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INDUCTOR GENERATOR FOR IGNITION PURPOSES.

APPLICATION FILED JAN. 28, 1908. RENEWED FEB. 10, 1909.

947,647. Patented Jan. 25, 1910.

Fig. 2.

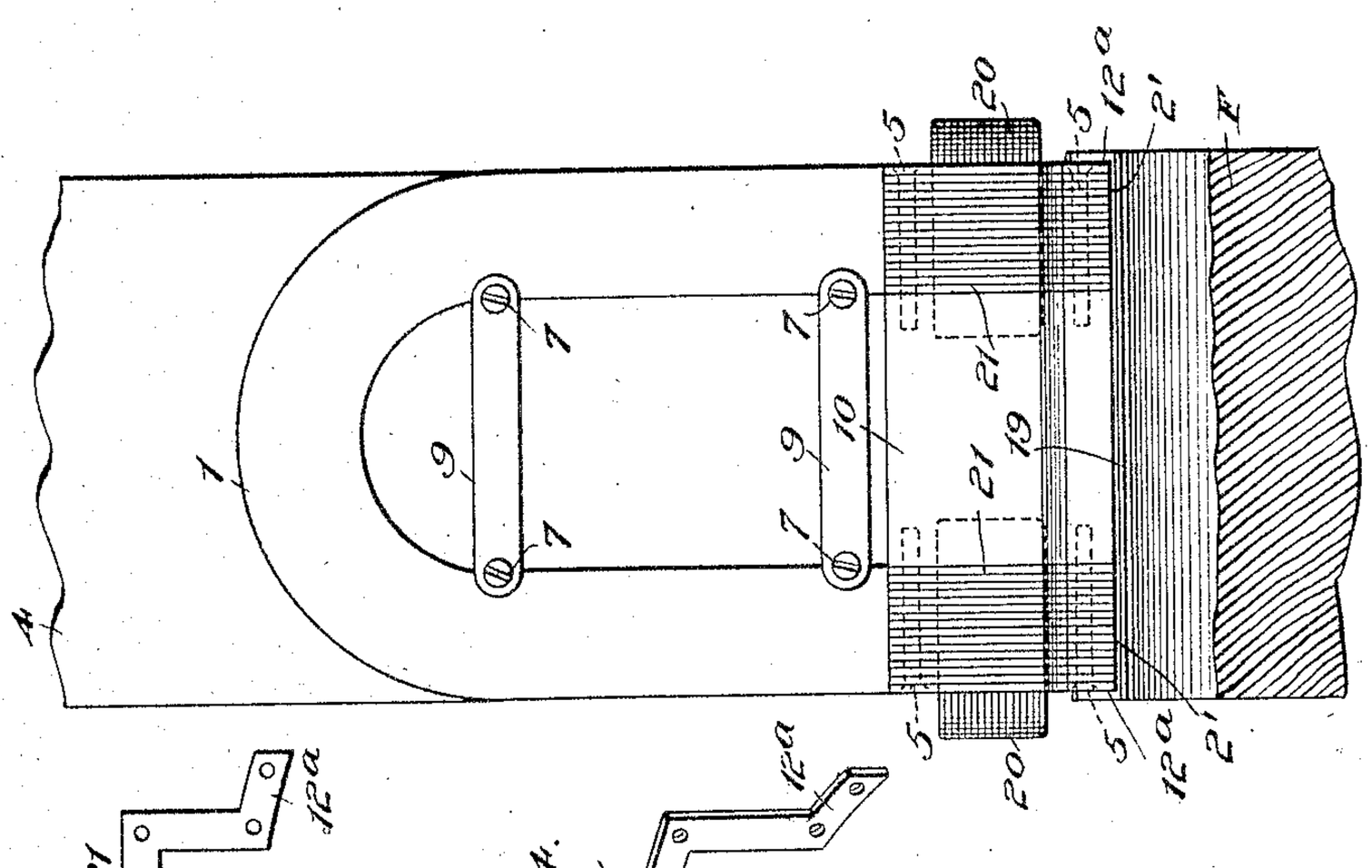


Fig. 3.

