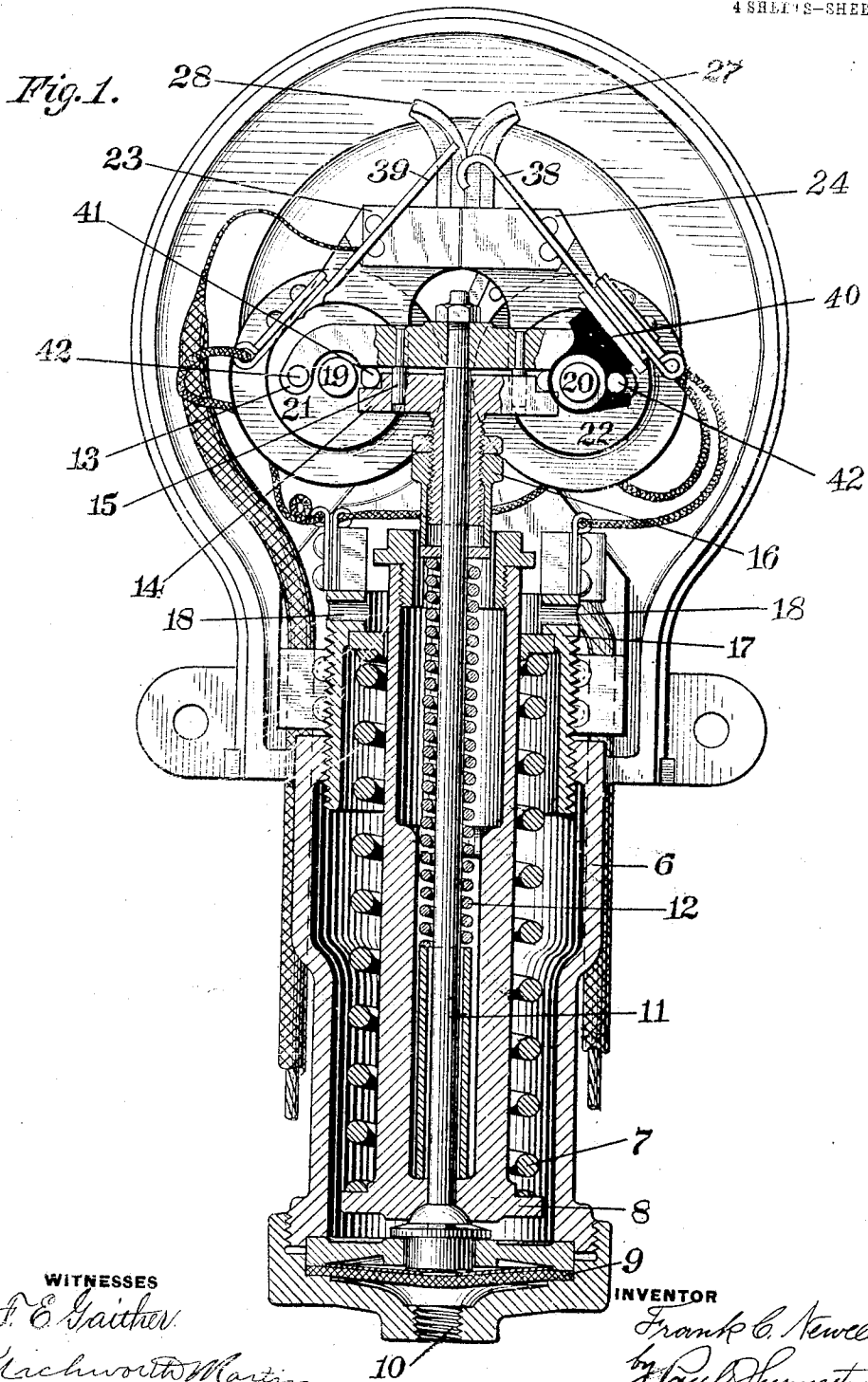


No. 851,691.

PATENTED APR 30 1907.

