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Method and device to free contacts in timers employing rotary disks.

Method and device to free contacts in timers employing rotary disks that bear the required programme substantially on their circumferential periphery, a movable contact (20) having one end operating continuously on a common contact (24) and having its other end cooperating with a first transit contact (25) or with a second transit contact (26), the movable contact (20) being actuated by the periphery of the rotary timer disks (23) which acts on a feeler element (35) of a lever (21) able to rotate about a rotation pivot (22), a spring (27) being located between the movable contact (20) and the lever (21) and imparting to the movable contact (20)

a lateral traversing movement (29) and a lengthwise traversing movement (30), in which method when the spring (27) cannot actuate the movable contact (20) owing to adherence of the latter (20) to the first transit contact (25), a second abutment (41) included on the movable contact (20) acts on the lever (21), which comprises a second inclined surface (39) having an angle of inclination " β ", the second inclined surface (39) inducing in the movable contact (20) a lengthwise traversing movement (30), which also displaces the movable contact (20) sideways and thus breaks the adherence of the same (20) and restores the resilient action of the spring (27).

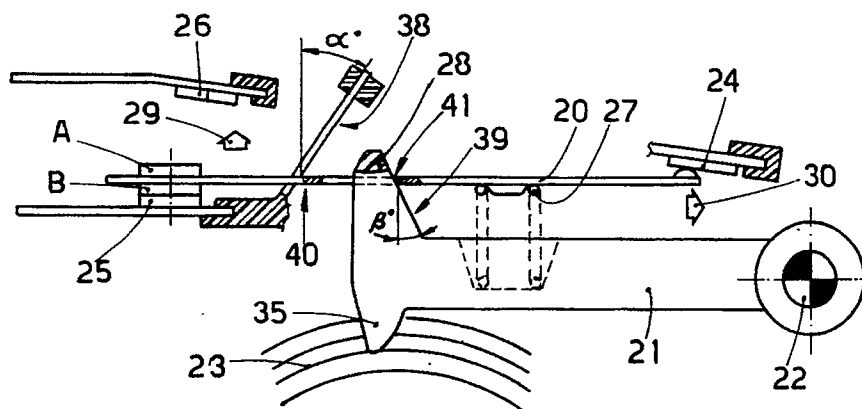


fig. 4

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METHOD AND DEVICE TO FREE CONTACTS IN TIMERS EMPLOYING ROTARY DISKS

This invention concerns a method and a device to free contacts in timers employing rotary disks. The invention is to be applied in electromechanical timers including a plurality of rotary disks the circumferential periphery of which is shaped in a programmed manner.

When the disk is rotated, its circumferential periphery transmits variable nominal distances to arm elements or rocker levers which actuate control or power contacts.

Timers of this kind are employed in washing machines, dishwashers, etc. to govern in a programmed and programmable manner all the functions of such apparatus.

The invention concerns particularly the timers indicated above which include a lever between the rotary programmer disk and a movable contact (see Figs.2 and 3 for instance).

The invention therefore does not concern the timers which comprise a rocker lever of the type shown in Fig.1, for instance, between the rotary programmer disk and the movable contact.

In timers employing disks of the type mentioned above the rotation of the programmer disks defines two or more positions, normally two or three, of a movable contact.

The contacts serve to transmit electrical control or power signals according to required logics so as to actuate specific functions in a desired way within desired times.

If a movable contact can take up two positions, one of those positions will undoubtedly cooperate with a stationary contact, while the other position may cooperate with another contact or provide for a mere disconnection.

If a movable contact can take up three positions, then the two outer positions normally cooperate with as many stationary contacts, while the middle position normally provides for disconnection.

The movable contact normally consists of a shaft which at one end is always engaged with a source of signals, while its other end can take up the aforesaid positions.

To eliminate the opacity created on the contacts by sparking, oxidization in general and dust, arrangements are made to provide the movable contact not only with a lateral traversing movement but also with a lengthwise traversing movement.

This lengthwise traversing movement causes sliding of the movable contact on the stationary contact with which it is always engaged, and this sliding eliminates the opacity and improves electrical contact. The problem of adherence of the contacts to each other has for some time become

important owing to the frequency of the cycles and to the electrical charge which designers apply more and more to each electrical circuit.

