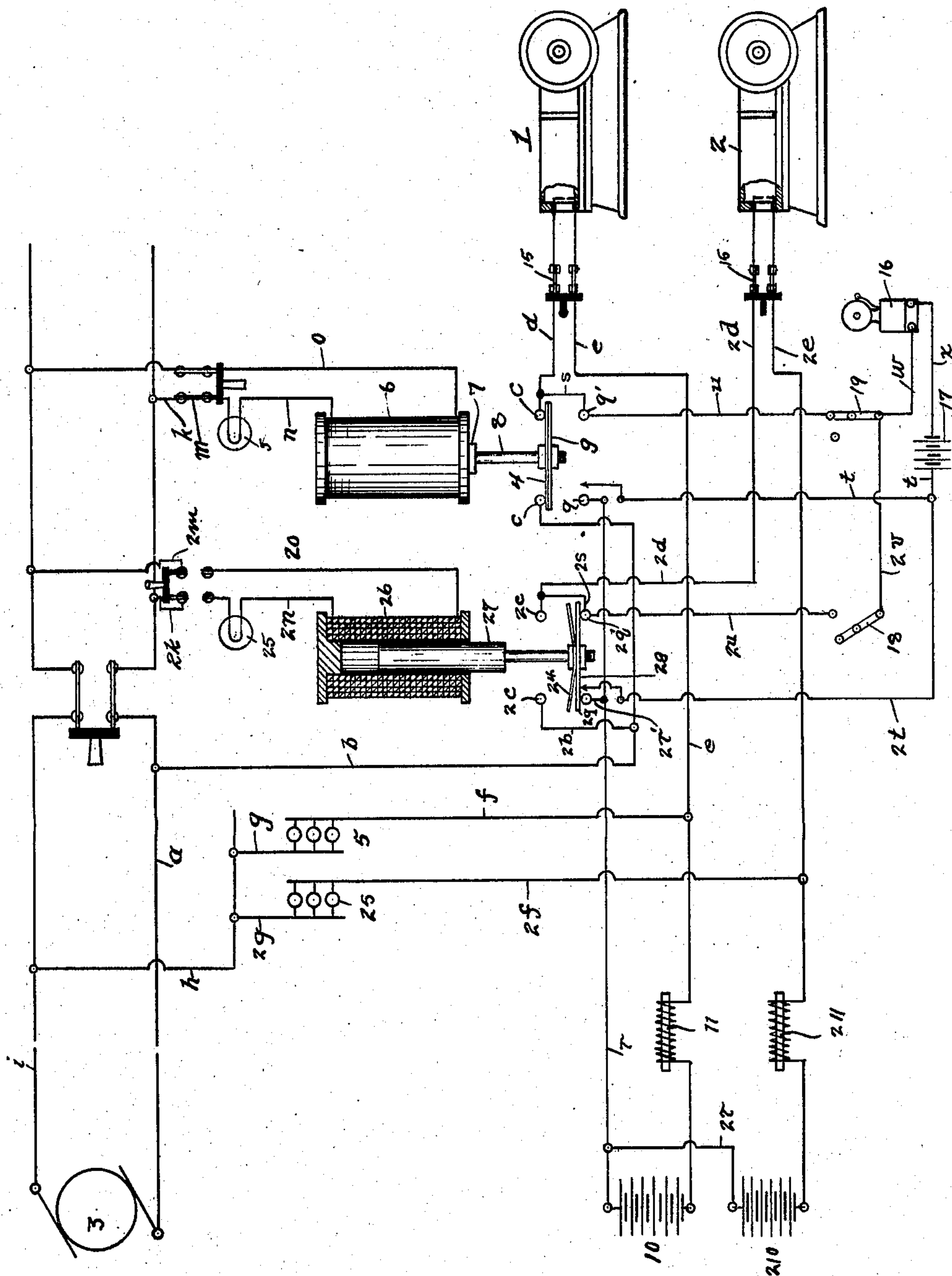


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IGNITION CONTROLLING APPARATUS.  
APPLICATION FILED OCT. 21, 1907.