F. C. NEWELL.
ELECTRIC SWITCH MECHANISM.
APPLICATION FILED AUG. 2, 1905.

4 SHEETS-SHEET 1.



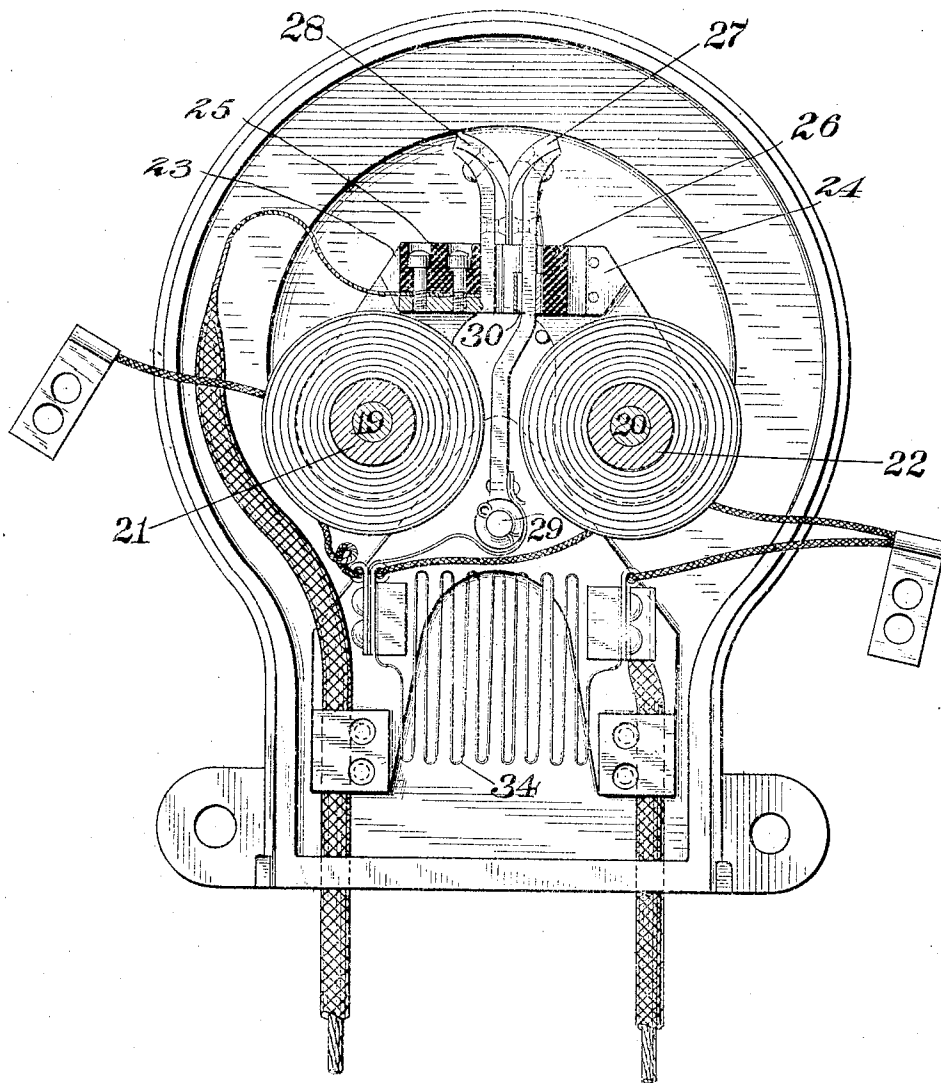
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

