Oct. 16, 1962 J. BERNUTZ ETAL 3,059,059

MARKING SPRING ARRANGEMENT FOR CROSSBAR SWITCHES

Filed June 14, 1957 3 Sheets-Sheet 1

FIG. 1

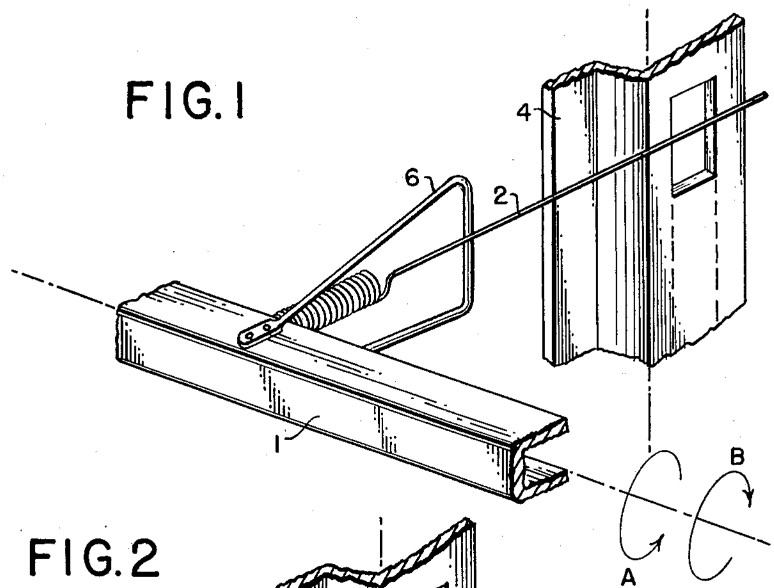


FIG. 2

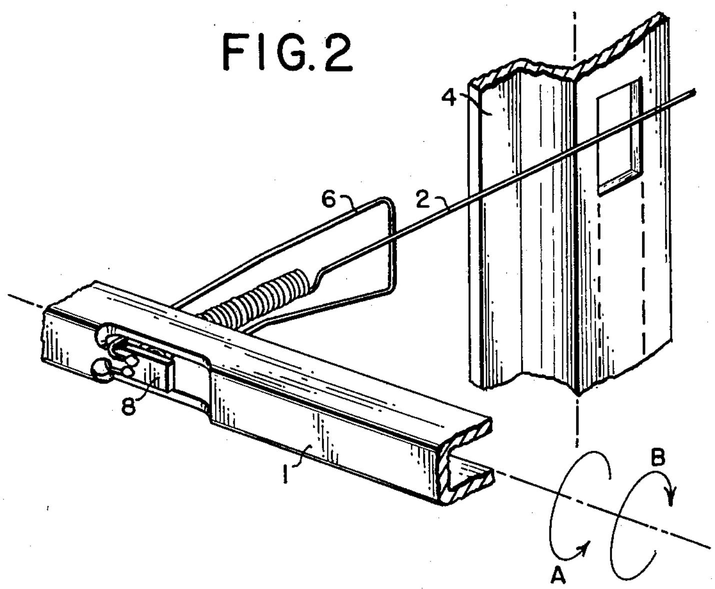
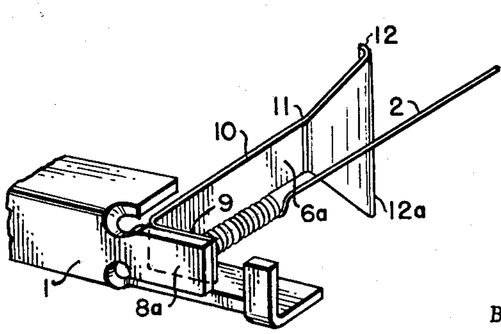


