No. 855,365. PATENTED MAY 28, 1907.

E. W. VOGEL.

RELAY.

APPLICATION FILED MAY 20, 1901.

2 SHEETS—SHEET 1.

Fig. 1.

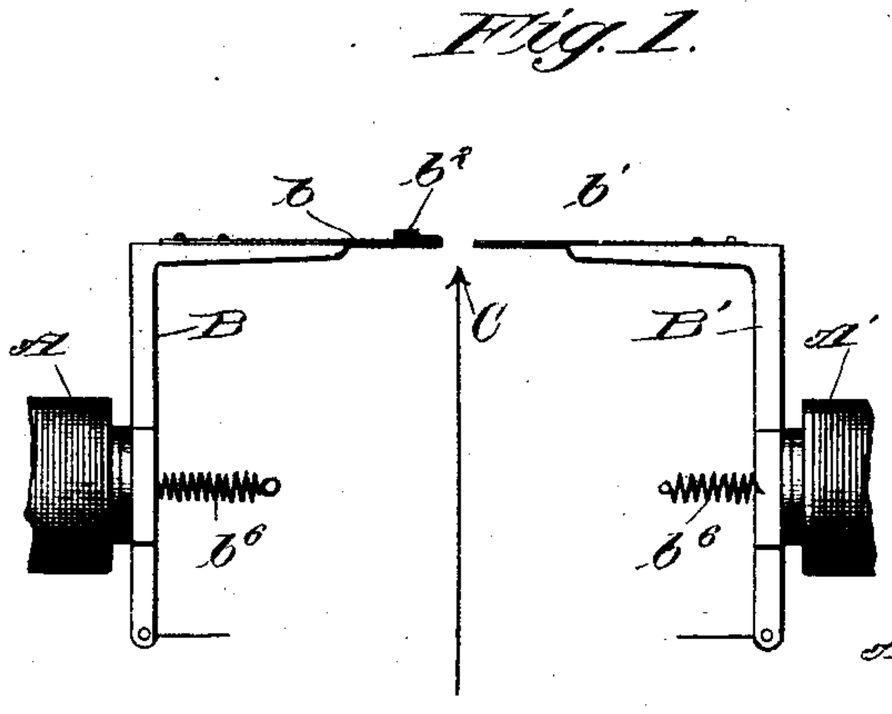


Fig. 4.

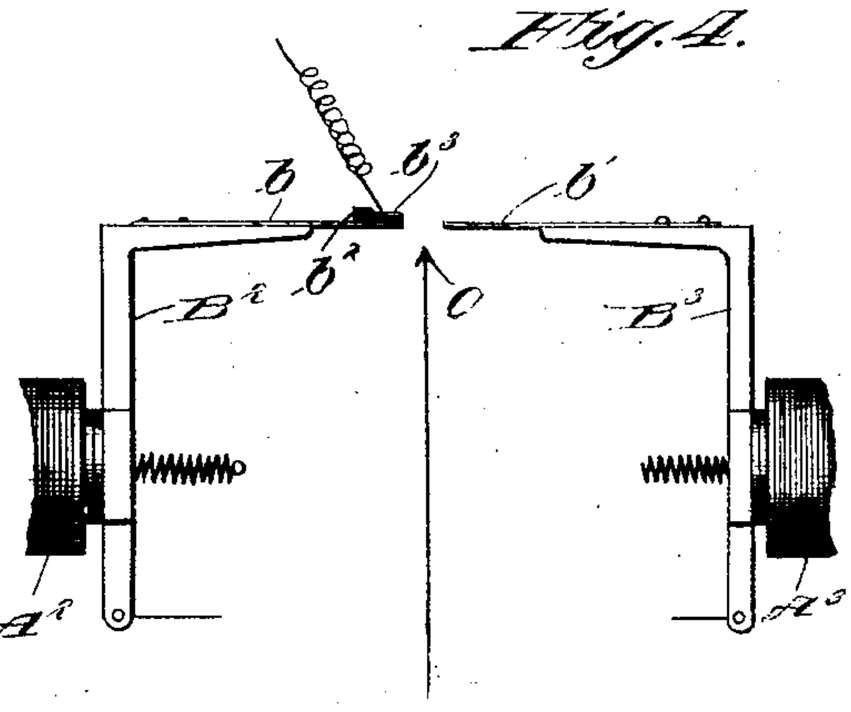


Fig. 2.

