March 4, 1947. A. WASSMER 2,416,970

ELECTRIC CONTACT DEVICE

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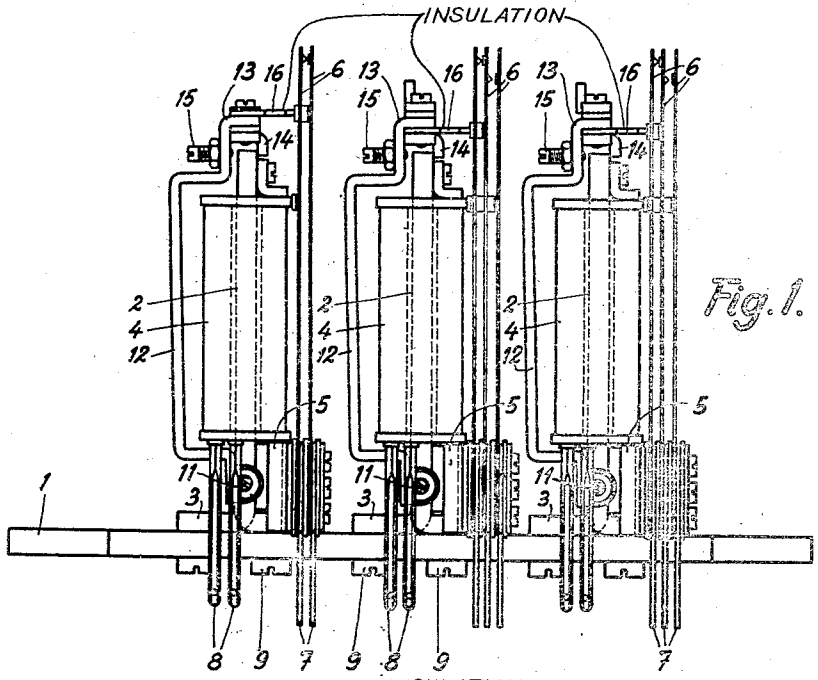


Fig. 1.

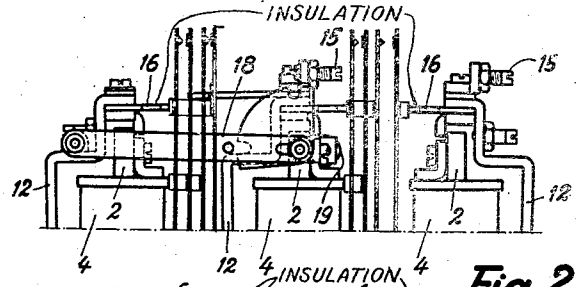


Fig. 3.

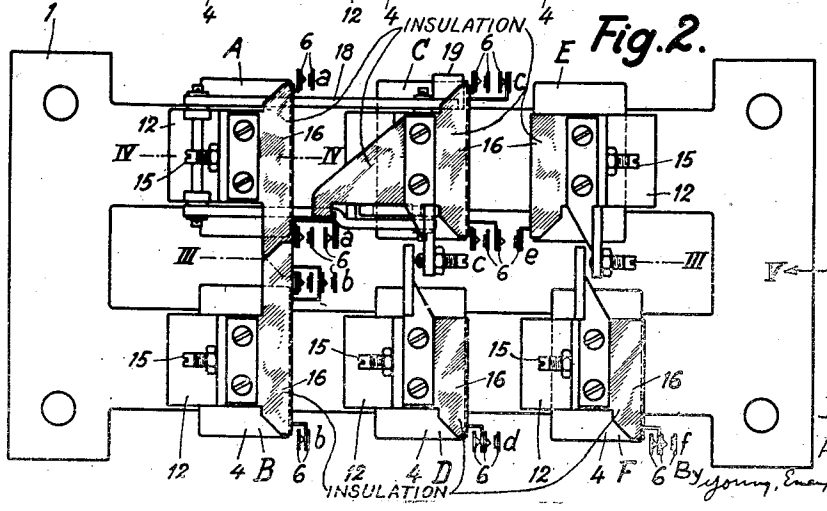


Fig. 2.

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Fig. 5.

