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(54) A quick tripping switch for controlling an electric device.

(57) A quick tripping switch, particularly for an automobile power window device, comprising:

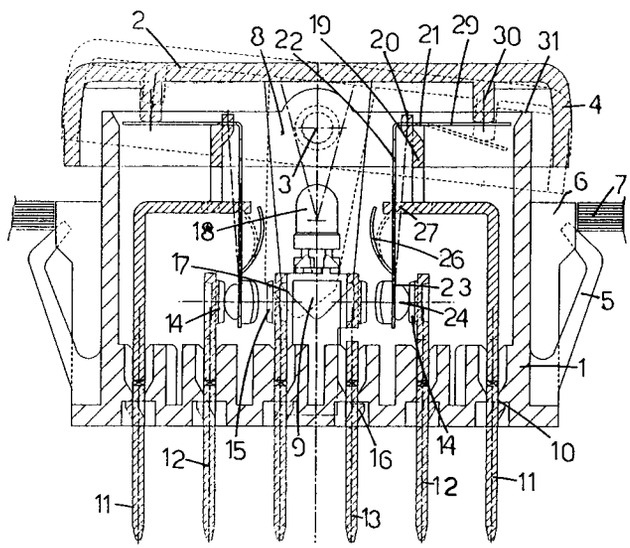
a housing (1) of plastic material containing at least two facing fixed (14,15) contacts;

at least one mobile contact (22) substantially in form of a lamina, said mobile contact being power supplied and interposed between the two fixed contacts so as to engage one at a time;

a control push button (2), movable against the bias of a spring.

The mobile contact lamina consists of two branch portions (23,29) jointed forming an L, and is pivotally mounted proximate to its angle on its branch portion engaged by the control push button.

FIG.1



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The present invention refers to a switch for actuating an electric device. Particularly, the invention relates to a quick tripping switch for actuating an automobile power window.

It is an object of the present invention to provide a switch of the aforesaid kind having a quick tripping regardless of the actuating speed, wherein the tripping stroke is variable according to requirements. Also, it is an object of the invention to provide a switch capable of performing a sliding effect on the contacts so as to clean same, and capable of providing such a sliding effect both in closing and opening the contact.

It is a further object of the invention to provide such a switch constructed with the least parts possible, well protected with respect to atmospheric agents and having particularly reduced overall dimensions. Further, it is an object of the invention to provide a switch that can be constructed as much as possible through automatic production cycles.

In order to attain the aforesaid objects, the present invention provides a quick tripping switch for controlling an electric device, particularly an automobile power window device, comprising:

a housing of plastic material containing at least two facing fixed contacts;

at least one mobile contact substantially in form of a lamina, said mobile contact being power supplied and having a first branch portion interposed between said two fixed contacts so as to engage one at a time;

a control push button mounted oscillating on the housing, said push button being adapted for actuating a second branch portion of said mobile contact;

characterised in that the mobile contact lamina consists of two branch portions jointed forming an L, and is pivotally mounted proximate to its angle on the branch portion engaged by said control push button, said fixed contacts being disposed vertical within the housing, the first branch portion of the mobile contact being adapted for moving between said fixed contacts responsive to pressure applied to said push button against the bias of an elastic member.

Further characteristics and advantages will be more apparent hereinafter from the following description with reference to the accompanying drawings, in which:

FIG. 1 is a cross-sectional view of a switch according to the present invention;

FIG. 2 is a cross-sectional view taken along line II-II of FIG. 1; FIGS. 3 to 5 are partial cross sectional views of the switch of FIG. 1 in various operational positions;

FIG. 6 is a cross-sectional view of a second embodiment of the device of this invention;

FIG. 7 is a cross-sectional view of a third embodiment of the invention;

FIG. 8 is a cross-sectional view of a fourth embodiment of the invention;

FIG. 9 is a partial cross-sectional view of a further embodiment of the invention; and

FIG. 10 is an enlarged view of a detail of FIG. 9.

Referring to FIGS. 1 and 2, the switch comprises a housing 1, preferably of plastic material, which forms the body of the device, and a push button 2. Push button 2 is pivotally mounted about an axle 3 on housing 1 and projects therefrom with its outer edge 4 which is slightly curved to envelope the push button and protect it from external agents.