Various solutions have been designed to eliminate this adherence and include the solution with a rocker contact (Fig.1) and the solutions with levers (Figs.2 and 3).

The rocker solution provides a rocker contact 120 acting between a common contact 24 and first 25 and second 26 transit contacts. The rocker contact 120 is actuated by a rotary programmer disk 23 by means of a feeler element 35 of a rocker lever 321, which can oscillate about a rotation pivot 22. Spring means 27 are included between the rocker lever 321 and rocker contact 120. If the rocker contact 120 adheres to the first transit contact 25, for instance, the rocker lever 321 rests, as shown in Fig.1, on the rocker contact 120 and frees it with a contrast tooth 28.

This known embodiment, however, is not of the type with which the present invention is concerned.

The known embodiments of the type with which the present invention is concerned are shown in Figs.2 and 3.

In Fig.2 a lever 121 with a rotation pivot 22 and feeler element 35 cooperates with a rotary programmer disk 23.

Owing to the action of the rotary programmer disk 23 on the lever 121 and of the lever 121 on a spring 27 a movable contact 20 is displaced with a lengthwise traversing movement 30 and a lateral traversing movement 29.

When the movable contact 20 has to be detached from a second transit contact 26, a contrast tooth 28 intervenes.

If the movable contact 20 adheres with an element B to a first transit contact 25 and the spring 27 yields owing to the movement according to the arrow 42 imparted to the lever 121 by the rotary disk 23, a contrast rod 37 intervenes and detaches the element B from the first transit contact 25.

This embodiment is excellent in itself but entails the drawback that the contrast rod 37 has to be well positioned geometrically in relation to the contrast tooth 28.

The outcome is that when an element A of the movable contact 20 comes in contact with a second transit contact 26, the extra travel of the lever 121 in a resilient field is no longer available; this extra travel in a resilient field is required to eliminate sparking and improve electrical contact.

The action of the spring 27 owing to its geometric position is such that it imparts to the lever 121/movable contact 20 under normal conditions a

lateral traversing movement 29 and a lengthwise traversing movement 30.

To overcome the problems regarding the extra travel in a resilient field and therefore to ensure a proper electrical contact engagement, the embodiment of Fig.3 has been proposed.

An L-shaped lever 32 pivoted at 31 has been applied in the embodiment of Fig.3 and cooperates with a seating 36 included in the main lever 221.

If during its lifting phase the element B of the movable contact 20 is found to have adhered to the first transit contact 25 and the spring 27 yields, then the seating 36 actuates a second arm 34 of the L-shaped lever 32, and the second arm 34 causes the L-shaped lever 32 to rotate on its pivot 31.

The L-shaped lever 32 exerts by means of its first arm 33 a mechanical action sufficient to break the adherence, and when the adherence of the element B to the first transit contact 25 has been broken, then the system works normally.

This system has been found satisfactory from the mechanical and electrical points of view but has entailed two sets of problems.

A first set of problems is of a mechanical type, for the L-shaped arms of the lever 32 may break in the event of repeated stresses in view of the small dimensions of the L-shaped lever itself 32.

A second set of problems is of an economical type and is linked to problems of procurement, storage, transport and installation of the L-shaped lever itself 32. These problems of an economical type affect the cost of a timer assembly by between a hundred and fiftieth and a sixtieth.

Even though this economical effect seems small, it must be thought of in the light of the great numbers involved in the market of timer assemblies.

The invention is set forth in the main claims 1 and 4, while the dependent claims describe variants of the idea of the main solution.

The invention is disclosed better in the further attached figures, which are given as a non-restrictive example and in which:-

Fig.4 shows a contact and a lever according to the invention in an inactive position;

Fig.5 shows the embodiment of Fig.4, but in this case the movable contact is working on the second transit contact;

Fig.6 shows a movable contact able to obtain the solution of Figs.4 and 5.

According to the invention a movable contact 20 is made to cooperate with a first inclined surface 38 and a second inclined surface 39 which are differently inclined at angles " α " and " β " respectively.

The first inclined surface 38 is stationary and has an ascending slope with an angle of inclination

" α " which is greater than the angle of inclination " β " of the second inclined surface 39. This means that, given an equal movement of the movable contact 20 towards the first inclined surface 38 and second inclined surface 39 respectively, the first inclined surface 38 induces in the movable contact 20 a greater lateral displacement than that induced in the movable contact 20 by the second inclined surface 39.

