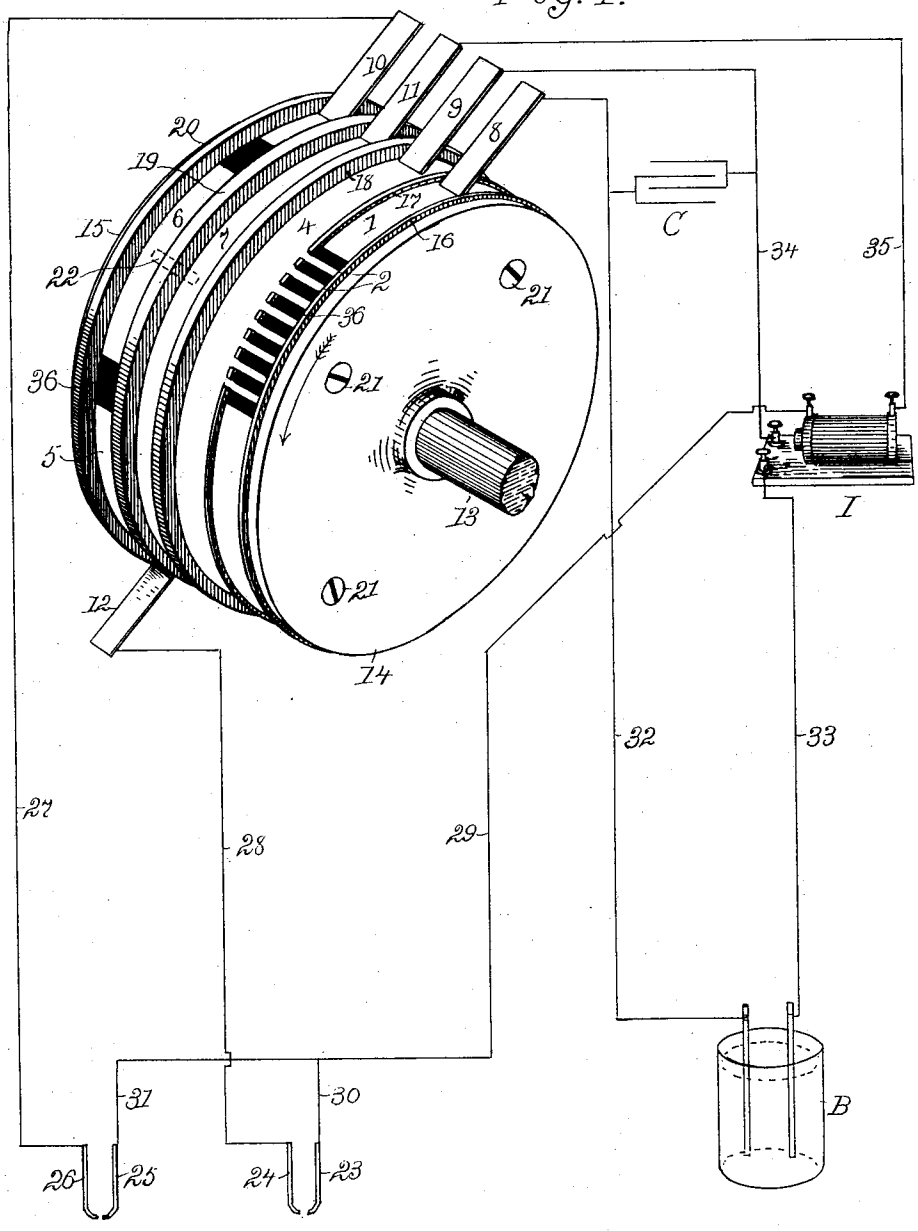
(No Model.) 2 Sheets—Sheet 1.

L. BLY.

IGNITER FOR EXPLOSIVE ENGINES.