In the accompanying drawings a switch is shown which is particularly adapted for controlling an automobile power window. Therefore, two opposite substantially identical electric switches are disposed facing each other within the body. As will be apparent from the ensuing description, rotation of push button 2 activates one or the other of the two switches to raise or lower the window.

Housing 1 is fitted with grips 5 and projections 6 for snap mounting to a sustaining wall 7. Push button 2 is provided with a central appendix 8 extending inside the housing with a sharp end 9.

A plurality of slots 10 are obtained in the bottom of the housing to allow automatic snap mounting of fixed electric contacts in form of blades 11, 12, 13. Blades 12 and 13 are disposed facing and are provided with contact capsules 14 and 15 kept in position by teeth 16. A socket 17 is located in the centre of the housing for holding a lamp 18 to light up push button 2.

Contact 11 carries integral thereto a support 19 having a seat 20 and a flat abutment 21 for accommodating a mobile contact formed by an L shaped metallic lamina 22. A branch portion 23 of lamina 22 extends between the facing fixed contacts 14, 15 and carries a contact capsule 24. Obtained in branch portion 23 is a tongue 26 acting as an elastic member. Tongue 26 is hooked to a folded end 27 of fixed contact 11, thereby forming a traction member which tends to pull branch portion 23 downwards and keep it far from seat 20.

The other branch portion 29 of mobile contact 22 extends perpendicular to the outer wall of housing 1 reaching a projection 30 integral to the inner wall of push button 2. By pressing the push button, projection 30 presses down branch portion 29.

The upper edge 31 of housing 1, that is upwardly open, stops the movement of the push button when this is pressed down.

Referring to FIGS. 3 to 5, operation of the above described switch is as follows.

In a rest position, lamina 22 is kept by elastic member 26 with capsule 24 pressed against one of the fixed contacts, in this case contact 12. Branch portion 29 is maintained against projection 30 of push button 2. The latter remains balanced as the other lamina exerts equal pressure on its opposite end.

Upon actuating push button 2 (FIG. 3), branch portion 29 is pushed downwards and pulls branch portion 23 upwards, acting as a lever with its fulcrum on abutment 21. This displacement increases the load on elastic member 26, forcing capsule 24 to slide on capsule 14 of contact 12 and causing a slight abrasion with reciprocal cleaning action. Further movement (FIG. 4) increases the bias on branch portion 23 in the direction of arrow A and tongue 26 in the direction of arrow B, until all of the loaded up energy is released suddenly, thereby moving capsule 24 violently against contact 13 and actuating the power window.

Upon pressing push button further (FIG. 5) until it reaches abutment 31, branch portion 23 is raised further up, causing capsules 15 and 23 and the respective contacts 13 and 22 to slide and self-clean.

By releasing the push button, the same effects described above occur in a reversed sequence.

The desired objects are attained, i.e. a good self-cleaning of the contacts and a high operational speed, regardless of the actuation speed.

FIG. 6 refers to a second embodiment of the switch for controlling the power window. In this variant form, an electronic processing unit (not shown) is combined with the switch, providing two different control modes. A first release gives normal closing while the push button is being pressed, and a second release gives automatic closing at the end of stroke.

Particularly, in addition to the above described components, the switch of this invention is provided with an additional fixed contact 33 that branch portion 29 of lamina 22 comes in contact with before the push button reaches its end of stroke.

The feeling of the second release is given by the fact that the end 9 of appendix 8 mounted on the push button overcomes a relief 34 obtained on a spring member 35 fitted on the bottom of housing 1. As far as the operation of the rest of the switch is concerned, the same previously described effects and advantages are attained.

Referring to FIG. 7, a switch according to the present invention is shown in a single variant, having the same previous operational features, with the addition of a spring member 36 inserted in the base of housing 1. Spring member 36 is provided with a projection 37 co-operating with a seat 38 obtained on the central appendix 8 of push button 2. This arrangement keeps the push button in a neutral position.

In a further modified embodiment, shown in FIG. 8, spring member 36 inserted in the housing is provided with a double projection 39 which engages the central appendix to keep the push button in a neutral position or in one of the two operational positions also in absence of external forces.

With reference to FIGS. 9 and 10, the support 19 of contact 11 has a different shape, as it has a cavity 121 in the place the flat abutment 21. Cavity 121 receives a folded portion 122 of branch portion 29 of lamina 22.

