No. 666,105. Patented Jan. 15, 1901.

C. E. LUFBERY.

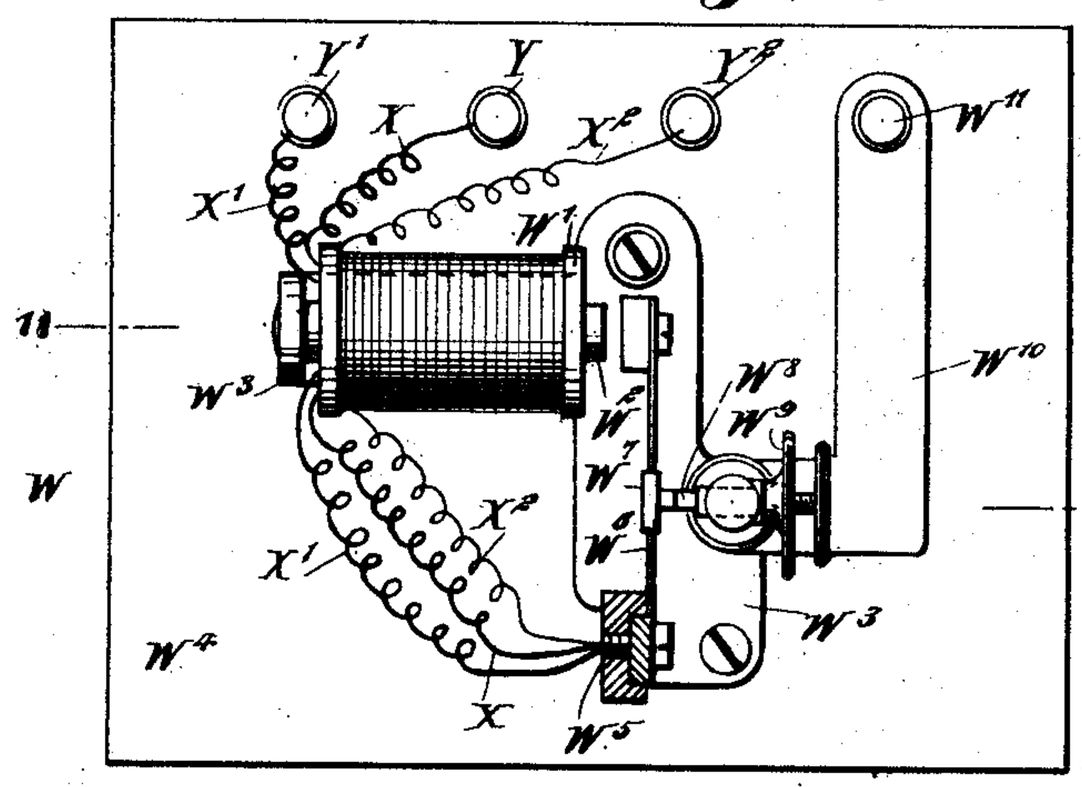
ELECTRIC IGNITER FOR EXPLOSION MOTORS.

(Application filed Oct. 14, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

Fig. 2.



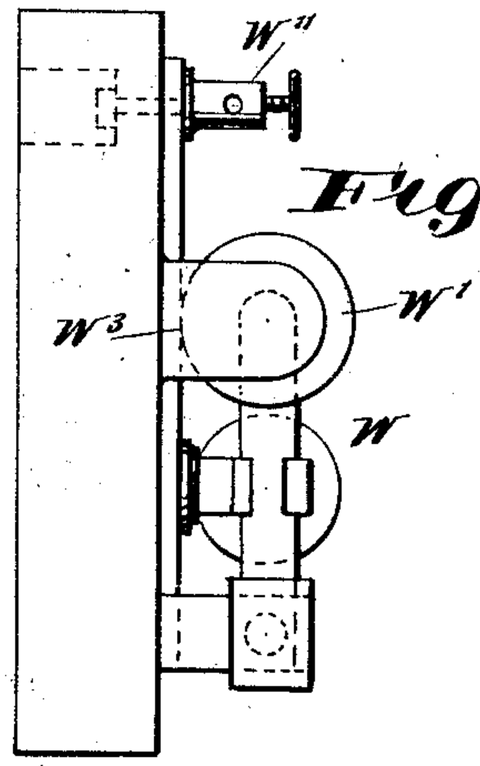


Fig. 3.