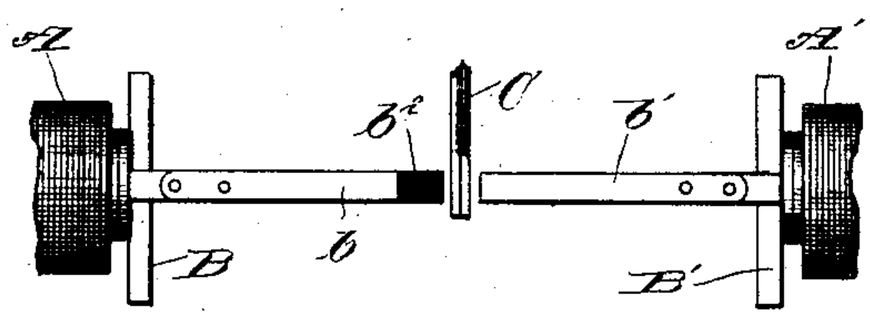


Fig. 5.

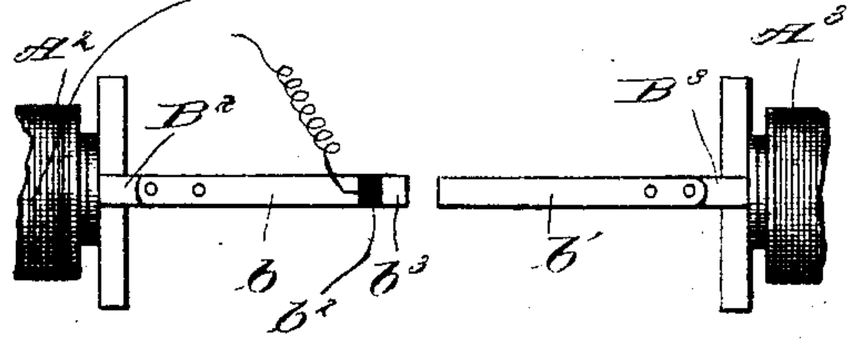


Fig. 3.

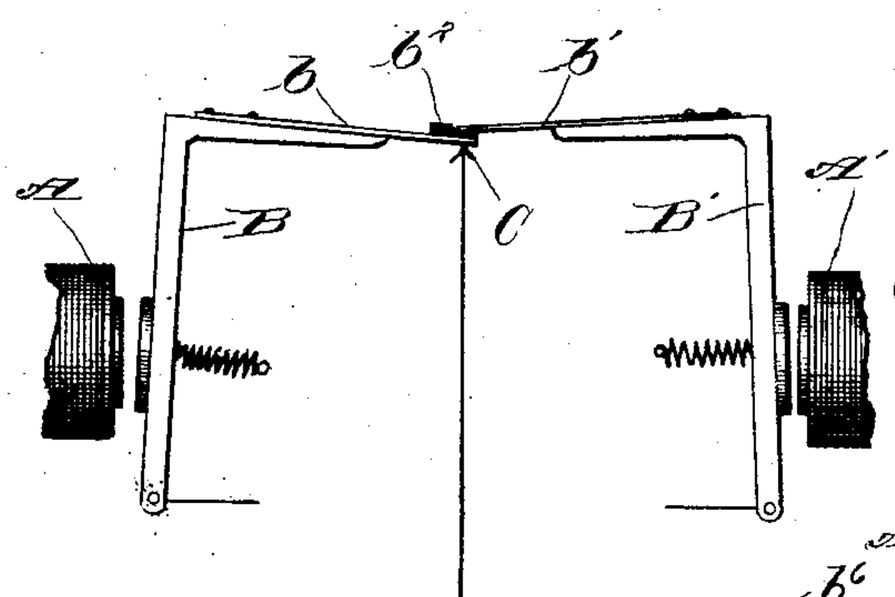


Fig. 6.