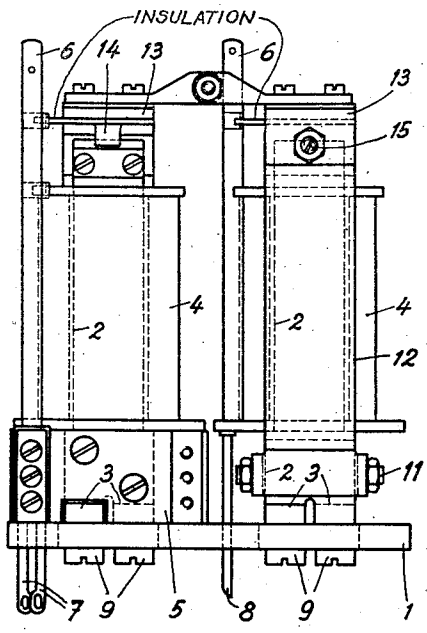


Fig. 4.

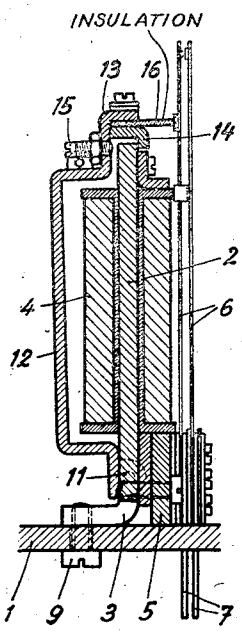


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Fig.6.

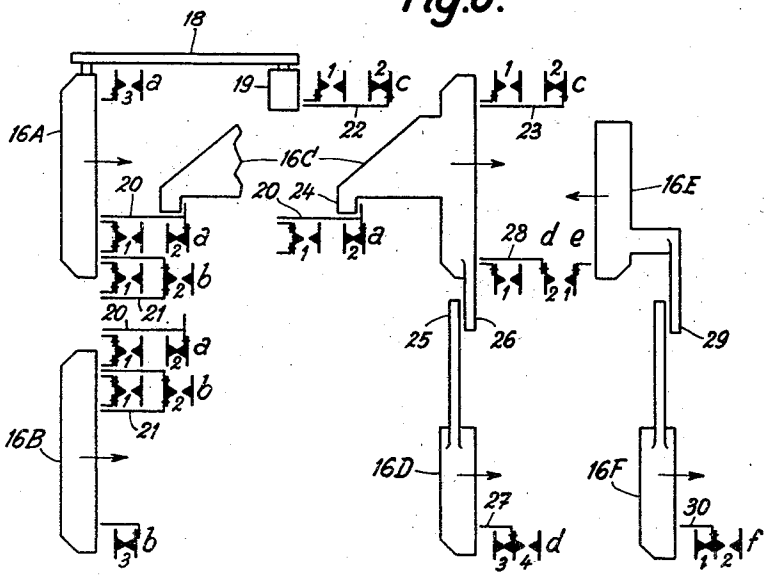



Fig.7.

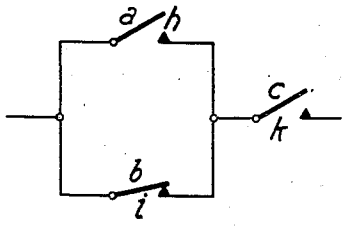



Fig.8.

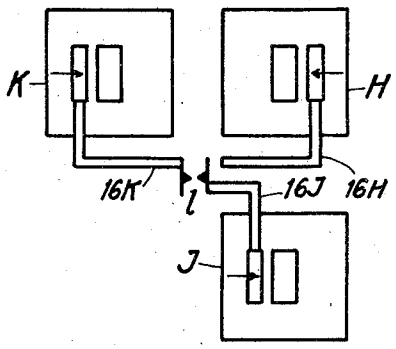



Fig.9.

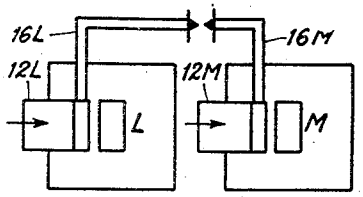
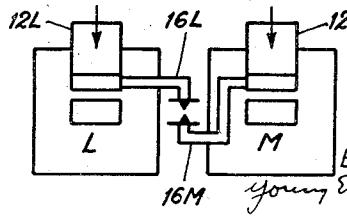



Fig.10.

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# UNITED STATES PATENT OFFICE

2,416,970

## ELECTRIC CONTACT DEVICE

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Application August 4, 1943, Serial No. 497,378
In Switzerland May 7, 1942

1 Claim. (Cl. 200—98)

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This invention relates to electrical relay systems particularly for use in the communication art in situations in which contacts belonging to the same circuit are to be connected in parallel or in series and wherein the closing of the circuit is dependent on events occurring in other circuits.