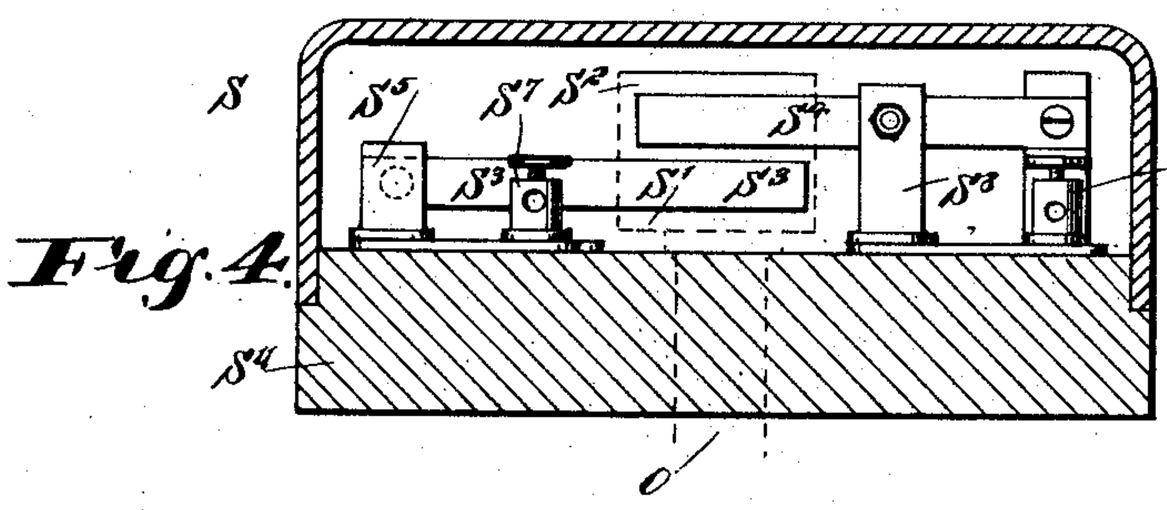


Fig. 4.

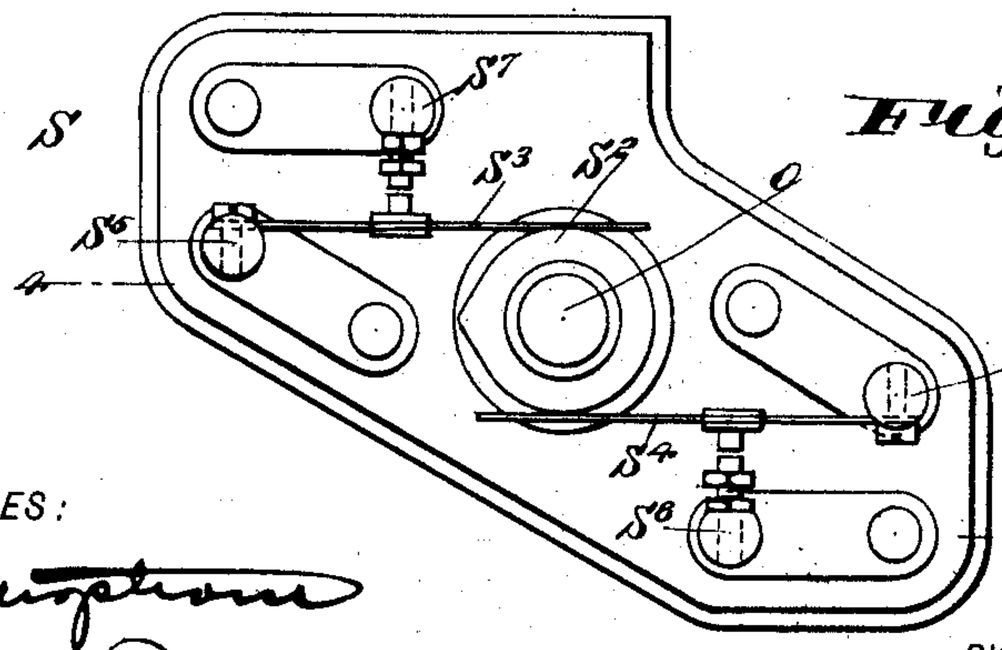


Fig. 5.

