

W. J. RAPP.
CIRCUIT CLOSER OR TIMER.
APPLICATION FILED JAN. 27, 1908.

957,713.

Patented May 10, 1910.

2 SHEETS—SHEET 1.

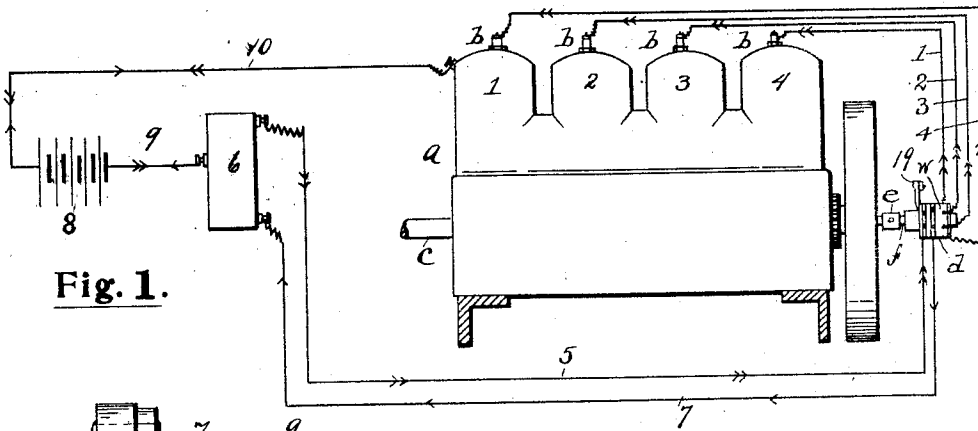


Fig. 1.

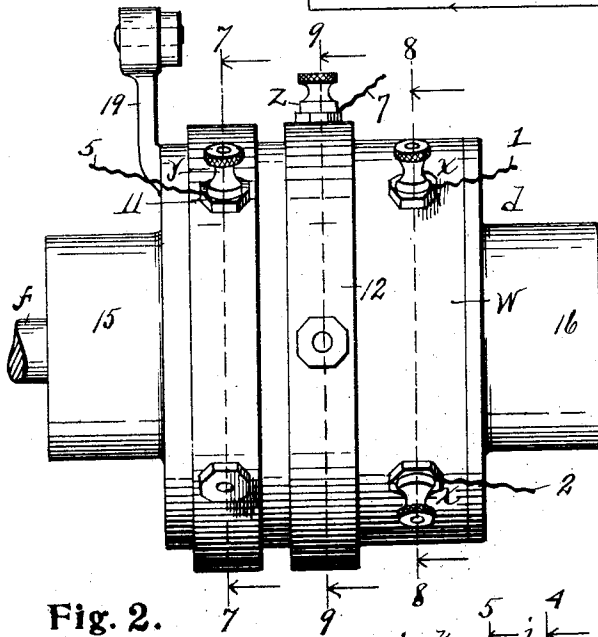


Fig. 2.

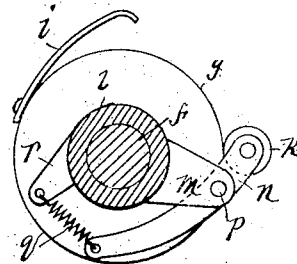


Fig. 5.

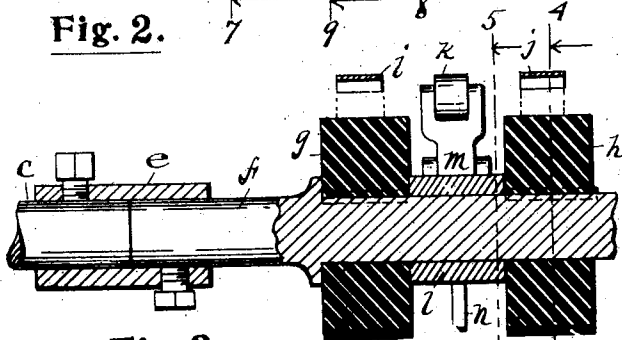


Fig. 3.

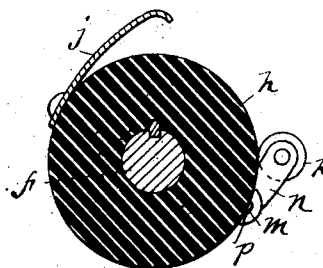


Fig. 4.

Witnesses

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2 SHEETS - SHEET 2.

Fig. 6.