No. 588,629. Patented Aug. 24, 1897.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

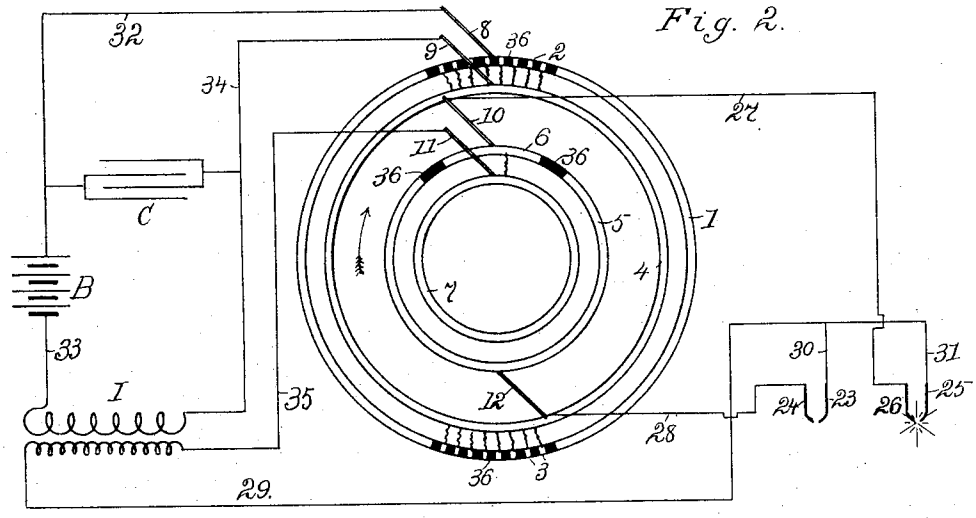


Fig. 3.

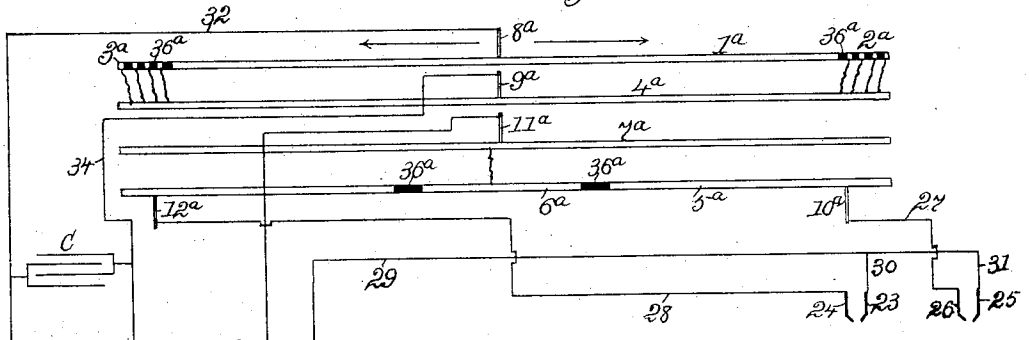
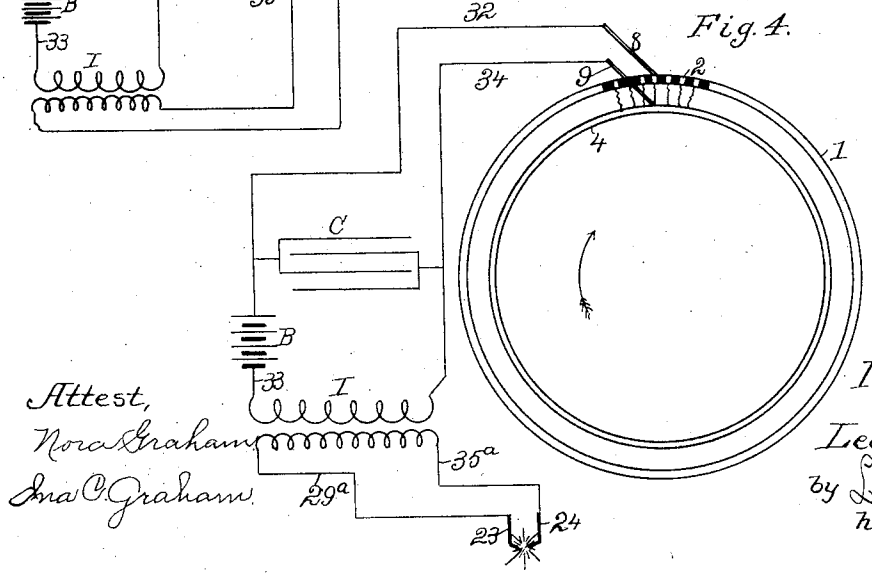


