

No. 891,647.

PATENTED JUNE 23, 1908.

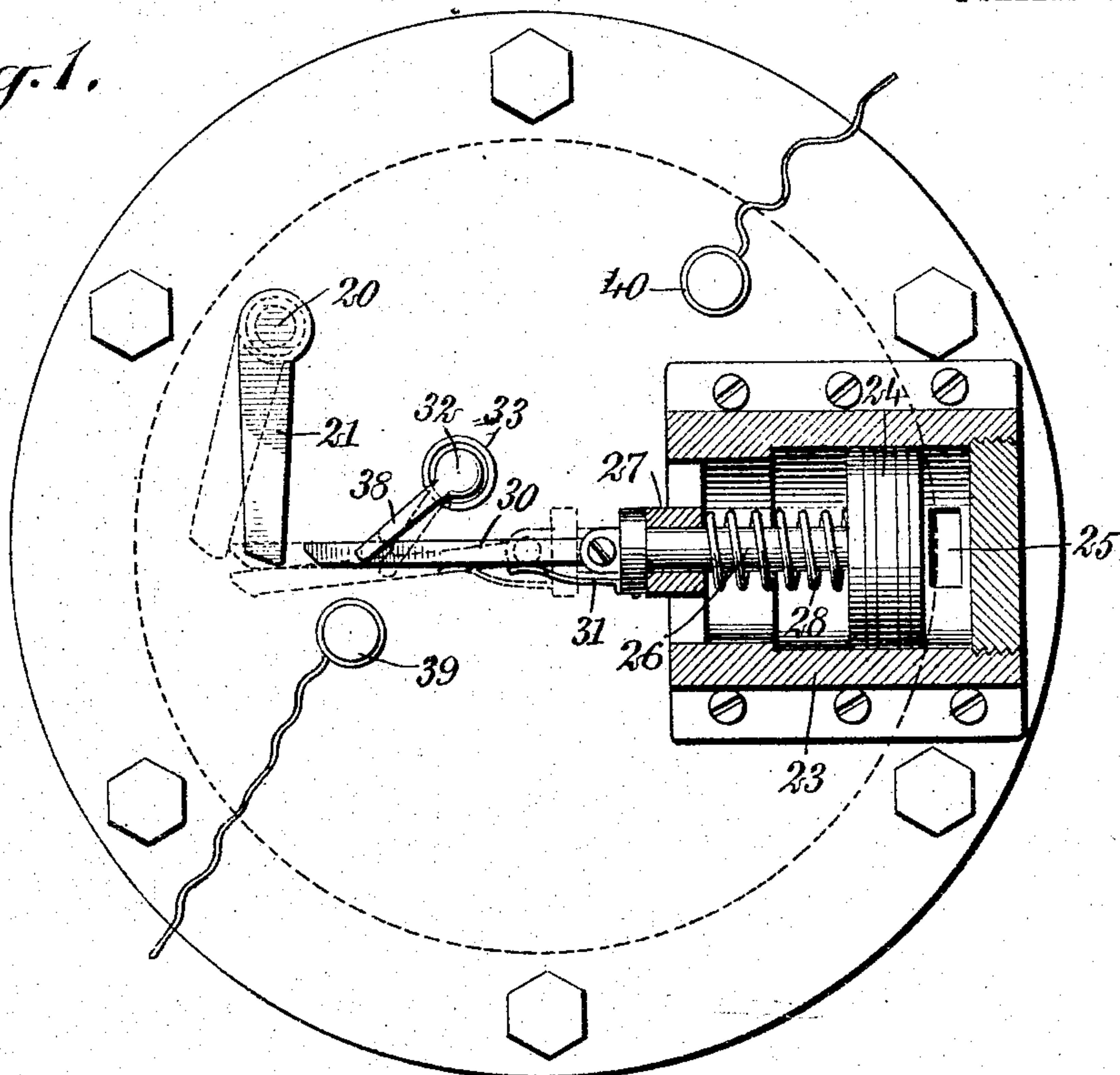
W. L. WAYRYNEN.

IGNITER.