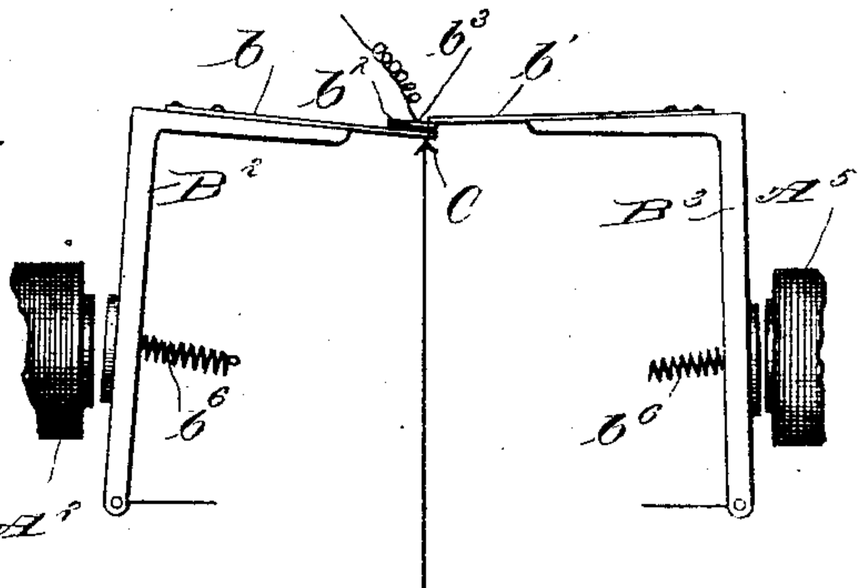
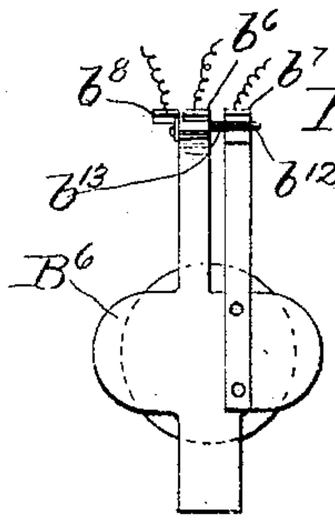


Fig. 12.



Witnesses.

G. A. Rauberschmidt.

Louis J. Delson

Inventor.

Eugene W. Vogel

By Fuller & Lauderkin

Atty.

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2 SHEETS—SHEET 2.

Fig. 7.