Fig. 4.



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UNITED STATES PATENT OFFICE.

LEON BLY, OF DECATUR, ILLINOIS, ASSIGNOR OF ONE-THIRD TO ELBERT E. JOHNSON, OF SAME PLACE.

IGNITER FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 588,629, dated August 24, 1897.

Application filed December 26, 1896. Serial No. 617,078. (No model.)

To all whom it may concern:

Be it known that I, LEON BLY, of Decatur, in the county of Macon and State of Illinois, have invented certain new and useful Improvements in Igniters for Explosive-Engines, of which the following is a specification.

In the present state of the art of igniting explosive-engines by means of electric sparks either a vibrator is used in connection with an induction-coil or moving contacts inside the cylinders are employed. The use of a vibrator is objectionable for the reason that it necessitates constant consumption of electrical energy, its speed of vibration is unreliable, in case of high speed in the engine there is no positive assurance of obtaining sparks at proper times, and the contact-points of the vibrator add considerable resistance to the circuit. The use of moving contacts inside the cylinders is objectionable for the reason that the delicate mechanism of the contacts are subject to wear and disarrangement and are practically inaccessible for adjustment and repairs.

It is the object of my invention to overcome the disadvantages incident to electrical igniters as commonly employed and to provide for advancement along lines not contemplated in present constructions. I attain these results by placing the moving parts of the igniter outside the cylinder, by cutting out the battery except at points of ignition, by increasing the frequency of current interruptions in the primary circuit, and by providing an automatic switch that will enable different cylinders to be successively ignited.

The invention is exemplified in the structure hereinafter described, and it is defined in the appended claims.

My invention resides in the following characteristics—namely, a group of separated contact-points, a single contact-point adapted to strike against the members of the group successively when suitable motion is given to the group or to the point, a source of electrical energy, an induction-coil, and ignition-points, one terminal of the source of electrical energy being electrically connected with the group of contact-points, the other terminal of the source of energy being connected with one terminal of the primary winding of the induction-coil, the other terminal of the induction-coil being electrically connected with the contact-point, the condenser being connected in parallel between the group and the point, and the terminals of the secondary winding of the induction-coil being electrically connected one with each ignition-point.

My invention also resides in a plurality of groups of separated contact-points having the corelation to other parts hereinbefore explained, a plurality of pairs of ignition-points, and a switch in the secondary circuit physically connected with the groups in a manner to successively and automatically throw the igniting-current through the different pairs of ignition-points.

My invention furthermore resides in the details of construction and combinations of parts hereinafter set forth and claimed.

In the drawings forming part of this specification, Figure 1 is a perspective representation of an embodiment of the physical features of my device together with a somewhat conventional illustration of the electrical features. Fig. 2 is a conventional diagram of the invention in its preferred form. Fig. 3 is a diagram illustrating a possible modification of the physical structure. Fig. 4 is a diagram showing the device as it is used in connection with an engine having but one pair of ignition-points.