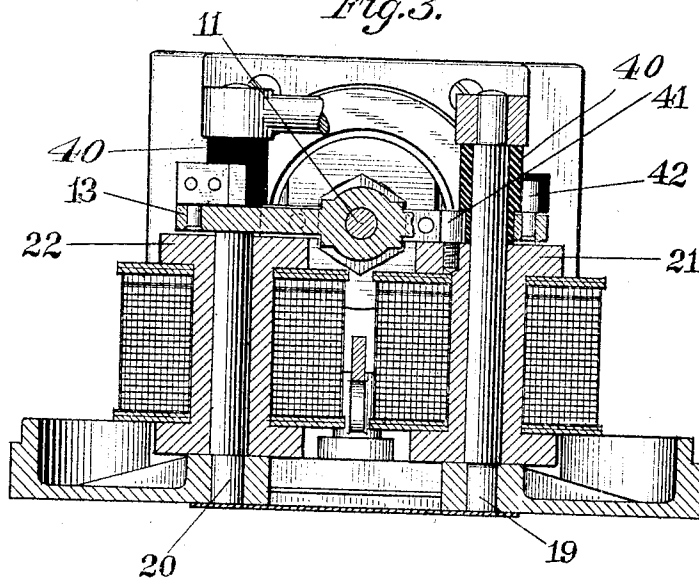
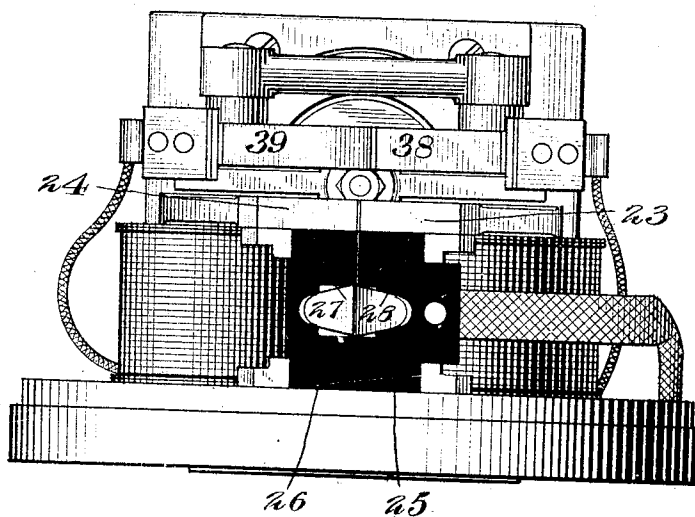


Fig. 4.



WITNESSES

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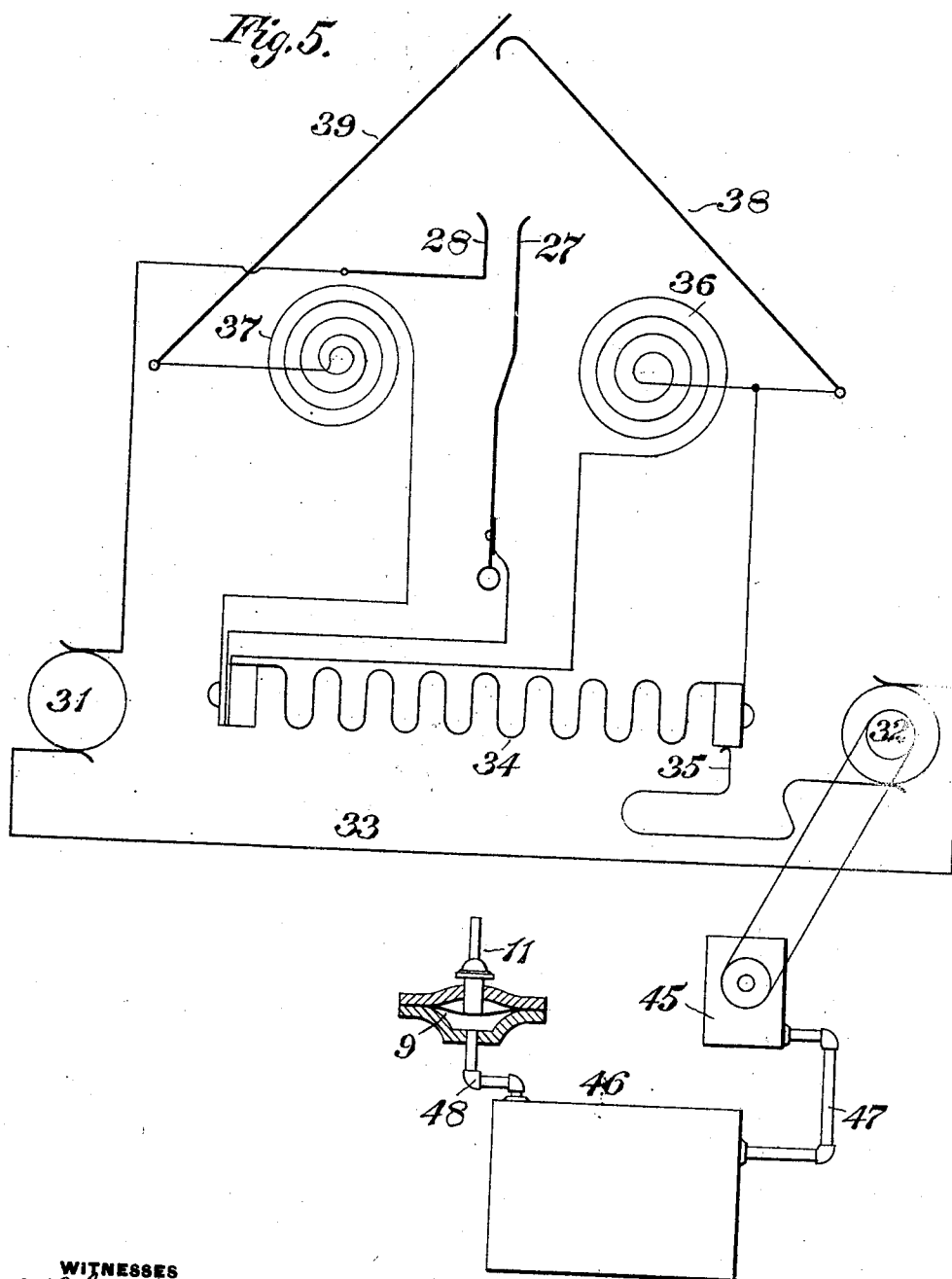
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH MECHANISM.

