electrical generator that will successfully ignite the combustible charge without failure.

This invention consists broadly in combining with a series of permanent magnets of a magneto a rotatable screen composed of magnetic and non-magnetic portions by which the lines of force that pass from one pole piece to another can be directed from the soft iron pole pieces through the windings of the armature, and also in providing means for suitably rotating this screen whereby the electro-motive force generated in the armature can be suitably varied.

Further details of the object and nature of my invention will be fully set forth in the detailed description of the invention.

In the drawings forming part of this application,—Figure 1 is a vertical longitudinal sectional view of the generator in a vertical plane passing through the axis of the armature, and the secondary shaft and distributer mechanism. Fig. 2 is a sectional elevation on the dotted line 2—2 of Fig. 1 through the distributer contact ring and distributer. Fig. 3 is an end elevation of Fig. 1 showing the make and break mechanism after the removal of the housing therefor, also showing the advance contact-plate. Fig. 4 is a vertical transverse sectional view of the magneto on the line 4—4, Fig. 1, showing the two windings on the armature, the cylindrical screen, and the condenser. Fig. 5 is a diagrammatic view of the wiring of my magneto. Fig. 6 is a perspective view of the armature core and screen, the screen being indicated as made of separate pieces.

Referring to these drawings in detail, *a* and *b* designate the series of permanent magnets, the magnet *b* being preferably shorter than the magnet *a*. The lower end of the magnets *a* rests on the upper surface of the base-piece *c*.

d designates the soft iron pole pieces that are permanently secured to the magnets *a* and *b* by any suitable means, as by machine-screws.

The base-piece *c* is secured to the pole-pieces *d* by means of the bolts *e*. The threaded openings *e*^{1} provide means for fixedly securing the machine to a permanent support.

f designates a bridge - piece, preferably made of aluminium, and mounted on the upper end of the pole-pieces *d*, as indicated at the point *g*. Rotatably mounted within the pole-pieces *d* is a cylindrical shell or screen *h* which is composed of magnetic and non-magnetic material,— the portion *i* being non-magnetic and the portion *j* magnetic, as soft iron or steel. The screen or shell *h* is provided with a handle *h*^{1} so that the same may be readily rotated. Mounted on the bridge-pice *f* is a condenser *k* of suitable capacity and contained within the housing *k*^{1}.

m designates the armature having two windings *n* and *o*,—*n* being the primary winding, and *o* the secondary winding.

o^1 designates suitable binding or insulating material.

The right-hand end of the armature *m* is provided with a spur gear *p* for engagement with another spur gear mounted on a suitable rotating shaft of the motor, the gear *p* being of such diameter that the rotation of the armature shaft may be accurately timed in relation to the movements of the engine pistons, as readily understood. The left-hand end of the armature *m* is provided with a metallic sleeve *q* that is rigidly fastened to the armature head *r*. Mounted within this sleeve *q* is a bushing *s* made from insulating material, as fiber or rubber, and mounted within the bushing is a metallic cylindrical brush-holder *t* for receiving the carbon brush *u* and compression spring *v* for maintaining the brush *u* extended.

w designates one terminal of the high tension winding that is connected with the secondary windings of the armature at one

end, and to the metallic cylindrical brush-holder *t* at its other end. The sleeve *q* and the shaft *x* are suitably mounted in ball-bearings, as designated at *y*, of any approved design.

z designates a collector ring secured to the periphery of the armature and insulated therefrom by means of the ring 2. One terminal of the primary winding *n* is connected to this ring, as designated by the numeral 3, and the other terminal is connected to the condenser and grounded, as will be described.

4 designates a carbon or other suitable brush bearing on the collector ring *z* that is inclosed within the metallic cylindrical casing 5, which is internally threaded at its outer end and provided with a closing plug 6.

7 designates a compression spring for imparting to the brush 4 the requisite tension or pressure which engages the ring *z*.

The metallic casing 5 is electrically connected to the condenser *k* by means of the wire 8. The metallic cylindrical casing 5 is also electrically connected to the advance contact-plate 19, engaging which is an advance brush 20 (preferably carbon) mounted within the metallic cylindrical casing 21 which is provided with a closing plug 22 and a compression spring 23, the latter serving the purpose of holding the brush 20 in good electrical contact with the advance contact plate 19.