The second inclined surface 39 is machined on the lever 21.

The first inclined surface 38 may be obtained by being moulded on a support of the contacts or may consist of an additional element or of an element to transfer electricity from one contact to another.

If everything works normally, when the lever 21 is lifted by a rotary programmer disk 23 acting on a feeler element 15, the first inclined surface 38 cooperates with the movement of the movable contact 20, accentuates the lengthwise transversing movement of that contact 20 and frees it from its connection to the second inclined surface 39 on the lever 21.

If instead the element B of the movable contact 20 adheres to the first transit contact 25, the lever 21 overcomes the resilient resistance of the spring 27 and acts on the movable contact 20 by means of the second inclined surface 39, which induces in the movable contact 20 a lengthwise transversing movement that breaks the adherence.

When the adherence is broken, the movable contact 20 is thrust by the spring 27 in the direction of the arrow 29 and cooperates with the first inclined surface 38. The movable contact 20 comprises a first abutment 40 able to cooperate with the first inclined surface 38.

The movable contact 20 comprises a second abutment 41 too which is suitable to cooperate with the second inclined surface 39.

The effect of the inclinations determined by the angles " α " and " β ", whereby the angle " α " is greater than the angle " β ", enables the device according to the invention to be obtained.

It is possible for the first inclined surface 38 not to be provided, for the adherence-release device can function just the same without it.

The inclusion of the first inclined surface 38 is required where it is desired not to increase the value of the torque necessary to rotate the lever 21 when the latter 21 is working by means of extra travel in a resilient field.

Thus, where there is adherence between the element B of the movable contact 20 and the first transit contact 25, by rotation of the lever 21 on its pivot 22 the second inclined surface 39 displaces the movable contact 20 according to the arrow 30 and breaks the adherence.

As soon as the adherence of the element B to the first transit contact 25 has been broken, the spring 27 is able to extend and moves the movable contact 20 in the directions of the arrows 29 and 30 and thrusts it to cooperate with the first inclined surface 38.

As the angle of inclination " α " of the first inclined surface 38 is greater than the angle of inclination " β " of the second inclined surface 39, the first inclined surface 38 displaces further in the direction of the arrow 30 the movable contact 20, which therefore does not come into contact with the second inclined surface 39.

In the example shown the action of the two inclined surfaces 38-39 possesses the same sign and should be considered in relation to the rotation of the lever 21 and in relation to the rotation of the movable contact 20 about the common contact 24.

When the movable contact 20 has to be detached from the second transit contact 26, a contrast tooth 28 intervenes even if there is adherence, and the first inclined surface 38 restores the position of the movable contact 20 in cooperation with the action of the spring 27.

The spirit of the invention includes a variation of the three-dimensional positions of the inclined surfaces 38-39 while keeping the working effect in full.

Claims

1 - Method to free contacts in timers employing rotary disks that bear the required programme substantially on their circumferential periphery, a movable contact (20) having one end operating continuously on a common contact (24) and having its other end cooperating with a first transit contact (25) or with a second transit contact (26), the movable contact (20) being actuated by the periphery of the rotary timer disks (23) which acts on a feeler element (35) of a lever (21) able to rotate about a rotation pivot (22), a spring (27) being located between the movable contact (20) and the lever (21) and imparting to the movable contact (20) a lateral traversing movement (29) and a lengthwise traversing movement (30), the method being characterized in that when the spring (27) cannot actuate the movable contact (20) owing to adherence of the latter (20) to the first transit contact (25), a second abutment (41) included on the movable contact (20) acts on the lever (21), which comprises a second inclined surface (39) having an angle of inclination " β ", the second inclined surface (39) inducing in the movable contact (20) a lengthwise traversing movement (30), which also displaces the movable contact (20) sideways and thus breaks the adherence of the same (20) and restores the resilient action of the spring

(27).

2 - Method as claimed in Claim 1, in which, with the lever (21) acting by means of the spring (27) to displace the movable contact (20) from the first transit contact (25), a lengthwise traversing movement (30) induced by a first inclined surface (38) having an angle of inclination " α " is also imparted to the movable contact (20).

