

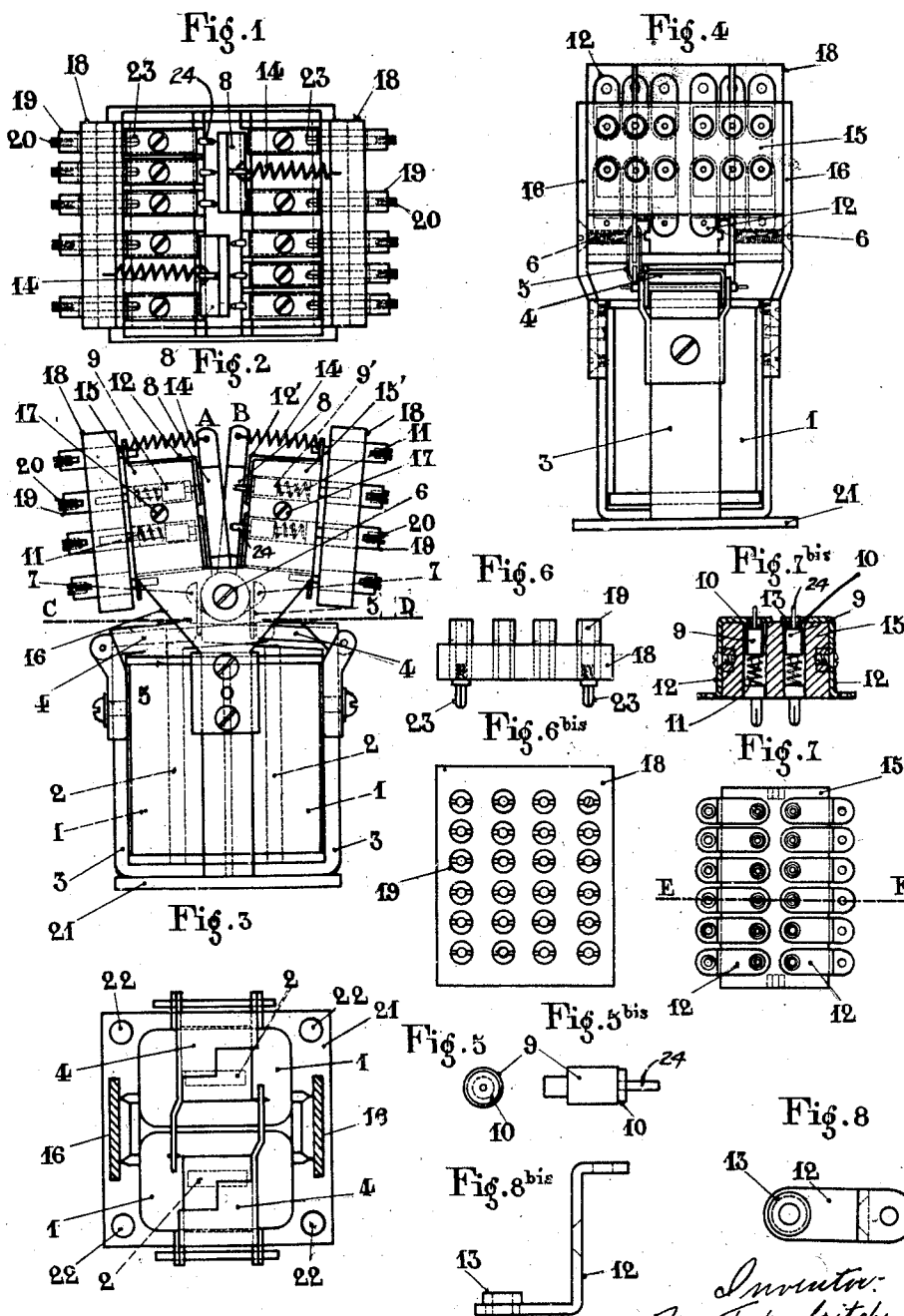
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ELECTROMAGNETIC RELAY FOR CONTROLLING ELECTRIC CIRCUITS

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UNITED STATES PATENT OFFICE

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ELECTROMAGNETIC RELAY FOR CONTROLLING ELECTRIC CIRCUITS

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It is well known that with certain relays at present known and particularly relays used in connection with telephone apparatus and provided with blade contacts, arranged in tandem, one behind the other, and themselves actuated successively as soon as the main line contact enters into action, it is necessary to increase the air gap between the movable armature and the magnetic coil at the same time that the number of contacts is increased. The result is that, with equal excitation, the force of attraction exerted by the electromagnet of the relay on the movable armature decreases when the number of contacts to be controlled increases while, on the contrary, the force of the relay involved should be increased.

Relays in which the blade contacts are all controlled by a movable mechanism actuated by an electromagnet armature are also known; but in these relays the spark gap is relatively large (the order of about 2 mm.) which requires a very intense excitation current to operate the apparatus.

In these relays it is impossible to determine exactly (during course of manufacture) the position and course (movement) of the blade contacts, which makes it necessary to adjust them very carefully before putting them into service and also during service, all these adjustments consisting in more or less twisting the various contacting blades by hand.

The present invention relates to a novel electromagnetic relay capable of actuating a large number of contacts and constructed in such manner that the spark gap provided between the movable armature and the magnetic core is very small (of the order of a few tenths millimeters only), whatever be the number of the contacts to be controlled.

