Nov. 9, 1926. 1,606,264

L. SAIVES

DOUBLE IGNITION ARRANGEMENT FOR EXPLOSION MOTORS

Filed Feb. 20, 1923

Fig. 1

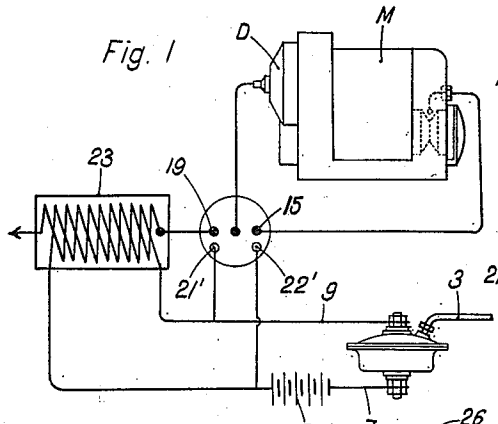


Fig. 2

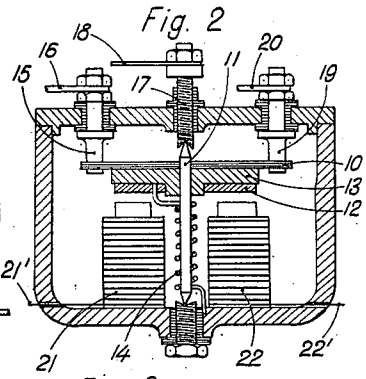


Fig. 3

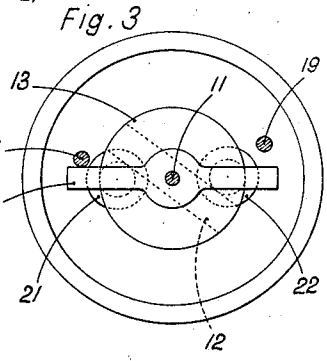


Fig. 4

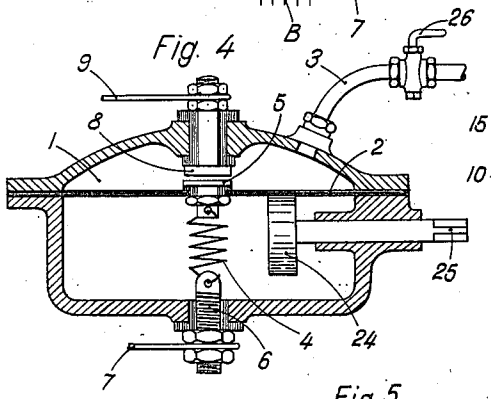
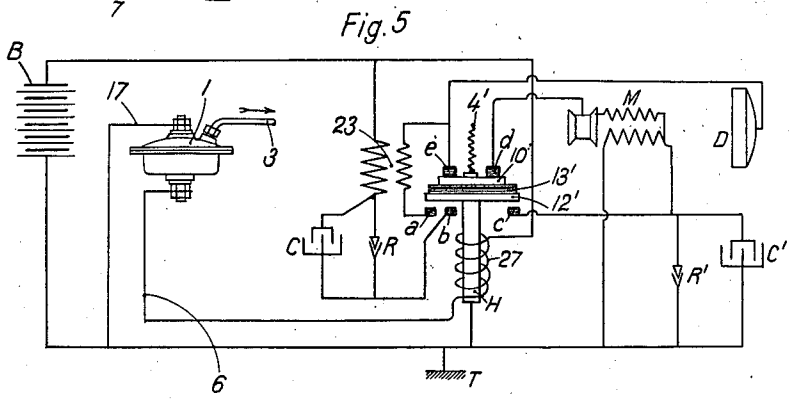


Fig. 5



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Patented Nov. 9, 1926. 1,606,264

UNITED STATES PATENT OFFICE.

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DOUBLE IGNITION ARRANGEMENT FOR EXPLOSION MOTORS.

Application filed February 20, 1923, Serial No. 620,214, and in France September 22, 1922.

This invention has for its object a double electric ignition arrangement for explosion motors. The arrangement comprises a magneto and a battery of accumulators which are utilized under definite conditions. The battery ensures the ignition for starting and working at low speeds of the motor whilst the magneto serves for high speeds. With the battery is combined an automatic apparatus the circuit of which is opened on stoppage of the motor. All the necessary connections to the different apparatus in circuit are operated automatically without the chauffeur having to intervene in order to effect this operation.

The accompanying drawings shew diagrammatically by way of example an arrangement in accordance with the present invention.

Figure 1 is a diagram representing the general arrangement of the double installation.

Figures 2 and 3 are respectively a vertical section and a plan of an automatic switch intended to start in the single distributor of the magneto the high tension current in the coil or that of the magneto itself.

Figure 4 represents the automatic interruptor which ensures on stopping the opening of the circuit of the accumulator.

Figure 5 is a diagram shewing a modified arrangement of the installation.

