(No Model.) 3 Sheets—Sheet 1.

A. A. HAMERSCHLAG.

IGNITING DEVICE FOR GAS OR PETROLEUM ENGINES.

No. 561,886. Patented June 9, 1896.

Fig. 1.

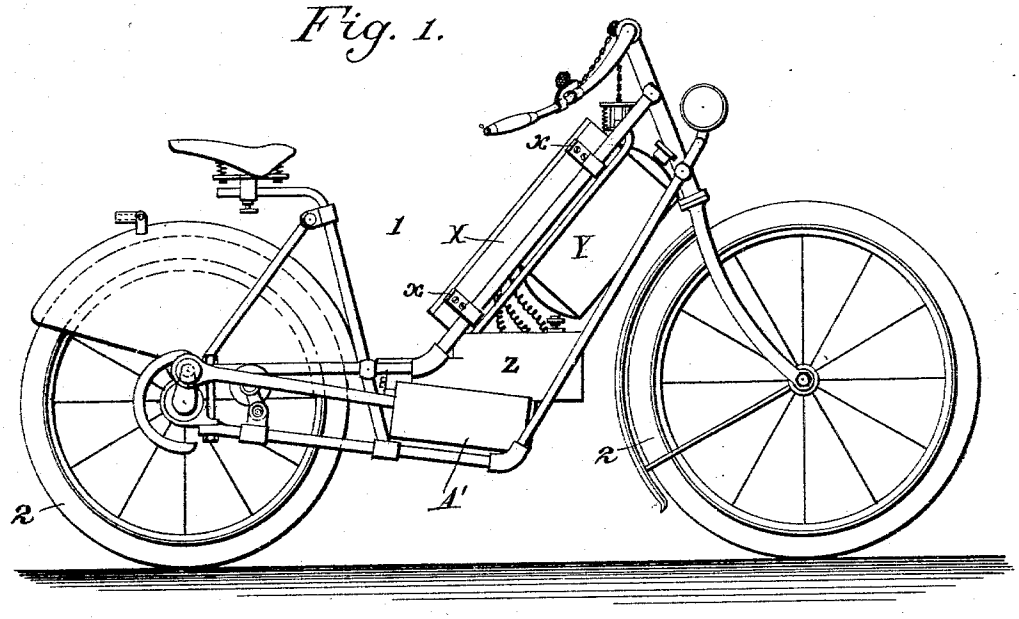

Fig. 2.

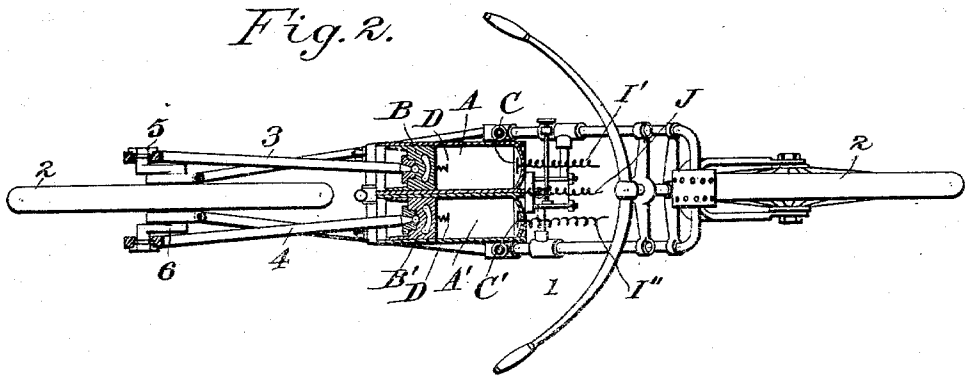

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Fig. 3.