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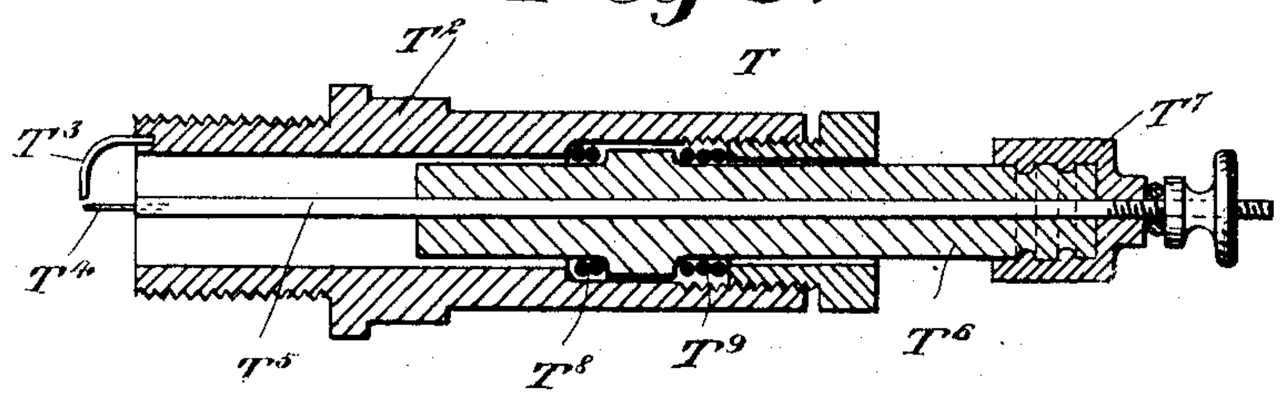
Fig. 6.