24 designates a supporting plate for the metallic cylindrical casing 21, and also provides supporting means on the upright part 24[1] for the contact screw 25,—said supporting means being designated by the numeral 26, and held in place on the plate 24 by the screw 27. Rotatably mounted on the supporting plate 24 is a make and break lever 28 by means of the pin 29, the lower end of the lever 28 being provided with an anti-friction roller 30 that engages a make and break cam 31 mounted on the armature shaft *x*. The upper arm of the make and break lever 28 carries the ordinary platinum contact point 32 which engages the opposite contact-point 25.

33 is a tension device for engaging the lower arm of the make and break lever 28 for placing suitable pressure on the lever. This tension device is adjustably mounted in the lug 34, as shown.

In order to vary the time of the spark, the plate 24 on which the make and break lever 28 is mounted is rotated. This rotary movement has the effect of moving the roller 30 either towards or away from the make and break cam 31 on the shaft *x*, according to whether the operator wishes to advance or retard the spark. At the same time that the plate 24 is moved, the brush 20 moves or slides upon the advance contact plate 19.

Mounted in roller bearings 35 and 36 is a secondary shaft 37 that is geared to the pinion 38 on the armature sleeve *q* by means of the gear 40 which carries a plate 41 of insulating material to which is secured the distributer 42 which is made of some suitable insulating material, as hard rubber. Extending through this distributer 42 and about one-half way through the plate of insulating material 41 is a metallic cylindrical brush-holder 43 in which is mounted the compression spring 44 and brush 45 that normally engages a cup-shaped metallic contact-piece 46 mounted on the upper end of the flexible transfer plate 47 which is secured to the insulated distributer contact ring 48 by means of the screw 49. The transfer plate 47 extends below the ring 48 and carries at its lower end another cup-shaped metallic contact-piece 50 similar to the one at its upper end, and with which the brush *u* normally engages. The distributer arm 42 also carries a brush-holder 51 which is electrically connected to the brush-holder 43 see Fig. 1 and contains a compression spring 52 and brush 53 which normally is in contact with the inner surface of the insulating ring 48, as shown. Mounted within the distributer contact-ring 48 and flush with the inner surface thereof are the distributer contact pieces 54 which are electrically connected to the sectional ring 55 that is secured to the distributer contact ring 48. The terminals of the cables 56 are connected to the sectional ring piece 55 whereby the current from the brush 53 can flow in succession through the contact-pieces 54 to the cables 56, as the distributer 42 is rotated.

Referring to Fig. 5 which is a diagrammatic view of the wiring,—57 designates the usual spark-plugs that are screwed into the casing of the combustion cylinders. The wires 58 shown connected to the plugs 57 and to the wire 59 in reality represent the ground or framework of the machine.

60 designates a wire connected with one terminal of the condenser *k* and the other terminal with the ground or framework of the machine. This wire is also connected to the primary winding *n* and to the secondary winding *o* of the armature, as shown. As the armature rotates, the current is generated in the primary winding *n* and passes from the brush 4 through the advance contact-plate 19, brush 20, contact-points 25 and 32 (when the same are closed) through the wire 59 (framework of the machine) wire 60, to the opposite terminal of the condenser *k* to charge the same, and when the contact points 25 and 32 are open, the condenser *k* will be discharged in the opposite direction through the wire 60, primary winding *n*, inducing a strong current in the secondary winding *o* which flows through the winding *o* by means of the wire *w* that passes through the insulating sleeve *s*, brush *u*, contact piece 50, transfer plate 47, brush 46, brush 45, cyl-

inders 43 and 51, brush 53, contact plates 54, sectional ring 55, cables 56, to the spark-plugs 57.

It should be stated that the operative parts of the generator are protected from dust and injury by means of the housings 62 and 63 which inclose the make and break mechanism and distributer mechanism respectively. These housings are connected together and held in place by means of the rod 64 and a thumb-nut 65 for convenience in removing the same, as readily understood.

In the operation of the machine, it should be stated that the roller 30 is not in contact with the cam 31 most of the time so that the contact points 25 and 32 are closed, and that just at the moment that the contact points are separated the condenser is discharged and the spark produced.