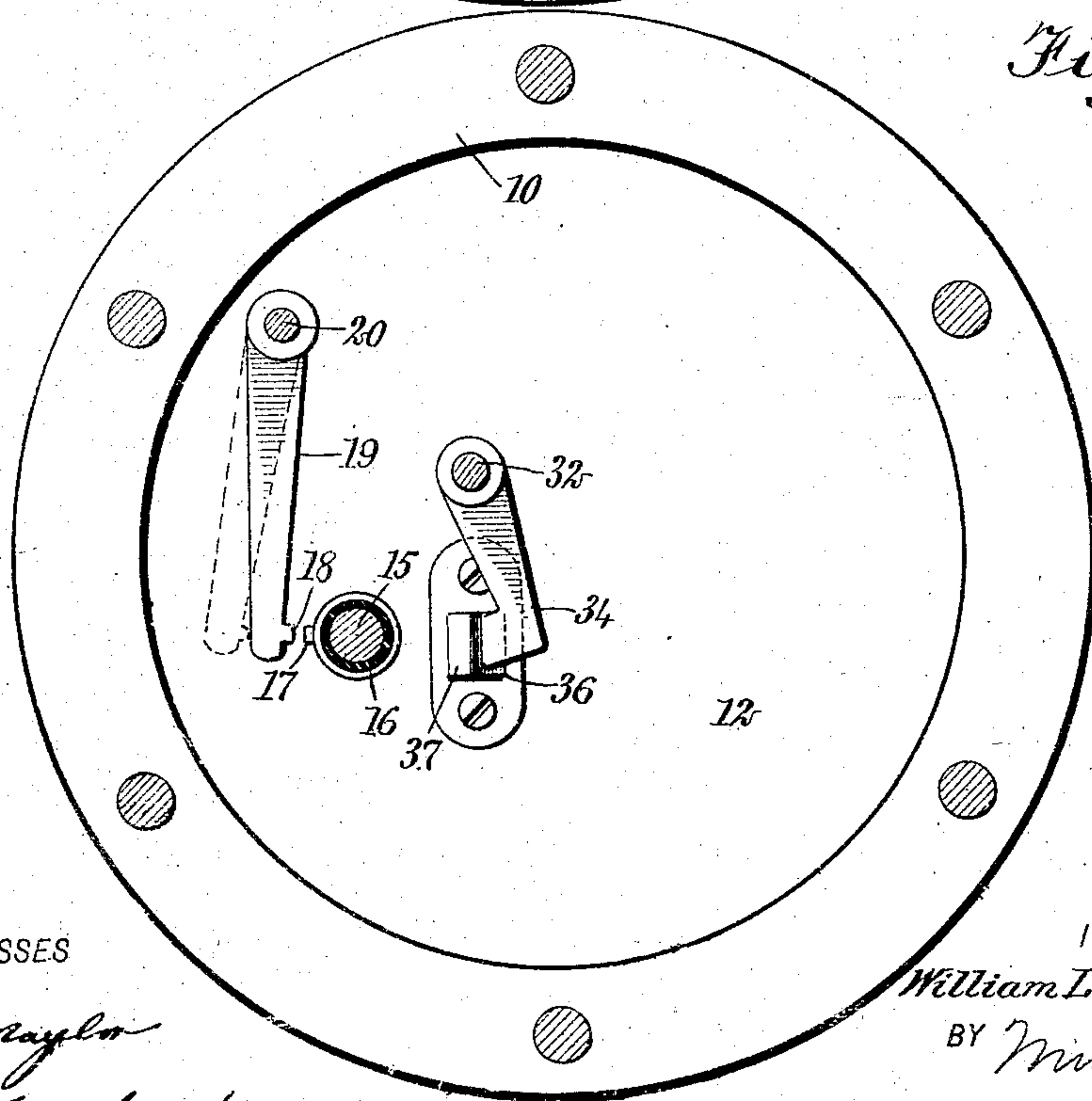
APPLICATION FILED JUNE 15, 1907.