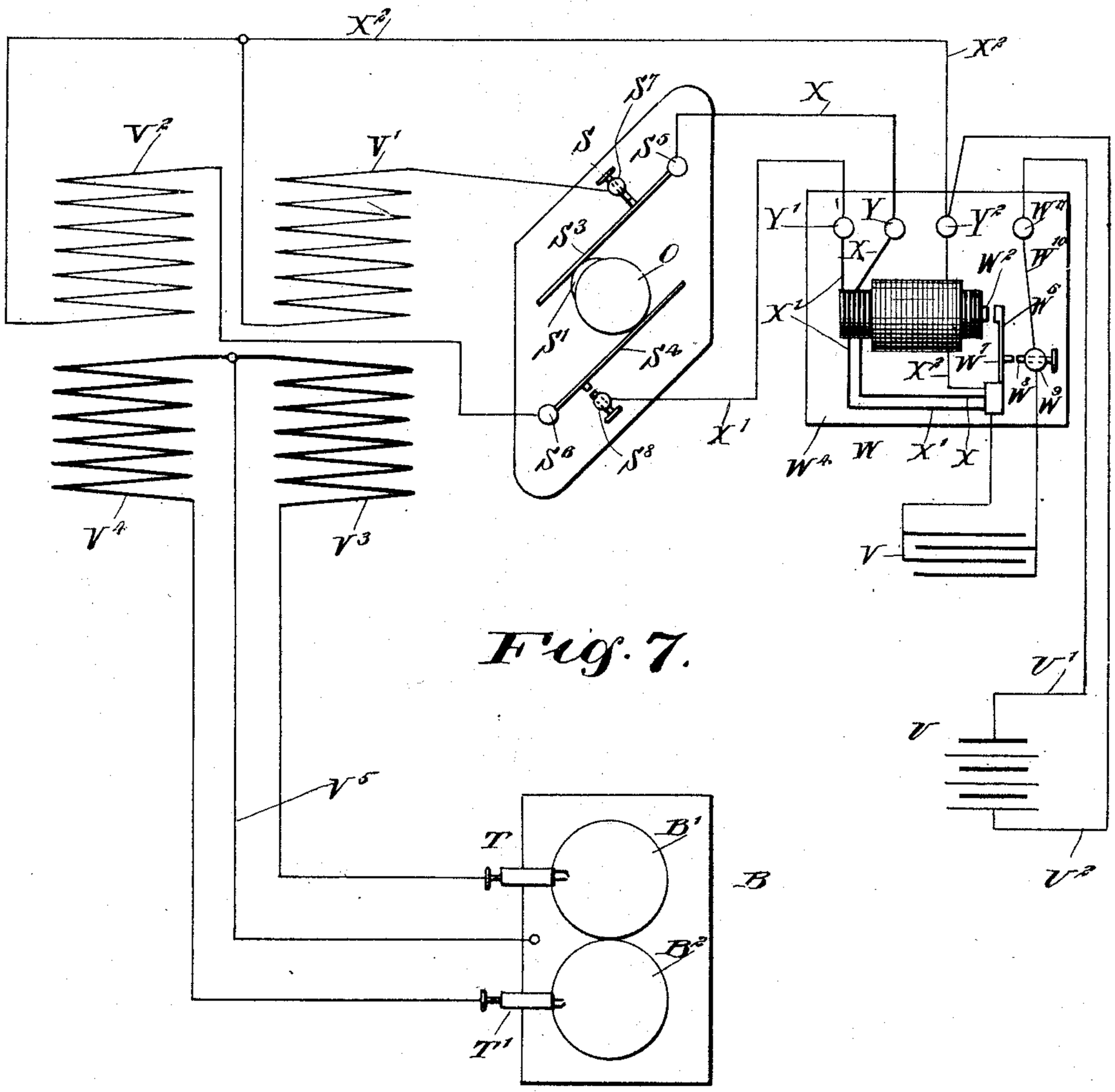


Fig. 7.

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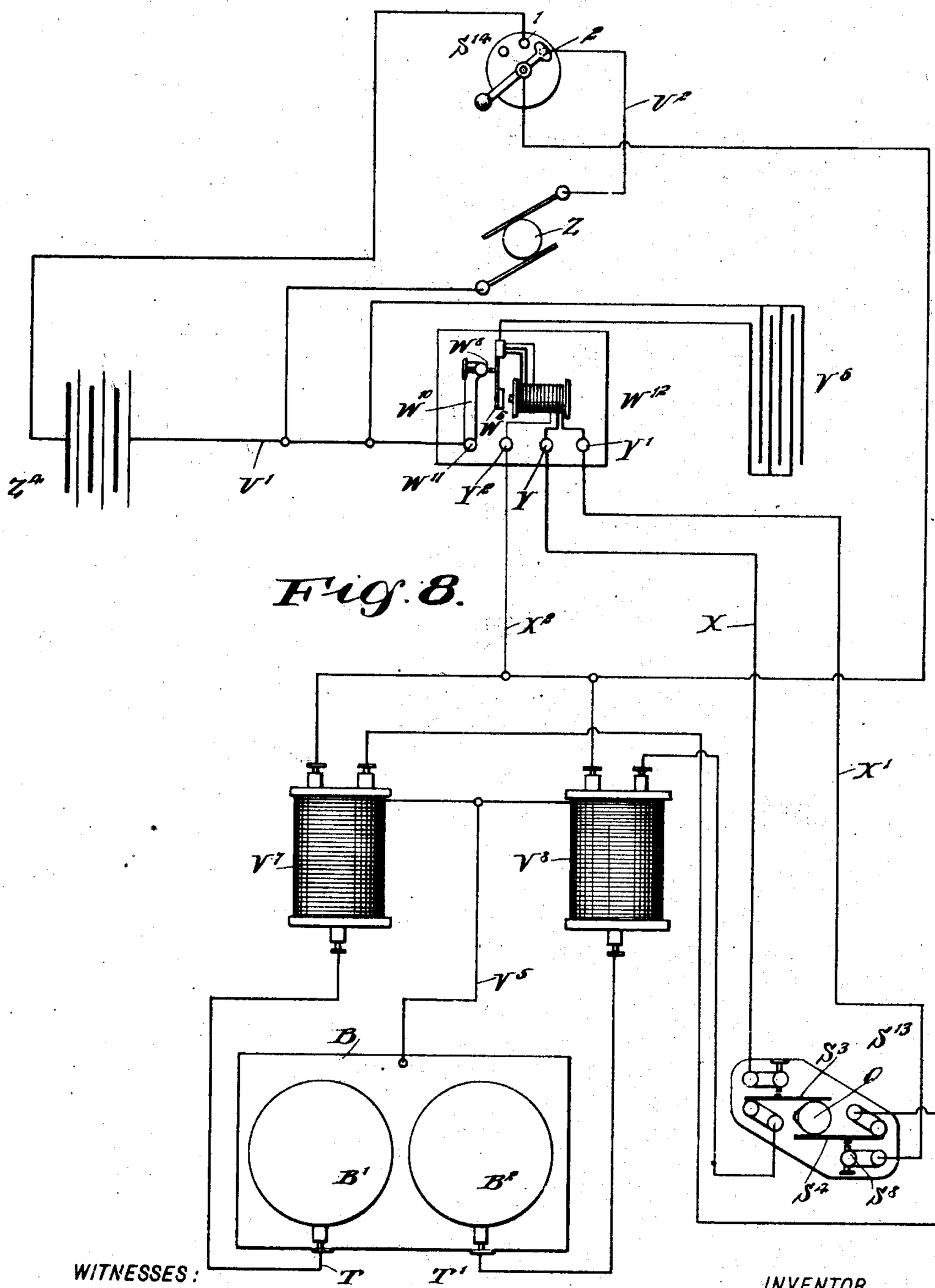

