No. 677,659.

Patented July 2, 1901.

R. HERMAN.

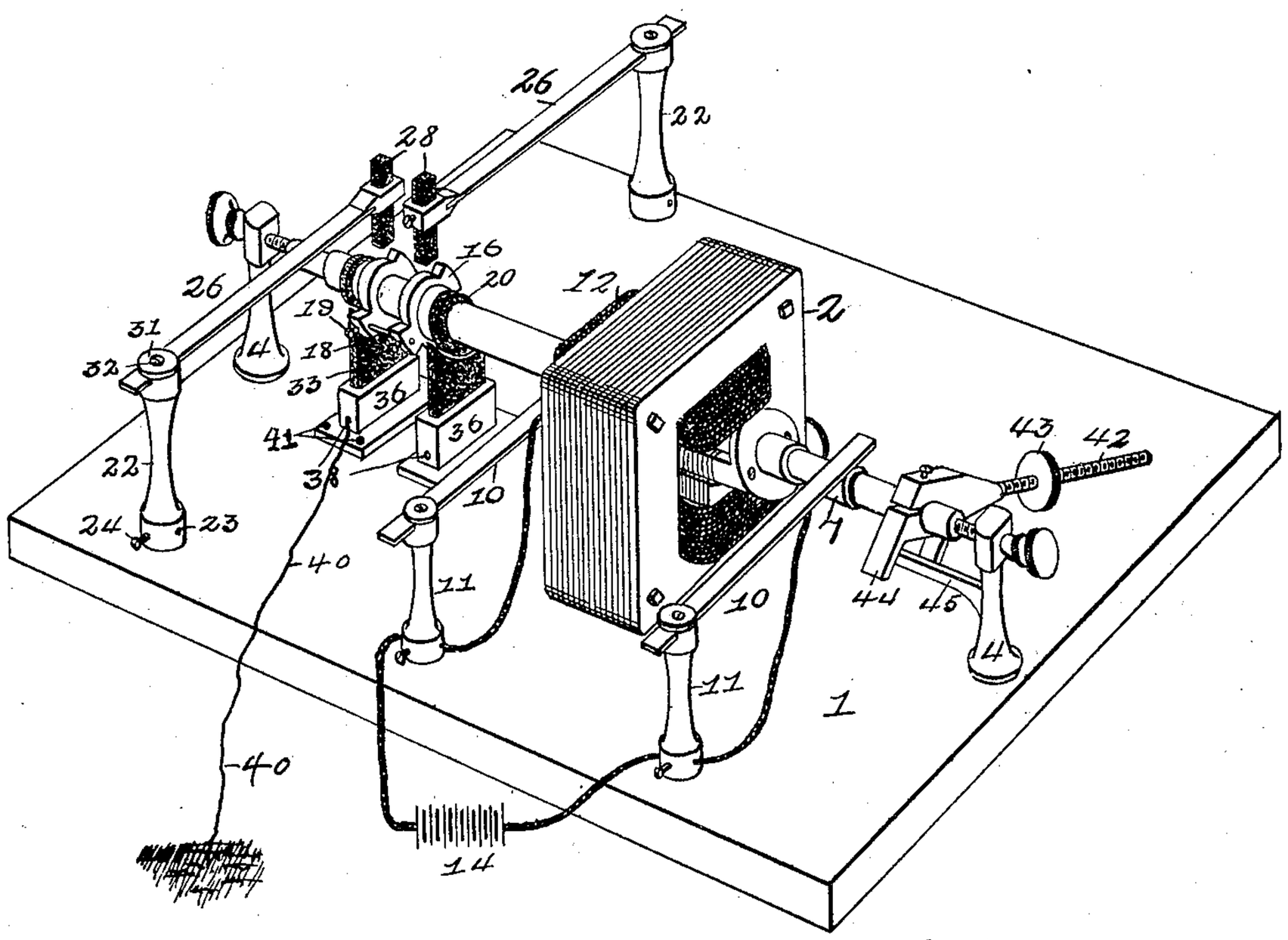
RELAY.

