

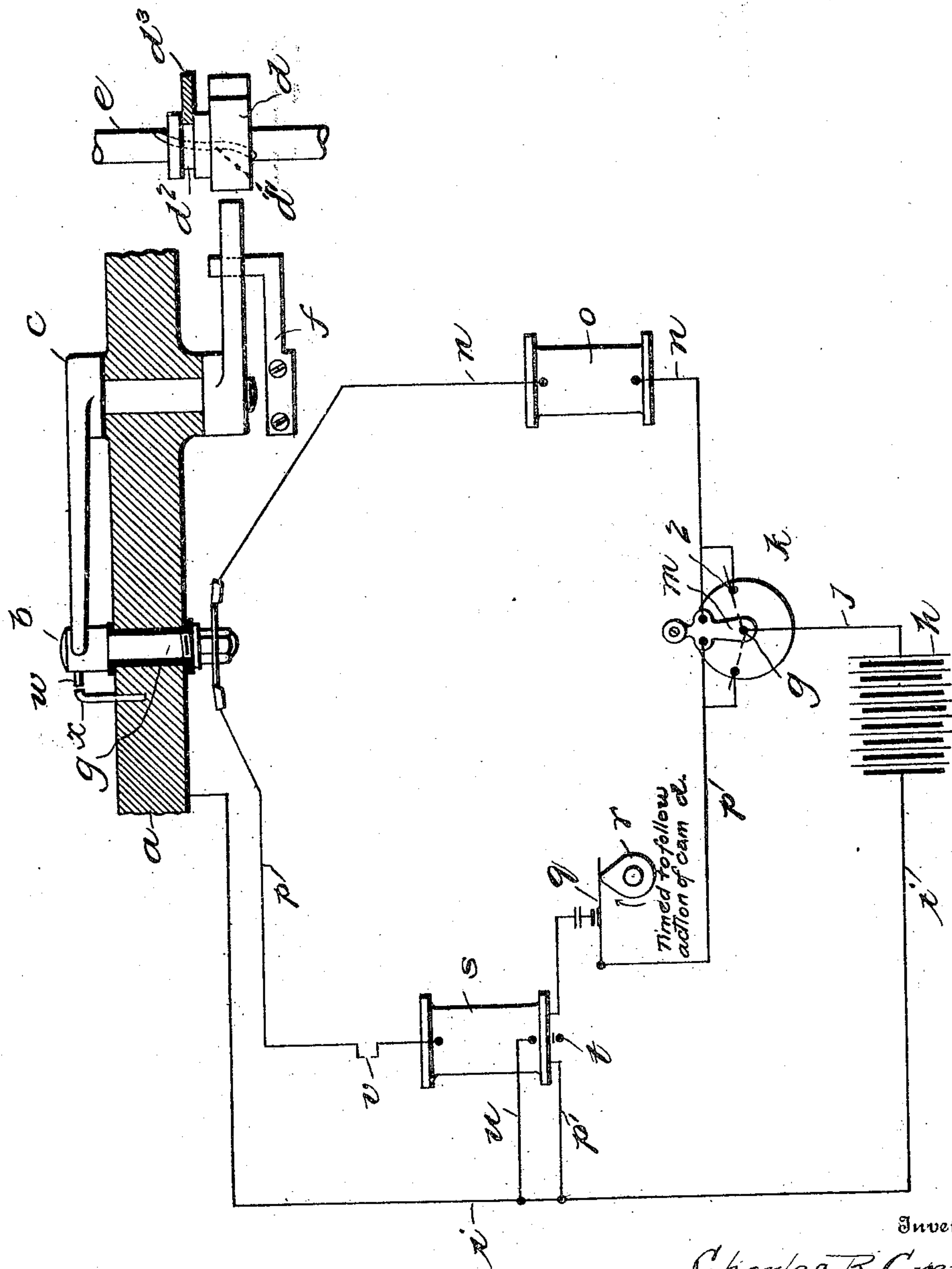
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PATENTED DEC. 31, 1907.

C. R. GREUTER.

COMBINED JUMP SPARK AND CONTACT SPARK DEVICE.

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COMBINED JUMP-SPARK AND CONTACT-SPARK DEVICE.

No. 875,258.

Specification of Letters Patent.

Patented Dec. 31, 1907.

Application filed June 5, 1906. Serial No. 320,324.

To all whom it may concern:

Be it known that I, CHARLES R. GREUTER, a citizen of the United States, residing at Wilkes-Barre, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Combined Jump-Spark and Contact-Spark Devices, of which the following is a specification.

This invention relates to improvements in electric igniters for internal combustion engines, the object thereof being to provide a combined contact-spark and jump-spark device which may be used either singly or combined.

It is well known that the ignition of the explosive mixture in internal combustion engines frequently gives much trouble from no readily apparent cause, and the larger the engine and the greater the number of cylinders operating on the same crank-shaft, the greater is the effect of the skipping of the spark. It not infrequently happens in multiple cylinder machines that some one cylinder alone will give trouble in this respect, the charges in the others igniting in proper sequence.

By means of this invention means are provided whereby if the ignition is imperfect in using the contact-spark, the jump-spark may be switched in in place thereof, or vice versa; or, in case the explosive is of low grade, it is possible to switch on both the contact and jump-sparks, one being operated an instant in advance of the other preferably.