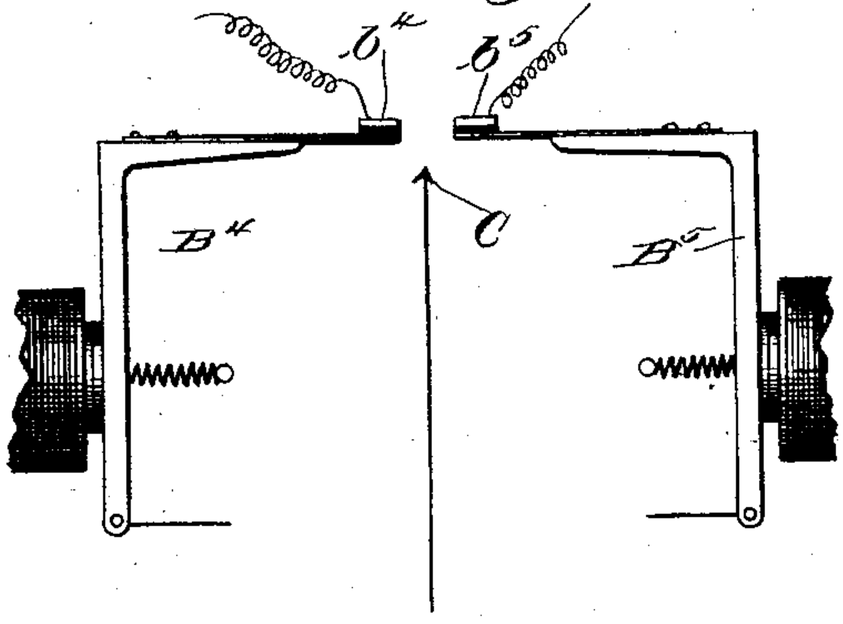


Fig. 9.

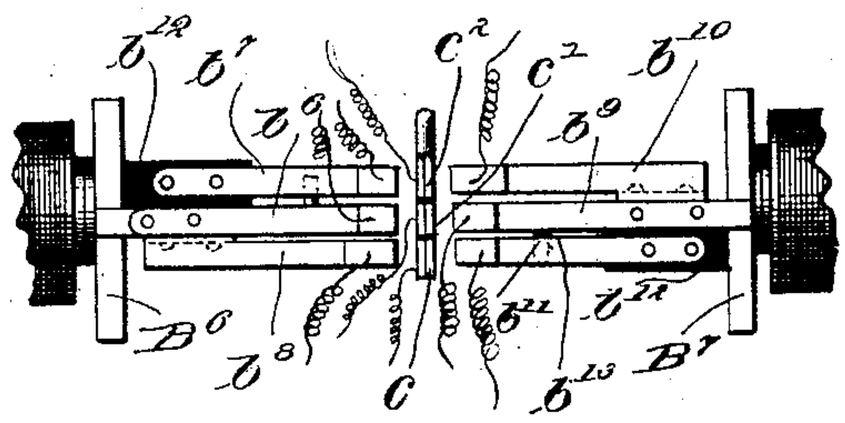


Fig. 8.

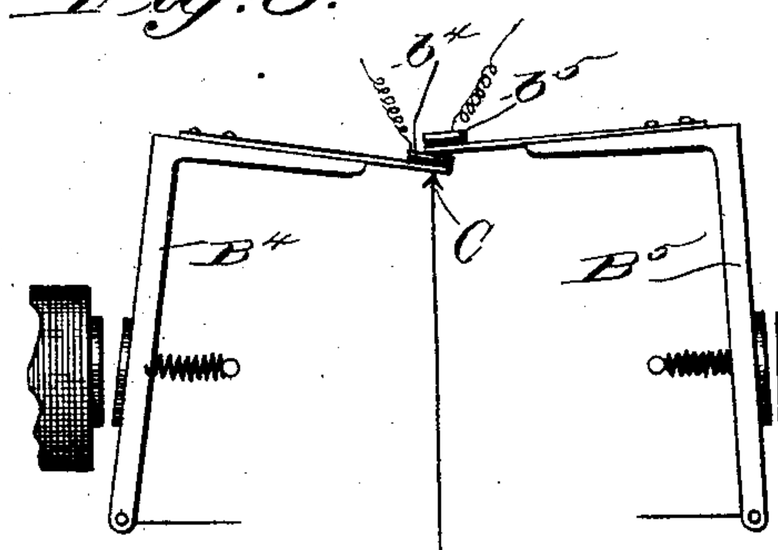


Fig. 10.