Object of the invention is an electric contact device comprising at least one set of contacts influenced by at least two electromagnetic systems independent of each other. With this device the solution of different connecting problems has become much simpler than before, when many contacts were necessary. For the same problem much fewer contacts are needed and in this way the working reliability is increased. Besides this, the expenses for material and erecting are reduced.

The accompanying drawings illustrate, by way of example, different embodiments of the object of the invention.

Fig. 1 is a side view of a contact device with six electromagnetic systems, which, in

Fig. 2, are shown in a plan view.

Fig. 3 is a section along the line III—III in Fig. 2.

Fig. 4 is a section along the line IV—IV in Fig. 2.

Fig. 5 is a side view seen in the direction of the arrow V in Fig. 2.

Fig. 6 represents a schematic illustration of the contacts present in the device shown and their manner of operation.

Fig. 7 is a diagram of connections which can be obtained by the contact device shown in Fig. 8.

Figs. 9 and 10 are diagrams showing certain possibilities of use of a contact device according to the invention.

Referring now to Figs. 1 to 6, 1 is a base plate on which a plurality of relay devices are mounted. The single magnetic systems of all the illustrated relays are similar and independent of one another. Each relay has a core 2 slotted at the bottom; the two halves 3 are bent along different directions in order to form a foot. The cores 2 are fixed to the base plate 1 by means of screws 9. Each relay has a coil 4 overlying a carrier member 5 to which the blades 6 of a set of contacts are fixed, having tongues 7 projecting below the base plate 1. The soldered terminals of the coil winding are designated by 8, Fig. 1.

A pair of pointed screws 11 enter into notches of each core 2. They pass laterally through lugs on the lower part of an armature 12, and can be adjusted by lock nuts, to form a pivot support of the armature 12. The body of the

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latter is substantially parallel to the core 2 of the coil and has a head 13 carrying a stop 14. The amplitude of the armature rocking movement can be adjusted by means of a screw 15. The whole armature construction is arranged in such a way that the weight of the armature presses the stop 14 against the upper part of the magnet core 2. If necessary the effect of the armature weight can be assisted by an initial tension in the springs or blades 6 of the set of contacts.

The blades 6 are longer than the electromagnetic system 2, 4, 12. In this way it is possible to render the contact making independent of the place of operation of the blades.

The armatures 12 carry different plates 16 of insulating material which operate, i. e., open or close the contacts (fixed to the blades) either directly or by means of loops, bars etc. These plates 16 are of different shapes. According to the purpose desired, they extend within reach of different sets of contacts and at the same time operate several contacts. They may also entrain one another or lock one another mechanically either directly or indirectly, e. g., by special parts of the plates themselves. As may be seen in Fig. 1 the plates 16 may be arranged at different heights without modifying the coil construction, merely by fixing them above or under the head 13 of the armature 12.

The different sets of contacts and the plates 16 operating them and present in the device shown in Figs. 1 to 5 are schematically illustrated in Fig. 6. The plates are designated by 16A—16F in correspondence with the relays A, B, C, D, E and F of Fig. 2 and, on attraction of the armature, are moved in a direction indicated by arrows.

The sets of contacts $a$ belong to the relay A, the sets of contacts $b$ to the relay B, etc.

As may be seen in Fig. 6, upon excitation of relay A, the plate 16A closes the contacts $a_1$ and $a_3$ directly, however, it opens the contact $a_2$ which, by a bar 20, is brought within the sphere of action of the plate 16A, closes simultaneously the contacts $b_1$ and $b_2$ (the latter by means of a loop 21) and, furthermore, by means of a rod 18 carrying the insulating member 19, the plate 16A closes the contact $c_1$ and opens the contact $c_2$; the one blade of the latter carrying a loop 22 which reaches within the sphere of action of the insulating member 19.

On attraction of the armature of the relay B, the plate 16B closes the contacts $a_1$, $b_1$ and $b_2$ and opens the contact $b_3$. The plate 16B, however, is without influence upon the contact $a_2$,

the bar 20 being outside the sphere of action of plate 16B.

On attraction of the armature of the relay C, the plate 16C closes directly the contacts $c_1$ and $d_1$, opens by means of the loop 23 the contact $c_2$ and, with a heel 24, engages the bar 20 for opening the contact $a_2$. At the same time the plate 16C, by means of the bar 28, moves the blade $d_2$, in this way preparing closing of the contact $d_2$, $e_1$.