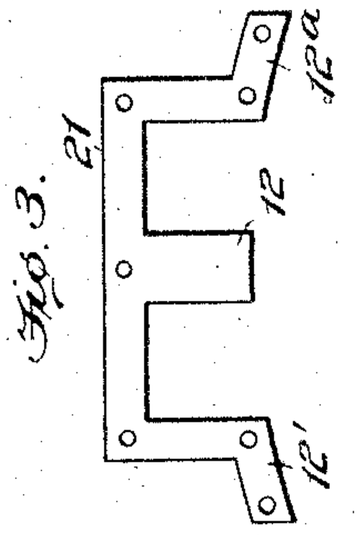


Fig. 4.

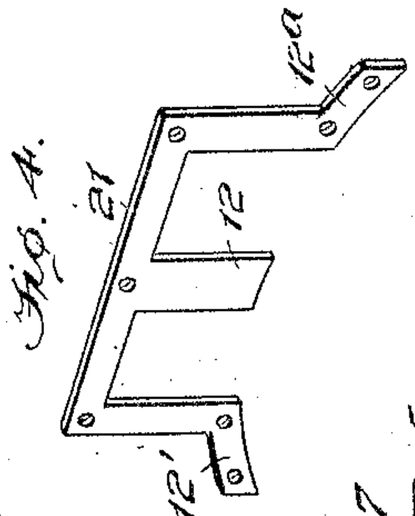
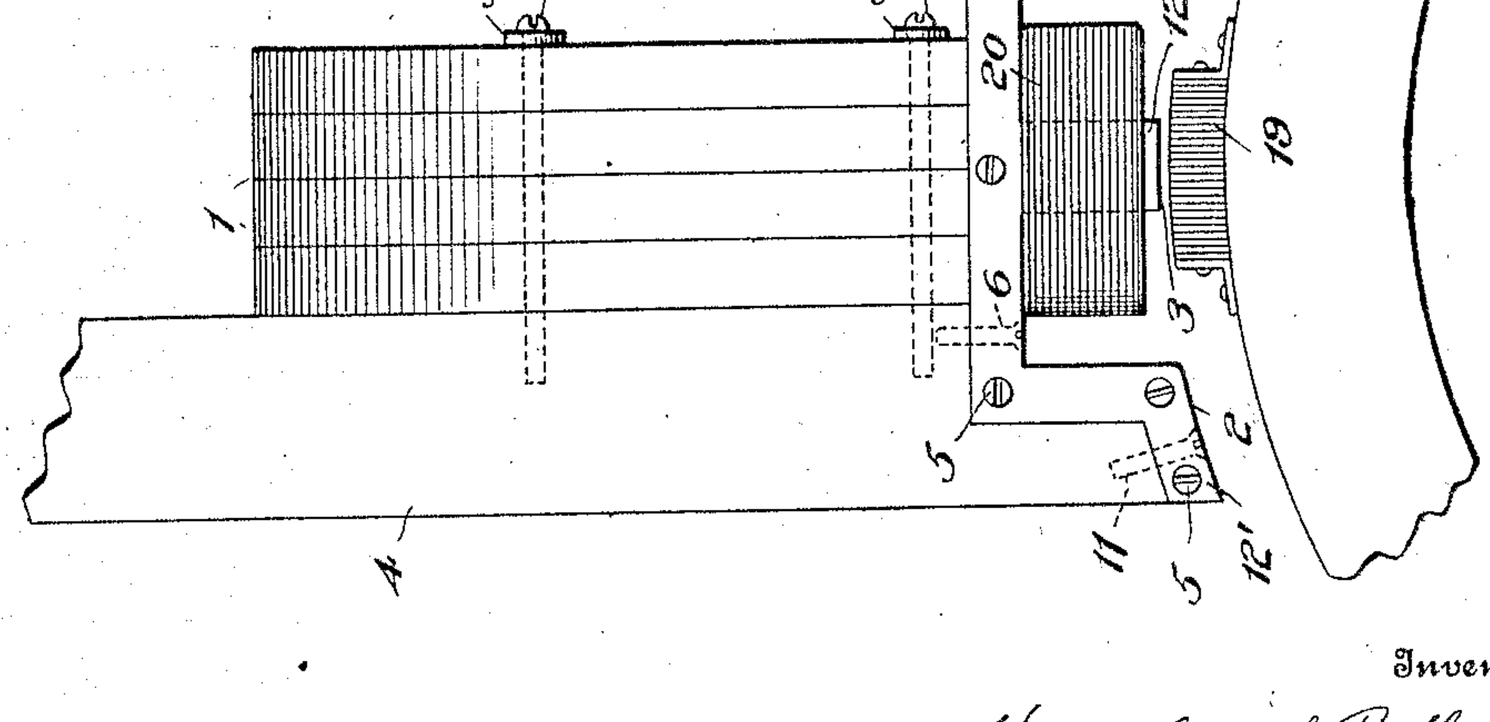