899,751.

Patented Sept. 29, 1908.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

CHARLES MITCHELL, JR., OF MILWAUKEE, WISCONSIN.

## IGNITION-CONTROLLING APPARATUS.

No. 899,751.

Specification of Letters Patent.

Patented Sept. 29, 1908.

Application filed October 21, 1907. Serial No. 398,324.

*To all whom it may concern:*

Be it known that I, CHARLES MITCHELL, Jr., a citizen of the United States, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Ignition-Controlling Apparatus, of which the following is a specification.

My invention relates to improvements in ignition controlling devices for internal combustion engines.

The object of my invention is to provide means whereby one or more electrical igniters may be operated from two different sources of electrical energy, for one of which the circuit is normally broken, while the other is normally closed through the igniter, with means for automatically closing the normally open or auxiliary circuit through the igniter, whenever the current is interrupted from any cause in the other or main circuit; also to provide means whereby a renewal of the current in the main circuit will automatically break the other circuit; also to provide means whereby a signal will be automatically given whenever the current is interrupted in the main circuit and the auxiliary circuit closed.

In the following description reference is had to the accompanying drawing, in which the elements of my device are illustrated conventionally, one of the solenoids being shown in section.

The drawing illustrates my invention as employed in connection with two internal combustion engines 1 and 2, from which it will be understood that any desired number of engines may be similarly connected. The main circuit is supplied from a generator 3 which in the illustration, is in circuit with the igniter of the engine 1, through the conductor *a* and *b*, armature switch bar 4 and conductor *d*, the igniter, and conductor *e*, *f*, *g*, *h*, and *i*. The conductors *d* and *e* connect with each other through the igniter of the engine 1 and the conductors *f* and *g* connect with each other through the lamps 5. The switch bar 4 is automatically held in contact with the terminals *c* by means of a solenoid 6 which is provided with a sliding core 7 and a rod 8 to which the switch bar 4 is connected. When the circuit of the generator 3 is closed, a portion of the current passes from the conductor *a* through the conductor *k*, switch *m*, and conductor *n*, the solenoid 6, and conductor *o* to the conductor *i*, thus completing a circuit through the solenoid and energizing the lat-

ter to lift the switch bar 4 into contact with the under surface of the terminals *c*, but in case the circuit of the generator 3 is interrupted, the solenoid is at once deenergized, permitting the core 7 to drop until a switch bar 9 carried thereby bridges the space between the terminals *q* and *q'*. Thereupon a circuit of battery 10 is closed through conductor *r*, switch bar 9, conductors *s* and *d*, igniter, and conductor *e* which leads back to the battery through spark coil 11.

When the circuit of generator 3 is again established through the solenoid 6 it energizes the latter and lifts switch bar 4 from the electrodes *q* into contact with the terminals *c*, thus breaking the circuit of the battery 10, and again establishing the circuit of the generator 3 through the igniter. It will be observed that the terminals of the battery and dynamo circuits are arranged in sets, the set of terminals *c*, *c*, which control the dynamo set, being directly above the corresponding terminals *q* and *q'*, which control the battery circuit for the engines.

Where the igniters of several engines are to be operated from a common source of electrical energy, separate batteries 10 are preferably employed, one for each engine, and the solenoids are preferably connected with the circuit in parallel as shown in the drawing. The same reference characters are applied to the parts pertaining to the engine 2, with the reference character 2 prefixed, for example,—the circuit of the generator 3 through the solenoid 26 is completed through the conductors *a* and *2k*, switch 2*m*, conductor 2*n*, the solenoid 26 and conductors 2*o* and *i*. When the solenoid 26 is energized, the circuit of the generator 3 will be completed through the igniter of engine 2, through conductor *a*, *b*, 2*b*, switch bar 24, conductor 2*d*, the igniter, and conductor 2*e*, 2*f*, 2*g*, *h* and *i*. One pole of the battery 210 is connected with the conductor *r* through a conductor 2*r*. One of the terminals 2*q* is connected with the conductor *r* by a conductor 2*r'*, and the other terminal 2*q'* is connected with the conductor 2*d* by means of a conductor 2*s*.