Fig. 8.

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UNITED STATES PATENT OFFICE.

CHARLES EDOUARD LUFBERY, OF CHAUNY, FRANCE.

ELECTRIC IGNITER FOR EXPLOSION-MOTORS.

SPECIFICATION forming part of Letters Patent No. 666,105, dated January 15, 1901.

Application filed October 14, 1899. Serial No. 733,591. (No model.)

To all whom it may concern:

Be it known that I, CHARLES EDOUARD LUFBERY, a citizen of the United States, residing at Chauny, Aisne, France, have invented a new and Improved Electric Igniting Device, of which the following is a full, clear, and exact description.

The invention relates to electrical igniting devices for igniting the explosive charges of gas or oil engines.

One object of the invention is to provide an electrical igniting device which is especially adapted for motors having a high speed, making, for instance, one thousand or more revolutions per minute, and which will cause an almost infallible ignition of the combustible charge when the piston is at the end of its compression-stroke, a result not likely to be obtained by vibrators of induction-coils.

A further object of the invention is to provide an igniting device of the character indicated which is simple and inexpensive.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of my invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional side elevation of the circuit-breaker for the electric igniting device, the section being on the line 1 1 in Fig. 2. Fig. 2 is a plan view of the same with part in section. Fig. 3 is an edge view of the same. Fig. 4 is an enlarged sectional plan view of the commutator for the electric igniting device, the section being on the line 4 4 in Fig. 5. Fig. 5 is an end view of the same. Fig. 6 is an enlarged sectional side elevation of the electrodes for the electric igniting device. Fig. 7 is a diagrammatic view of the electric igniting device with a battery as the source of electricity, and Fig. 8 is a like view of the electric igniting device with a dynamo as the source of electricity.

In the drawings the igniting device is shown applied to a two-cylinder explosive-engine and as being controlled by a cam-shaft which is to be operated from the main shaft of the engine in any suitable manner.

The igniting device shown in Figs. 1, 2, 3, 4, 5, 6, and 7 of the drawings consists, essentially, of the commutator S, located at one end of the cam-shaft O, spark-producers or igniters T T′ for the cylinders B B′, respectively, a source of electricity U, such as a Leclanché battery, a condenser V, and a vibrator or interrupter W.