According to the present invention also the contacts are constructed in such a manner that they practically require no adjustment either whilst being mounted in position or during the course of use. Their position on the relay and the stroke having been determined once and for all in advance they remain in the normal position which they are adapted

to occupy when in use after being mounted in position.

These contacts are enclosed in a block of insulating material which protects them from dust. The space required by such a relay is, with an equal number of contacts to be actuated, one-half the space required by an ordinary blade relay. The arrangement of the various members with which the new relay is provided is such as to enable a group of two relays to be combined with advantage.

One method of construction of a group of two relays, arranged in accordance with the present invention, each of the relays being provided with 24 contacts, is illustrated by way of example in the accompanying drawings, wherein:—

Figure 1 illustrates a plan of the group of two relays.

Figure 2 shows an end view of the group.

Figure 3 is a section on the line C—D of Figure 2.

Figure 4 is a side view of a group of which an accessory (left-hand block) has been omitted.

Figure 5 illustrates to a larger scale an end view of a movable piston provided with a silver contact.

Figure 5^b illustrates a side view of the same piston.

Figure 6 is an end view of a block.

Figure 6^b is a plan view.

Figure 7 is an end view of the contact block.

Figure 7^b is a section on the line E—F of Figure 7.

Figure 8 is an end view, to a larger scale, of a stationary blade with its silver contact, and

Figure 8^b is a side view.

In the form of construction illustrated in the drawing each of the two relays forming the group is provided with an exciting coil 1 having a core 2 and a strap 3. A movable plate 4 forming an armature is hinged mounted on the strap 3. The free end of the movable plate 4 engages with a ring 5 which is actuated by a lever 7 pivoted on a shaft 6 and secured to a shutter 8 of insulating material drawn into its position of rest by means of a spring 14. Two supporting blocks 15

and 15', clamped between two plates 16, by means of screws 17, extend the full width occupied by the two shutters 8 of the group of relays and carry contacts arranged so as to be actuated by the two relays of the group.

5 Behind each supporting block 15 and 15' is provided a block 18 provided with a suitable number of slotted studs 19. The connecting screws are fitted into the slots of the studs 19 and are tightened in position by means of tightening screws 20. These slots may also receive a peg 23 which places the connecting screw in contact with any one of the contacts 9 (or 9') or 12 (or 12').

10 The two relays which form the groups are secured to a plate 21 provided with four holes 22 adapted to receive the screws for securing the group. Each of the contacts proper of the device is formed by a piston 9 (or 9') prolonged by a rod 24 of slight diameter and provided with a washer 10 of alloy or silver (Figure 5^b) threaded on this rod. Each piston contactor, located in a cylindrical recess of the contact supporting block 15 (or 15'), is subjected to the action

25 of a conducting coiled spring 11 and bears against a stationary blade 12 (or 12') of which one end is provided with a gold and silver contact washer 13. The rod 24 of the piston projects from the block 15.

30 The operation of this relay is as follows: When an exciting current passes through the coil 1, the magnetic field which is created in the circuit consisting of the core 2, the strap 3, the movable plate 4 and the air gap between the said plate and the core determines the attraction of the said blade by the core. During its movement the movable plate 4 moves the ring 5 which causes the lever 7, secured to the shutter 8, to pivot about the shaft 6.

35 At the moment in which the flywheel 8 leaves the position A it leaves all the pistons 9 which it forced by their rods 24 under the action of the withdrawal spring 14 and pushes their corresponding pistons 9' from the block

40 15.

Under the pressure of the coiled springs 11 the movable pistons 9, which are no longer pushed by the shutter 8, bear against the stationary blades 12, thus closing the circuits

50 which they control. The reverse movement takes place as regards the pistons 9' which are pushed by the shutter 8 which determines the opening of the circuits controlled by the contacts 9', 12'. When the current is interrupted the magnetic field ceases and the return spring 14 returns the shutter 8 into its initial position of rest A.

In the example illustrated in the drawing it is impossible either to reverse 6 circuits or

60 to establish 6 circuits and to interrupt 6 others, these different operations taking place with a maximum air gap of $\frac{1}{10}$ of an mm. for example, irrespective of the number of contacts.

65 What I claim is:—

1. In an electromagnet relay including the usual electro-magnet and its armature, a circuit breaker comprising a series of independently movable contacts and a fixed contact, a shutter of insulating material arranged in opposition to the movable contacts and movable into and out of engagement with the same to, in the former instance effect movement of the engaged movable contacts out of engagement with the fixed contact, a spring in circuit with each of the movable contacts and urging the same to engagement with the fixed contact, a spring normally holding the shutter in engagement with the movable contacts and of a strength to overcome the springs for the said movable contacts, and operative connection between the shutter and the armature of the relay to effect movement of the shutter out of engagement with the movable contacts upon energization of the relay magnet.

2. An electromagnetic relay as specified in claim 1, and comprising a second series of independently movable contacts and a fixed contact, the independently movable contacts being actuated by individual ones of said shutters, whereby the selective energization of either of two of the electro-magnets will effect actuation of the respective shutter without affecting the other.

3. An electromagnetic relay as specified in claim 1, and comprising two independent control electro-magnets arranged in a plane perpendicular to the pivotal axis of two of the shutters, each of which shutters controls a respective one of two sets of the movable contacts mounted side by side.

In testimony whereof I have signed my name to this specification.

MICHEL TCHOUBRITCH.