(Application filed Nov. 21, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



Witnesses:

J. P. Hoffman.

E. C. Cotter.

Inventor

R. Herman.

By

A. C. Ewer & Co.

Att'ys

No. 677,659. Patented July 2, 1901.

R. HERMAN.

RELAY.

(Application filed Nov. 21, 1900.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 2.

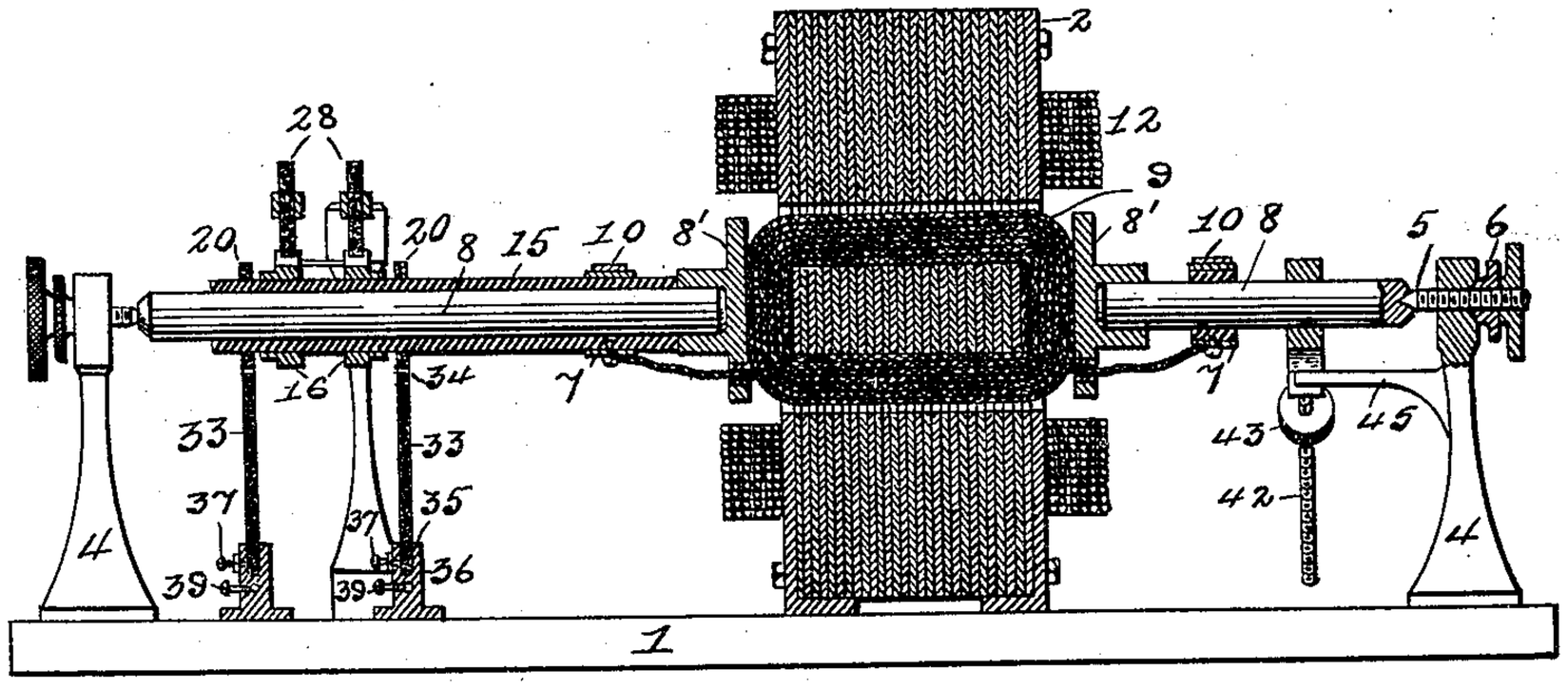


Fig. 4.