2 SHEETS—SHEET 1.

*Fig. 1.*



*Fig. 2*



WITNESSES

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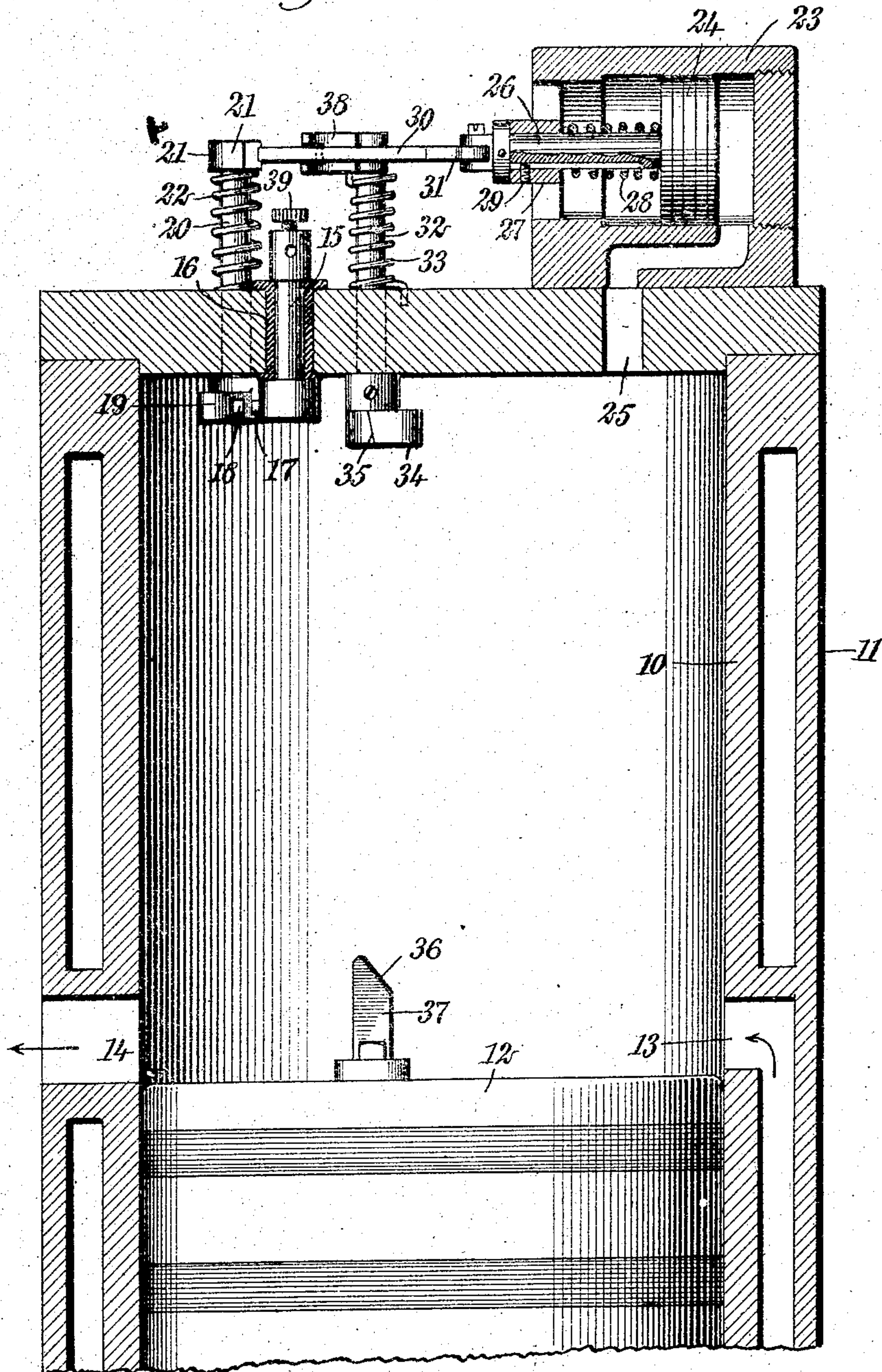
W. L. WAYRYNEN.

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APPLICATION FILED JUNE 15, 1907.

2 SHEETS—SHEET 2.

*Fig. 3.*



WITNESSES

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# UNITED STATES PATENT OFFICE.

WILLIAM L. WAYRYNEN, OF DOLPH, SOUTH DAKOTA.

## IGNITER.

No. 891,647.

Specification of Letters Patent.

Patented June 23, 1908.

Application filed June 15, 1907. Serial No. 379,160.

*To all whom it may concern:*

Be it known that I, WILLIAM L. WAYRYNEN, a citizen of the United States, and a resident of Dolph, in the county of Hamlin and State of South Dakota, have invented a new and Improved Igniter, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in igniters for internal combustion engines, and the object of the invention is to so construct the igniter that its operation is dependent not only upon the position of the piston within the cylinder, but also upon the pressure within the cylinder.