The vibrator W (shown in detail in Figs. 1, 2, and 3) is provided with a wooden bobbin W′, which incloses an iron core W^2, carried on a metallic bracket W^3, attached to a block of wood W^4, secured to the vehicle-body at a convenient place. On the bobbin W′ are arranged two coils X X′ of wire of nine-tenths of a millimeter in diameter covered with cotton, wound together from one end of the bobbin back to the same end, so as to form two layers. Over these layers is wound a silk-covered wire X^2 of fourteen-hundredths of a millimeter in diameter. This wire X^2, which fills the bobbin W′, has much greater length and resistance than the wire X X′. The three wires X X′ X^2 are attached at one end to separate binding-posts Y Y′ Y^2, respectively, and their other ends are secured to a screw W^5, engaging an armature W^6 for the core W^2, said armature being in the form of a plate-spring secured at one end to an upturned part of the bracket W^3. Near the middle of the armature W^6 is arranged a platinum pin W^7, adapted to make contact with a platinum screw W^8, held in a post W^9, insulated from the bracket W^3 by mica washers or the like, but connected by a brass plate W^{10} with a binding-post W^{11}. The post W^{11} is connected to the positive terminal of any source of electricity U by wire U′, while the negative terminal is connected by the wire U^2 with the post Y^2. The wires X X′ are traversed by two currents from the same source, but form parts of two distinct circuits, in each of which is inserted the primary of an induction-coil and a commutator. (See Fig. 7.) The commutator consists, essentially, of the cams S′ S^2, insulated on the cam-shaft O, and the cams are adapted to engage spring contact-plates S^3 S^4, respectively, held on posts S^5 S^6 and adapted to make contact with posts S^7 S^8, respectively. The post S^5 is connected by the wire X with the binding-post Y, and the post S^8 is connected by

the wire X′ with the binding-post Y′. The binding-post S^7 is connected with the primary coil V′ of an induction-coil, and the post S^6 is connected with the primary coil V^2, both primary coils being connected by the wire X^2 with the post Y^2. The secondary coils V^3 V^4 of the induction-coils are connected with spark-producers T T′, respectively, and by a wire V^5 with the body of the gas-engine B, as is plainly indicated in the said Fig. 7.

Each of the spark-producers or igniters T T′ (shown in detail in Fig. 6) is provided with a metallic tubular casing T^2, screwed into the body of the engine, and carries at its inner end an electrode T^3, extending into the working chamber of the corresponding engine-cylinder. The spark is produced between the electrode T^3 and the electrode T^4, of which the latter is secured on a metallic rod T^5, extending through a porcelain body T^6 and secured to the outer end thereof by a suitable cap T^7, preferably made of an alloy of lead with twenty-five per cent. of antimony. This cap is preferably cast around the porcelain body. (See Fig. 6.) The porcelain body T^6 is held between two asbestos packings T^8 T^9 in the tubular casing T^2, and the inner end of said body T^6 is a suitable distance away from the inner end of the casing T^2, so that this inner portion of the casing forms a chamber which readily fills with an inert gas to prevent short-circuiting by soot on the porcelain body of the igniter. It is evident that the porcelain body is a distance away from the direct action of the explosion-flame in the cylinder and is separated therefrom by a layer of inert non-combustible gas, so that deposit of soot is impossible even should the carbureted gas be below the standard. The circuit of the fine wire X^2 is closed to the source of electricity, owing to its resistance taking a very small current, but is still sufficient to maintain rapid vibration of the armature W^6. If the circuit of the wire X is closed by its commutator, the cam S′, engaging the contact-plate S^3, then there is obtained in it and in the corresponding primary V′ of the induction-coil a succession of currents, setting up induction in the secondary of the coil V^3, so that a spark is produced between the electrodes T^3 T^4 of the spark-producer T. In a similar manner a spark is produced between the electrodes T^3 T^4 of the spark-producer T′ when the commutator-cam S^2 makes contact with the plate S^4, so that the current in the primary V^2 induces a current in the secondary V^4, connected with the spark-producer T′. When the engine is working, the fine wire X^2 of the interrupting-coil is always connected with the source of electricity and the vibrator W continually vibrates. Now as the cam-shaft O revolves the cams S′ S^2 make contact with their plates S^3 S^4, so that the inducing-current traverses alternately the induction-coils X′, but only at intervals of the moment of contact made by the cams, so that a dry battery of any approved construction may be the source of electricity, it being understood that a spark is immediately produced in either cylinder B′ B^2. The commutator S can be turned around relative to the cam-shaft O, which carries the cams S′ S^2, so that the moment of ignition can be varied to suit the speed of the motor.

