

No. 867,211.

PATENTED SEPT. 24, 1907.

A. L. RIKER.

CIRCUIT MAKING AND BREAKING DEVICE.

APPLICATION FILED JAN. 18, 1904.

Fig. 1.

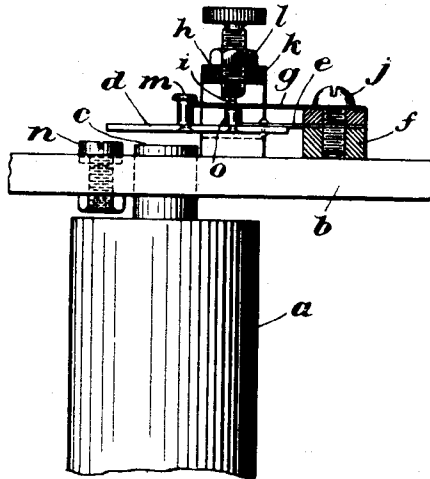
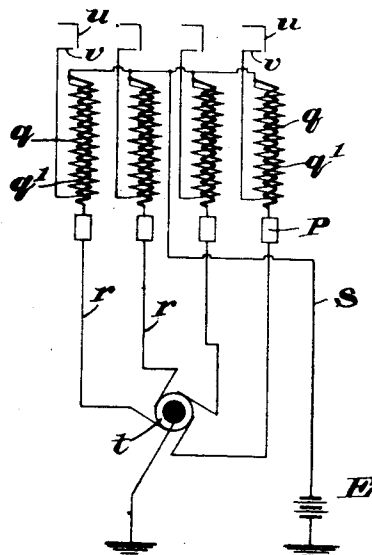


Fig. 2.



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UNITED STATES PATENT OFFICE.

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CIRCUIT MAKING AND BREAKING DEVICE.

No. 867,211.

Specification of Letters Patent.

Patented Sept. 24, 1907.

Application filed January 18, 1904. Serial No. 189,421.

To all whom it may concern:

Be it known that I, ANDREW L. RIKER, a citizen of the United States, and a resident of Bridgeport, county of Fairfield, and State of Connecticut, have invented
5 an Improvement in Circuit Making and Breaking Devices, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention consists in an improved electric circuit
10 making and breaking device, being particularly adapted for application to vibrators or tremblers, such as are used in the sparking circuits for internal combustion engines and the like.

My invention will be best understood by reference
15 to the following description when taken in connection with the accompanying drawing of one specific and illustrative embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings,—Figure 1 is a view partially in section and partially broken away, showing the application of my invention to the vibrator of a sparking circuit; and, Fig. 2 is a diagrammatic view illustrating the connections of the sparking circuits for a multiple
20 cylinder engine and showing the relation therein of the improved vibrator illustrated in Fig. 1.

In the embodiment of my invention selected for illustration herein and shown in the drawing, *a* represents the usual sparking coil, which is customarily contained within the inclosing walls of a casing of which
30 the wall *b* only is shown, the latter being preferably of insulating material. The core *c* of the sparking coil or electro-magnet *a* projects through the wall *b*, suitably located respecting position and distance to attract the armature *d* when energizing current from the battery
35 or other source of electro-motive force passes through the helices of the primary of coil *a*. The armature *d* is preferably secured to a resilient member, such as the flat spring *e*, clamped to the stationary support *f*, to suitably permit vibratory movement of the armature
40 member *d*, during the interrupted reoccurring current impulses in the primary of the coil *a*.

Appropriate current controlling means in the primary of the coil *a* are shown comprising the resilient contact carrying member *g*, herein also a leaf spring, and a
45 fixed though preferably adjustable contact carrying member *h*; the said members *g* and *h* carrying each one member of the two coöperating contacts, *i*, *i*. For simplicity the spring *g* is secured to the same support *f* as the flat spring *e* by a binding screw *j* or other appropriate means. The member *h* is preferably screw
50 threaded to engage coöperating threads in the overhanging supporting yoke, *k*, for the purpose of adjustment, the lock nut *l* being also preferably provided. Connections are normally established to the supports

f and *k*, to include the contact members *i*, in series with
55 the circuit to be interrupted, which is herein the circuit of the primary coil, the normal position of said members being that shown in Fig. 1, when the circuit at that point is closed. On the passage of current through the primary coil, energization of the magnet
60 core *c* results, effecting an attraction of the armature *d*. The latter is provided with a stud *m*, normally out of engagement with the spring or other contact carrying member *g*, but provided with an overhanging head to cause engagement between the same and said spring,
65 after the armature has started its inward or attracted movement, to thereby cause the quick and positive separation of the contacts *i* and the interruption of the primary circuit. Since there is normally an appreciable movement by the armature before engagement
70 of the stud *m* with the spring *g*, the armature will acquire an appreciable momentum before said engagement takes place, and consequently causes both an instantaneous and a certain interruption of the circuit at the contact members *i*, by reason of the impact of
75 the stud *m* against the contact carrying spring *g*. The inward movement of the armature may be limited in any desired way, but a suitable adjustable stop, *n* is here shown for that purpose.

