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SHORT CIRCUITING DEVICE FOR ELECTRICAL IGNITION APPARATUS.

APPLICATION FILED AUG. 26, 1919.

1,401,367. Patented Dec. 27, 1921.

Fig. 1.

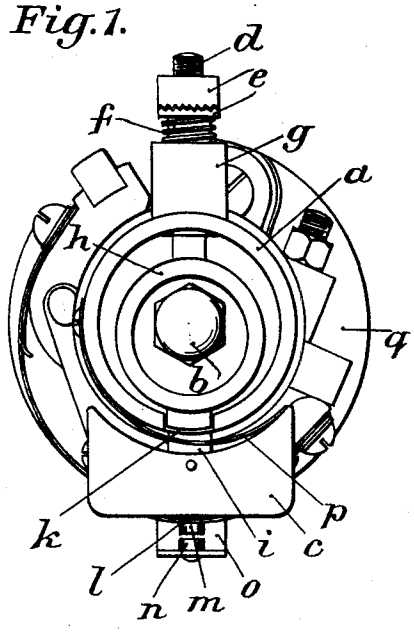


Fig. 3.

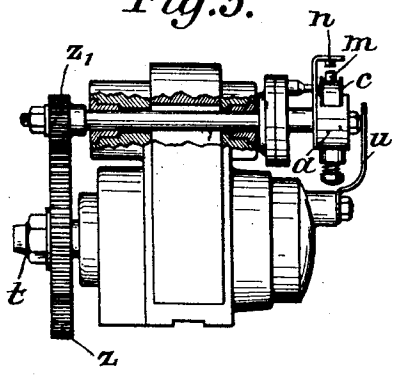
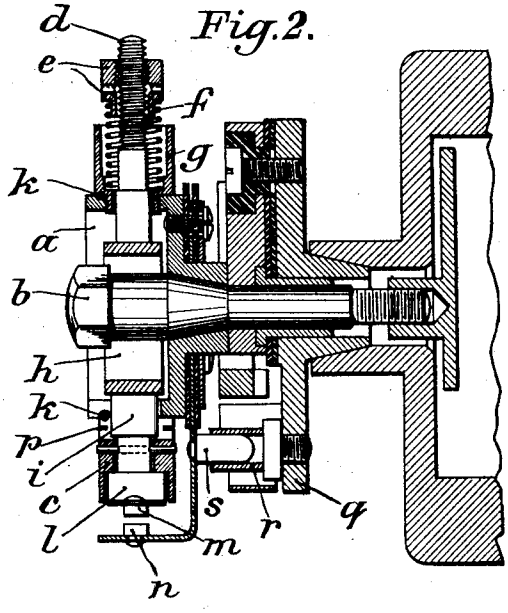


Fig. 2.



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UNITED STATES PATENT OFFICE.

MAX SCHÄFER, OF STUTTGART, AND ADOLF KRAUS, OF CANNSTATT, GERMANY, ASSIGNORS TO FIRM OF ROBERT BOSCH AKTIENGESELLSCHAFT, OF STUTTGART, GERMANY.

SHORT-CIRCUITING DEVICE FOR ELECTRICAL IGNITION APPARATUS.

1,401,367. Specification of Letters Patent. Patented Dec. 27, 1921.

Application filed August 26, 1919. Serial No. 320,060.

To all whom it may concern:

Be it known that we, MAX SCHÄFER, engineer, a citizen of Germany, residing at and whose post-office address is Stuttgart, Johannesstrasse 96, Germany, and ADOLF KRAUS, foreman, a citizen of Germany, residing at and whose post-office address is Cannstatt, Bryestrasse 8, Germany, have invented certain new and useful Improvements (for which we have filed applications in Germany, October 7, 1915; Germany, Aug. 30, 1918; Austria, March 27, 1916; Switzerland, May 26, 1919, and Sweden, May 30, 1919,) in Short-Circuiting Devices for Electrical Ignition Apparatus; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a short-circuiting device for electric ignition or sparking apparatus which short-circuits the ignition current by means of a fly-weight swung outward by centrifugal force on a certain adjustable speed of revolution being reached.