No. 851,691.

Specification of Letters Patent.

Patented April 30, 1907.

Application filed August 2, 1905. Serial No. 272,373.

To all whom it may concern:

Be it known that I, FRANK C. NEWELL, a citizen of the United States, residing at Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Electric Switch Mechanism, of which the following is a specification.

My invention has reference to certain improvements in electric switch mechanism such as may be used for example in conjunction with fluid pressure devices for regulating the supply or quantity of fluid, and is particularly designed for service in conjunction with a pump governor for controlling the action of an electrically driven pressure pump such as is used in air brake practice on many street railway lines.

The first of the objects of this present invention is the provision of an improved mechanism of the character specified in which the action of the main circuit terminals will be effectively subject to control by the movement of parts directly governed by the pressure supply opposed to a spring under adjustable tension, and to the combination of a certain arrangement of main circuit terminals with electro-magnetic means to aid in bringing the terminals together and holding them so with yielding force and the electro-magnetic means for magnetically driving the terminals apart and breaking the circuit. A further object of the invention is the combination with the main circuit terminals described, of a certain arrangement of repulsion terminals employed in conjunction therewith and with a repulsion coil for inducing the repellent magnetization which separates the terminals, all of which will hereinafter be more particularly described.

In carrying out my invention I have embodied the same in preferred form in a construction illustrated in the accompanying drawing, wherein—

Figure 1 is a vertical section through the apparatus, showing the action of the fluid pressure devices in conjunction with the switch mechanism;

Figure 2 is a view showing the switch mechanism proper, with the fluid pressure devices removed;

Figure 3 is a sectional view showing the magnet arrangement;

Figure 4 is a plan view looking down on the magnet and switch terminals, and

Figure 5 is a diagram of the electrical circuits employed.

Referring now more particularly to Figures 1 to 4 inclusive, it will be seen that I have provided a main barrel or casing 6 having within its lower part a main spring 7 which operates upon a movable plunger 8 against a diaphragm device 9 that is exposed on its underside to fluid pressure through the passage 10.

Within the plunger 8 extending upwardly from the diaphragm 9 is a central rod 11 surrounded by a spring 12 employed for the purpose of varying the range of the apparatus, and at the upper end of the rod 11 is a T-bar 13 securely attached to such rod so as to move therewith, and having below it a movable head or cross bar 14 which is slidably mounted upon the rod as shown, and held in relative position by means of the guide pins 15. The tension on the range varying spring 12 is adjusted by a range adjusting nut 16 which may be readily varied to suit the requirements. The tension on the main spring 7 may be regulated by the main spring adjusting nut 17 provided with openings 18 for the application of a spanner wrench thereto; such adjusting nut 17 having engagement with the barrel 6 as shown.