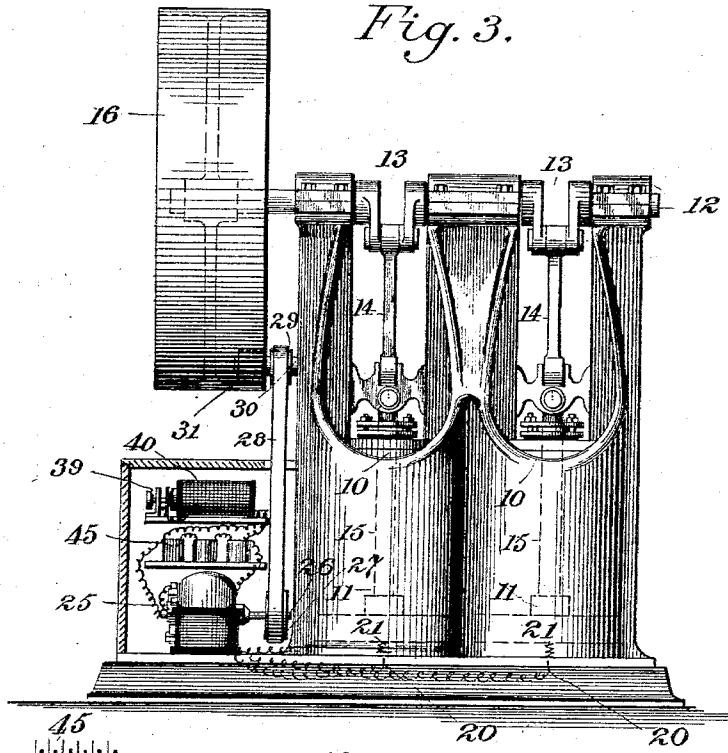

Fig. 4.

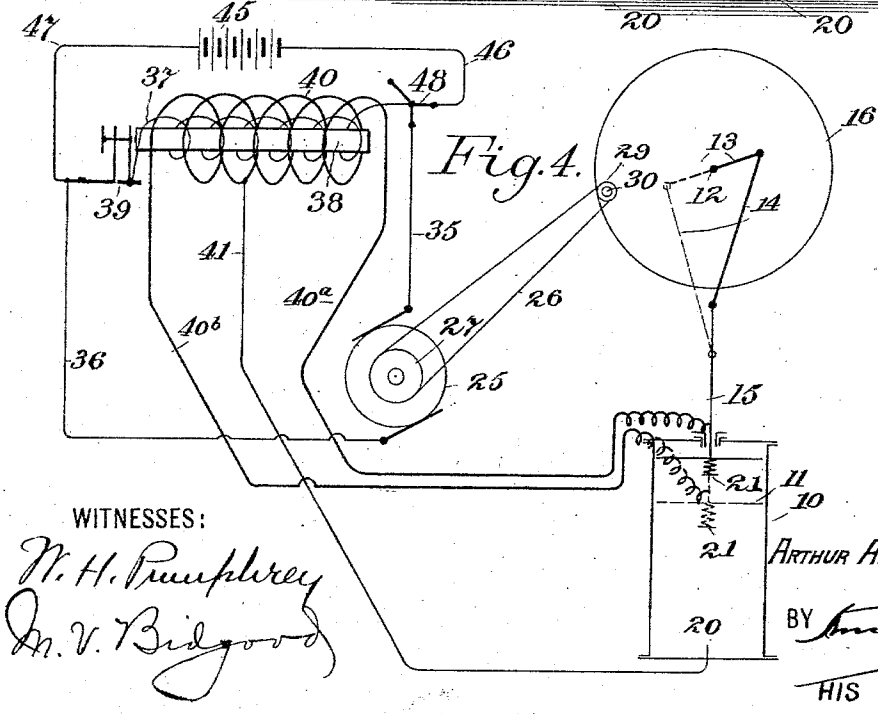

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Fig. 5.

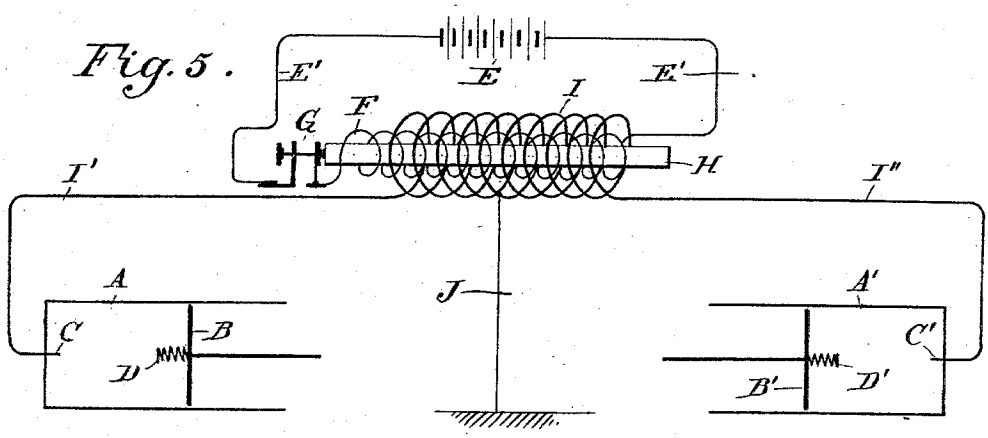


Fig. 6.