In order that the action of the arrangement as a whole may be clearly understood, it is considered desirable to give a summarized description of the apparatus.

The automatic interruptor of the circuit of the battery is of the type of apparatus described below. It essentially comprises, Figure 4, a chamber 1 closed by a flexible diaphragm 2 and communicating by means of a conduit 3 with the suction piping of the motor. The flexible diaphragm 2, which is subjected to the downward action of a spring 4, carries a central contact terminal 5 which communicates through the spring and the screw 6 thereof with the lead 7 connected to the circuit of the battery. Above the contact terminal 5 is a cover which closes the chamber 1 and which is provided with a contact terminal 8 connected by a lead 9 to the low tension circuit of a coil or transformer. When the motor is stopped there is no suction in the chamber 1 and the contacts 5 and 8 are apart. At the moment of starting, that is to say, when the suction attains its maximum in the suction conduit in consequence of the small opening of the throttle valve for the gases, the flexible diaphragm 2 is caused by reason of this suction to move upwards and establish contact between the terminals 5 and 8, that is to say, the insertion of the battery circuit in the low tension coil circuit. The ignition is then ensured by the battery. As soon as the motor is working the suction decreases in the suction pipe and for a definite value of the tension of the spring 4, the latter will overcome the suction starting from a certain speed and will open the circuit of the battery. The ignition will then take place by the action of the magneto alone. Whatever be the case the automatic interruptor above referred to will ensure stoppage of the motor as soon as there is no suction in the suction pipe, and the automatic opening of the circuit of the battery.

The automatic switch shewn in Figures 2 and 3 is of the following construction:—A rockable metallic lever 10 is mounted on a central pivot 11. It is rigid with an iron arm 12 from which it is insulated by a plate 13. The arm 12 is constantly subjected to the action of a spring 14 in such manner that one end of the lever 10 tends to bear against contact terminal 15 to which the current from the magneto is delivered by a lead 16. When the circuit is closed current passes through the lever 10 and the pivot 11 from the metallic stop of the latter and the wire 18 which is connected to the distributor of the magneto. The frame of the apparatus is provided at the opposite end of the lever 10 with a second contact terminal 19 to which current from the high tension winding of the coil is delivered through a lead 20. The iron arm 12 serves simultaneously as an armature to the electromagnets 21 and 22, the windings of which are disposed in parallel in the circuit of the battery.

The action is as follows:—

The position of the parts shewn in Figures 1, 2 and 3 corresponds to the condition of the motor when the latter is stopped. In the chamber 1 of the automatic interruptor, Figure 4, the suction is nil and the terminals 5 and 8 remain apart and the circuit of the battery B is open. Further, the motor being stopped, no current is delivered by the magneto M.

When the throttle valve is manipulated

to start the motor the suction becomes very great in the chamber 1. This actuates the flexible diaphragm 2 and establishes contact between the contact terminals 5 and 8; the low tension current from the battery flows into the primary winding of the coil 23. As soon as contact is established between the contact terminals 5 and 8 a parallel circuit 21′ and 22′ for the current from the battery B is inserted which includes the electromagnets 21, 22. These magnets attract the armatures 12, which are rigid with the pivot 11. The armature 12 tends by rotation to place itself in the diametrical plane of the electromagnets 21, 22. The contact is interrupted between the lever 10 and the contact terminal 15 whilst that it is established between the lever 10 and the terminal 19. The high tension current in the coil is transmitted by this terminal to the pivot 11, to the stop 17 of the pivot, then by the lead 19 to the distributor D of the magneto and from thence to the sparking plugs.

When the speed of the motor increases and exceeds the limit for battery ignition, the spring 4 comes into action in view of the decreased suction which then exists in the chamber 1 and the contact between terminals 5 and 8 is broken. The energization of the electromagnets 21 and 22 ceases and the spring 14 restores the lever 10 to a position against the contact terminal 15. The latter transmits then through the pivot 11, the stop 17 and the lead 18, the current from the magneto to the distributor of the latter, then to the sparking plugs.

The parts are then in the position shewn in the drawings which is therefore not only that of stoppage but also that of running at high speed.

Summarizing, the action presents the following characteristic features:

(1) On stoppage, the current from the battery is cut off. The latter is therefore cut out of circuit.

(2) At the moment of starting and during running at low speeds, the ignition is ensured by the battery.

(3) At high speed the ignition is ensured by the magneto.

In all these cases a single distributor, that of the magneto, serves as the intermediary for the delivery of current to the sparking plugs, which current may be either from the battery or from the magneto itself.

In practice it is desirable to complete this installation by arrangements having for their principal object to increase the safety of its working.

For this purpose the automatic interruptor, shewn in Figure 4, is provided with parts which permit of momentarily suspending its automatic action in case of need of current, the function of the automatic interruptor being to cut the battery out of circuit on stoppage of the motor. If the magneto fails it is necessary that the ignition by battery act continually and that contact may be permanently ensured between contact terminals 5 and 8. If, on the other hand, the battery be at fault or fails, it is convenient to render it impossible that the battery be placed in circuit.