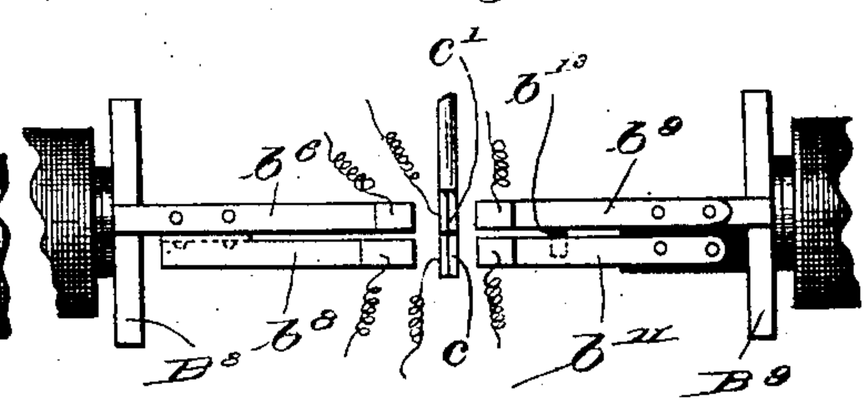
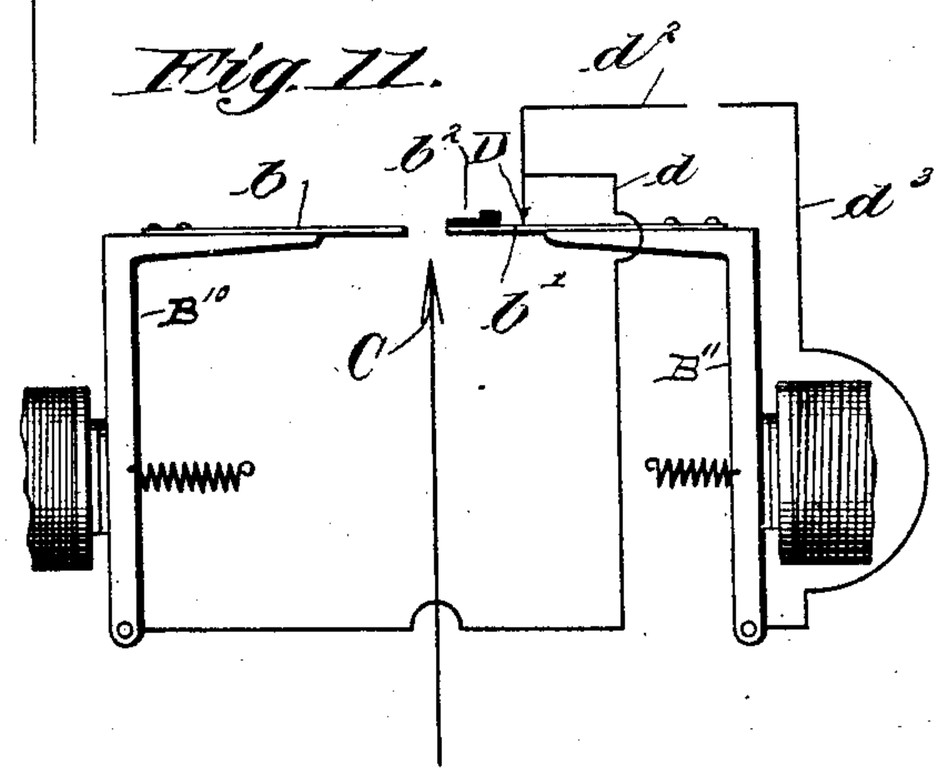


Fig. 11.



Witnesses—

W. A. Rauberschmidt

Louis J. Delson.

Inventor—

Eugene W. Vogel

By Walter H. Lamberger

Atty.

UNITED STATES PATENT OFFICE.

EUGENE W. VOGEL, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE RAILROAD SUPPLY COMPANY, A CORPORATION OF ILLINOIS.

RELAY.

No. 855,365. Specification of Letters Patent. Patented May 28, 1907.

Application filed May 20, 1901. Serial No. 61,146.

To all whom it may concern:

Be it known that I, EUGENE W. VOGEL, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Relays; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements for relays and for convenience is shown embodied in an interfering relay of the Hovey type, though obviously, any form of interfering or interlocking relay may be used.