Fig. 1.



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HENRY JOSEPH PODLEŠÁK, OF CHICAGO, ILLINOIS, AND TESLA EMIL PODLESAK, OF MORRISTOWN, NEW JERSEY.

INDUCTOR-GENERATOR FOR IGNITION PURPOSES.

947,647. Specification of Letters Patent. Patented Jan. 25, 1910.

Original application filed September 25, 1901, Serial No. 76,559. Divided and this application filed January 28, 1908, Serial No. 413,070. Renewed February 10, 1909. Serial No. 477,251.

To all whom it may concern:

Be it known that we, HENRY JOSEPH PODLEŠÁK and TESLA EMIL PODLESAK, residing at Chicago, in the county of Cook and State of Illinois, and Morristown, county of Morris, State of New Jersey, respectively, have invented certain new and useful Improvements in Inductor-Generators for Ignition Purposes, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to inductor alternators for ignition purposes. It essentially pertains to inductor alternators capable of producing electrical effects suitable for the ignition of combustible charges in internal combustion motors. It is for a division of the subject matter shown and disclosed in our application for Letters Patent Serial No. 76,559, filed September 25th, 1901.

The principal object of this invention is to provide an inductor generator adaptable for use in connection with a reversible motor, so that the electric generator will produce the requisite electromotive force to cause a spark in the engine cylinder at the proper instant, irrespective of the direction in which the crank shaft of the engine is rotating.

Figure 1 is an edge elevation of an inductor generator embodying our improvement, a portion only of the inductor-carrying element being shown. Fig. 2 is a side elevation of the parts shown in Fig. 1. Fig. 3 is a side elevation of the pole piece, detached. Fig. 4 is a perspective view of the same.

In the drawings,—1 indicates a permanent magnet preferably horseshoe or U-shaped in form. It is composed of as many magnet sections, arranged in series, as may be required to establish the desired density of magnetic field.

4 is a frame, preferably of non-magnetic material, and employed to position and support in proper relation to each other the normally stationary parts of our inductor alternator.

9 are clamp pieces or cleats arranged to bear against the outermost magnet section in the series, and 7 are bolts or screws extending through said cleats and into the frame 4, and adapted to clamp or bind the said frame and permanent magnets together.

21 are pole pieces composed of a suitable member of punchings or laminæ. A pair of these pole pieces is preferably used, assembled, one at either side of a suitable center piece or spacing piece 10 of non-magnetic material, and suitably bolted thereto by means of bolts 5. This non-magnetic spacing piece 10 is suitably secured to the frame 4 by means of bolts or screws 6 and 11, so as to hold the laminated pole pieces 21 in close magnetic contact with the ends or poles of the permanent magnet sections.

As shown, each one of the pole pieces has three polar projections, the center one of which serves as a coil core, and is indicated as 12, the ones at either side of it being unwound and indicated as 12′ and 12ª, respectively. A winding or coil 20 of insulated wire is slipped upon and suitably secured to the middle polar projection or coil core on each pole piece. The outer faces or polar faces of the polar projections 12, 12′, and 12ª, are suitably shaped to conform to the path of travel of a suitable inductor, hereinafter described. The polar faces on the polar projections 12, 12ª, are designated by 2, 2′, respectively, and hereinafter referred to as exciting polar faces, and the polar faces on the polar projections 12, are designated by 3, and hereinafter referred to as generating polar faces.