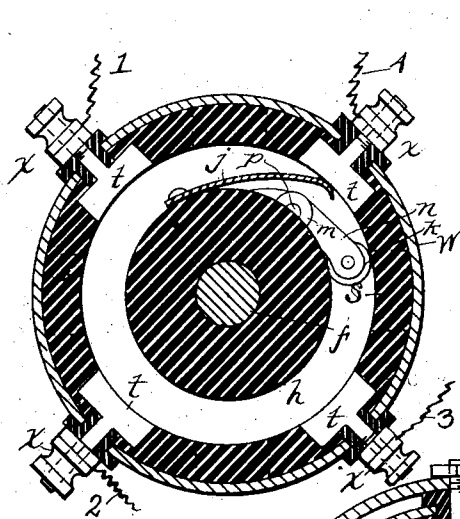
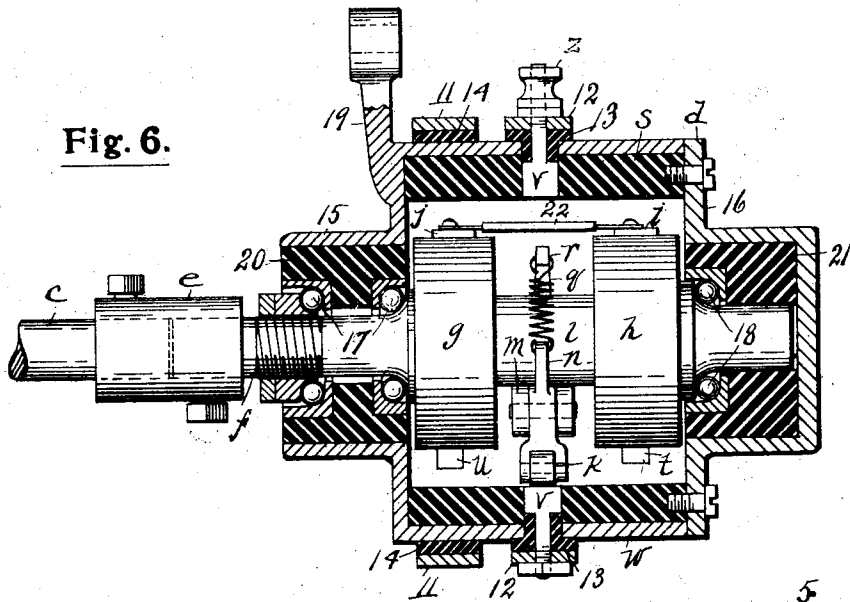


Fig. 8.

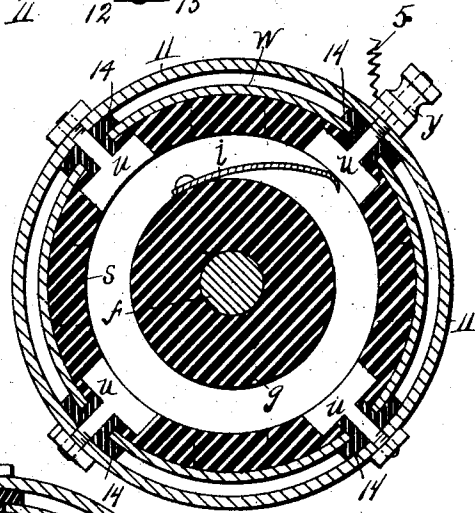


Fig. 7.

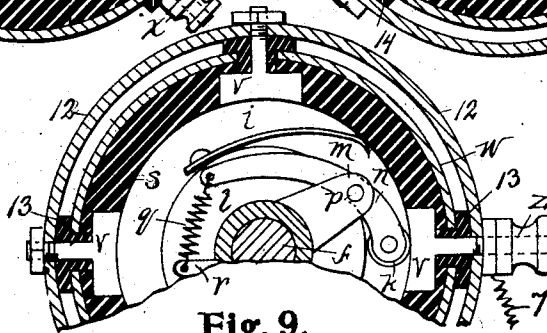


Fig. 9.

Witnesses

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UNITED STATES PATENT OFFICE.

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CIRCUIT CLOSER OR TIMER.

957,713.

Specification of Letters Patent.

Patented May 10, 1910.

Application filed January 27, 1908. Serial No. 412,726.

To all whom it may concern:

Be it known that I, WILLIAM J. RAPP, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Circuit Closers or Timers, of which the following is a specification.