The object of the invention is to provide means for operating a plurality of independent circuits by means of a single relay.

The invention consists of the matters hereinafter described and more fully pointed out and defined in the appended claims.

In the drawings: Figure 1 is a side elevation of a relay embodying my invention. Fig. 2 is a top plan view of the same. Fig. 3 is a side elevation showing one of the positions the armatures assume when the electro magnets are de-energized. Fig. 4 is a side elevation and showing an insulated contact piece on one of the armatures. Fig. 5 is a top plan view of the same. Fig. 6 shows the same in one of its operative positions. Fig. 7 is a side elevation of a relay embodying my invention having additional contact pieces on each armature. Fig. 8 is a side elevation similar to Fig. 7, showing one of the positions the armatures assume when the electro magnets are de-energized. Fig. 9 is a top plan view of a form in which the armature is provided with a plurality of arms. Fig. 10 is a similar top plan view showing the armatures with two arms one of which is insulated from the other. Fig. 11 is a side elevation illustrating another modification of my invention. Fig. 12 is an elevational view looking toward the left from the center of Fig. 9.

In said drawings; referring first to Figs. 1, 2 and 3: A and A^1 indicate the electro magnets of an interfering relay. B and B^1 indicate L shaped armatures pivoted at their lower ends and provided at their upper ends with the contact springs b—b^1, which project toward each other approximately at right angles with the armatures. C indicates a contact piece located in position to be engaged by either of the contact springs when its electro magnet is de-energized and having a conductor connected therewith designed to form a part of a circuit. One of the contact springs, as shown b is constructed of non-conducting material, such as ivory or other suitable material or is provided with a non-conducting tip b^2 so that when the armature B falls first, the contact spring b^1 when it falls will be supported on the spring b out of contact with the contact C and insulated from the armature B. Should however, the electro magnet A^1 be first de-energized, the contact spring b^1 first engages the contact point C. The electro magnet A being subsequently de-energized the non-conducting spring b falls on top of b^1 without in any way affecting the normal flow of current.

The form illustrated in Figs. 4, 5 and 6 is similar to that illustrated in Figs. 1, 2 and 3, with the exception that the armatures B^2 and B^3 supported respectively by the electro magnets A^2 and A^3 are provided with the contact springs b and b^1, of which b, or a tip b^2 carried thereby, is of ivory or other insulating material provided at its outer end on the top thereof with tip or plate b^3 of platinum or other good conducting material with which, as shown, a conductor is connected. Should the armature B^2 fall first, the spring b thereof will rest upon the contact C thereby preventing a contact being made therewith with the spring b^1 when it falls. Said spring b^1, however, makes a contact with the platinum tip b^3 whereby current is permitted to flow through the conductor connected therewith. Should the armature B^3 fall first, the contact spring b^1 of said armature rests upon and has electrical contact with the contact point C. Obviously by this arrangement different circuits may be closed, depending upon which armature falls first.

In the form illustrated in Figs. 7 and 8, both of the contact springs on each armature B^4 and B^5 are of conducting material, and each is provided on its upper side at its free end with a tip of insulating material having secured thereon a plate of conducting material such as platinum, and indicated by b^4—b^5 with which a conductor may be connected.

The operation is as follows: Should the armature B^4 fall first contact is made with the contact point C. When B^5 falls the spring

thereof engages the plate b^4 thereby forming an electrical contact the current passing through the wire connected therewith. When B^4 lifts, the contact is broken at C, while the current continues to pass through the spring of B^5 and plate b^4 which supports the same, until B^5 is retracted by its electro magnet.