Upon the axles 19 and 20 are mounted two coils, such coils being carried in spools marked respectively 21 and 22 (see Figure 3). The coils or spools are provided with magnetic projections 23 and 24 as shown in Figure 1, which on the oscillation or rotation of the spools about their axles are adapted to come into the position shown in Figure 1 where the adjoining faces of the projections 23 and 24 are nearly, but not altogether in contact. Within the projections 23 and 24, as indicated in Figure 4 there are secured pieces of insulation marked respectively 25 and 26 (see Figure 4), such insulated pieces carrying copper terminals 27 and 28, which are the contacting terminals for the main circuit.

The terminal 28 is mounted so as to move with the spool 21 to which it is secured in a motion of rotation about its axle pin 19 (see Figures 1 and 2), while the terminal 27 is carried upon a lever from a fulcrum point 29 about which it moves, and has a slight range

of motion within the projection of the spool 22 as indicated at the point marked 30. The purpose of this slight lost motion is to permit the main circuit terminals to come together with a kind of wiping action, it being apparent that such result will be produced in the difference in centers of rotation about which the said terminals 27 and 28 move.

Referring now more particularly to the diagram shown in Figure 5, it will be seen that I have therein indicated a dynamo 31 and a translating device 32 in a main circuit 33, having the main circuit terminals which are the terminals 27 and 28 of the apparatus previously described, and in conjunction with such parts I have provided a shunt resistance 34 having a movable contact connection 35, and the coils mounted respectively on spools 22 and 21, which coils are marked 36 and 37, 36 being the attracting coil and 37 being what I call the repulsion coil. Extending from one terminal of the coil 36 is a lead which I have marked 38, which in conjunction with the lead marked 39 which extends from a terminal of the coil 37 forms what I have called repulsion terminals, the purpose of these terminals being when they come in contact to close the circuit in the repulsion coil and to produce like magnetization of the magnetic poles of the device and forcibly drive the main circuit terminals 27 and 28 apart, thus breaking the circuits and dissipating the arc, at the same time having the effect by means of the wiring shown in the diagram of breaking the circuit in the repulsion coil, leaving the wiring dead. The translating device 32 is in driving connection with the pump 45, which supplies the air reservoir 46, by means of the pipe 47. From this reservoir a pipe 48 leads to the diaphragm 9.

By reference to Figure 1 it will be seen that the repulsion terminals 38 and 39 are carried in blocks shown at 40, which are independently movable about the axles 19 and 20, and the ends of the terminals are so arranged that when they come together, oscillating as they do about different centers, they will contact with a kind of wiping motion to keep the contacts bright.

Referring to Figures 1 and 3 it will be seen that between the T-bar 13 and the movable head 14 there are provided, secured respectively to each of the coils, a couple of pins 41, while engaging the outer end of the T-bar at each side of the device there are a couple of additional pins 42 which serve as a means for imparting the motion of the T-bar to the repulsion terminals by engagement of the said pins 42 with the movable blocks 40 on which said repulsion terminals are mounted.

The operation of my device will be understood by special examination of Figure 1, in which it will be seen that the air pressure coming through the opening 10 and bearing against the diaphragm device 9 will act in

opposition to the main spring 7 and tend to push upwardly on the central rod 11, moving with it the T-bar 13 and imparting pressure to the movable head 14, due to the upward pressure against the range varying spring 12. This pressure upon the movable head 14 and pin 41 will act in a direction to impart rotative movement to the two spools in a direction to separate the main circuit terminals 27 and 28, but such main circuit terminals while current is flowing will be held together by magnetic attraction caused through current flowing through attraction coil 36, which has the effect of holding said main terminals together by the magnetization of the projections 23 and 24 against the resistance obtained by compression of the spring 12 through upward movement of the diaphragm. Until such time as the upward movement of the diaphragm through the T-bar 13 has produced the rotation of the blocks 40 carrying the repulsion terminals 38 and 39 until the latter have come in contact with the wiping motion as described, and the current then flows through the repulsion coil 37 and induces like polarity in the magnetic terminals or projections 23 and 24, and forcibly drives them apart, aiding the action of the spring 12 which has been placed under tension by the fluid pressure.