In the drawing a manner of carrying out the invention in connection with an interrupter is shown, Figure 1 representing an end-view and Fig. 2 a longitudinal section. Fig. 3 illustrates a short-circuiting speed governor that is geared to the ignition current magneto by spur-wheels

The cup-shaped casing *a*, which is furnished with a hub, and the interrupter are fastened by the interrupter screw *b* to the ignition apparatus in the well known manner. A hole is drilled at right angles to the axis of rotation through the casing *a* and this hole acts as a guide for a rod to which a fly-weight *c* is attached. The upper part of the rod has a thread onto which a known form of serrated coupling-nut *e* is screwed, the loose part of the latter being pressed against the threaded portion by a spiral spring *f*, the fly-weight being thus also pulled up against the casing when it is at rest. A bush *g* screwed into the casing *a* serves as a guide for the rod *d* and as a casing for the spiral spring *f*. The middle portion of the rod is shaped in the form of a ring *h* so as to enable the rod to pass around the fastening screw *b*. The lower part *i* of the rod, to which the fly-weight *c* is attached, is inserted in a guiding slot cut into the casing *a* and the part *i* is inclosed in this slot by an elastic or spring *k* that fits into a circular groove. This ring being easy to remove, the rod can easily be taken out of the casing, and besides it reduces the friction between the guide portions and the rod to a minimum. Attached to the fly weight *c* is a leaf-spring *l*, which in turn carries a platinum contact *m*, while the other platinum contact *n* is arranged on a support *o* screwed fast to, but insulated from, the casing *a*.

The electrical connection between the casing *a* and the fly-weight *c* is established by a strip *p* consisting of annealed copper sheet. A means for conducting the current from the casing *a* to the movable fly-weight *c* is thus obtained by which no additional tension is caused that would be likely to affect the adjustment of the fly-weight for a desired speed of revolution.

The current is conducted from the interrupter to the short-circuiting device through a slit thimble or sleeve *r* mounted upon the interrupter disk *q* and through a pin *s* that is arranged on the contact support *o* and fits into the said sleeve.

The manner in which short-circuiting device operates will be apparent from the drawing.

On the speed of revolution for which the tension of the spiral spring is adjusted being reached or exceeded the contact *m*, *n* will close and thus short-circuit the current from the interrupter so that ignitions in the engine will be suppressed and the speed of the engine lowered. As soon as it has sunk to a point where the tension of the spring *f* exceeds the centrifugal force the contact at *m*, *n* is opened and the regular ignitions recommence.

It has been found that in engines in which violent vibration occurs the fluctuations of the speeds at which the short-circuiting governor suppresses the ignitions are extremely large and that during the ignition-suppressing-operation irregular ignitions due to vibrations continue to occur, *i. e.* the short-circuiting governor opens the short-circuit and the speed of revolution of the engine rises considerably more than is desired after short-circuiting of the ignition current has taken place. In the device shown in Fig.

3 this drawback is removed by driving the short-circuiting governor at a higher speed than the ignition apparatus or magneto with the aid of a suitable speed-raising means such as spur wheels. By this means the centrifugal force of the fly-weight of the short-circuiting governor is considerably increased so that when a certain speed is reached the fly-weight securely closes and maintains the short-circuit of the ignition current in spite of the vibrations of the engine being more or less severe, thus preventing irregular ignitions and hence the considerable fluctuations in the speed of revolution of the engine due to the suppressing of ignitions.

The short-circuiting governor employed in the design shown, by way of example, in Fig. 3, may be of the type illustrated in Figs. 1 and 2 or of any other type. It is not fixed direct to the armature as in the case of Figs. 1 and 2, but is driven by the armature shaft t by gear wheels z, z' so as to revolve at a much higher speed than the said shaft. Hence, after the fly-weight has once reached the much higher speed of revolution at which the short-circuiting contact m, n is designed to be closed, its centrifugal force will be such as to keep the contact much more securely closed than in the above design when vibrations of the ignition apparatus occur, so that the irregular ignitions and the appreciable fluctuations of the speed of revolution of the engine, which are apt to occur when ignitions are suppressed, are prevented. The spring u conducts the ignition current from the armature to the interrupter.