The forms illustrated in Figs. 9 and 10 show a plurality of arms or contact springs secured on each armature B^6—B^7—B^8 and B^9 and movable therewith. The contact springs attached to the armature B^6 are indicated by b^6—b^7—b^8 and the contact springs attached to the arms of the armature B^7 are indicated by b^9—b^{10}—b^{11}. Of these contact springs b^6 and b^9 are attached as shown directly to their armatures and the contact springs b^7 and b^{11} are secured to their armatures by means affording insulation. As shown, a block of insulating material is attached to each armature on corresponding sides of the contact springs b^6 and b^9 and to which said contact springs b^7 and b^{11} are secured. Contact springs b^8 and b^{10} are secured on each armature on the opposite sides thereof from the insulated contact springs thereof and may or may not be insulated therefrom, as preferred. Insulating tips, either with or without additional contact plates as indicated in Figs. 9 and 10 may be provided as preferred, and conductors may be connected with said contact plates as shown in Figs. 4 and 7. The armatures are each provided with a pin made of insulating material b^{13} which extends beneath and normally supports the contact springs b^7 and b^{11} respectively. Fig. 10 is similar to Fig. 9, with contact springs b^7 and b^{10} omitted.

A plurality of contact pieces C, comprising parts c—c^1—c^2 each insulated from the other and connected in different circuits if preferred and respectively in position to be engaged each by one of the pairs of contact springs are located beneath the ends of said contact springs. When one of the electro magnets is de-energized, permitting an armature to fall, each of the arms thereof engages one of the portions of said contact piece, thereby enabling many independent and separate circuits to be operated, said number of circuits being much greater than the number of separate contact springs on said armatures and contact plates thereon. The arrangement also permits of cutting out and cutting in certain circuits, dependent upon which electro magnet is first de-energized. Should the armature B^6 fall first, the contact spring b^7 being insulated and engaging the contact piece c^2 would not close a circuit connected therewith, while b^6 engaging the contact piece c^1 as the spring b^8 engages the contact c, each act to close the respective circuits, connected therewith. The fall of the armature B^7 results in the ends of the springs b^9—b^{10}—b^{11} being supported upon the insulated end of the contact springs b^6—b^7 and b^8. This has no effect upon the circuits previously formed but will close other circuits through the contact plates. On the other hand, if the armature B^7 falls first, the contact spring b^{11} being insulated, does not close the circuit connected in the contact c, while the circuits connected with the contacts c^1—c^2 are closed by the arms or contact springs b^9—b^{10} and the fall of armature B^6 will close other circuits through the contact plates on contact springs b^9—b^{10} and b^{11}, said circuits remaining closed after the armature B^7 is lifted by its magnet and until the armature B^6 is retracted by its magnet. Obviously, any number of arms or contact springs may be provided on the armatures, and any number of contact pieces in position to engage the same. Obviously, too, if preferred the ends of said contact springs being provided with insulated plates, an almost infinite number of circuits may be arranged therewith in many different ways, without departing from the principle of my invention.

In the embodiment of my invention shown in Fig. 11, the electro-magnets when energized retain the armatures apart from each other, and in such position close the following circuit; lead d^2, contact D, spring extension b^1; armature B^{11}, to lead d^3, and from thence to any electrical mechanism back to lead d^2. If the magnet controlling the armature B^{11} is de-energized before the magnet controlling the armature B^{10} is de-energized, the circuit above described will be broken, owing to the extension b^1 falling away from the contact D. The subsequent de-energization of the magnet controlling B^{10} will not affect the broken condition of the circuit, as the extension b will rest upon the insulated tip b^2 upon the end of the extension b^1. If, however, the magnet controlling the armature B^{10} should be de-energized before the de-energization of the other magnet, the extension b would engage the stop C, and then upon the de-energization of the magnet controlling the armature B^{10}, the spring extension b^1 would fall upon the extension b, thus continuing the circuit closed as follows; lead d^2, to lead d to armature B^{10}, spring extension b, spring extension b^1, armature B^{11}, lead d^3 through the electric devices to the lead d^2; it is thus evident that in this modification of my invention a circuit is continued in its open or closed condition according to which of the armatures B^{10} B^{11} falls first. In this figure C may be merely a stop serving to arrest the inward movement of the armatures through engagement with the spring extensions b—b^1, or C may be a contact through which a circuit may be controlled, as in the other figures of the drawings.