After the circuit is broken and the pump has stopped the accumulation of pressure, the pressure reduces gradually, causing the diaphragm to travel downward. The diaphragm carries with it the bar 13, thus separating the repulsion terminals and gradually bringing the main circuit terminals 27 and 28 together until they make contact, when the current will flow as shown in the diagram, downward and be divided, part of it flowing through the shunt resistance 34 and part of it through the attraction coil 36, the two currents joining at 35 and passing through the motor and back through the main circuit 33 as indicated. In order to determine the proportion of current which will flow through the attraction coil 36 I may provide the terminal 35 with means for moving it to different parts of the shunt resistance 34, so as to vary the amount of current which will travel through said shunt resistance, and to cause the attracting coil to take the larger or smaller proportion, as the conditions of service may require. I can get substantially similar results by inserting different shunt resistances 34, having varying amounts of resistance, this making it possible to apply the apparatus to various classes of service without the necessity of changing the windings in the attraction or repulsion coils. This shunt resistance is indicated clearly in Figure 2' as well as in the diagrammatic Figure 5.

As soon as the terminals 27 and 28 come in contact, current flowing through the attracting coils produces magnetization effect on

the coil 36, which forcibly pulls such main circuit terminals still closer together, allowing them to have a little sliding motion upon each other by means of the provision of lost motion indicated at the point marked 30, as before described.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is the following:

1. The combination in switch mechanism of a pair of separable contact terminals having magnetizable parts, an energizing winding, means including a switch whereby the current through the winding may be governed so that the terminals will either repel each other to break the circuit or attract each other to close such circuit and fluid operated means adapted to operate the said switch.

2. The combination in switch mechanism of a pair of separable contact terminals having magnetizable parts, an energizing winding, means including a switch whereby the current through the winding may be governed so that the terminals will either repel each other to break the circuit or attract each other to close such circuit and spring means for accelerating the opening of the terminals.

3. The combination in switch mechanism of a pair of separable contact terminals having magnetizable parts, an energizing winding, means including a switch whereby the current through the winding may be governed so that the terminals will either repel each other to break the circuit or attract each other to close such circuit, a spring for accelerating the opening of the terminals and means adapted to place the spring under tension during the closing of the switch.

4. The combination in switch mechanism of a pair of separable contact terminals having magnetizable parts, an energizing winding, means including a switch whereby the current through the winding may be governed so that the terminals will either repel each other to break the circuit or attract each other to close such circuit, an operating member having a spring connection with the terminals and a second connection with the switch so arranged that yielding pressure may be applied to the terminal members tending to separate them before the switch is closed.

5. The combination in switch mechanism of a pair of separable contact terminals having magnetizable parts, an energizing winding, means including a switch whereby the current through the winding may be governed so that the terminals will either repel each other to break the circuit or attract

each other to close such circuit, and means for operating the switch and for applying pressure to the terminals tending to move them.

6. The combination in switch mechanism of a pair of separable contact terminals having magnetizable parts, an energizing winding, means including a switch whereby the current through the winding may be governed so that the terminals will either repel each other to break the circuit or attract each other to close such circuit and means for operating the switch and for applying yielding pressure tending to separate the contact terminals preliminary to the closing of the switch.

7. In combination, separable contact terminals, energizing windings for the terminals, means for operating the terminals, yielding means between the operating means and the terminals, a pair of contact members for controlling the energizing of the coils, a connection whereby the coils are energized to attract when the contact members are separated and means whereby the contact members are made to engage after the yielding means have been actuated.

8. In combination, a pair of oscillatory terminals having magnetizable parts, an energizing winding and a pair of oscillatory switch members so arranged that when the switch members are separated the terminals are energized for attraction and when in contact for repulsion, a reciprocatory spring supported means for oscillating the terminals out of engagement, means for swinging the switch members into contact and an operating means for moving such last means and the spring supported means together.

9. In combination, a pair of oscillatory terminals having magnetizable parts, an energizing winding and a pair of oscillatory switch members so arranged that when the switch members are separated the terminals are energized for attraction and when in contact for repulsion, a spring supported yoke having engagement with the terminals, a second yoke having engagement with the switch members, and a reciprocatory member having engagement with both yokes and adapted on a forward movement to first place the terminal members under a resilient opening pressure and on a further movement cause the engagement of the switch members.

In testimony whereof I have hereunder signed my name in the presence of the two subscribed witnesses.

FRANK C. NEWELL.

Witnesses:

F. E. GAITHER,
ARCHWORTH MARTIN.