The automatic interrupter is provided for the first case with an eccentric 24 which constantly bears on the flexible diaphragm 2 and which can be manipulated from the exterior by a knob 25. In the position shewn in the drawing and which is that of normal working, the eccentric 24 allows of the free movement of the flexible diaphragm 2. If the eccentric be turned through an angle of 180° the flexible diaphragm will be raised permanently and will constantly maintain the contact terminals 5 and 8 in contact. The battery only will then ensure the ignition.

In the case of default of the battery, the passage 3 connecting the chamber 1 to the suction pipe is provided with a cock 26 which is open during normal working. If it be found convenient to leave the battery constantly out of circuit because of its failure to deliver current, it will be sufficient to close the cock 26 and whatever may be the speed of the motor the chamber 1 is not under the action of suction, and the flexible diaphragm remains stationary and the contact between the terminals 5 and 8 is interrupted. The same occurs if the defect arises from the coil.

Figure 5 shews in a more complete form the diagram of an installation conforming to that of Figure 1 with the necessary parts which are provided in view of the following considerations:

(1) The primary current from the coil not being negligible, a spark might possibly pass on cutting out the automatic interruptor on suction which might interfere with the working of the whole system at the same time as the contacts would be quickly inserted. It is therefore advantageous to interrupt the primary current from the coil.

(2) It may be remarked that the magneto might operate continually and effect the working of the arrangement if the distance between the terminals of the high tension interruptor in the automatic switch be insufficient; it may also be advisable to short-circuit the primary current of the magneto in order to avoid this inconvenience.

The automatic interruptor is indicated at 1 as acting on the solenoid 27. 23 and M are the low and high tension windings respectively of the coil and of the magneto. C and C′ are the condensers associated with this apparatus and R and R′ indicate the interrupt-

ing arrangements. 4′ is a spring which acts to oppose the energization of the solenoid 27.

The core H of the solenoid is earthed as at T as well as the lower plate 12′ of the switch. The upper plate 10′ is insulated.

At low speeds the contact is established in the interruptor 1 operated by suction, the current of the battery energizes the solenoid 27, H is attracted and the plate 12′ comes into contact with the terminals *a*, *b*, *c*, thus short-circuiting the current which is earthed, that is to say:—

The primary winding of the magneto is short-circuited, its secondary winding is interrupted, and the primary circuit of the coil is closed as well as the secondary circuit.

At high speeds or on stoppage, the solenoid 27 unenergises, the spring 4 acts and through the upper plate 10 short-circuits *d*—*e*. The magneto then comes into action, the primary circuit through the coil being interrupted.

It should be clearly understood that the constructional form of switch shewn in Figure 5 is only given by way of example, in which the switch functions by the attraction of the core of a solenoid. It could be of the rotary type of Figures 1, 2 and 5, the connections being ensured by contact terminals arranged on the insulated disc 13′.

Other details could also be modified, in particular, the arrangements provided for stopping in one direction or the other, the automatic interruptor of the circuit from the battery. A single mechanical control could, in place of the cock 26 of the eccentric 24 shewn in Figure 4, immobilize or render stationary the flexible diaphragm in one or other of its extreme positions, that of permanent contact or that of permanent opening. The same result, consisting in causing only the battery or the magneto to act, could be obtained by means of the switch iself by immobilizing or rendering stationary through any suitable means the lever 10 in such manner as to maintain it in contact with one or other of the terminals 15 and 19.

Claims:

1. In a double ignition system for explosion motors, a battery for supplying current for starting and at low speeds, a magneto for supplying current at high speeds, and means including a suction operated interruptor for selectively placing either battery or magneto in circuit and for opening the battery circuit when the motor stops.

2. In a double ignition system for explosion motors, a battery for supplying current for starting and at low speeds, a magneto for supplying current at high speeds, a suction operated interruptor for placing the battery in circuit during starting and at low speeds, and opening the battery circuit when the motor stops or the speed increases, and an automatic switch for selectively conducting the battery or magneto current to the engine distributor in accordance with the operation of the interruptor.

3. In a double ignition system for explosion motors, a battery, a magneto, an automatic suction operated battery interruptor, and an automatic switch for conducting the current from the battery or the magneto to the engine distributor in accordance with the operation of the interruptor.

4. In combination with the structure defined in claim 3, means for suspending the operation of the interruptor and for closing the battery circuit.

5. In combination with the structure defined in claim 3, means for suspending the operation of the interruptor and for opening the battery circuit.

6. In combination with the structure defined in claim 3, means for avoiding the formation of sparks on opening of said suction operated battery interruptor.

7. In combination with the strucure defined in claim 3, means for short-circuiting the primary winding of said magneto when said magneto is not supplying current for ignition, as at starting or low speeds.

In testimony whereof I affix my signature.

LÉON SAIVES.