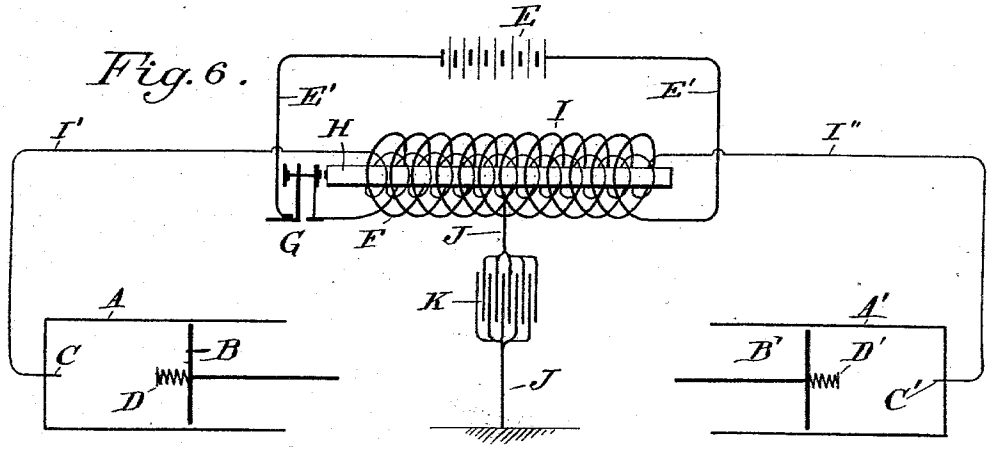
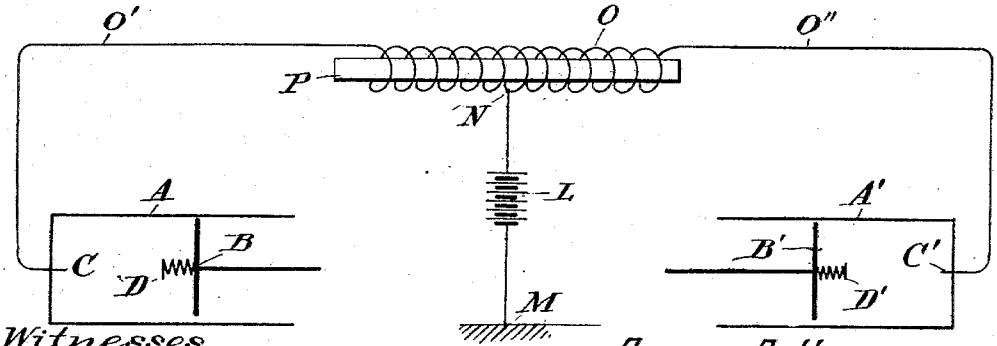


Fig. 7.



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UNITED STATES PATENT OFFICE.

ARTHUR A. HAMERSCHLAG, OF NEW YORK, N. Y.

IGNITING DEVICE FOR GAS OR PETROLEUM ENGINES.

SPECIFICATION forming part of Letters Patent No. 561,886, dated June 9, 1896.

Application filed February 17, 1896. Serial No. 579,503. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR A. HAMERSCHLAG, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Igniting Devices for Gas or Petroleum Engines, of which the following is a specification.

The object of my invention is to provide a simple and effective means for supplying electric impulses of equal intensity to two or more igniting devices simultaneously from a single source or generator, in order to accomplish the simultaneous explosion in two or more cylinders of a gas or petroleum engine or similar device. I can accomplish this object by passing a current through the divided sections of a sparking-coil, the igniting devices being in circuit with the divided sections of said coil, or I may obtain the impulses from divided sections of the secondary coil of an ordinary induction-coil, or I can obtain the desired result by connecting the electric igniting devices in the secondary circuit to a common return connected to the primary coil.