In the arrangement shown in Fig. 8 the source of electricity is a dynamo Z. S^{13} is the commutator. W^{13} is the vibrator. V^6 is the condenser. Z^4 is the accumulator, and V^7 V^8 the induction-coils, having their secondaries connected with the spark-producers T T′ on the engine-cylinders B′ B^2. The object of the dynamo is to furnish electricity for the ignition of the engine and to recharge the accumulator, which is required for starting the engine, as the dynamo will furnish the current only when the engine is running at full speed—say from seven hundred to one thousand revolutions per minute. A switch S^{14} (shown in Fig. 8) is placed on the steering-rod in front of the operator, so as to enable the latter when the engine is running to effect the ignition of the explosive charges in the cylinders either by the accumulator or the dynamo. Thus when the switch-lever is in engagement with the contact-point 1 then the accumulator is in service, and when the switch-lever makes contact with the point 2 then the dynamo effects ignition. When the switch is placed in such position as to come in contact with both contact-points 1 and 2, then the dynamo effects the ignition of the explosive charge in the cylinder and at the same time recharges the accumulator. In case only one coarse wire is used it is necessary to make a connection between the wires X X′ and the posts Y Y′, and this connection will then be alternately traversed by the current going through the induction-coils, according to the contact then made by the cams on the cam-shaft acting on the contact-plates. The dynamo Z is preferably provided with a Siemens armature.

By means of my improved igniting device the ignition is positive and the device is better adapted for engines employed on motor-vehicles than the usual electrical igniting devices heretofore used.

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

1. An electric igniting device for explosion-engines, comprising an electrically-worked interrupter having its bobbin wound with a fine wire of great resistance constantly connected to the source of electricity for maintaining the vibrations of the interrupter, said bobbin also containing one or a plurality of coarse wires the current circulating through the coarse wire only at the moment of ignition, substantially as shown and described.

2. An electric igniting device for explosion-engines, comprising an interrupter having two wires, one of a great resistance and the

other of a low resistance, the wire with great resistance being constantly connected with the source of electricity, a circuit-breaker controlled by the engine and connected with said low-resistance wire, and an induction-coil having its primary coils connected with said circuit-breaker and said wire of high resistance, the secondary coils of the induction-coil being connected with the igniter, substantially as shown and described.

3. An electric igniting device for explosion-engines, comprising an interrupter having two wires, one of a great resistance and the other of a low resistance, the wire with great resistance being constantly connected with the source of electricity, a circuit-breaker controlled by the engine and connected with said low-resistance wire, an induction-coil having its primary coils connected with said circuit-breaker and said wire of high resistance, the secondary coils of the induction-coil being connected with the igniter, a dynamo as the source of electricity, an accumulator, and a switch under the control of the operator, for shunting either the dynamo or the accumulator, or for charging the accumulator from the dynamo and furnishing the current of the dynamo for the ignition, substantially as shown and described.

4. An electric igniting device for explosion-engines, comprising a dynamo, an accumulator, an interrupter, a circuit-breaker controlled by the engine, an igniter, induction-coils having their primaries connected with said circuit-breaker and their secondaries connected with said igniter, and a switch connected with said dynamo and said accumulator, substantially as shown and described.

5. In an electric igniting device for explosive-engines, the combination with an induction-coil having its secondary coil connected with the electrode, and a circuit-breaker controlled by the engine and connected with the primary of the induction-coil, of an interrupter, comprising a bobbin, an iron core, two coils on the bobbin, one of great resistance and the other of low resistance, the low-resistance coil being connected with the circuit-breaker, and the high-resistance coil connected with the primary of the induction-coil, an armature for the core of the bobbin, and with which the said coils are connected, a contact-pin carried by the armature and a contact-pin with which the pin of the armature is adapted to engage, and a source of electricity having one terminal connected with the last-named contact-pin and its other with the high-resistance coil, substantially as described.

6. In an electric igniting device for a two-cylinder explosive-engine, the combination with induction-coils having their secondaries connected with the electrodes respectively, and a circuit-breaker controlled by the engine and connected with the primaries of the induction-coils, of an interrupter, comprising a bobbin, an iron core, three coils on the bobbin, two of the coils being of low resistance and the third of high resistance, the low-resistance coils being connected with the circuit-breaker, and the high-resistance coil connected with the primaries of the induction-coils, an armature for the core of the bobbin and with which the said coils are connected, a contact-pin carried by the armature and a contact-pin with which the pin of the armature is adapted to engage, and a source of electricity having one terminal connected with the last-named contact-pin and its other with the high-resistance coil, substantially as herein shown and described.

CHARLES EDOUARD LUFBERY.

Witnesses:
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AUGUST OVERMAN.