While I have shown the armatures in the various figures of my drawings held apart

through the energization of the controlling magnets and drawn together upon the de-energization of the magnets, yet it would be equally practicable to reverse this arrangement by locating the magnets between the armatures so that their energization would draw the armatures inwardly, they being drawn outwardly by means of springs.

I claim as my invention:

1. In a circuit controller, the combination with a plurality of magnets, of an armature operated by each magnet, said armatures having intersecting paths of movement, a relatively fixed contact located at the point of intersection of the paths of said armatures, insulating material carried by the portion of one of said armatures which extends into the path of movement of the other armature, and leads connected to said armatures and contact.

2. In a circuit controller, the combination with a plurality of magnets, of an armature operated by each magnet, said armatures having intersecting paths of movement, a relatively fixed contact located at the point of intersection of the paths of said armatures, insulating material carried by the portion of one of said armatures which extends into the path of movement of the other armature, a contact supported by said insulating material, and leads connected to said contact and said armatures.

3. In a circuit controller, the combination with a plurality of magnets, of an armature operated by each magnet, said armatures having intersecting paths of movement, a relatively fixed contact located at the point of intersection of the paths of said armatures, insulating material carried by the portion of each of said armatures which extends into the path of movement of the other armature, a contact supported by the insulating material on each armature, and leads connected to said contacts.

4. In a circuit controller, the combination with a plurality of magnets, of an armature operated by each magnet, a plurality of contacts carried by each armature, the contacts on the respective armatures having intersecting paths of movement, relatively fixed contacts located at the point of intersection of the paths of movement of corresponding pairs of movable contacts, insulating material supported upon the portions of the contacts carried by one armature which in one position of said armature extend into the paths of movement of the corresponding contacts carried by the other armature, and leads connected to said contacts and said armatures.

5. In a relay, the combination with a plurality of electro magnets of an armature operated by each, an inwardly directed contact member on each armature said contact members having intersecting paths of movement, a contact piece located to engage either of said contact members, and means whereby separate and independent circuits are closed dependent upon the order in which said armatures make contact with said contact pieces.

6. In a relay, the combination with a plurality of electro-magnets of an inwardly directed armature operated by each, a conductor on the extremity of each armature and insulated therefrom, a fixed contact piece located between and in operative relation with said armatures and means whereby a plurality of circuits may be controlled thereby depending upon the position and coaction of said armatures.

7. In a device of the class described, an armature, a plurality of resilient contact members thereon one of which is insulated therefrom, a conductor plate secured on the outer end of each contact member and also insulated therefrom, a conductor leading to each and a contact piece for each contact member and means whereby each contact member together with the contact piece and conductor plate is adapted to make and break a plurality of circuits.

8. In a relay, the combination with coacting armatures of contact members secured on each, those of one armature acting to engage those of the other when in one position, contact pieces located in position to be engaged by the contact members of either armature whereby a plurality of separate and independent circuits may be closed or broken dependent upon the relative position of said armatures to each other and the contact pieces.

9. The combination with two electro magnets, of conductors located between the same each provided with a separate contact piece, armatures adapted to be normally supported by said electro magnets and a plurality of resilient contact members on each armature adapted each to engage a contact piece when the armature is unsupported by the electro magnet, insulated contact plates on each contact member and conductors leading therefrom and forming parts of separate and independent circuits adapted to be opened and closed by the engagement of the contact members contact plates and contact pieces.

In testimony whereof, I have hereunto subscribed my name in the presence of two subscribing witnesses.

EUGENE W. VOGEL.

Signed in the presence of—
H. H. VAUGHAN,
J. P. WIBORG.