My invention has for its object new and useful improvements in an electrical instrument, or circuit closer or timer, and it consists of the construction, combination, and arrangement of devices and appliances hereinafter described, and claimed, and illustrated in the accompanying drawings, in which,

Figure 1. is a diagrammatic view illustrating my invention. Fig. 2. is a view in side elevation. Fig. 3. is a view showing parts in longitudinal section. Fig. 4. is a view in transverse section on the line 4—4 Fig. 3. Fig. 5. is a view in transverse section on the line 5—5 Fig. 3. Fig. 6. is a view in longitudinal section showing the circuit closer or timer and other parts in elevation. Fig. 7. is a view in cross section on the line 7—7 Fig. 2. Fig. 8. is a view in section on the line 8—8 Fig. 2. Fig. 9. is a view in partial transverse section on the line 9—9 Fig. 2.

The object of my invention is to provide an electrical instrument of this nature of simple and economical construction and of superior utility.

My invention is applicable to internal combustion engines of various sizes, or to engines having any desired number of cylinders, the sparking mechanism for the engines being uniformly actuated from a single coil. It is obviously a matter of great advantage to have but a single coil, inasmuch as by my invention I obtain the same results on the one coil which heretofore have been obtained by multiple coils.

I will first proceed to describe my invention as follows: In the drawings *a* represents an engine of the class described, the particular engine illustrated herewith being a four cylinder engine, but I would have it understood that my invention is applicable to engines having various numbers of cylinders. The four cylinder engine will, however, enable me to illustrate my invention. The engine is shown provided with spark-plugs *b*, and with a shaft *c* upon which may be located my improved circuit closer or

timer *d*, the circuit closer being provided with a shaft connected with the engine shaft by a suitable coupling *e*. The shaft of the circuit closer is indicated at *f*, the same being provided with fiber or analogous disks *g* and *h*, said disks each carrying any suitable electrical contact devices *i* and *j*. Between the disks *g* and *h* is shown located a contact roller *k* carried upon said shaft, the same being shown mounted upon a sleeve *l* upon the shaft, the sleeve being provided with an arm *m*, the roller being carried upon the lever arm *n* fulcrumed upon the arm *m*, as indicated at *p*, the opposite end of the lever arm having a spring connection as indicated at *q* with an additional arm *r* upon the sleeve. The shaft *f*, with its electrical contact devices, is rotatable within an insulating cylinder, as of hard rubber, as indicated at *s*, said cylinder being provided with a series of electrical contact devices preferably arranged in three rows extending circumferentially there-about, one row of contact devices being indicated by the letter *t* shown arranged toward one end of the cylinder. Another row of similar contact devices is shown at *u*, the same being indicated toward the opposite end of the cylinder, the cylinder being shown also provided with another set of similar contact devices indicated at *v*.

It will be understood that the cylinder will be provided with as many contact devices in each set as there are cylinders in the engine. The contact devices are all insulated one from another circumferentially of the cylinder and extend through the cylinder to the exterior of a shell *w* which preferably incloses the said cylinder, the contact devices *t* of one set terminating in binding screws as at *x*, from which lead wires 1, 2, 3, and 4 to the spark plugs of the engine. The contact devices *u* of another set are shown electrically connected with a single binding post *y* which leads, as by a conductor 5, to the coil 6, and the contact devices *v* are electrically connected with the binding post *z* leading to the coil 6, as by a conductor 7. The battery 8 is shown connected with the coil 6 by the conductor 9, and with the engine by a conductor 10, the circuit being completed through the engine with the shaft *f* and the contact devices *k*; and thence back to the battery. The contact devices *u* are electrically connected with a single binding post, *y*, as by conductor 11. The contact

devices *v* are electrically connected, as by a connecting band 12 insulated from the shell *w*, the connection 11 being also insulated from the shell, such insulations being indicated at 13 and 14. The jacket or shell of the cylinder *s* is shown provided with a head 15 and with a head 16, ball bearings being provided for each end of the shaft *f* as indicated at 17 and 18. The cylinder *s* and its jacket are made movable as by a lever arm 19 whereby the same may be adjusted to advance the spark if desired. It is thus evident that an electrical circuit is made through one of the spark plugs of the engine, whenever the coil circuit is closed, there being but one wire from the battery to the coil, and one circuit from the coil to the circuit closer, as many connections leading to the spark plugs of the engine as may be required. For the sake of clearness the adjacent contact points *v* and *k* through which the coil is charged may be termed the primary contact devices; the adjacent contact points *u* and *i* the secondary contact devices, and the adjacent contact point *t* and *j* the sparking contact devices. The primary circuit, as noted, is from the battery through the circuit closer shaft, and primary contact devices, to the coil, and thence back to the battery, and is indicated by the single arrow heads. The secondary, or high tension circuit, is from the coil to the secondary contact devices, thence to the sparking contact devices, thence to the spark plugs of the engine, the current jumping from the spark plugs to the engine case, and passing back to the coil, completing the secondary circuit, and doing away with any jump spark on the outside. The secondary circuit is indicated by the double arrow heads.