In order that my invention may be fully understood, I have illustrated several modifications of the same, together with their applications, in the accompanying drawings.

I will first describe the invention with particular reference to the drawings, and will afterward point out the novelty with more particularity in the accompanying claims.

In said drawings, Figure 1 is a side elevation of a bicycle provided with a gas or petroleum engine having my improved igniting device applied thereto. Fig. 2 is a sectional plan of the same. Fig. 3 is a front elevation of an improved gas or petroleum engine provided with one of the preferred forms of my improved igniting device, part of the casing being broken away. Fig. 4 is a diagrammatic representation of operative parts of the engine shown in Fig. 3. Figs. 5, 6, and 7 are diagrammatic representations of modified forms of my improved igniting devices.

The essential features of the invention will first be described in connection with Figs. 5, 6, and 7.

In Fig. 5, A and A′ represent engine-cylinders, and B and B′ pistons working in said cylinders. C and C′ are electrical contact or sparking points supported in the ends of the cylinders A and A′ and insulated therefrom. D and D′ are resiliently-supported sparking points or contacts mounted upon the pistons B and B′. The pistons B and B′ are grounded electrically through the engine cylinders and frames. E is a battery, and E′ is a circuit-wire leading from said battery and communicating with the primary circuit F of the induction-coil. G is a vibrator or automatic circuit-breaker interposed in the primary circuit of the battery and coil. H is a soft-iron core. I is the secondary coil of the induction-coil, having its ends connected through wires I′ and I″ with the sparking-contacts C and C′, respectively, supported in the ends of the cylinders. J is a wire connecting one of the central convolutions of the secondary coil with the ground, forming two circuits through the sections of the secondary coil and sparking-points of the engines.

The pistons B and B′ are adapted to operate simultaneously toward and from the cylinder-heads. It will therefore be observed that the contacts C D and D′ C′ will simultaneously touch and close or almost touch and close the circuits through the sections of the secondary coil I and thereby produce sparks in the cylinders A and A′ simultaneously and of the same intensity.

In Fig. 6 I have shown the primary coil F outside of the secondary coil I, and have interposed a condenser K in the ground-wire J, connected to the center of the primary coil and forming the common return for the igniting devices in the secondary circuit. With this exception the parts are the same as shown in Fig. 5 and are similarly indicated.

In Fig. 7 I have shown the application of my improvement to a circuit containing an ordinary sparking-coil. The cylinders, pistons, and contacts are indicated by the same reference-letters. In this arrangement the battery L is grounded at M and connects at N with a central convolution of a sparking-coil O, which is coiled around a soft-iron bar P. The opposite ends O′ and O″ of the coil connect with the contacts C and C′, respectively. It will therefore be observed that when the contacts C D and D′ C′ engage impulses will simultaneously pass through the

divided circuit and cause sparks of equal intensity between the contact-points.

Referring now to Figs. 1, 2, 3, and 4, I will describe two applications of my invention.

In Figs. 1 and 2, 1 is a bicycle-frame mounted upon the wheels 2. A A′ are the cylinders, and B B′ are the reciprocating pistons connected by pitmen 3 and 4 to the cranks 5 and 6. C C′ are the insulated contact-points in the cylinder-heads, and D D′ are the other contact-points carried by the pistons and in electrical connection with the bicycle-frame. I′ and I″ are the circuit-wires leading from contacts C C′ to the opposite ends of the secondary of the induction-coil, and J is the wire connected with the bicycle-frame and united to the central convolution of the secondary coil. X is a box secured to bicycle-frame by straps *x* and adapted to carry the induction-coil and battery. Y is the petroleum or gas reservoir, and Z is the valve-chest of the engine. It will be observed that the pistons are adapted to reciprocate together, the sparking being accomplished in the manner already explained.