The illustrated variant embodiment of contact 11 provides maximum accuracy for main operation points C and D, as they are obtained by a blanking operation. Moreover, automatic assembling of lamina 22 on contact 11 is facilitated as the deformation of the tongue 26 is predetermined as being the difference between radiuses O-E and O-F. However, said deformation is always less than its operational strain. A further purpose of the folded portion 122 is to release transversal bending stress of branch portion 29 of lamina 22.

Claims

1. A quick tripping switch for controlling an electric device, particularly an automobile power window device, comprising:

a housing of plastic material containing at least two facing fixed contacts;

at least one mobile contact substantially in form of a lamina, said mobile contact being power supplied and having a first branch portion interposed between said two fixed contacts so as to engage one at a time;

a control push button mounted oscillating on the housing, said push button being adapted for actuating a second branch portion of said mobile contact;

characterised in that the mobile contact lamina consists of two branch portions jointed forming an L, and is pivotally mounted proximate to its angle on the branch portion engaged by said control push button, said fixed contacts being disposed vertical within the housing, the first branch portion of the mobile contact being adapted for moving between said fixed contacts responsive to pressure applied to said push button against the bias of an elastic member.

2. A switch according to claim 1, characterised in that the push button has curved edges enveloping the upper part of the housing.

3. A switch according to claim 1, characterised in that the lamina of the mobile contact is pivotally mounted to a support having an abutment laterally displaced with respect to the pivoting point, said abutment being adapted for cooperation with said second branch portion for urging said first branch portion upwardly when pressure is exerted on the push button.

4. A switch according to claim 1, characterised in that the pivoting point is a folded portion integral with the second branch portion of the of the mobile contact.

5. A switch according to claim 1, characterised in that the elastic member is a tongue obtained integral with the lamina of the mobile contact.

6. A switch according to claim 1, characterised in that the lamina engages a third fixed electric contact located within the housing.

7. A switch according to claim 1, characterised in that a further fixed electric contact is located within the housing for co-operation with said second branch portion of the lamina.

8. A switch according to claim 1, characterised in that the push button has an appendix extending towards the inside of the housing, said appendix having an end adapted for co-operation with a spring member fitted to the bottom of the housing so as hold the push button in at least one predetermined position.

FIG.2

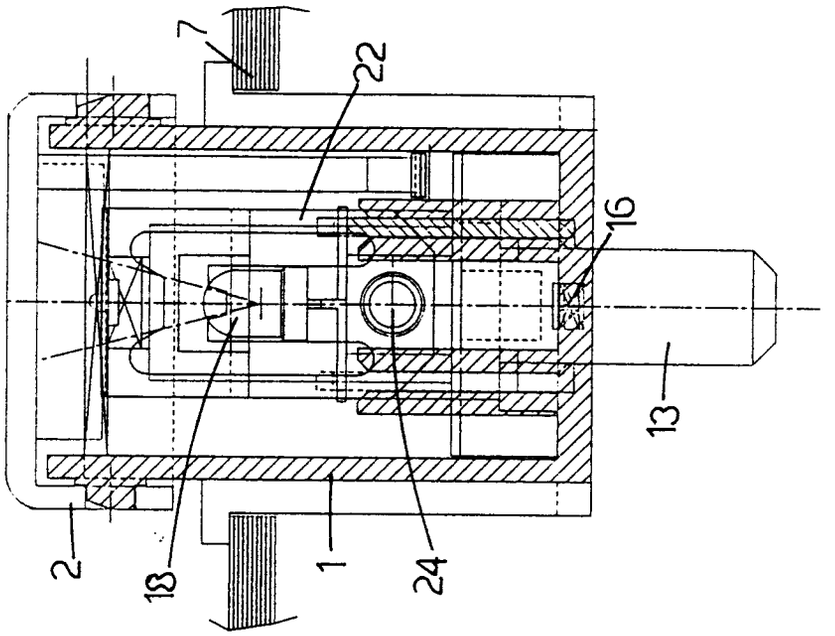
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FIG.1