The plate 16D has a heel 25 extending within reach of a projection 26 of the plate 16C, so that on operation of the plate 16D all the contacts lying in the sphere of action of the plate 16C are operated. Besides this, by means of the bar 27, the contact $d_3$ is opened and the contact $d_4$ closed.

The plate 16E acts upon the blade of contact $e_1$ and moves in the direction of the blades of the contacts $d_2$. For closing the contacts $d_2$, $e_1$ the attraction of a pair of relays C and E or D and E is, therefore necessary. By means of the heel 29 the relay E prevents the armature of relay F from moving when E is excited. If this is not the case, attraction of the armature of relay F causes by means of the bar 30 the opening of the contact $f_1$ and the closing of the contact $f_2$.

In this example it has been shown how sets of contacts, e. g., $a$ and $b$, are influenced directly by different electromagnetic relays which are independent of one another (the relays A, B and C).

An indirect operation of a set of contacts takes place when the plate of the relay D acts upon that of the relay C and a locking takes place when relay E is excited, for in this case, excitation of the relay F is without effect. In this way, the armature of the relay E influences the contacts belonging to relay F.

Fig. 7 illustrates by way of example a simple connecting problem which can be solved with the relays H, J, K of Fig. 8 and a single contact. Hitherto three contacts $h$, $i$, $k$ had to be closed with these three relays (Fig. 7). In the device according to the invention, however, the insulated plates 16K, 16H and 16J of the relays K, H and J act upon the blades of the single contact $l$. If the armature of relay K only is attracted $l$ is closed, and when, after this, the armature of relay J is attracted the contact $l$ is reopened, since the one initially tensioned blade of the contact follows the movement of plate 16J. When relay H is attracted, this blade is brought back and the contact $l$ is again closed. If K is opened both the excitation of relay H and that of relay J is without effect.

If one wishes to replace two contacts connected in parallel by a contact influenced by two relay armatures, both armatures are caused to act independently of one another upon the same contact blade so that both armatures are able to communicate the same movement. Then, on operation of a single armature, the contact is closed.

The series connection of two contacts can likewise be replaced by a single contact if one causes each of the two armatures to act upon one blade of the same contact in opposite directions so that the electric connection is only perfect when both armatures are attracted.

The same result might also be obtained by giving the one blade of the contact an initial tension so that it bears against both armatures of two relays. In this way each separate armature prevents contact making which is only performed when both armatures are attracted.

In the case of change-over contacts considerable saving is made by bringing the three blades of the same under the influence of the armatures of different relays. If, for instance, two pairs of relays are disposed in such a way that their heads are directed towards the middle of the whole arrangement a single set of contacts can be easily influenced by four relays.

There are likewise no difficulties in coupling these four relays with other four relays so that the plates cooperate with the set of contacts in such a way that this single set of contacts can be influenced by a great number of circuits etc. The same can be attained by mutually coupling or locking the relay armatures in a suitable manner. In Fig. 9 is shown how different kinds of connection can be obtained by a single contact. The arrows indicate the direction of movement of the armature on excitation of the relays. If the armatures of both relays are attracted simultaneously, the condition shown will not be changed. This is also the case if the armature of relay M only is attracted. If relay L is excited the contact is closed. In this state the contact can be reopened by the relay M without the excitation being removed from relay L. If the circuits of the relays L and M are then interrupted, no change of the contact conditions takes place. The same connection possibilities can be obtained by arranging the relays as shown in Fig. 10.

What I claim is:

An electrical relay system comprising, a plurality of relay magnets each having a movable armature, a set of resilient contact blades associated with each relay magnet, means carried by each relay armature engageable with the blades of the associated set to selectively position its blade contacts into any one of a plurality of positions, mechanical couplings between adjacent relay armatures whereby energizing of one relay magnet will influence the contact positions in more than one blade set, and energizing circuits for said magnets, said mechanical couplings including means whereby movement of one armature prevents movement of another armature.

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## REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS


| Number | Name | Date |
|---|---|---|
| 276,087 | Smithers | Apr. 17, 1883 |
| 773,324 | Hopewell | Oct. 25, 1904 |
| 1,151,720 | Ruddick | Aug. 31, 1915 |
| 1,364,874 | Ford | Jan. 11, 1921 |
| 1,496,442 | Becker et al. | June 3, 1924 |
| 1,904,847 | Babbitt | Apr. 18, 1933 |
| 1,964,268 | Morganstern | June 26, 1934 |
| 2,199,570 | Ostline | May 7, 1940 |
| 2,317,310 | Stern | Apr. 20, 1943 |