In Figs. 3 and 4 I have represented a small double-cylinder explosive-engine, in which 10 are cylinders; 11, pistons working therein; 12, the crank-shaft; 13, the cranks, and 14 the pitmen uniting the cranks 13 to the piston-rods 15. 16 is the fly-wheel keyed to the projecting end of shaft 12. Supported in the lower heads of the cylinders 10 are the insulated contact or sparking points 20, and mounted upon the pistons 11 are the resiliently-supported contacts 21. 25 is a small dynamo mounted upon the base of the engine-frame and having its armature-shaft 26 projecting inwardly and provided with a pulley 27, over which runs a driving-belt 28, which is driven from the pulley 29, mounted upon a short shaft 30, which receives its motion by reason of the contact of the pulley 31 with the inner rim of the fly-wheel 16, or it can be directly driven from the shaft. 35 and 36 are the circuit-wires leading to and from the dynamo. 37 is the primary of an induction-coil surrounding the soft-iron core 38. 39 is an automatic circuit maker and breaker or vibrator. The circuit-wires 35 and 36 connect with the primary coil 37. 40 is the secondary coil having the ground-circuit wire 41 leading from one of its central convolutions to the insulated contact 20 and having its opposite ends 40^a and 40^b leading to the grounded contacts 21 carried by the pistons. 45 is a battery, which may be a primary battery or a storage battery, preferably the latter. 46 and 47 are the battery-wires connected with the dynamo-circuit wires 35 and 36, a switch 48 being interposed between the wires 35 and 46 for throwing the battery 45 into or out of circuit with the primary coil 37 of the sparking-coil.

The operation of the engine shown in Figs. 3 and 4 will be clear with but a slight exception. When it is desired to start the engine, the switch 48 is turned to throw the battery 45 into the primary circuit of the induction-coil. This will energize the secondary coil 40 and produce the proper sparking in the ends of the cylinders. As soon as the engine has gotten up sufficient speed to generate a current with the dynamo 25 the switch 48 is thrown off and the primary circuit 37 is energized from the dynamo. The pistons 11 are adapted to move up and down in the same intervals.

Though I have shown my improvements applied to but two forms of engines, it will be clear that the application of the invention is much broader than this, as I am enabled to satisfactorily supply electrical impulses of equal strength from the same source to two or more sparking devices simultaneously, whether the sparking devices are in the cylinders of the same engine or of different engines, or whether the engine has one or a dozen cylinders, without any outside mechanical contrivance which would cause a spark at the proper time, using as I do the lateral motion of the piston-heads.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of an explosive-engine having two or more explosion-chambers and electrical igniting devices located therein, an electric battery or other generator, and an electric circuit energized by said battery and including the igniting devices and having a separate branch for each igniting device and a common return for all, substantially as set forth.

2. The combination of an explosive-engine having two or more explosion-chambers and electrical igniting devices located therein, an electric battery or other generator, an electric circuit energized by said battery and including the igniting devices, having a separate branch for each and a common return for all, and a sparking-coil included in said circuit and having its coil divided and a section included in each branch circuit, substantially as set forth.

3. The combination of two or more sparking devices with a battery or other electric generator, and a divided coil energized by said battery and having branches including all the sparking devices and a common return for all, substantially as set forth.

4. The combination of two or more sparking devices or igniters, with a divided induction-coil including said devices in the secondary circuit, and a battery or other electric generator in the primary circuit, substantially as set forth.

5. The combination of two or more sparking devices or igniters, a condenser, a divided induction-coil including said igniters and condenser in its secondary circuits, and a battery or generator included in the primary circuit, substantially as set forth.

6. The combination of two or more sparking

devices or igniters, a sparking-coil having its secondary coil divided to include the separate igniters in separate sections, and a battery or generator included in the primary circuit, as set forth.

7. The combination of two sparking devices or igniters, an induction-coil having its secondary coil divided and including the sparking devices in different sections of it having a common return, a battery included in the primary circuit, and a vibrator also included in the primary circuit, substantially as set forth.

8. The combination of two explosive-engine cylinders, the pistons working therein, the sparking devices carried on the cylinders and pistons, an induction-coil having its secondary coil divided in sections which are grounded and include the sparking devices, and a battery or electric generator included in the primary circuit of the sparking-coil, substantially as set forth.

9. The combination of an explosive-engine, an electric igniting device for said engine, a dynamo run by the engine, a battery adapted to be included in the dynamo-circuit, and a divided sparking-coil also included in said circuit and including an igniting device in each one of its circuit-divisions, substantially as set forth.

10. The combination of an explosive-engine, an igniting device comprising two sparking-points mounted on the cylinder and piston respectively, a dynamo driven by the engine, a divided induction-coil having its primary circuit included in the dynamo-circuit and its divided secondary coil including the sparking-points of the igniting device, and a battery adapted to be included in the dynamo-circuit, substantially as set forth.

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