April 8, 1952 G. DEAKIN 2,591,684

ELECTRICAL CONTACT

Filed Dec. 23, 1948

Fig. 1.

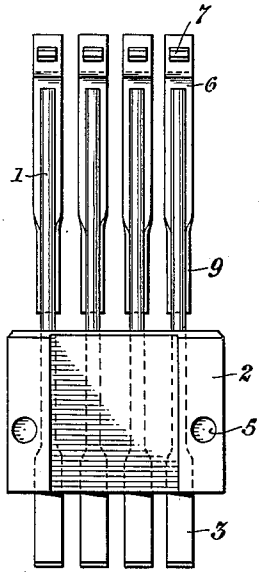

Fig. 2.

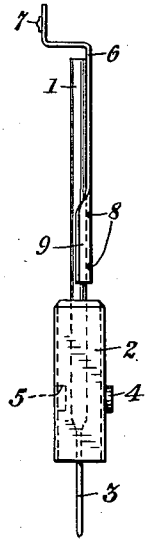

Fig. 3.

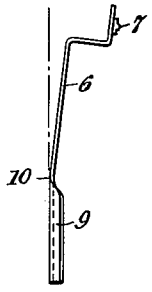

Fig. 4.

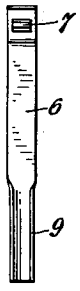

Fig. 6.

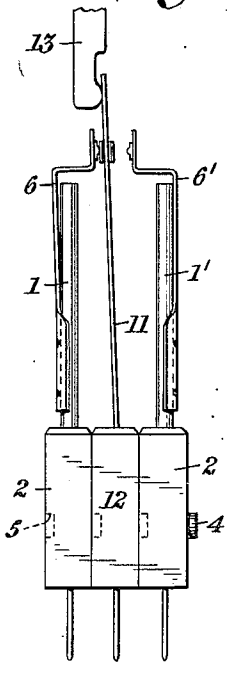

Fig. 7.

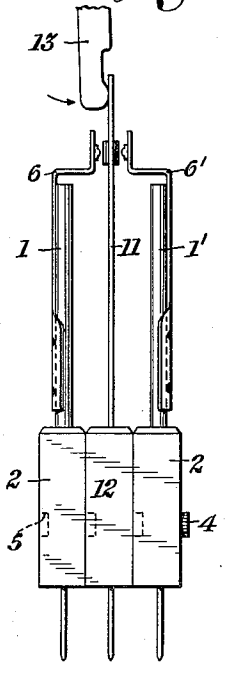

Fig. 5.

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ELECTRICAL CONTACT

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8 Claims. (Cl. 200—166)

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This invention relates to contact springs and contact spring assemblies for electromagnetic, relay switching keys and similar apparatus particularly of the type used in telephone systems.

In such relays and keys the contact springs have associated therewith backstops for limiting their following movement when the relay is in its energized and/or deenergized condition. Such stops usually consist of detached stop members fixed or stiff enough to resist the tension of the contact springs with which they are associated. The adjustment of springs with respect to such detached backstops is one of the most costly items in the assembly and adjustment of telephone relays at the present time.

An object of the present invention is the provision of spring assemblies and backstops for relays and other apparatus, which require substantially no adjustment after the relay or other apparatus is assembled, and which comprise a minimum of parts.

According to one feature of my invention a combined contact spring and backstop comprises a rigid mounting rod or pin and a flexible contact carrying spring supported from the pin which acts as a backstop and is preferably molded in an insulating supporting block. In a preferred embodiment of my invention the flexible springs are given an initial predetermined tension set to meet the required operating characteristics of the contact assembly.

These and other features of my invention will be clear from a reading of the following detailed description in conjunction with the accompanying drawings which illustrate a preferred embodiment of the invention.

Referring to the drawings:

Fig. 1 is a front elevation of an assembly unit of four combined contact springs and backstops moulded in a supporting insulator,

Fig. 2 is a side elevation of the assembly of Fig. 1,

Fig. 3 is a side elevation of a contact spring,

Fig. 4 is a front elevation of the contact spring of Fig. 3,

Fig. 5 is a side elevation of an armature spring,

Fig. 6 is a side elevation of a break-before-make contact assembly in the normal deenergized condition of the relay, and

Fig. 7 is a side elevation of the assembly of Fig. 6 in half-operated condition.

Referring to Figs. 1 and 2 each combined contact spring and backstop consists of a stiff rod support 1 molded into an insulator block 2. The lower ends of the rod supports 1 which may be

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made, for example, of phosphor bronze are squeezed into tongues 3 adapted to fit into a relay socket terminal. The insulator block 2 is formed with molded studs 4 on one side and with corresponding depressions 5 on the other side which interlock with depressions and studs on adjacent blocks when the spring units are assembled on the relay. The blocks 2 may be held together and to the relay structure by spring clamps or by other suitable means.