3 - Method as claimed in Claim 1, in which the angle of inclination " α " of the first inclined surface (38) induces a traversing movement (30) greater than that imparted by the angle of inclination " β " of the second inclined surface (39) when the lateral traversing movements (29) are equal.

4 - Device to free contacts in timers employing rotary disks that bear the required programme substantially on their circumferential periphery, a movable contact (20) having one end operating continuously on a common contact (24) and having its other end cooperating with a first transit contact (25) or with a second transit contact (26), the movable contact (20) being actuated by the periphery of the rotary timer disks (23) which acts on a feeler element (35) of a lever (21) able to rotate about a rotation pivot (22), a spring (27) being located between the movable contact (20) and the lever (21) and imparting to the movable contact (20) a lateral traversing movement (29) and a lengthwise traversing movement (30), the device being characterized in that the lever (21) includes a second inclined surface (39) that induces also a momentary lateral traversing movement (30) of the movable contact (20) if the latter adheres to a first transit contact (25), the second inclined surface (39) being tilted by an angle " β ".

5 - Device as claimed in Claim 4, in which the second inclined surface (39) is inclined in the direction of rotation of the lever (21) so as to detach the movable contact (20) from the first transit contact (25).

6 - Device as claimed in Claim 4 or 5, in which the movable contact (20) cooperates with a first inclined surface (38) having an angle of inclination " α ".

7 - Device as claimed in any of Claims 4 to 6 inclusive, in which the angle of inclination " α " is greater than the angle of inclination " β ".

8 - Device as claimed in any of Claims 4 to 7 inclusive, in which the inclined surfaces (38-39) cooperate with respective abutments (40-41) on the movable contact (20).