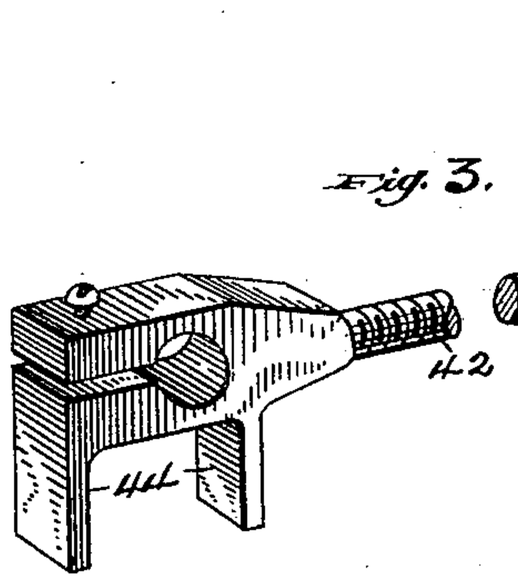


Fig. 5.

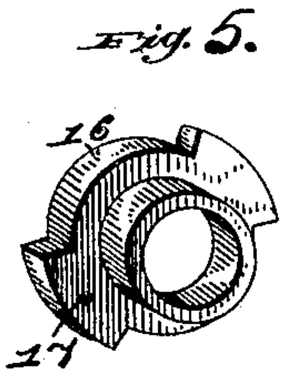


Fig. 3.

Fig. 7.

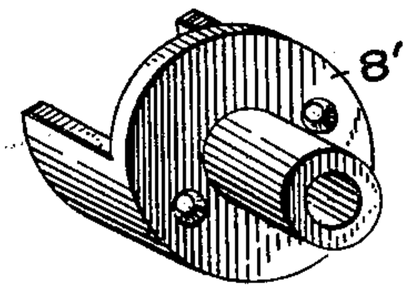


Fig. 8.

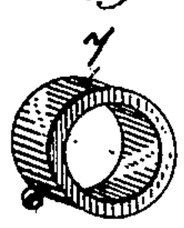


Fig. 6.

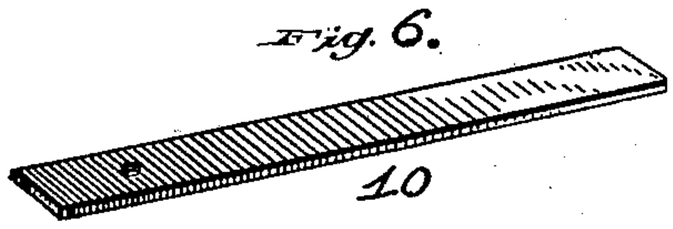
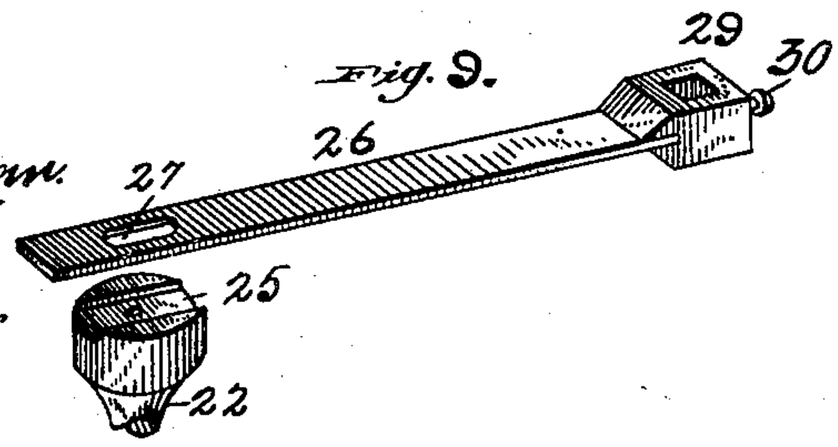


Fig. 9.