In constructing an igniter in accordance with my invention I prefer to make a wooden cylinder, place on it a set of copper rings 1, 4, 5, and 7, with insulating-rings 17, 18, and 19 between the copper rings, clamp the rings and the cylinder between metal disks 14 and 15 after placing insulating-rings, as 16 and 20, between the copper rings and the metal disks, and then fasten the disks onto a drive-shaft, as 13. The ring 1 has groups of separated contact-points, as 2 and 3, insulated one from another and all from the residue of the ring, as indicated at 36, and connected electrically with ring 4. The ring 5 has a segment of contact-surface, as 6, which is wider than a group of contact-points, is insulated from the residue of the ring, as shown at 36, and is electrically connected with ring 7. The disks may be fastened together and to the wooden cylinder by means of screws or

bolts, as 21, and the complete cylinder so constructed is in practical use suitably journaled and driven by the engine with which it is used at a speed proportionate to the number of ignitions required at each revolution of the crank-shaft of the engine. As a matter of choice the contact-surface 6 is placed on the same face of the cylinder as one of the groups of contact-points, though this is not essential.

The rings 1, 4, and 7 are each provided with a brush, as 8, 9, and 11, which are to be held in any manner best suited to the circumstances of each particular case, and the ring 5 has two brushes, as 10 and 12, placed one diametrically opposite the other and so disposed with relation to the contact-surface 6 that one of the brushes will be in contact with such surface some little time before a group of points strike brush 8 and will hold such contact until the group has passed from contact with brush 8.

An electrical connection 32 leads from brush 8 to a battery B or other source of electrical energy. An electrical connection 33 leads from the battery to one terminal of the primary winding of an induction-coil I. An electrical connection 34 leads from the other terminal of the primary winding of the induction-coil to brush 9. A condenser C is connected to leads 32 and 34 in parallel across brushes 8 and 9. An electrical connection 35 leads from the secondary winding of the induction-coil to brush 11. An electrical connection 29 leads from the other terminal of the secondary winding of the induction-coil toward the igniters and has branches 30 and 31, that connect with terminals 23 and 25, respectively, of different igniters. An electrical connection 27 leads from brush 10 to igniter-terminal 26, and electrical connection 28 leads from brush 12 to the terminal 24 of the other igniter. This is the arrangement in case the device is applied to an engine having two igniters. Should there be other igniters, the number of groups will be increased proportionately and be distributed around the cylinder in a manner to leave suitable spaces, and the brushes on ring 5 will be correspondingly increased and spaced and the wiring will be done in such manner that the lead 29 will connect with one terminal of each of the igniters and each of the brushes on ring 5 will connect with the other terminal of an igniter.

In case but one igniter is employed the connections will be made with the igniter-terminals directly from the secondary winding of the induction-coil, as shown at 29^a and 35^a in Fig. 4.

In this description it is assumed that the motion of the contact-surfaces will be rotary, but it is not impossible that a reciprocating motion may be used, and in that case the arrangement would be something like that shown in diagram in Fig. 3, the operation of which is obvious.

In the operation of the invention the cylinder is turned in the direction indicated by the arrows, or in the case of the modification shown in Fig. 3 reciprocating motion is given to the different surfaces which are physically connected. If the engine to which the device is applied has but one pair of ignition-points, the simplified construction shown in Fig. 4 will be used. When the brush 8 is in contact with a contact-point of the group, a circuit is completed and the battery develops electrical energy. This energy magnetizes the core of the induction-coil, creating an electromotive force in the secondary winding, which breaks through the air-gaps between the ignition-points whenever brush 8 makes or breaks contact with one of the members of the group. The condenser is connected between the brushes 8 and 9 to reduce the effects of self-induction.

The contact-surface of brush 8 is considerably thinner than spaces between members of the groups, and a multiplicity of makes and breaks is thereby assured. This higher frequency of current interruption has the advantage of developing more units of heat per unit of time than when lower frequency is employed. As the electromotive force is proportional to the rate of change of magnetism, a continuous contact does not generate electromotive force, but does consume energy. This fact enables the ignition of the gas in the explosive-engine to be accomplished by the expenditure of a small amount of electrical energy, taking the work done at points of ignition alone into consideration, and in addition to this the energy does no work and makes no expenditure except at points of ignition.