On the interruption of the primary circuit caused by
80 the separation of the contact members *i*, the magnet core *c* is deenergized, so that immediately on the completion of its inward movement, reverse armature movement is caused under the tension of its spring, the acquired momentum causing the armature, however, to
85 overthrow or pass by its normal position shown in Fig. 1, and to strike the contact carrying spring, *g*, and the contact carried thereby, a sharp blow, through the stud *o*, which is carried by the armature immediately opposite the point of attachment to the spring of the contact
90 *i*, after which the armature tends to return to the normal position shown in Fig. 1. The force with which the two contacts are driven together, caused by the gathered momentum of the armature on its outward or return movement, and the impact thereof upon the contact carrying member *g*, provides for a sure and certain
95 making of the circuit at that point. Moreover, it will be evident, as has been found in practice, that foreign matter upon the surface of the two contacts tending to insulate them from each other, such as dirt, rust, or
100 carbonized matter, will be crushed or broken, while enveloping films of oily or insulating matter which may gather upon the contacts are punctured and rendered ineffective to disturb the positive and quick making of the circuit on the meeting of the contacts.

Since the result of the blow delivered by the armature through its stud *o* upon the contact pieces is to
105 prevent further outward movement thereof and bring

it effectually to rest, no further stop to the outward armature movement than that afforded by the engagement of the said stud *o* with the spring *g* is necessary in the herein described embodiment of my invention.

5 Thus, the embodiment of my invention here shown, provides circuit controlling means for insuring both the sharp and certain making as well as breaking of the circuit through the momentum of the armature, the impact of which against the contact carrying spring in both its
10 inward and outward movement enforces a sure and positive make and break.

The relative movements of the armature and the contact carrying member may obviously be varied to suit different conditions or purposes of use and to this end
15 the proportions of the two springs *e* and *g* and their relative strengths may be varied as desired.

In Fig. 2 I have illustrated diagrammatically one method of connecting up my improved device; it being indicated at *p* in connection with each of a plurality of
20 spark coils, *q*, *q'*, arranged in circuits *r*, *s*, which include a source of electro-motive force, *E*, and a circuit controlling device *t*, attached to the engine, for instance, of an automobile, and which closes the circuits of the several coils in succession, as required; there
25 being one coil for each of the four cylinders of the engine. Sparking points are provided, marked *u*, *v*. Whenever any one of the circuits, *s*, *t*, is closed, the circuit making and breaking device *p*, is set in operation to produce a succession of impulses through the
30 closed circuit, which by their decisive nature produce certain and sufficient sparking between the points, *u*, *v*, thus insuring successful ignition of the motive power mixture within the engine cylinder.

While I have here described a specific embodiment
35 of my invention for illustrative purposes, it is to be understood that the same is not limited to the details of construction nor to the form and arrangement of parts shown, but that the latter may be varied within the spirit and scope of my invention; nor is my invention
40 restricted to any particular use, although especially useful in connection with sparking circuits for internal combustion engines for automobiles or other purposes or wherever a sparking coil is used.

Claim.

45 1. A circuit making and breaking device provided with a contact member and impact means for enforcing the making of the circuit.

2. A circuit making and breaking device provided with a contact member, movement of which causes the making
50 and breaking of the circuit, and an independently movable member adapted to engage said contact member to enforce the making of the circuit.

3. A circuit making and breaking device containing a

contact member, an armature member normally out of engagement therewith, and means to cause engagement between said contact member and armature member during both inward and outward movement of the latter. 55

4. A circuit making and breaking device provided with a contact member having both a circuit breaking and a circuit making movement, an armature having also a circuit making and a circuit breaking movement and being
60 normally out of engagement with said contact carrying member, and means for causing engagement between said armature and contact carrying member during the circuit making movement of the former toward its corresponding contact. 65

5. A circuit making and breaking device provided with a resilient contact carrying member, a resilient armature carrying member normally out of engagement therewith, means upon said armature carrying member for engaging
70 said resilient contact carrying member on the inward movement of the former to cause the latter forthwith and forcibly to interrupt the circuit and means upon said armature carrying member and immediately adjacent the location of the contact upon said contact carrying member for engaging the latter on the outward armature movement to cause the forcible making of the circuit. 75

6. A circuit making and breaking device provided with a contact member, a relatively movable armature actuated member, said contact member providing a stop for said
80 relatively movable armature member on the circuit making movement thereof.

7. A circuit making and breaking device comprising a circuit controlling member of relatively small mass adapted thereby for a quick opening of the circuit and a second member of relatively greater mass adapted to engage therewith to enforce a positive making of the circuit. 85

8. A circuit making and breaking device provided with impact means for enforcing the making of the circuit and means for moving said device to break the circuit. 90

9. A circuit making and breaking device comprising a contact member and a resiliently mounted armature member provided with impact means for enforcing the making and breaking of the circuit.

10. A circuit making and breaking device comprising a
95 contact member and a resiliently mounted armature member provided with impact means for enforcing the making of the circuit.

11. A circuit making and breaking device containing a contact member, an armature member, a vibratable leaf
100 spring carrying said armature member and impact means for enforcing the making of the circuit.

12. A circuit making and breaking device containing a contact member and a vibratory armature member having a vibratory movement either side of its normal position, and impact means for enforcing the making of the circuit. 105

13. A circuit making and breaking device containing a contact member and a vibratory armature member having a vibratory movement either side of its normal position, and impact means for making and breaking the circuit. 110

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

ANDREW L. RIKER.

Witnesses:

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WM. S. TEEL, Jr.