It will be observed that the contact devices in electrical connection with the shaft are located in advance of the other contact devices upon the shaft. It will also be observed that the contact devices at opposite extremities of the cylinder are arranged to make simultaneous electrical connections with the corresponding contact devices carried by the cylinder.

It will be evident that in an instrument constructed and arranged as shown, the middle roller *k* which is in electrical contact with the shaft *f* actuates the coil. The two outside set of contact devices serve to switch the current to the spark mechanism of the engine. The contact devices of the cylinders connected by leads 1, 2, 3, and 4, with the spark plugs of the engine all actuate a corresponding spark plug alike. The ball bearings are provided with fiber bushings thereabout indicated at 20 and 21. The contact devices *i* and *j* are shown connected by an electrical conductor 22. The high tension current thus connected with the con-

tact devices *u* is led to the corresponding contacts *t* leading to the spark plugs. The operation of the device will now be understood.

The engine cylinders, it will be understood, may have a ground connection with the battery. The engine cylinders may be equipped with any suitable spark plugs, the jump spark being on the inside of the cylinder.

What I claim as my invention is:

1. An electrical instrument for the purpose described comprising a battery, an induction coil, a cylinder of insulating material, triple circular circumferentially arranged rows of insulated electrical contact devices carried within the cylinder and extending therethrough, a shaft rotatable within the cylinder provided with plural correspondingly arranged electrical contact devices to form electrical connection with the two outer rows of contact devices of the cylinder, and with an intermediate electrical contact device in electrical circuit with the shaft, and with the intermediate row of the contact devices of the cylinder, the contact device in circuit with the shaft arranged to be in electrical circuit with the battery through the shaft, and to be connected with leads to the coil, one of the outer rows of the contact devices of the cylinder arranged to be in electrical circuit with the coil, and the other outer row of contact devices of the cylinder arranged to be in electrical contact with independent spark plug leads, the contact device in circuit with the spark plug leads being insulated from said shaft.

2. An electrical instrument for the purpose described, comprising a cylinder of insulating material, triple circular circumferential rows of insulated electrical contact devices carried within the cylinder and extending therethrough, the contact devices of each row being separated and insulated one from the other by said cylinder, a shaft rotatable within the cylinder provided with corresponding triple electrical contact devices to contact with the adjacent contact devices of the cylinder, one row of the contact devices of the cylinder arranged to be in electrical circuit with a battery through the shaft and with leads to an induction coil, a second row of the contact devices of the cylinder arranged to be in electrical connection with leads to the coil, and the other row of the contact devices of the cylinder arranged to be placed in electrical connection with the second row of contact devices of the cylinder, and being connected with independent spark plug leads.

3. An electrical instrument for the purpose described, comprising a cylinder of insulating material, triple circular circumferential rows of insulated electrical contact devices carried within the cylinder and extend-

ing therethrough, the contact devices of each row being separated and insulated one from the other by said cylinder, a shaft rotatable within the cylinder provided with corresponding triple electrical contacts to contact with the adjacent contact devices of the cylinder, one row of the contact devices of the cylinder arranged to be in electrical circuit with a battery through the shaft and with leads to an induction coil, a second row of the contact devices of the cylinder arranged to be in electrical connection with leads to the coil, and the other row of the contact devices of the cylinder arranged to be placed in electrical connection with the second row of contact devices of the cylinder and being connected with independent spark plug leads, the second row of contact devices of the cylinder having electrical connections one with the other.

4. An electrical instrument for the purpose described, comprising a cylinder of insulating material, triple circular circumferential rows of insulated electrical contact devices carried within the cylinder and extending therethrough, the contact devices of each row being separated and insulated the one from the other by said cylinder, a shaft rotatable within the cylinder provided with corresponding triple electrical contacts to contact with the adjacent contact devices of the cylinder, one row of the contact devices of the cylinder arranged to be in electrical circuit with a battery through the shaft and with leads to an induction coil, the second row of the contact devices of the cylinder arranged to be in electrical connection with leads to the coil, and the other row of the contact devices of the cylinder arranged to be placed in electrical connection with the second row of contact devices of the cylinder, and being connected with independent spark plug leads, the first mentioned row of contact devices of the cylinder having electrical connections the one with the other.