Flexible springs 6 provided with welded contacts 7 are secured, for example, by two spot-welds 8, to the rod supports 1 after molding. As illustrated in Figs. 3 and 4, the springs 6, which may be of phosphor bronze, are formed with a channelled portion 9 which partially embraces the rod support 1 to which the spring is secured. The springs 6 are also initially formed with an angular off-set bend 10 to impart to them a predetermined tension set.

The armature spring units, Fig. 5, which cooperate with the combined contact springs and backstops, consist of flat ribbons of spring metal 11 molded in an insulator supporting block 12 similar to the block 2 and also given an initial tension set before assembly so as to impart to them the required contact pressure when the complete contact pile-up is assembled.

Figs. 6 and 7 show a break-before-make contact assembly comprising two combined spring and backstop units 1, 6 and 1', 6' and an interposed spring 11 adapted to be moved by an armature 13. In Fig. 6 the armature spring 11 is shown in its unoperated condition resting against the flexible back contact spring 6. The tension offsets previously mentioned cause the armature spring 11 to force the flexible spring a short distance away from the rod support 1 which acts as a backstop. Fig. 7 shows the armature spring 11 midway between the front and back contacts in the half-operated condition. In this position there is a clear and ample air-gap on both sides of the armature spring contacts. When the armature spring 11 is fully operated, it again assumes a position similar to that of Fig. 6 but on the other side.

When a make-before-break contact combination is required the flexible springs 6, 6' are given less initial tension so that the armature spring 11 when adjusted to give normal contact pressure of say, 20 grams, forces the flexible spring 6 a considerable distance away from its backstop rod 1. When the armature spring 11 is in its midway position, it will make contact with the flexible springs 6 and 6' on both sides, the di-

mensioning being such that both springs 6 and 6' are a short distance away from their backstop rods 1 and 1'. When the armature spring 11 is fully operated, its right-hand contact is in engagement with the right spring 6' and its left-hand contact is disengaged from the left spring 6.

My method of designing and assembling contact springs permits all contact springs to be pretensioned to obtain desired relay operating characteristics. The amount of off-set required to obtain the necessary tension depends, of course, upon the nature of the material used for the springs.

It is to be understood that my invention is not limited to the detailed structures described above and that modifications may be made coming within the spirit of my invention as defined in the appended claims.

I claim:

1. A combined contact spring and backstop assembly, comprising a mounting pin and a flexible contact carrying spring secured to said pin in such position that said pin acts as a backstop for said contact spring.

2. A contact spring assembly comprising an insulating supporting member, a rigid mounting pin, means for securing said pin in said supporting member, and a flexible contact carrying spring secured to said mounting pin intermediate its ends in such position that an extended portion of the surface of said pin acts as a backstop for said contact spring.

3. A contact spring assembly according to claim 2 wherein one end of said mounting pin projects through said supporting member and is formed with a flattened tongue adapted for insertion in a contact socket.

4. A contact spring assembly comprising an insulating supporting means, a rigid mounting pin, a first spring secured to said mounting pin in such position that a portion of its length in the unoperated condition of said spring engages the surface of said pin, a first contact mounted on said spring, a second spring, a second contact mounted on said second spring and means for mounting said pin and said second spring in spaced relation in said insulating supporting means with said first and second contacts in engageable relation.

5. A contact spring assembly according to claim 4, wherein said first and second spring are each

initially formed intermediate their ends with an angular offset bend in order to impart to them a predetermined tension set.

6. A contact assembly comprising a first combined mounting pin and backstop and a first flexible contact-carrying spring secured thereto, a second combined mounting pin and backstop and a second contact-carrying spring secured thereto, a third flexible contact-carrying spring mounted between said first and second springs, said three springs each being formed with an angular offset bend in order to impart to them predetermined tension sets to provide a break-before-make contact operation.

7. A contact assembly comprising a first combined mounting pin and backstop and a first flexible contact-carrying spring secured thereto, a second combined mounting pin and backstop and a second contact-carrying spring secured thereto, a third flexible contact-carrying spring mounted between said first and second springs, said three springs each being formed with an angular offset bend in order to impart to them predetermined tension sets to provide a make-before-break contact operation.

8. A contact spring assembly comprising an insulating supporting member, a rigid mounting pin, means for securing said pin in said supporting member, and a flexible contact carrying spring secured to said mounting pin intermediate its ends in such position that a part of the surface of said pin acts as a backstop for said contact spring, said contact carrying spring being formed with a channel shaped portion over the area where it is secured to said pin and being initially formed intermediate its ends with an angular offset bend in order to impart to it a predetermined tension set.

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