FIG. 7



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MARKING SPRING ARRANGEMENT FOR CROSSBAR SWITCHES

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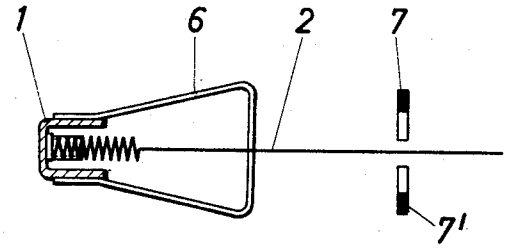

Fig. 3

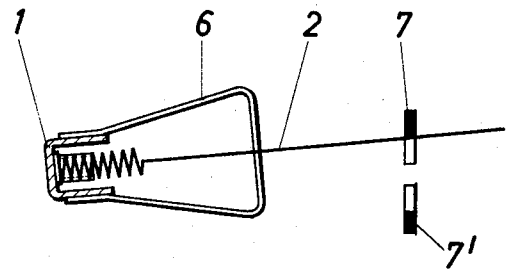

Fig. 4

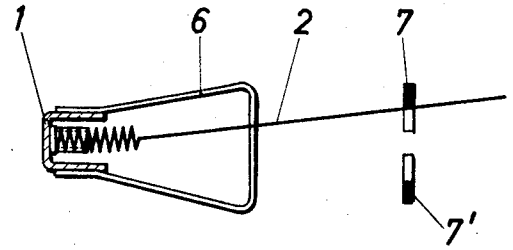

Fig. 5

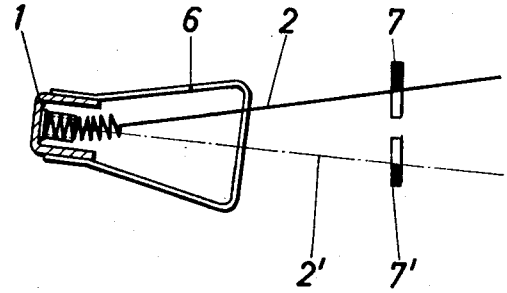

Fig. 6

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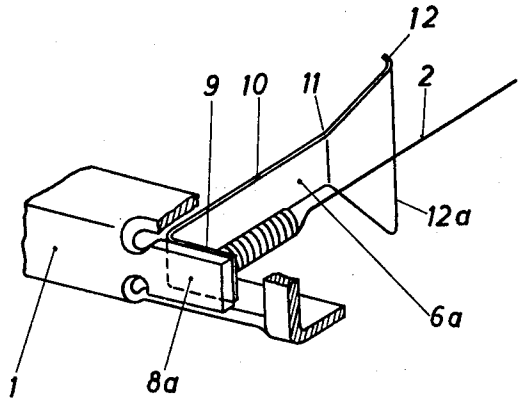

Fig. 8

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MARKING SPRING ARRANGEMENT FOR CROSSBAR SWITCHES

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4 Claims. (Cl. 179—27.54)

This invention relates to marking spring arrangements for crossbar switches employed in telecommunication systems and particularly telephone systems.

As is well-known, crossbar switches incorporate a stationary spring set contact bank. For the operation of these contacts there are provided so-called selecting bars with marking springs or marking fingers which are used for marking the desired contacts. Thereafter the thus marked contacts are actuated by means of connecting bars which are arranged vertically in relation to the selecting bars. To the selecting bars as well as also the connecting bars there are respectively assigned individual operating magnets.

It has been found that the marking springs oscillate for a certain period of the order of some milliseconds, in their plane of actuation. The extinction time of the oscillations of the marking springs should be as short as possible, in order to achieve proper operation during the marking process, and to achieve as short as possible selecting times.

In order to obtain these short selecting times, arrangements have already become known for damping the pendulous oscillations of the selecting bar, as well as of the marking springs mounted thereon. For this reason the marking springs have been provided with oscillation damping means, and apart therefrom, rest with a slight pretension on the armature of the connecting magnets. In order that, under these conditions, there is obtained an unobjectionable functioning of the marking springs, the surface of the armature has to be very carefully finished especially at the point of contact with the marking spring.