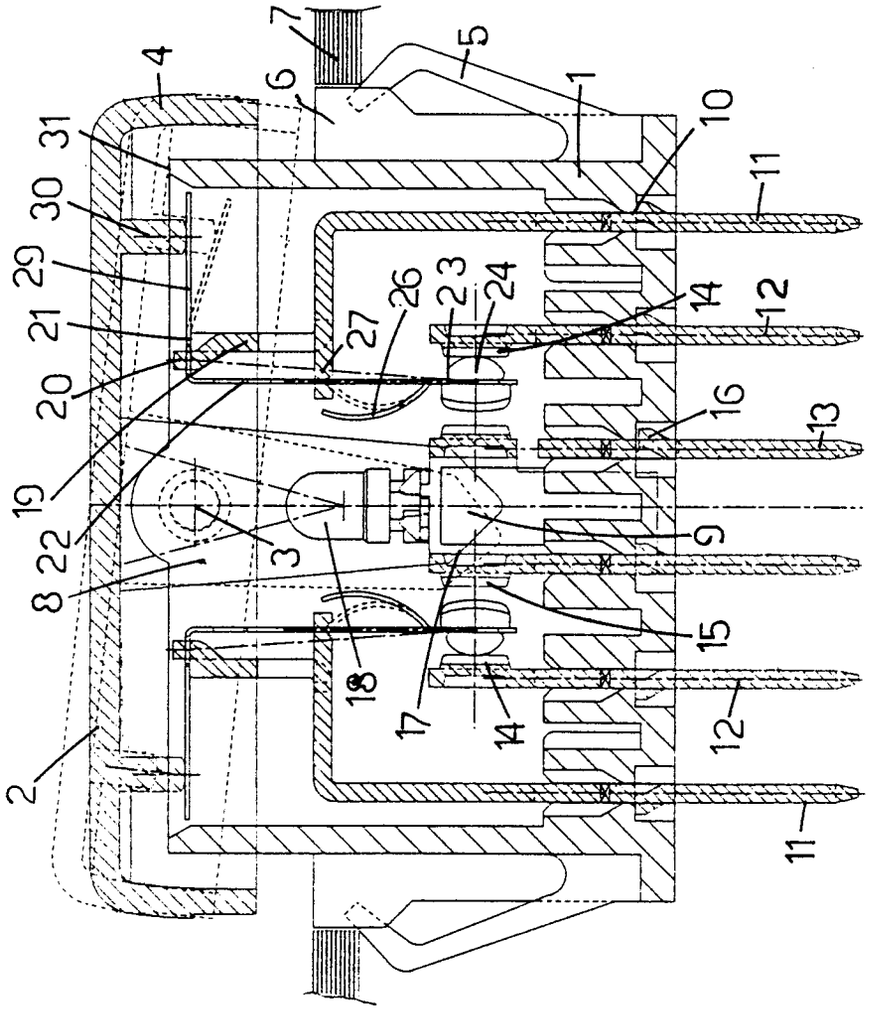
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FIG.5