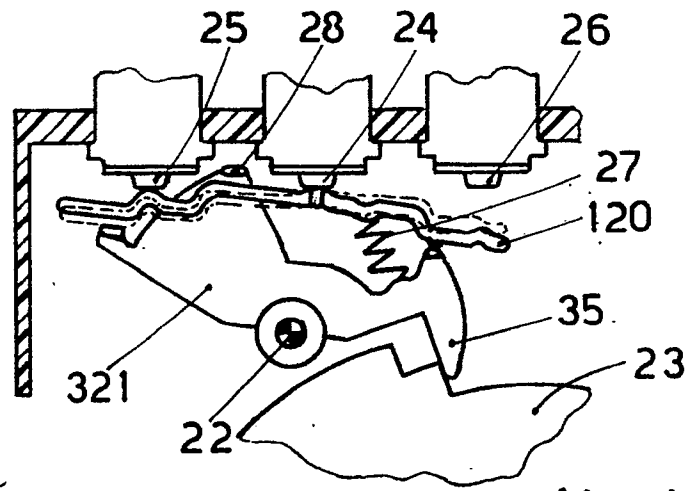


fig. 1

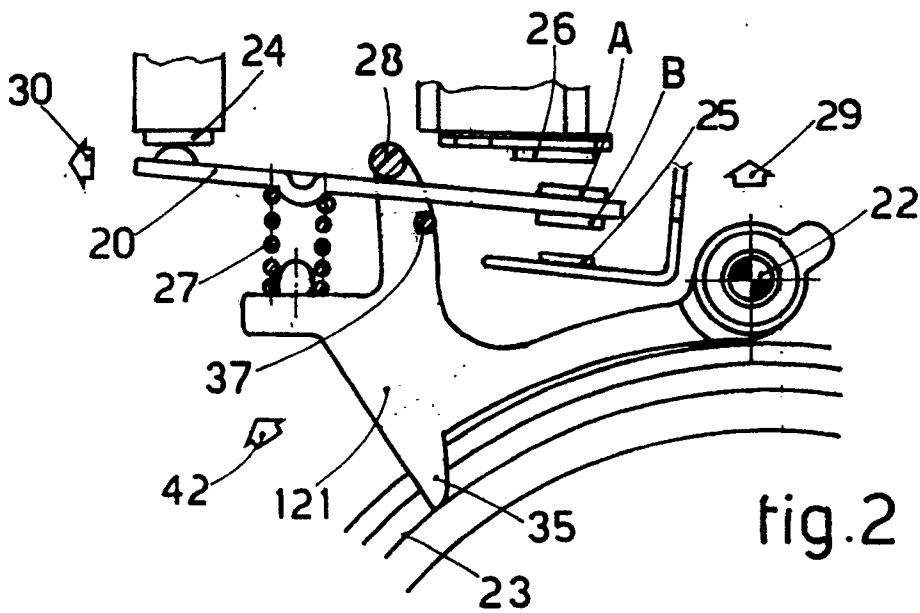


fig. 2

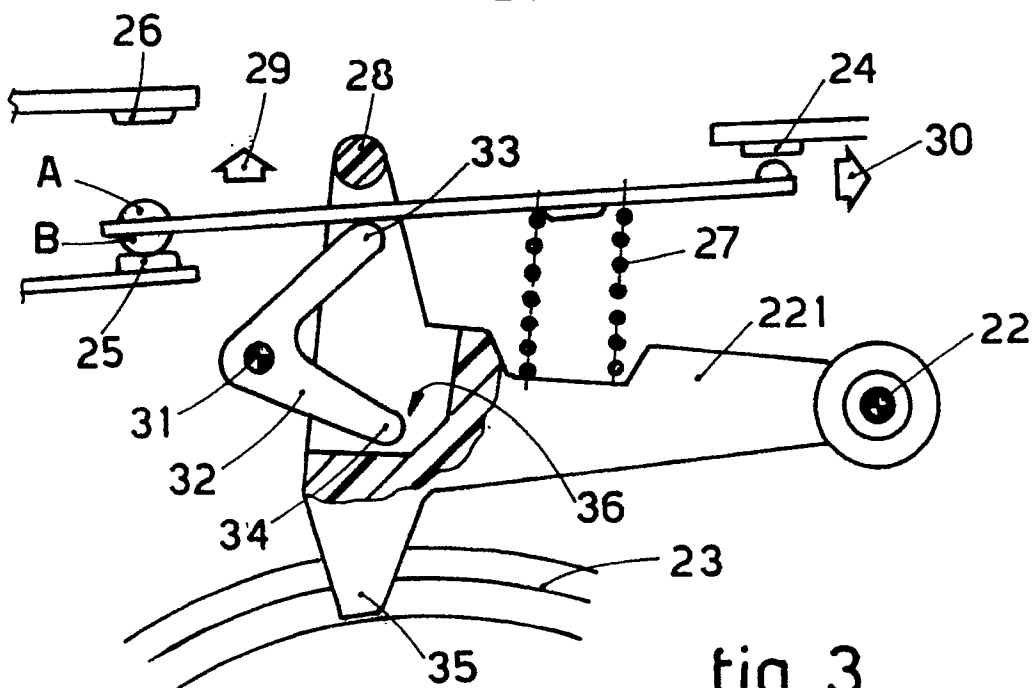


fig. 3

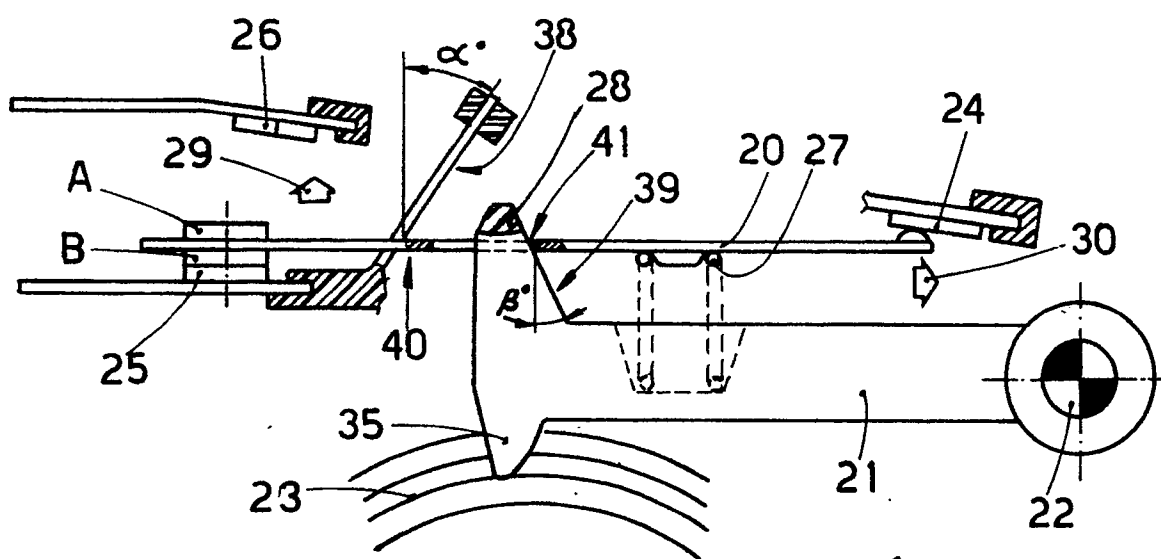


fig. 4

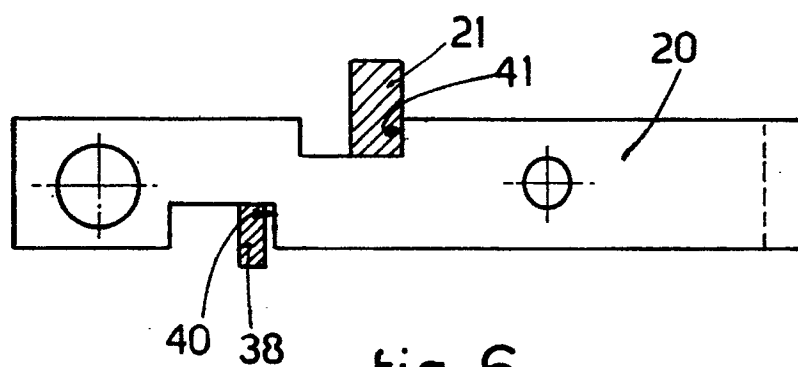


fig. 6

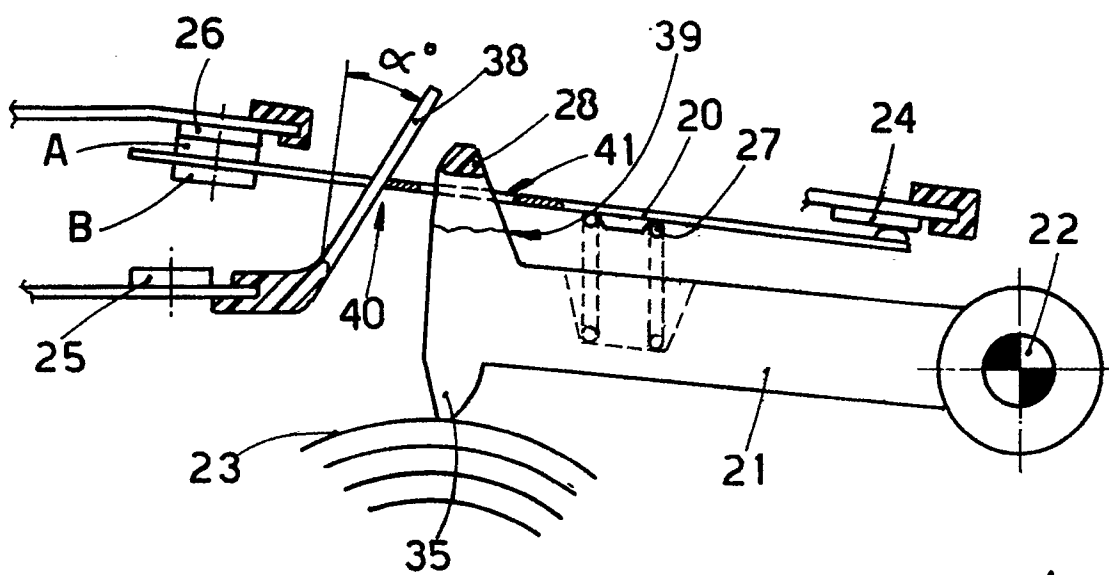


fig. 5



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EUROPEAN SEARCH REPORT

Application Number

EP 90 10 2474

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	DE-A-3415539 (LICENTIA PATENT-VERWALTUNGS-GMBH) * the whole document * ----	1	H01H43/02 H01H3/00
A	GB-A-2091042 (ETABLISSEMENTS CARPANO & PONS) * abstract; figure 2 * ----	1	
A	US-A-3243548 (T.K. KJELLMAN ET AL.) * column 1, lines 62 - 64 * * column 5, line 24 * -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			H01H
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 10 SEPTEMBER 1990	Examiner RUPPERT, W
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