It has, therefore, already been proposed to support the marking springs not on the surface of the connecting magnet, but on a special supporting arrangement that is mounted near the armature, on the yoke of the connecting magnet. Such a supporting arrangement, which may consist of wire or of a piece of sheetmetal, has a corrosion-proof surface and, therefore, does not need to be subjected to a surface treatment, such as polishing, as a magnet armature would have to be.

The aforementioned difficulties are overcome by the invention with the aid of still more simple and reliable means in that each marking spring, in its normal position, rests with a certain pretension on a supporting arrangement, which is individually assigned to it and is arranged on the selecting bar. This supporting arrangement, which is made in the shape of a bow, consists of a corrosion-proof wire or sheetmetal member, is mounted on the selecting bar, and follows the movement of the bar during the marking process. The arrangement ensures that during the marking process there will not be caused any friction between the marking spring and the bow-shaped member. The marking spring rests with a predetermined pretension on the supporting bow, and at its free end, is slightly lifted off the bridge armature. No sooner than during the switching process the marking spring is seized by the armature of the connecting magnet and is utilized for the actuation of the respectively marked contact assembly, whereby this spring is lifted off its supporting arrangement.

The above-mentioned and other features and objects of the invention and the manner of attaining them will

become more apparent and the invention itself will be best understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings in which:

FIG. 1 shows an arrangement according to the invention comprising a marking-spring resting on a bow-like member individually assigned to this spring and mounted on the selecting bar;

FIG. 2 shows one embodiment of an adjustable form of supporting bow according to the invention.

FIGS. 3 through 6, show the behaviour of the marking-spring arrangement according to the invention in different stages of functioning during one selecting process, and

FIG. 7 shows one embodiment and FIG. 8 shows another embodiment of an adjustable form of supporting bow according to the invention.

The speedy and frictionless operation of the marking spring is required, not only because in the case of multi-switches the selecting processes have to be handled successively and because, therefore, a quick completion of the individual selecting operations is desirable, but also because in cases where there are employed particularly quick acting electronic switching means, an acceleration of the selecting and switching processes becomes still more desirable. This is of a special importance because the marking spring, when resting on a fixed support with a coarse or unpolished surface, will not follow quickly enough the movements of the selecting bar during the selecting or switching operations.

The arrangement of FIG. 1 shows a portion of a multi-switch, comprising a part of the selecting bar **1** which, according to requirements, may be swivelled either in the direction A or B. On this selecting bar there is mounted a marking spring **2**, which is provided with an individual damping element **3**. In the normal condition the marking spring rests against a wire bow **6** and is mounted on the selecting bar **1**.

The bow **6** raises the free end of marking spring slightly off the connecting bar **4**. The mounting of this wire bow **6** directly on the selecting bar **1** ensures that the marking spring, during the swiveling of the selecting bar in the course of the marking process, will not slide on the supporting bow, but that when it springs back to normal, it is damped by the frictional forces between the spring and the bow.

In the following FIGS. 3–6 there is shown the behaviour of the marking spring with respect to the supporting bow during the several individual phases of functioning during a selecting operation.

In FIG. 3 the selecting bar **1** is shown in its normal position and the marking spring **2** is lying in the middle between the two straps **7** and **7'**. These two straps, during the switching through process, serve to actuate the desired contact set. Depending on whether the marking spring is swivelled upwardly or downwardly either the upper or the lower contact set, not shown in the figures, will be switched through.

FIG. 4 shows the selecting bar **1** in the upper marking position, whereby the marking spring **2** and the bow **6** have followed the movement of the bar without having caused any mutual friction. The marking spring **2**, therefore, has placed itself below the upper strap **7**. If the armature of the connecting magnet, not shown in this drawing, is now moved vertically in relation to the plane of the drawing, then the marking spring **2** is lifted off its support and is retained by the strap **7** and the bridge armature, so that the associated contacts (not shown) will be connected through.