Witnesses:
A. D. Hepleman.
E. E. Potter.

Inventor
R. Herman.
By
A. C. Evers & Co.
Atty's

UNITED STATES PATENT OFFICE.

REINHOLD HERMAN, OF CRAFTON, PENNSYLVANIA.

RELAY.

SPECIFICATION forming part of Letters Patent No. 677,659, dated July 2, 1901.

Application filed November 21, 1900. Serial No. 37,241. (No model.)

To all whom it may concern:

Be it known that I, REINHOLD HERMAN, a citizen of the United States of America, residing at Crafton, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Relays, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in relays, and has for one object to construct a relay in which the pressure on the contacts is not dependent on the magnetic pull exerted by the magnets, but due to spring-contacts independent of the pull of the armature.

A further object of the invention is to construct a relay having a lightning-arrester for the main-circuit contacts to prevent the relay being destroyed or its effectiveness impaired by electric lightning discharges.

A still further object of the invention is to operate the relay electrically with low-pressure currents, but transmit high-pressure or currents of great volume over contacts of a main circuit; furthermore, to provide means for adjustably controlling or regulating the movement of the armature, to provide non-fusible contacts, and also means for adjustably holding the non-fusible contacts or conductors.

Briefly described, the invention comprises an insulated base, a laminated field-magnet, a rotatable armature, supports for the same, adjustable spring contact or conductor holders, non-fusible contacts or conductors mounted in said adjustable contact or conductor holders, combination binding-posts which support the contacts of the main and local circuits, and a lightning-arrester for the main circuit, together with other details of construction to carry out the objects of my invention, as will be hereinafter more specifically described and then particularly pointed out in the claims.

In describing the invention in detail reference will be had to the accompanying drawings, forming a part of this specification, and wherein like numerals of reference will be employed for designating like parts throughout the several views of the drawings, in which—

Figure 1 is a detail perspective view of a relay constructed in accordance with my invention. Fig. 2 is a longitudinal sectional view of the same. Fig. 3 is a detail perspective view of the adjustable counterbalance, partly broken away. Fig. 4 is a detail perspective view of one of the plates of which the armature is constructed. Fig. 5 is a detail perspective view of one of the cam-contacts. Fig. 6 is a like view of one of the contact-springs which engage the contact-rings carried by the armature-shaft. Fig. 7 is a detail perspective view of one of the journals that support the armature-shaft. Fig. 8 is a detail perspective view of one of the contact-rings carried by the armature-shaft. Fig. 9 is a detail perspective view of one of the springs which carry the non-fusible contacts, also showing a part of the supporting-post therefor.

The relay shown, and to be hereinafter described in detail, is particularly adapted for use in connection with signaling systems wherein a track-relay and three-position relay are employed in connection with the signal, and in such use the relay controls a main-line circuit and a local circuit for operating the signal mechanism. The invention is not, however, limited to this specific use, as the same form of relay may be employed in connection with telegraphy, in which use it would be employed for controlling a local circuit.

In the accompanying drawings, which show a practical form of the invention, 1 indicates the base, which is composed of any suitable insulating material and upon which is mounted the laminated field-magnet 2. The armature 3 is supported by standards 4, having adjustable journals 5 and lock-nuts 6, and are screwed in the insulated base 1. This armature 3 is provided with contact-rings 7, which are insulated from the armature-shaft 8 for the purpose of transmitting current from local batteries to the armature-winding 9. The armature-shaft 8 is in two parts, the inner ends thereof being held in journals 8′, connected to the armature. Binding-posts 11 are supported on the base 1, and these posts 11 support springs 10 and are provided with apertures to receive the wire from the field-coils 12 and local batteries 14. The armature-shaft 8 is provided with a tubular insulation