In case one of the engines is to remain idle while the other is in operation, the switch *m* (or 2*m*) corresponding with the idle engine, is opened thus cutting out the solenoid pertaining to that engine. Another switch breaks the ignition circuit at or near the idle engine.



Where the main circuit is interrupted and the auxiliary circuit closed for any engine, it is desirable that notice of the change of circuits should be given and this is accomplished by means of a signal indicated by the bell 16 in the drawings. This bell is in circuit with a battery 17, the circuit of which is closed through the bell by either the switch bar 9 or 29 in dropping to the terminals of the auxiliary circuit, for example,—the circuit of the battery 17 may be closed through the conductors *t*, *2t*, switch bar 29, conductor *2u*, switch 18 and conductors *2v*, *w*, the bell and conductor *x*. It may also be closed through the conductor *t*, switch bar 9, conductor *u*; switch bar 19, conductor *w*, the bell and conductor *x*. It will be observed that conductors *u* and *2u* respectively are connected with the terminals *q'* and *2q'*, while the conductors *t* and *2t* are arranged for separate electrical contact with the switch bar 9 and 29 respectively; so that the circuits of the batteries 10 and 210 will not be closed through the bell when the solenoids are energized. With this construction, whenever one of the solenoids is deenergized permitting the core and corresponding switch bar to drop from the terminals of the main circuit to the terminals of the secondary circuit, the bell 16 will immediately sound and thus give notice of the fact that the main circuit has been interrupted, provided of course, that the switch 15 for the corresponding engine is closed for the operation of the engine. As soon as the main circuit is again established through the solenoid it becomes energized and thus again closes the main circuit through the igniter, breaking the battery circuit and the bell circuit. Where it is not desired that the bell should sound, the switch 18 or 19 is opened thus cutting out the bell from either or both engines as desired.

While I have illustrated a generator 3 as supplying the current for the main circuit it will be understood that a battery may be substituted therefor, it being immaterial to my invention what constitutes the source of the current.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is,

1. In apparatus of the described class, the combination with a plurality of electrical cir-

uits each having a set of terminals, and independent sources of electrical energy, of a solenoid electrically connected with one of the sources of energy, an igniter included in said circuits, and a switch located between the sets of terminals controlled by the solenoid and adapted to make or break either of said circuits through the igniter; said solenoid being provided with a longitudinally movable core bar, and said switch being directly connected and arranged to move bodily with the core bar from one set of terminals to the other.

2. In apparatus of the described class, the combination with a plurality of electrical circuits each having a set of terminals, and independent sources of electrical energy, of a solenoid electrically connected with one of the sources of energy, an igniter included in said circuits, and a switch located between the sets of terminals controlled by the solenoid and adapted to make or break either of said circuits through the igniter, said switch being arranged to be moved in one direction by the solenoid and in the other direction by gravity; one terminal of each set being independently connected with the corresponding source of electrical energy and the other terminal being connected with a conductor common to both sources of electrical energy, the terminals for the respective circuits being located on opposite sides of the switch, and said switch being arranged to move bodily from one set of terminals to the other.

3. In apparatus of the described class, the combination with a plurality of electrical circuits and independent sources of electrical energy, an igniter connected in common with both circuits, a solenoid connected to receive electrical energy from one of said circuits, a vertically movable solenoid core bar, and a switch connected therewith, one of said igniter circuits having terminals above and the other having terminals below said switch, whereby, when the solenoid is energized, the switch is lifted to contact with the upper terminals, and permitted to drop by gravity to the lower terminals when the solenoid is deenergized.

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

CHARLES MITCHELL, JR.

Witnesses:

LEVERETT C. WHEELER,  
CHAS. B. PERRY.