5. An electrical instrument for the purpose described comprising a battery, an induction coil, a cylinder of insulating material triple circular circumferentially arranged rows of insulated electrical contact devices carried within the cylinder and extending therethrough, a shaft rotatable within the cylinder provided with plural correspondingly arranged electrical contact devices to form electrical connection with the two outer rows of contact devices of the cylinder, and with an intermediate electrical contact device in electrical circuit with the shaft, and arranged to connect with the intermediate row of the contact devices of the cylinder, the contact device in circuit with the shaft arranged to be in electrical circuit with the battery through the shaft, and to be connected with leads to the coil, one of the outer rows of the contact devices of the cylinder arranged to be in electrical circuit with the coil, and the other outer row of contact devices of the cylinder arranged to be in electrical contact with independent spark plug leads, the contact device in circuit with the spark plug leads being insulated from said shaft, and said cylinder being adjustable about said shaft.

6. An electrical instrument for the purpose described comprising the combination with an internal combustion engine, of a battery, a cylinder of insulating material, triple circular circumferentially arranged rows of insulated electrical contact devices carried within the cylinder and extending therethrough, a shaft rotatable within the cylinder provided with a contact device in electrical circuit with the shaft, and with plural electrical contact devices insulated from the shaft to form electrical connections with the two outer rows of contact devices of the cylinder, an induction coil having electrical connection with the battery, the intermediate row of the contact devices of the cylinder being in electrical circuit with the battery through the shaft, and connected with leads to the coil, one of the outer rows of the contact devices of the cylinder having a single electrical connection with the coil, the other outer row of contact devices of the cylinder being arranged to be placed in electrical contact with the opposite row, and being connected with independent spark plug leads to the engine.

7. An electrical instrument for the purpose described comprising the combination with an internal combustion engine, of a battery, a cylinder of insulating material, triple circular circumferentially arranged rows of insulated electrical contact devices carried within the cylinder and extending therethrough, a shaft rotatable within the cylinder provided with plural electrical contacts to form electrical connections with the two outer rows of contact devices of the cylinder, and with a contact device in electrical circuit with the shaft to form electrical connection with the intermediate contact devices of the cylinder, an induction coil having electrical connection with the battery, the intermediate row of the contact devices of the cylinder being in electrical circuit with the battery through the shaft and connected with leads to the coil, one of the outer rows of the contact devices of the cylinder having a single electrical connection with the coil, and the other outer row of the contact devices of the cylinder arranged to form electrical contact with independent spark plug leads to an engine, the shaft being in electrical connection with the engine shaft and rotatable therewith.

8. The combination with a multiple cylinder engine and its shafts, of spark plugs carried by the engine cylinders, a cylinder

arranged to be in electrical circuit with the coil, and the other outer row of contact devices of the cylinder arranged to be in electrical contact with independent spark plug leads, the contact device in circuit with the spark plug leads being insulated from said shaft, and said cylinder being adjustable about said shaft.

of insulating material, triple circular circumferentially arranged rows of insulated electrical contact devices carried within the cylinder and extending therethrough, a shaft 5 electrically connected with the engine shaft rotatable within the cylinder provided with plural electrical contact insulated one from another and from their shaft to form electrical connections with the adjacent contact 10 devices of the cylinder and with a contact device in electrical circuit with its shaft to form electrical connection with the corresponding contact devices of the cylinder, a battery electrically connected with said 15 shaft, an induction coil electrically connected with the battery and through the shaft within the cylinder to charge the coil, one row of the contact devices of the cylinder being in electrical circuit with the battery 20 through the shaft within the cylinder, a second row of the contact devices of the cylinder having a single electrical connection with the coil, and the third row of the contact devices of the cylinder arranged to 25 form electrical contact with the corresponding contact device on the shaft, said coil being also arranged to be brought into electrical connection with separate spark plug leads to the spark plugs of the engine. 30

9. An electrical instrument for the purpose described comprising a cylinder of insulating material, triple circular circumfer-

entially arranged rows of insulated contact devices carried within the cylinder and extending therethrough, a shaft rotatable 35 within the cylinder provided with disks of insulating material each disk carrying an electrical contact device to form contact with the outer rows of contact devices of the cylinder, an additional contact device carried 40 by the shaft and in electrical connection therewith to form contact with the central row of contact devices of the cylinder, one row of the contact devices of the cylinder arranged to be in electrical circuit with a 45 battery through the shaft and with leads to an induction coil, a second row of the contact devices of the cylinder being in electrical connection with leads to the coil, another row of the contact devices of the cylinder being arranged to be placed in electrical 50 connection with the second row of the contact devices of the cylinder and being connected with independent spark plug leads, the contact devices upon the shaft arranged 55 to make simultaneous electrical connections with the corresponding contact devices upon the cylinder.

In testimony whereof I have signed this specification in presence of two witnesses. 60

WILLIAM J. RAPP.

Witnesses:

N. S. WRIGHT,
G. E. McGRANN.