When an engine has a plurality of igniters—as two, for instance—two groups of contact-points are placed in ring 1, as shown in Fig. 2, rings 5 and 7 are connected physically with rings 1 and 4, as hereinbefore explained, brushes 10 and 12 are introduced and connected with terminals of the different igniters, brush 11 is connected with one terminal of the secondary winding of the induction-coil, and the other terminal of the secondary winding of the induction-coil is connected with each of the other terminals of the igniters. When this is done, the current will be thrown to one igniter when contact-surface 6 touches brush 10 and brush 8 touches one group of contact-points and will be shifted to the other igniter when the surface 6 is in contact with brush 12 and the other group is in contact with brush 8.

What I claim as new, and desire to secure by Letters Patent, is—

1. An igniter for explosive-engines having characteristics as follows, namely, a group of separated contact-points, a single contact-point adapted to strike against the members of the group successively when suitable motion is given to the group or to the point, a source of electrical energy, an induction-coil and ig-

nition-points, one terminal of the source of electrical energy being electrically connected with the group of contact-points, the other terminal of the source of energy being connected with one terminal of the primary winding of the induction-coil, the other terminal of the induction-coil being electrically connected with the contact-point, and the terminals of the secondary winding of the induction-coil being electrically connected one with each ignition-point, substantially as set forth.

2. An igniter for explosive-engines having the following characteristics, namely, a group of separated contact-points, a single contact-point adapted to strike against the members of the group successively when suitable motion is given to the group or to the point, a source of electrical energy, an induction-coil, a condenser, and ignition-points, one terminal of the source of electrical energy being electrically connected with the group of contact-points, the other terminal of the source of energy being connected with one terminal of the primary winding of the induction-coil, the other terminal of the induction-coil being electrically connected with the contact-point, the condenser being connected in parallel between the group and the point, and the terminals of the secondary winding of the induction-coil being electrically connected one with each ignition-point, substantially as set forth.

3. In an igniter for explosive-engines, a rotatable cylinder having a collecting-ring and a group of contact-points electrically connected with the collector-ring, a brush in contact with the collector-ring, another brush bearing against the cylinder in position to strike the group of contact-points, a source of electrical energy, an induction-coil, a condenser, and ignition-points, one terminal of the source of energy being connected with the brush that strikes the group, the other terminal of the source of energy being connected with one terminal of the primary winding of the induction-coil, the other terminal of the induction-coil being connected with the brush resting on the collector-ring that communicates with the group, the condenser being connected in parallel between the brush that strikes the group and the brush of the collector-ring that communicates therewith, and the terminals of the secondary winding of the induction-coil being electrically connected one with each ignition-point, substantially as set forth.

4. In an igniter for explosive-engines, a rotatable cylinder having two collector-rings, a plurality of groups of contact-points connected electrically with one of the collector-rings, a contact-surface, wider than a group, connected electrically with the other collecting-ring, a brush in contact with each of the collecting-rings, a brush bearing against the cylinder in position to strike the groups of contact-points, a source of electrical energy, an induction-coil, a condenser, and a plurality of igniters, one terminal of the source of energy being connected with the brush that strikes the groups, the other terminal of the source of energy being connected with one terminal of the primary winding of the induction-coil, the other terminal of the induction-coil being connected with the brush resting on the collector-ring that communicates with the groups, the condenser being connected in parallel between the brush that strikes the groups and the brush of the collector-ring communicating therewith, one terminal of the secondary winding of the induction-coil being connected with the brush of the collector-ring that communicates with the contact-surface, the other terminal of the secondary winding of the induction-coil being connected with one terminal of each of the igniters, a number of brushes in position to strike the contact-surface, such number depending on the number of igniters, and connections between each of such brushes and a terminal of an igniter, substantially as set forth.

In testimony whereof I sign my name in the presence of two subscribing witnesses.

LEON BLY.

Witnesses:
MILTON JOHNSON, Jr.,
J. A. DAWSON.