The invention consists in certain features of construction and combinations of parts, all of which will be fully set forth hereinafter and particularly pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, and in which

Figure 1 is an end view of an engine constructed in accordance with my invention and showing the pressure-controlled operating mechanism in section; Fig. 2 is a section through the cylinder in the plane of the inner surface of the cylinder head; and Fig. 3 is a longitudinal section through the engine cylinder.

My improved igniter is adaptable for use in connection with either two-cycle or four-cycle engines, having the cylinder and valve constructed in any well-known manner, the operation of the igniter being independent of any of the structural details of the engine.

In the drawings I have illustrated the igniter as applied to a valveless two-cycle engine having a cylinder 10 provided with a water jacket 11 and having a piston 12 controlling the inlet port 13 and the exhaust port 14, the inlet port communicating with a passage leading to a compression chamber.

The igniter proper or spark terminals comprise a stationary electrode 15 extending through the cylinder head and insulated therefrom by a suitable insulating sleeve 16. The inner end of the electrode is provided with a projection 17 from which the spark may jump to a similar projection 18 upon the movable electrode. The latter comprises an arm 19 carrying said projection 18 and secured to the inner end of an oscillatory pin 20 also extending through the cylinder head. The pin 20 is not necessarily insu-

lated from the cylinder head, as the cylinder itself may constitute a part of the electric circuit. The outer end of the pin 20 is provided with an arm 21, by which the said pin and the inner arm 19 may be oscillated to vary the distance between the spark terminals 17 and 18. The pin 20 is provided with a suitable spring 22 which serves to normally hold the pin and arm 19 in the position illustrated in Figs. 2 and 3, namely, with the sparking terminals or projections 17 and 18 spaced a short distance apart.

Mounted upon the cylinder head or in any other suitable locality is a small cylinder 23 having a piston 24 mounted therein and having a passage 25 leading from the interior thereof to the interior of the main working cylinder 10, whereby the two are maintained in open communication with each other. The piston 24 is provided with a piston rod 26 extending out through the open end of the cylinder and moving through a suitable guide 27. The piston rod is provided with a coil spring 28 intermediate the piston and said guide, whereby the piston is normally forced inward toward the closed end of the cylinder and against the pressure of the gas from the main working cylinder. For preventing the rotation of the piston 24, the piston rod is preferably provided with a groove within which extends a small set screw 29 carried by the guide. The outer end of the piston rod is provided with an operating finger 30 pivoted thereto to move in a plane parallel with the cylinder head and normally forced in one direction by the action of a small spring 31. The finger 30 lies in the same plane as the lever arm 21, and the end of the finger is adapted to engage with the lever adjacent the end thereof, but by the lateral movement of the finger 30 upon its pivot the lever may return to its normal position.

For controlling the spark by the position of the piston within the cylinder, a second oscillatory pin 32 is provided, said pin extending through the cylinder head and substantially parallel to the pin 20. This pin is provided with a spring 33 which tends to normally hold the pin in the position illustrated, and the inner end of the pin is provided with a lever 34 having a cam surface adapted to engage with a cam surface upon a lug 37 carried by the main working piston. At the outer end of the pin 32 there is provided a releasing lever 38 for the finger



30. This releasing lever is provided with a recess in the side thereof for the reception of the finger, and by the rotation of the pin 32 and its lever, the finger 30 is moved laterally and out of engagement with the lever 21 of the movable electrode.

In the operation of my improved igniter, the parts normally rest in the position illustrated in solid lines in the drawings, and are varied from this position by variation in the pressure in the working cylinder and by the action of the projection 37 of the piston. After a fresh charge is taken into the cylinder, the working piston returns upon the compression stroke, the piston 24 is moved outward against the action of the spring 28, and the finger 30 forces the lever 21 to the position shown in dotted lines in Fig. 1, and this moves the electrode 19 to the position illustrated in dotted lines in Fig. 2. As the working piston reaches the end of the compression stroke, the cam surface 36 engages with the cam surface 35 of the lever 34 and rotates the pin 32 to bring the releasing lever 38 to the position illustrated in dotted lines in Fig. 1. This moves the finger 30 laterally out of engagement with the arm 21, and due to the action of the spring 22, the latter returns to its normal position, but in returning the inertia of the moving parts causes the electrode 19 to pass the normal position and causes the terminals 17 and 18 to contact for an instant. The contact is immediately broken by the return of the lever 19 to the position illustrated in solid lines in Figs. 2 and 3. Upon the making and breaking of the circuit at this point a spark is caused to jump from one terminal to the other, and the explosive charge is ignited to force outward the piston 12. Any suitable source of electricity may be employed and the binding posts connected to the separate parts in any manner desired. As illustrated, the pin 15 is provided with a binding post 39 at its outer end, and the cylinder head is provided with a binding post 40, each binding post being connected to the terminal wires from the source of electrical energy.