19 is an inductor, preferably formed of punchings or laminæ of suitable metal. This inductor is adapted to be rotated in either direction, so as to have one of its faces pass over and closely adjacent to the polar faces of the polar projections on the pole pieces by mere mechanical clearance, or, in other words, as close to said polar faces as mechanical conditions will permit. The said inductor 19 is connected with and carried by a wheel or disk F, only part of which is shown. This wheel F may be of any suitable construction, and may be the fly wheel of a motor, to the ignition apparatus of which, the induction windings of the generator are connected. The polar faces 2, 2′, 3 and the face of the inductor which passes adjacent to them, are preferably shaped to the arc of a circle struck from the axis of the wheel F as a center.

Normally the lines of magnetic force emanate in a scattered way from all sides of the magnet and for about one-half of its

length from its free ends, and some of these lines of force emanate from the pole pieces. The inductor 19, when rotated in clockwise direction, first spans the exciting polar faces 2 and causes the concentration of a dense flow of magnetic lines of force, a substantial magnetic short circuit, between the polar projections 12′ of the laminated pole pieces. The inductor then moves across the air gap between the exciting polar faces 2 and the generating polar faces 3 and causes a rapid and substantially complete diversion of the magnetic flux density, first concentrated across the exciting polar faces, into and through the coil cores 12 and across the generating polar faces, so as to establish a substantial magnetic short circuit across the generating polar faces. The inductor then leaves the generating polar faces, crosses the air gap between them and the exciting polar faces 2′, and the magnetic flux density through the induction windings is rapidly diminished, a substantial magnetic short circuit being established outside of them.

If the inductor 19 is rotated in anti-clockwise direction, it first concentrates the lines of magnetic force across the exciting polar faces 2′, 2′, then across the generating polar faces, and then across the exciting polar faces 2, 2. It will thus be seen that in either direction of rotation the inductor operates to bring about similar variations of magnetic flux density in the induction windings. This we have found to be of great importance where our electric generator is used with a reversible motor, as it insures similarly satisfactory ignition in either direction of rotation of the motor.

With an inductor alternator constructed in accordance with our invention, the inductor does not at any time move sufficiently closely to the limbs of the magnets themselves to draw or concentrate a dense magnetic flux across the limbs of the magnets above the poles thereof, but on the contrary, we have so constructed and arranged the elements of an inductor alternator for ignition purposes, that the inductor in its operation tends only to draw or concentrate the magnetic flux emanating from the magnet poles at the said magnet poles, thereby tending to prevent the shifting of the said poles and to overcome the tendency of the said poles to shift, with the consequent loss of magneto-motive force by the magnets.

The electro-motive force is generated in the inductive windings 20, as in all dynamo-electric generators, by varying the magnetic flux density in the said windings. The inductor 19 operates to cause a very rapid varying of the magnetic flux density by first establishing a substantial magnetic short circuit, *i. e.*, by concentrating the magnetic flux at a point adjacent to but outside of the induction windings, so that the magnetic flux density in the cores of said windings is practically zero, then quickly diverting the magnetic flux through the coil cores, and then, practically instantly, establishing a magnetic short circuit outside of the coil cores and causing the magnetic flux density in said coil cores to again drop to substantially zero.

With multi-cylinder motors, two or more inductors are used, there being one inductor for each cylinder, as will readily be understood, unless the periods of ignition of two or more of said cylinders occur at the same period of the stroke at alternate revolutions. In any case, an inductor must be provided and so arranged that it will pass over and span the generating polar faces when the ignition of a combustible charge is required. Also, when the motor is arranged for two or more ignitions, usually termed "late, early," etc., it may prove desirable to use one inductor for each of such ignitions, and to mount and hold stationary the permanent magnet and induction windings.