In carrying out my invention, I ground one terminal of the jump-spark and one electrode of the contact-spark, and insulate the other terminal of the jump-spark on the plug which constitutes also the second terminal of the contact-spark. One plug therefore serves for both systems. The wiring from the battery to the plug for each system will be described in its proper place.

The drawing accompanying this application consists of a sectional view of a portion of the wall of a cylinder, showing sparking electrodes, and a diagrammatic view of the electrical connections and appliances associated with the latter.

Referring to these drawings, *a* indicates a portion of the cylinder of an internal combustion engine; *b* indicates the spark-plug; *c* the electrode, and *d* a cam mounted on a shaft *e* to periodically trip the electrode.

whereby contact may be made and broken with the spark-plug. In the diagrammatic view the cam *d* is illustrated as having a spiral splined connection *d'* with the shaft *e* and provided with a grooved hub portion *d''* adapted to be engaged by an adjusting element *d'''* which constitute means for adjusting the position of the cam *d* axially for effecting a variation in the time of sparking, but as these particular means for accomplishing this result form no part of the present application, they are simply indicated in the diagrammatic view for illustrative purposes.

The electrode is moved into contact with the plug by the action of any suitable spring, as *f*. The spark-plug *b* is insulated from the cylinder in the usual manner, said insulation being indicated by *g* in the drawing.

h indicates a battery or suitable source of electricity, and *i* indicates an electrical connection connecting one pole of said battery with the cylinder of the motor or with some other part of the machine on which the cylinder is mounted.

From the opposite side of the battery or source of electricity, a line *j* runs to a three-way switch *k* the latter comprising the switch-lever *m* the functions of which will be described further on, suffice it to say that from this switch two circuits run to the spark-plug *b*. One of these circuits comprises the line *n* and the spark-coil *o*. The other circuit comprises the line-wire *p*, an interrupter consisting of a pivoted lever *q*, and a cam *r* whereby the circuit is opened and closed, the rotation of the cam being substantially in time with the vibratory movements of the electrode *c*. As a matter of fact, however, the operation of the electrode *c* is slightly in advance of the interruption of the circuit by the cam. Between this interrupter and the spark-plug is located an induction coil *s* provided with a vibrator *t*, the interrupter being connected to the primary winding of the coil, and from thence by line *p'* with the line *i*. The secondary winding of the coil *s* is also connected with the line *i* by the wire *u*, the other terminal of the secondary being connected by the continuation of the line *p* with the spark-plug, a spark-gap *v* being located between the coil *s* and the plug. In the latter, a wire *w* is inserted and in the cylinder another wire *x*, the extremities of these two wires being con-

tiguous one to another as shown, both being provided with the usual platinum points.

By following the course of the various circuits just described, it will be seen that with the switch lever *m* in the position in which it is shown in the drawings, there will be produced on the plug *b* one spark by means of the operation of the electrode *c*, and a second spark between the terminals of the wires *w* and *x*, the latter being a jump-spark and being produced by the interruption of the line *p* through the coil *s* by the rotation of the cam *r*. This cam is designed to be carried by any suitable shaft of the engine and is so timed in its rotation as to follow the action of the cam *d* whereby the contact-spark is operated a little in advance of the jump-spark. When it is desired to cut out the jump-spark, using the electrode alone, the switch-lever *m* will be thrown to the right swinging on the post *y* and will bridge the space between said post and the post 2, thereby cutting out the line *p* and cutting in the line *n*. Similar movement of the lever to the left will cut out the line *n* and render the contact-sparking devices inoperative and cut in the line *p*.

It is seen from the foregoing description that this construction is so arranged that either the contact-spark or the jump-spark may be used separately, or that both of them may be used together; in the latter case, however, the contact-spark, as already stated, is operated a little in advance of the jump-spark.

It is to be understood that the devices shown herein are illustrated in a conventional and diagrammatic form, and their arrangement may be varied without causing any change in the operation of the device.

I claim:

1. In an internal combustion engine, a

contact-sparking device, and a jump-spark device, and one spark-plug in the cylinder constituting the common terminal for said sparking devices, and means to operate said two devices either singly or in substantial unison.

2. In an internal combustion engine, an electric igniter comprising a jump-spark device and a contact-sparking device each being comprised in a suitable electrical circuit, means to make and break each of said circuits periodically, either separately or in substantial unison.

3. The combination with the cylinders of an internal combustion engine, of a spark-plug located in the wall thereof in the usual manner; an electrode, and devices to reciprocally move the same against and away from the plug, an electric circuit comprising a source of electricity, and a suitable spark-coil, said plug and electrode constituting the terminals of said circuit, together with a second circuit comprising an induction coil, and a source of electricity, and an interrupter in said second circuit to make and break the latter, said spark-plug constituting one terminal of said second circuit, the opposite end of the circuit being grounded on the cylinder.

4. The combination in an internal combustion engine, of two sparking devices included in circuits carrying primary and secondary currents respectively, and means to actuate said devices substantially at the same time, or separately.

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

CHAS. R. GREUTER.

Witnesses:

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