15, preferably made of lava, on which is located one or more cam-contacts 16, having an aperture 17 to receive the fusible wire 18, which is locked in the cam-shaped contacts with a screw 19. One or more carbon disks 20 are mounted on this tubular insulation and fastened thereto in any suitable manner. Binding-posts 22 are also supported on the base 1 and are provided with apertures 23 for the reception of the main-line or circuit wire, the latter being locked therein by lock-screws 24. These posts 22 are provided in their upper ends with grooves 25 to receive and aline the springs 26, which are in turn provided with oblong slots 27 for the purpose of adjusting the non-fusible contacts 28 into line with the contacts 16. The springs 26 are provided on the opposite ends with apertures 29 and lock-screws 30 for the purpose of regulating and adjusting the pressure on the cam-contacts 16. After the springs 26 have been adjusted to the desired position they are locked by means of the washers 31, resting upon the upper face of the springs above the posts, and lock-screws 32, engaging through the washers, through the slotted end of the springs, and into the apertures in the upper ends of the posts.

Placed in a suitable position adjacent to the carbon disk 20 is a carbon plate 33, having a concave face 34, that is in close proximity to the carbon disk 20. This plate 33 is held in a slot 35, formed in a support 36, resting on the base 1 and carrying a lock-screw 37 to secure the plate in position. This support 36 is provided with an aperture 38 to receive the wire 40, leading to ground connection, said wire being held by a lock-screw 39 and the support being fastened to the base 1 with suitable screws 41.

In order to open contacts on cams 16 and non-fusible contacts 28, I provided an adjustable counterbalance consisting of a threaded rod 42, which is suitably clamped to the armature-shaft 8 and carries an adjustable weight 43. In order to form a stop for this weighted rod and prevent the armature revolving past its neutral point under excessive charge of current, I provide the rod 42 with downwardly-extending lugs 44, and on the standard or support, adjacent to the rod 43, I provide a bracket-arm 45, which extends outwardly between the two lugs, so as to be engaged thereby and limit the movement of the shaft, as will be readily apparent.

In the practice of the invention it will of course be understood that a suitable case or covering—such, for instance, as glass—is provided for the relay.

I desire to call attention to the fact that with a relay constructed as herein set forth the pressure of the contacts thereof is in no manner dependent upon the magnetic force exerted by the magnet on the armature, but is due to the adjustable spring-contacts provided with non-fusible conducting material and insulated from the rotating armature. It will be noted that the carbon disks 20 and carbon plates 33 are in no way connected to the main circuit, but are insulated with an air-gap of sufficient distance from the rotating contact-disks 16, the plates 33 being placed directly under said disks 20 and also insulated therefrom by an air-gap and held in position by suitable metallic supports that are fastened to the base of the relay and have means to receive and hold wires leading to the ground connection. It will be noted that in case a main circuit should be struck or charged with an electric bolt it will find a shorter path of travel over the carbon disks and carbon plates 33, through the metallic supports, over the wires attached thereto to the ground, thereby forming the shortest path of least resistance and in so doing preventing the excess charge from passing to the field-magnet affecting or impairing the effectiveness of the same. If the local circuit, which is the circuit that passes to field and armature winding, were a grounded circuit to local battery, it will be noted that the excess charge in the main circuit would not be taken care of by the fuse-wire 18 and lightning-arrester 33 36, and it would find a path across the insulation to armature-shaft, also to field-magnet, to ground, thereby burning out the instrument; but as the lightning-arrester is placed in a position as shown it will be seen that the excessive charge will find a path of lower resistance across the air-gap between carbon disks and carbon plates, through the latter and their supports to ground. If the lightning-arrester become ineffective, the fuse 18, placed between metallic cam-contacts, will burn out, thereby opening main-line circuit, and will in no way affect the operation of the relay. In case there would be two or more main-line contacts to be operated on same armature-shaft it will be observed that the excessive charge will not interfere with the operation of any of the main-line contacts except the one set receiving the excessive charge, which will be taken care of by lightning-arrester and fuse 18 to ground without interfering with local circuit or other main-line circuits.