What I claim, is:—

1. An electric generator having in combination an armature provided with two windings in inductive relation to each other, compound field magnets, a condenser included in the primary winding, a make and break mechanism in the primary, spark terminals, a distributer mechanism interposed between the secondary winding and one of the spark terminals, and an electrical connection extending between the other spark terminal and the secondary winding, and means for varying the magnetic flux through the armature whereby the electro-motive force produced may be varied, said means including a rotatable screen, the cylindrical surface of which is composed entirely of magnetic and non-magnetic material and having an unbroken outer cylindrical surface, as described.

2. An electric generator having in combination an armature having primary and secondary windings thereon, field magnets, a collector ring carried by the armature, one terminal of the primary connected thereto, the other terminal of the primary being grounded, a second ground connection connected to the collector ring, a make and break mechanism interposed between the collector ring and the second ground connection, the secondary winding having one terminal connected to a spark-plug and its other terminal grounded, and means for varying the magnetic flux through the armature whereby the electro-motive force produced may be varied, said means including a rotatable screen, the cylindrical surface of which is unbroken from end to end.

3. An electric generator having in combination, a compound field magnet, an armature provided with primary and secondary windings, an armature shaft, a secondary shaft operatively connected to the armature shaft, a distributer connected to one terminal of the secondary winding, a contact-piece adapted to be engaged by the distributer, a spark terminal connected with the contact-piece, an electrical connection extending between the spark terminal and the other terminal of the secondary, a collecter, a grounded connection extending therefrom, make and break mechanism included in the primary winding and the ground terminal, a condenser connected to the primary terminal, and means for varying the magnetic flux through the armature whereby the electro motive force induced therein may be varied, said means comprising a rotatable screen, composed entirely of magnetic and non-magnetic material and having a uniform unbroken and closed outer cylindrical surface, as described.

4. A magneto electric generator having in combination an armature provided with primary and secondary windings, a rotatable screen interposed between the pole pieces and the armature, said screen being composed of magnetic and non-magnetic material whereby the inductive effect of the field on the windings may be changed, a condenser connected in the primary winding, means operatively connected to the armature shaft for electrically connecting the secondary winding to the external circuit, conducting devices interposed between the external circuit and the primary and secondary windings, a make and break mechanism included in the circuit of the primary, the make and break device including a rotatable supporting plate, and an upright, as 24^1, forming a part thereof, a lever pivoted to the supporting plate and provided with a roller at one end, a cam for engaging the roller, and a contact-point and brush carried by the upright, the brush being electrically connected to the primary, as described.

5. An electric generator having in combination an armature, a shaft therefor provided with primary and secondary windings, a secondary shaft operatively connected to the armature shaft, a make and break mechanism included in the primary circuit, means for advancing or retarding the operation of the make and break mechanism, a distributer carried by the secondary shaft, electrical connections between the external circuit and the primary and secondary windings, a condenser connected to the external circuit, and means for varying the magnetic flux through the armature whereby the electro-motive force induced in the secondary may be varied, the distributer comprising a brush-holder electrically connected to the secondary winding, and a second brush holder in electrical connection with the secondary, a sectional ring connected to the external circuit, and contact-pieces connected to the ring and engaged by the distributer, as described.

6. A magneto electrical machine having in combination a series of permanent mag-

nets, an armature, primary and secondary windings thereon, a rotatable screen located between the magnets and armature and composed of magnetic and non-magnetic materials, the non-magnetic material being formed from a single integral piece and having an opening in which is fitted the magnetic piece flush with the outer surface of the cylinder, and means for rotating the same, whereby the flux through the armature may be varied, as described.

7. A magnetic electric generator having in combination a series of permanent magnets, one end of the armature being provided with a sleeve, a bushing of insulating material mounted within said sleeve and carrying a metallic cylindrical brush-holder, the same being electrically connected to the secondary winding of the armature, a brush mounted in said holder, a ring, a transfer-plate mounted thereon, a secondary shaft geared to the armature shaft, a plate of insulating material carried by the shaft and supporting a distributer arm, the plate and distributer arm being each provided with a brush, the transfer plate forming an electrical connection between the brush in the sleeve and the brush in the plate and distributer arm, and electrical connections between the brush in the distributer arm and the armature windings, as described.

EDWARD B. JACOBSON.

Witnesses:
HIRAM B. WELLINGTON, Jr.,
HIRAM B. WELLINGTON.