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MECHANICAL INTERRUPTER FOR ELECTRICAL IGNITION SYSTEMS.

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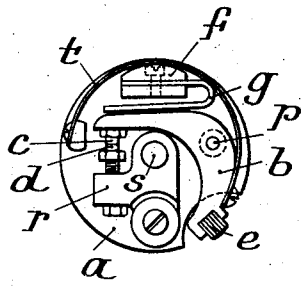
1,154,311. Patented Sept. 21, 1915.



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Application filed May 22, 1914. Serial No. 840,173.

Be it known that I, GOTTLOB HONOLD, a subject of the Emperor of Germany, residing at and whose post-office address is Militärstrasse 4–8, Stuttgart, Germany, have invented certain new and useful Improvements in Mechanical Interrupters for Electrical Ignition Systems; and I 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.

The present forms of rotary mechanical interrupters for electrical ignition systems are effective for producing sparks at the spark plugs when the internal combustion engine is running at the usual speeds of operation, but they often become unreliable and even inoperative at times when the speed increases to a high value, five thousand revolutions per minute or more, as happens in the case of racing cars in speed contests, and more especially where the engines have four or more cylinders. Under this abnormal condition of operation, the actuating cams of the mechanical interrupter act with such violence and so quickly on a movable electrode that the latter reaches the limiting position of its outward throw very quickly and with a comparatively great shock, so that in going back toward its normal position it either strikes the cam before the cam is out of the way and thus has a second rebound therefrom, or else it rebounds from the limiting position of its inward throw with sufficient force to cause a shock and consequently a chatter. In those cases, the ignition circuit is not reliably opened or closed at the desired instant, the ignition being interfered with or rendered ineffective. If an abutment limiting the outward throw of the movable electrode is arranged so as to provide for the proper interval of the ignition period, then the abutment is so close to the movable electrode that the latter would be broken off at the abnormal speeds referred to as a result of the violent impact, whereas if the spring which returns the movable electrode to its normal position is used as an abutment limiting the outward movement of the electrode, then the normal action of the spring is prevented.

The object of the present invention is to provide a mechanical interrupter of this type which operates effectively as heretofore under the usual conditions of moderate speeds of the engine, and as is free from the objections at the abnormal speeds as noted.

In accordance with my invention, a resilient abutment is so arranged that the movable electrode is damped only when its movement becomes excessive as a result of abnormally high speeds of the engine, the normal movement during moderate speeds of rotation not being interfered with.

In the preferred form of construction, a spring is arranged in proximity to, but out of engagement with, the movable electrode when the latter has its normal position of rest, and such that the movable electrode does not engage the spring in its outward throw from this position until the speed of the engine reaches an excessive value, whereupon the more violent movement of the electrode is damped in such manner as to preclude the occurrence of the difficulties hereinbefore mentioned.

In the accompanying drawing, I have illustrated the preferred form of my invention in combination with a rotary mechanical interrupter, wherein the movable electrode is separated from the coöperative electrode to bring about the generation of an ignition voltage in the armature winding of an ignition current generator, as an example.

The interrupter disk *a* is fastened upon the rotatable shaft *s* of the ignition current generator, and the electrode *b* is pivoted at *p* upon the disk while the electrode *r* is fastened upon the disk and insulated therefrom, so that the interrupter contacts *c* and *d* are capable of being moved into and out of engagement with each other. The pivoted electrode *b* is provided with the fiber block *e*, which projects outwardly from the cam disk and is adapted to be moved inwardly during rotation of the interrupter disk by one or more normally stationary actuating cams (not shown) in order to bring about the separation of the interrupter contacts *c*, *d* and thereby interrupt the circuit of the armature winding of the ignition current generator. The spring *t* is fastened to the pivoted electrode *b* and is arranged in such manner that it tends to hold the interrupter contacts *c*, *d* in engagement and to bring them back into en-

gagement from an open position with the desired force and pressure. The rigid abutment *f* is fastened to the interrupter disk *a*, and the flat spring *g* is fastened to the abutment. This spring is stiff compared with the spring *t* and is so bent that when the interrupter contacts *c*, *d* are in engagement, it is separated from the back of the pivoted lever by a small amount of clearance.

When the shaft *s* is rotating at a speed corresponding to a moderate speed of the internal combustion engine with which the ignition system is associated, the pivoted lever *b* is deflected upon engagement of the fiber block *e* and one of the actuating cams by such an amount that the spring *g* is not quite engaged. In this way, the normal action of the pivoted electrode *b* is not interfered with by the spring *g*, and thus the movement of the electrode is not damped. However, when the speed of the shaft *s* increases beyond the normal value, the throw of the pivoted electrode is sufficient to bring it into engagement with the spring *g*. The outward movement is then damped in such manner as to prevent shock and rebound of the pivoted electrode from the cam and from the other electrode, thereby avoiding the difficulties resulting from opening the ignition circuit two or more times at each sparking period. It is apparent, therefore, that during normal speeds of the shaft *s*, the comparatively weak spring *t* acts alone to return the pivoted electrode *b* into its normal position of engagement with the electrode *r* without rebound, whereas during speeds greater than the normal, the spring *g* damps the excessive outward movements of the pivoted electrode and thereby effects the same reliability and effectiveness in operation as before.

The resilient abutment formed by the spring *g* fastened to the block *f*, may be replaced, if desired, by a damping structure made up of a coiled spring, or a rubber pad, or the like, provided that the arrangement of the resilient abutment is such that it damps the movement of the pivoted electrode only when the outward throw becomes excessive as a result of abnormally high speeds of rotation.

Having thus described my invention, what I claim is:

1. In a rotary mechanical interrupter for electrical ingnition systems, normally engaged interrupter electrodes one of which is mounted for disengagement from the other, a spring tending to hold the electrodes in engagement, and a resilient abutment which is disengaged from the relatively movable electrode when the electrodes are engaged and which is engaged by the relatively movable electrode only upon excessive movement thereof.

2. In a rotary mechanical interrupter for electrical ignition systems, an interrupter electrode mounted on a pivot, a coöperative interrupter electrode, a spring tending to hold the electrodes in normal relation, a rigid abutment, and a damping member interposed between the abutment and the pivoted electrode and being out of engagement with the latter when the electrodes have their normal relation.

3. In a rotary mechanical interrupter for electrical ignition systems, an interrupter electrode mounted on a pivot, a coöperative interrupter electrode, a spring tending to hold the electrodes in normal relation, and a damping spring which is stiff compared with the other spring and which is normally out of engagement with the pivoted electrode when the electrodes have their normal relation.

4. In a rotary mechanical interrupter for electrical ignition systems, an interrupter electrode mounted on a pivot, a coöperative interrupter electrode, a spring tending to hold the electrodes in normal relation, a rigid abutment, and a flat spring fastened to the abutment and extending to a position in proximity to, but out of engagement with, the pivoted electrode when the electrodes have their normal relation, in order to damp only the excessive movements of the pivoted electrode relatively to the coöperative electrode.

In testimony whereof I affix my signature, in presence of two witnesses.

GOTTLOB HONOLD.

Witnesses:
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