When my improved igniter is employed, two conditions must prevail before the explosive charge is caused to ignite. First, the charge must be compressed to a sufficient extent to cause the desired movement of the lever 21, and, second, the piston must reach the desired position to release the lever 21 and cause the sparking terminals to contact; thus, no current is wasted in a four-cycle engine should the exhaust valve fail to close, or for any other reason the gas is not compressed to the desired extent in the cylinder. Premature explosion is impossible, as during the compression stroke the sparking terminals are moved farther and farther apart, and the higher the pressure the less the liability to ignition until the piston

reaches substantially the end of its stroke and the releasing lever 38 is operated.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In combination with the cylinder and piston of an internal combustion engine, an igniter comprising two sparking terminals, one of which is movable, a member, the operation of which is dependent upon the pressure within the cylinder, a second member, the operation of which is dependent upon the position of the piston, and means controlled by both of said members for controlling the position of the movable terminal.

2. In combination with the cylinder and piston of an internal combustion engine, an igniter comprising a stationary electrode, and a movable electrode, an arm for moving said movable electrode, means adapted to be operated by a variation in pressure in the working cylinder, means adapted to be operated by the position of the piston, and a finger operable by both of said means and in engagement with said arm for controlling the movement of the movable electrode.

3. In combination with the cylinder and piston of an internal combustion engine, an igniter comprising a stationary electrode, a movable electrode mounted adjacent thereto, an auxiliary cylinder in communication with the working cylinder, a piston mounted therein, a finger connected to said piston and adapted to move the movable electrode upon an increase in pressure in the working cylinder, and means in engagement with said finger and adapted to be operated by the working piston for releasing the finger from engagement with the electrode.

4. In combination with the cylinder and piston of an internal combustion engine, an igniter comprising two spark terminals, one of which is movable, means operated by an increase in pressure in the engine cylinder for separating the terminals, and means operated by the piston for releasing them and permitting them to come together.

5. An internal combustion engine, comprising a working cylinder, a working piston mounted therein, an auxiliary cylinder in open communication with the main working cylinder, an auxiliary piston mounted therein, a movable electrode, a finger operated by said auxiliary piston and adapted to move the electrode in one direction upon an increase in pressure in the cylinders, and means controlled by the position of the working piston for releasing said finger and permitting the return of the movable electrode.

6. An internal combustion engine, including a working cylinder, a working piston, an auxiliary cylinder in open communication with said working cylinder, an auxiliary piston mounted therein, a stationary electrode, a movable electrode, a finger connected to



said auxiliary piston for controlling the position of the movable electrode, and means in engagement with said finger and adapted to be operated by the working piston for releasing said finger.

7. An internal combustion engine, including a working cylinder, a working piston mounted therein, a stationary electrode, a movable electrode, means operable by variations in the pressure in the working cylinder for operating said movable electrode, said means including a finger, means for controlling the position of said finger by said piston, said means including a member carried by the piston and a member carried by the cylinder and in engagement with said finger and adapted to be operated by the member carried by the piston.

8. An internal combustion engine, comprising a cylinder having a cylinder head, a stationary electrode and a movable electrode

carried by said cylinder head, an arm for operating said movable electrode, means movable by a variation in pressure within the working cylinder and adapted to engage with said arm for moving the movable electrode, said means including a pivoted finger, and means for releasing said finger by the action of the piston, said last mentioned means including a member carried by the piston and a member carried by the cylinder head and adapted to be moved by the member carried by the piston to move the finger out of engagement with the arm.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM L. WAYRYNEN.

Witnesses:

E. A. RUDEN,

MATTI WAYRYNEN.