What we claim is—

1. In an inductor generator for ignition purposes, the combination of a permanent magnet, a pair of pole pieces each held in magnetic contact with one pole of said magnet and having three polar projections, a coil of wire in inductive relation to the middle polar projections on said pole pieces, and an unwound inductor movable relative to said polar projections to concentrate the magnetic flux emanating from the poles of said magnet first outside of said wire wound polar projections and between said pole pieces, then across said wire wound polar projections and then outside of said wire wound polar projections and between said pole pieces in rapid succession.

2. In an inductor generator for ignition purposes, the combination of a field magnet, a pair of pole pieces each in magnetic contact with one of the poles of said field magnet and having three polar projections, two coils of wire, one in inductive relation to the middle polar projection on one pole piece and the other in inductive relation to the middle polar projection on the other pole piece, and an unwound inductor movable in either direction to concentrate between said pole pieces the magnetic flux emanating from the poles of said magnet, first across unwound polar projections, then across the said wound middle polar projections and then across the other unwound polar projections.

3. In an inductor generator for ignition purposes, the combination of a permanent magnet, laminated pole pieces in magnetic contact with the poles of said magnet, each pole piece having a coil core and polar pro-

jections with exciting polar faces on opposite sides of said coil core, coils of insulated wire in inductive relation to said coil cores, and a laminated unwound inductor mounted on a rotatable support.

4. In an inductor generator for ignition purposes, the combination of a permanent magnet, pole pieces in magnetic contact with the poles of said magnet, each pole piece having three polar projections, coils of insulated wire in inductive relation to the middle polar projection on said pole pieces, the other polar projections on each pole piece being unwound, and an unwound inductor movable relative to said polar projections.

5. In an inductor generator for ignition purposes, the combination of a permanent magnet, a pair of pole pieces, each in magnetic contact with one of the poles of said magnet, one of said pole pieces carrying three polar projections having polar faces arranged in series in the arc of a circle, a coil of insulated wire in inductive relation to the middle polar projection of said series, the polar projections at either side of said middle one being unwound, and an inductor rotatable in either direction relative to the polar faces of said polar projections to intermittently establish substantial magnetic-short circuits between each one of said polar projections and the opposite pole piece.

6. In an inductor generator for ignition purposes, the combination of a permanent magnet, a pair of pole pieces, each in magnetic contact with one of the poles of said magnet and having three polar projections each provided with polar faces, an induction winding on the middle projection of each one of said pole pieces, and an unwound rotatable inductor shaped and correlated to the said polar faces on said pole pieces and arranged when rotated in either direction to first concentrate the lines of magnetic force emanating from said magnet poles between said pole pieces outside of said induction windings, then rapidly to divert the magnetic flux through said induction winding, and then as rapidly divert said magnetic flux outside of said induction windings, and between said pole pieces.

7. In an inductor generator for ignition purposes, the combination of a bi-polar permanent field magnet, a pair of pole pieces, each held in magnetic contact with one of the poles of said field magnet and in suitable relation to each other, and each having three polar projections, each of which terminates in a polar face, two coils of wire, each wound in inductive relation on the middle polar projection of each said pole piece, a movable unwound inductor, arranged to establish, by its movements, a magnetic path through itself and alternately through the unwound polar projections and the wound polar projections of the said pole pieces.

8. In an electric generator, the combination of a field magnet provided with pole pieces, three polar projections carried by one of said pole pieces, a winding on the middle polar projection, and an unwound inductor adapted cyclically to short-circuit the magnetic flux outside of said winding, then divert the flux through said winding, and then again divert the flux outside the winding.

9. In an electric generator, the combination of a field magnet provided with pole pieces, three polar projections carried by each of said pole pieces, windings on the middle polar projections, and an unwound inductor adapted cyclically to short-circuit the magnetic flux outside of said windings, then divert the flux through said windings, and then again divert the flux outside the windings.

In witness whereof we affix our signatures, in the presence of witnesses.

HENRY JOSEPH PODLEŠAK.
TESLA EMIL PODLESAK.

Witnesses to the signature of Henry Joseph Podlešák:

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Witnesses to the signature of Tesla Emil Podlesak:

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