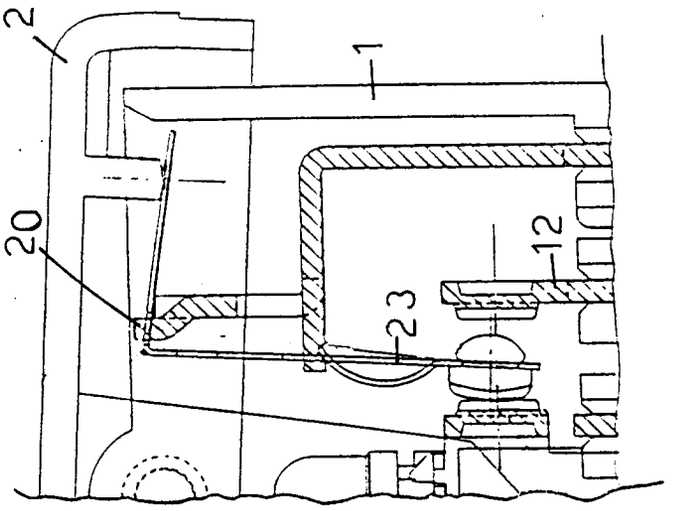


FIG.4

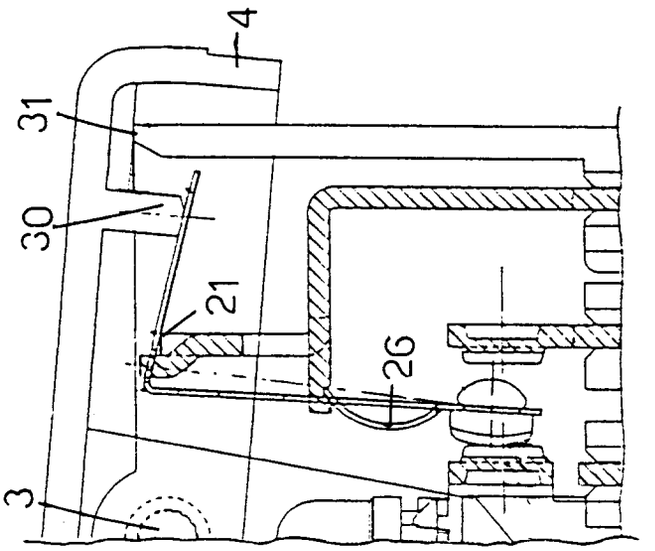
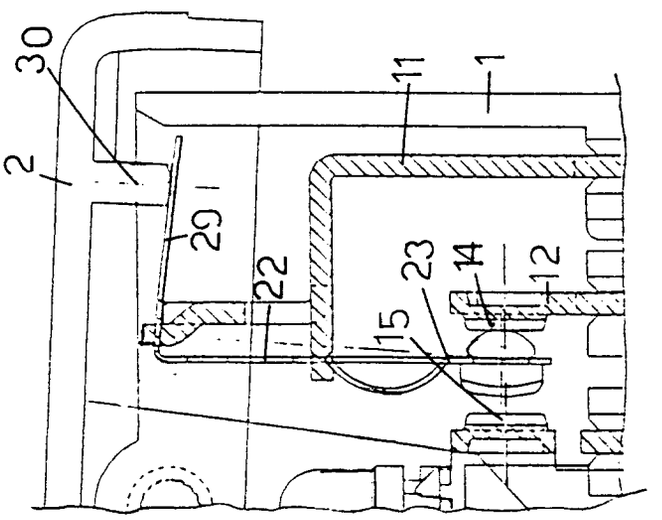