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

1. In a relay, the combination of a magnet, a rotatable armature, an armature-shaft, contact-rings mounted on said shaft for the local circuit, contact-springs engaging said rings, cam-contacts mounted on the armature-shaft for the main circuit, adjustable contact-holders, non-fusible contacts adjustably mounted in said holders, and means carried by the armature-shaft for breaking the circuit between the cam-contacts and the non-fusible contacts.

2. In a relay, a field-magnet having a rotatable armature-shaft, cam-contacts mounted on said shaft for the main-line circuit, a fuse connecting said cam-contacts, contact-rings

mounted on the armature-shaft for the local circuit, adjustable contact-springs engaging said contact-rings, adjustable contact-holders for the main-line circuit, non-fusible contacts adjustably mounted in said holders, and conducting-plates mounted in close proximity to the cam-contacts with a ground connection to said plates, substantially as described.

3. In a relay, the combination of a field-magnet, a local circuit connected thereto, a rotatable armature, a main-line circuit, contact-disks mounted on the rotatable armature, a fuse between said disks, and non-fusible contacts for engagement with said disks when the armature-shaft is actuated.

4. In a relay, the combination with the magnet and the local circuit connected thereto, of a rotating armature fusible contacts for said local circuit, a main-line circuit, contact-disks and non-fusible contacts for said main-line circuit, and a fuse between said disks, as and for the purpose described.

5. In a relay, the combination of a field-magnet, a local circuit connected thereto, a rotatable armature, a main-line circuit, contact-disks mounted on the rotatable armature, a fuse between said disks, non-fusible contacts for engagement with said disks when the armature-shaft is actuated, and means for grounding an excessive charge of current over the main-line circuit to prevent the same passing to the field-magnet and local circuit, substantially as described.

6. In a relay, the combination of a field-magnet, a local circuit connected thereto, a rotatable armature, a main-line circuit, contact-disks mounted on the rotatable armature, fusible connections between said disks, non-fusible contacts for engagement with said disks when the armature-shaft is actuated, means for grounding an excessive charge of current over the main-line circuit to prevent the same passing to the field-magnet and local circuit, and means for counterbalancing said armature, substantially as described.

7. In a relay, the combination of a field-magnet, a local circuit connected thereto, a rotatable armature, fusible contacts for said local circuit, a main-line circuit, contact-disks and non-fusible contacts for the main-line circuit, a fuse between said disks, and adjustable contact-holders for said contacts, substantially as described.

8. In a relay, a field-magnet, a local circuit connected thereto, a rotatable armature, a main-line circuit, non-fusible contacts for the main-line circuit, spring contact-holders in which said non-fusible contacts are adjustably mounted, and means for grounding an excessive charge of current over the main-line circuit to prevent the same passing to the field-magnet and local circuit, substantially as described.

9. In a relay, a field-magnet, a local circuit connected thereto, fusible contacts for the said local circuit, a rotatable armature, a main-line circuit, non-fusible contacts for the main-line circuit, adjustable contact-holders in which the non-fusible contacts are adjustably mounted, contact-disks for the main-line circuit, fusible connections between said disks, and means for counterbalancing said armature, substantially as described.

10. In a relay, a field-magnet, a local circuit connected thereto, a rotatable armature, fusible contacts for said local circuit, spring-contacts therefor, a rotatable armature, means for counterbalancing the movement of the armature, a main-line circuit, non-fusible contacts for the main-line circuit, contact-holders for said non-fusible contacts, contact-disks carried by the rotatable armature to be engaged by the non-fusible contacts, and fusible connections between said disks, substantially as described.

11. In a relay, the combination with a field-magnet, and the local circuit connected thereto, of a rotatable armature, fusible contacts for said local circuit, a main-line circuit, contact-disks and non-fusible contacts for said main-line circuit, and fusible connections between said disks, substantially as described.

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

REINHOLD HERMAN.

Witnesses:

JOHN NOLAND,

E. E. POTTER.