Practical tests carried out with this device have shown that in the case of a benzin engine, for example, with a speed of revolution of about 1800 per minute the fluctuations due to suppression of the ignitions by the short-circuiting governor only amounted to about 20 to 25 revolutions per minute, while the flunctuations of the same engine, equipped with a short-circuiting governor mounted on the armature shaft or connected to the armature of the ignition magneto, amounted to about 200 per minute when ignitions were suppressed by the governor.

We claim:—

1. A short-circuiting device for electrical ignition apparatus comprising, a casing, a rotary interrupter disk adapted to be screwed to the said casing, a fly-weight, a mechanical spring connection between the fly-weight and the casing, a contact carried by the said fly-weight, a second contact opposite to the said fly-weight contact, a support fixed to the casing and supporting the second contact, a thimble mounted on the interrupter disk, and a current-conducting-pin attached to the said support and inserted in the said thimble.

2. A short-circuiting device for electrical ignition apparatus comprising, a cap-shaped casing, a rotary interrupter disk, a screw located in the center of the disk and holding the casing and the disk together, a fly-weight guide consisting of an upper rod, a lower rod and a ring-shaped bond joining the upper and lower rods, a fly-weight attached to the lower rod, a radial tube screwed into a radial threaded hole in the rim of the cap-shaped casing, the said screw passing through the ring-shaped bond, the upper rod extending through the radial tube, while the lower rod is guided in a radial slot in the said rim that is opposite to the said tube, an adjustable spring abutment on the said upper rod, a pressure spring abutting at its one end against the said abutment and holding the fly-weight guide with its fly-weight in a normal position, a contact carried by the said fly-weight, a second contact opposite to the said fly-weight contact, a support fixed to the casing and supporting the second contact, a thimble mounted on the interrupter disk, and a current-conducting-pin attached to the said support and inserted in the said thimble.

3. A short-circuiting device for electrical ignition apparatus comprising, a cap-shaped casing, a rotary interrupter disk, a screw located in the center of the disk and holding the casing and the disk together, a fly-weight guide consisting of an upper rod, a lower rod and a ring-shaped bond joining the upper and lower rods, a fly-weight attached to the lower rod, a radial tube screwed into a radial threaded hole in the rim of the cap-shaped casing, the said screw passing through the ring-shaped bond, the upper rod extending through the radial tube, while the lower rod is guided in a radial slot in the said rim that is opposite to the said tube, an adjustable spring abutment on the said upper rod, a pressure spring abutting at its one end against the said abutment and holding the fly-weight guide with its fly-weight in a normal position, a contact carried by the said fly-weight, a second contact opposite to the said fly-weight contact, a support fixed to the casing and supporting the second contact, a thimble mounted on the interrupter disk, a current-conducting-pin attached to the said support and inserted in the said thimble, and a flexible ring adhering by its contraction to the rim of the cap-shaped casing and constituting a border at the open end of the said slot that is cut into the said rim, thus forming a closed guide hole for the said lower rod.

4. A short circuiting device for electrical ignition apparatus comprising, a casing, a rotary interrupter disk adapted to be screwed to the said casing, a fly-weight, a mechanical spring connection between the fly-weight and the casing, a leaf-spring on

the said fly-weight, a fly-weight contact carried by the leaf-spring, a second contact opposite to the said fly-weight contact, a support fixed to the casing and a support therefor fixed to the casing and insulated therefrom, a thimble mounted on the interrupter disk, a current-conducting-pin attached to the said support and inserted in the said thimble, and an electrical connection between the fly-weight contact and the said casing, the electrical connection consisting of a ribbon made of annealed copper sheet.

5. A short circuiting device for electrical ignition apparatus comprising a casing, a rotary interrupter disk adapted to be screwed to the said casing, a shaft carrying the said interrupter disk and said casing and connected by gearings to the shaft of the ignition apparatus, said gearings being of such transmission ratio that the interrupter shaft operates at a speed higher than that of the ignition apparatus, a fly weight, a mechanical spring connection between the fly weight and the casing, a contact carried by the said fly-weight, a second contact, a support fixed to the casing and supporting the second contact, a thimble mounted on the interrupter disk and a current conducting pin attached to the said support and inserted in said thimble.

In testimony whereof we affix our signatures, in presence of two witnesses.

MAX SCHÄFER.
ADOLF KRAUS.

Witnesses:
ADOLF SIBBERS,
HERMANN SCHNEIDER.