FIG.3



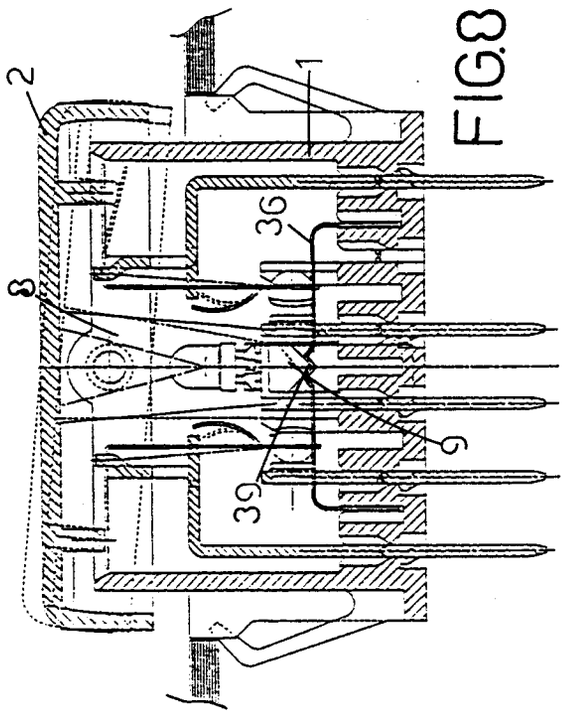


FIG.8

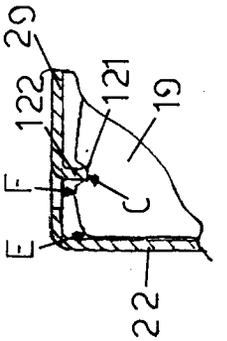


FIG.10

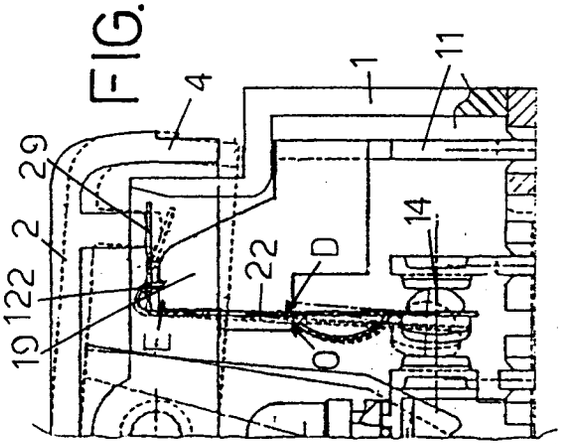


FIG.9

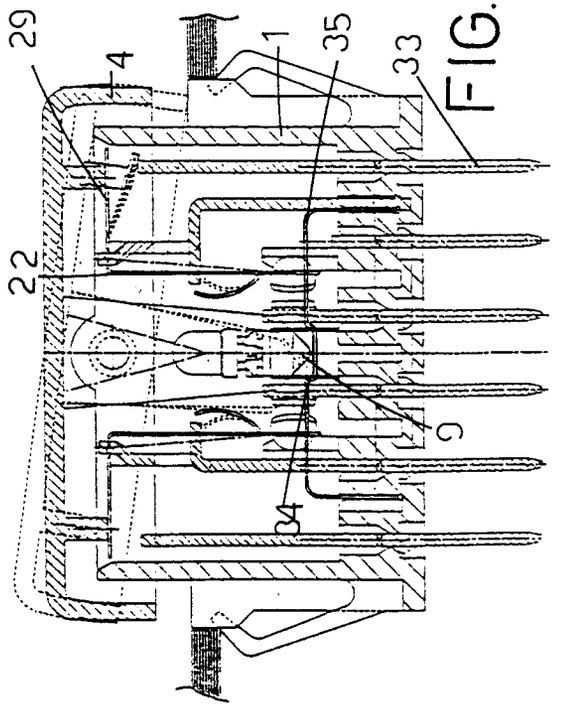


FIG.6

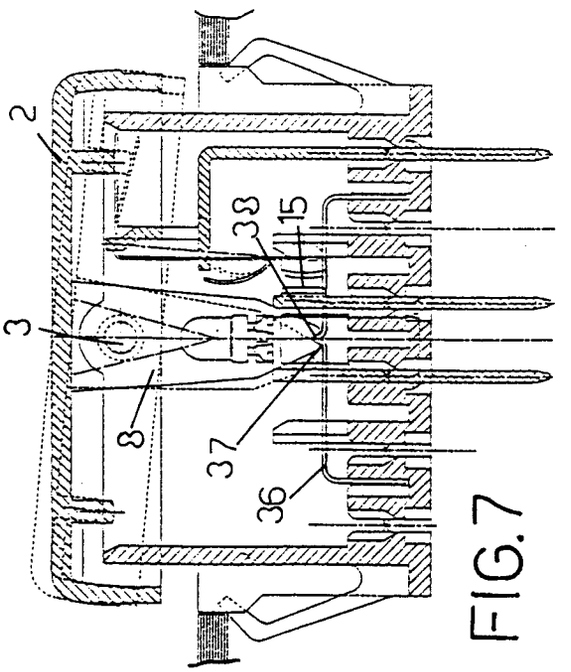


FIG.7

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EUROPEAN SEARCH REPORT

Application Number
EP 94 11 1748

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.6)
A	EP-A-0 375 521 (VALEO NEIMAN) * column 1, line 1 - column 2, line 18; figures 1,2 * ---	1	H01H23/20 H01H5/18
A	FR-A-2 221 801 (DAV) * page 2, line 13 - page 3, line 38 * * page 5, line 3 - line 34; figure 6 * ---	1	
A	EP-A-0 377 116 (WOLFGANG PRIESEMUTH) * column 1, line 1 - line 8 * * column 4, line 51 - column 5, line 21 * * column 5, line 30 - column 8, line 13; figures * ---	1	
A	DE-U-19 83 603 (SCHALTBAU) * page 2, last paragraph - page 3, paragraph 1; figure 1 * ---	1	
A	US-A-3 067 301 (YAMAMOTO) * the whole document * -----	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

H01H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	8 November 1994	Nielsen, K

CATEGORY OF CITED DOCUMENTS

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