FIG. 5 shows the condition in which the desired contact set is actuated, but the selecting bar **1** has returned to its normal position, i.e. to its mid-position. For the time of the existing connection the marking spring **2** will remain

clamped between the armature of the connecting magnet and the strap of the actuated contact set. Upon the return movement of the selecting bar **1** to normal there will be no friction between the supporting bow **6** and the marking spring **2**, because the marking spring, in this condition of switching, is lifted off the bow. Immediately, however, the resilient or elastic marking spring **2** jumps back after the interruption of the connection on account of the de-energization of the connecting magnet, the oscillations of the marking spring will be dampened by the friction produced at the bow **6**. If, during a still existing connection, but subsequently to the restoring of the selecting bar, this bar is swivelled in the course of another selecting process in the opposite direction, viz. in this case downwardly, then there will be likewise caused no friction between the retained marking spring **2** and the associated bow **6**. In this case the marking spring **2** will merely be elastically deformed (as at **2'** in FIG. 6).

In FIG. 2 there is shown a modification in which the supporting bow **6** is mounted, an adjustable tongue **8** formed in the selecting bar **1**, and on which the marking spring **2** associated with the bow is also mounted. The mounting of the bow to this tongue can be accomplished either by soldering or welding. The tongue **8** on the bar **1** is appropriately formed on the front side, so that the tongue will be easily accessible for adjusting purposes.

The supporting bow **6** itself, as already mentioned hereinbefore, should appropriately consist of a corrosion-proof wire. However, it is also possible, instead of this bow, to provide a supporting means of a similarly shaped piece of sheet metal, which, at the supporting point of the marking spring, may be provided with a small bead.

In FIG. 7 there is shown the example of an embodiment in which the supporting bow **6** is replaced by a supporting arrangement **6*a*** consisting of one single piece of sheet metal made of corrosion-proof metal. This supporting member **6*a*** is provided at its lower end with a correspondingly bent mounting member **9**, which is attached e.g. by soldering or welding, or in any other suitable way to the tongue-shaped member **8*a*** of the selecting bar **1**. The supporting arrangement **6*a*** is arranged with its portion **10** in parallel with the marking spring **2** and is slightly bent towards this spring at **11**. This bent portion is gradually enlarged up to the edge **12**, which is slightly bent backwardly, so that the spring **2** will come to lie on the slightly arched smooth surface **12*a***.

By dispensing with the friction between the support and the marking spring there will be obtained a higher security and speed for the marking operation itself. The adjustment of the supporting forces between the marking

spring and the supporting means, as well as the alignment of the marking spring, may be carried out for each bar prior to the assembling of the switch. The surface quality of the armature of the connecting magnet thus has no influence upon the functioning of the selecting and releasing operations.

While we have described above the principles of our invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of our invention.

What is claimed is:

1. Marking spring arrangement for crossbar switches used in telecommunication systems wherein said marking spring is mounted on a selecting bar, comprising an oscillation damping member individual to said marking spring and mounted on said selecting bar, said marking spring pre-tensioned to abut against said member and free to move laterally independently of said member, said damping member having a surface sufficiently large for said marking spring to abut against while said selecting bar is in any of its possible positions and said marking spring is in selecting position, whereby oscillation of said marking spring is inhibited during selecting or releasing operations of said marking spring.

2. An arrangement for a marking spring as claimed in claim 1, in which said damping member comprises a bow-shaped wire of corrosion-proof material, the ends of said bow being secured to said selecting bar.

3. An arrangement for a marking spring as in claim 1, in which said damping member comprises a tongue-shaped sheet metal part of corrosion-proof material, which is provided with a bead adjacent the point of a contact of the marking spring.

4. An arrangement for a marking spring, as claimed in claim 1, wherein said selecting bar is formed on its front side with an adjusting tongue on which said damping member and said spring are mounted.

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