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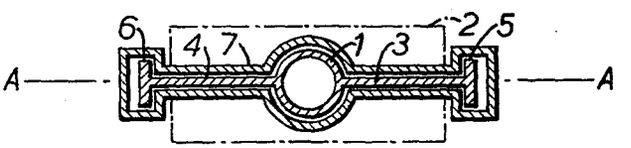
(54) Key mechanism for a keyboard.

(57) A key assembly, for a keyboard, includes stabilising arms attached to a shaft of the assembly for correcting any binding caused by tilting of the shaft during keyboard operation.

Also an arrangement for supporting a long narrow top member for a keyboard includes a linking rod held by clips, which, over the central part of the rod, are provided by spaced-apart parts of a generally U-shaped member. The spaced-apart parts of the generally U-shaped member would belong to a base member with which the top member is associated.



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Key mechanism for a keyboard

The invention relates to a key mechanism for a keyboard, for example, a computer keyboard.

A keyboard includes a plurality of keys the top members of which vary in size and shape in order to present to an operator a visual indication of the functions of the keys associated with the top members which are pressed by the operator in using the keyboard. Top members which have specially large surfaces may not be pressed centrally and may tilt. It is necessary to provide key mechanisms which operate correctly even when a top member which may tilt is pressed off-centre.

According to the present invention, a key mechanism for a keyboard includes a shaft arranged to transmit an operating force applied to the key mechanism, stabilising arm members connected to the shaft, and guide members for the arm members, the arm and guide members being so arranged as to provide a moment to counter tilting of the shaft caused by the application of an operating force.

In one arrangement of a key mechanism in accordance with the present invention, arm members extend from the shaft in directions transverse to the shaft axis and terminate in flanges, the inner surfaces of which lie

immediately adjacent to guide members which are arranged parallel to the axis of the shaft. Tilting of the shaft and consequently the arm members may cause binding contact between one flange and its adjacent guide member. A force causing tilting acts through the shaft on the arm members to exert a correcting moment acting about the region of binding contact.

Preferably, arm members extend in directions orthogonal to the axis of the shaft and lie in a plane passing through the axis of the shaft. That is, the arm members may lie along lines orthogonal to and passing through the shaft axis.

Arm members orthogonal to the axis of the shaft may also lie in more than one plane passing through the shaft axis. That is, the arm members may extend in two or more directions radially from the shaft.

In accordance with the present invention, a key assembly for a keyboard includes a top member bearing or adapted to bear a symbol representative of the key function, a shaft connected to the top member arranged to transmit an operating force applied to the top member, stabilising arm members connected to the shaft, and guide members for the arm members, the arm and guide members extending in directions dependent on the shape of the top member and being so arranged as to provide a moment to counter tilting of the shaft caused by the application of an operating force to the top member.

The arm and guide members are so arranged that any binding force will result in a moment to counter tilting of the shaft caused by an operating force to the top member releasing the binding.

The key assembly may include any one or more of the alternative arrangements for the key mechanism described above.

As explained above, a keyboard includes a plurality of keys the top members of which vary in size and shape. Top members having long relatively narrow forms require means for ensuring movement of the member with mimal tilting regardless of the point of application to the top member of an operating force.

An arrangement for supporting a long relatively narrow top member for a keyboard includes a linking wire member having a straight middle portion terminated by cranked end portions, clip members integral with the top member holding the end portions of the linking wire member, and retaining and support members integral with a base member holding the middle portion of the linking wire member, a retaining member and a support member displaced from each other along the middle portion of the linking wire member together acting as a clip member for the linking wire member. The provision of spaced apart retaining and support members permits moulding of the members without the use of a movable portion on the moulding die, and the retaining and support members are nevertheless effective as clip members.

Clip members may be provided by various combinations of retaining and support members. For example, a single retaining member and a single support member, or a support member straddled by two retaining members, or a retaining member straddled by two support members.

A support member may be a solid rectangle with a wire-accommodating depression, and a retaining member may be an L-shaped projection.

The support arrangement, referred to above, includes a new clip member configuration formed by laterally displaced retaining and support members.

The various possible arrangements of retaining and support members referred to above may be employed as clip members for rods or the like, application being particularly suitable for, but not restricted to, keyboards.

The new clip member configuration simplifies the design of moulding tool dies for producing parts in which integrally formed clip members are desirable.

A key mechanism in accordance with the present invention is now to be described by way of example only and with reference ot Figs. 1 to 4 of the accompanying drawings, and, an arrangement for supporting a long relatively narrow top member is described with reference to Figs. 5 to 7 of the accompanying drawings.

In the accompanying drawings,

Fig. 1 is a transverse cross-sectional representation of a key mechanism, for a keyboard, employing a movable shaft, and two stabilising arms for use with a rectangular top member,

Fig. 2 is a longitudinal cross-sectional representation of the key mechanism of Fig. 1 along a line A-A of Fig. 1,

Fig. 3 is a diagrammatic representation in elevation of the situation which exists in the event of tilting of the shaft and arms of the key mechanissm of Figs. 1 and 2,

Fig. 4 is a diagrammatic plan representation of a key mechanism, for a keyboard, employing a movable shaft, and three stabilising arms, for use with a generally-L-shaped top member,

Fig. 5 is a perspective view representation of a key mechanism, for a keyboard, viewed from the underside, employing a movable shaft, a stabilsiing linkage co-operating with clip members, and a long beam-like top member,

Fig. 6 is a perspective view representation of an alternative arrangement of the clip members of Fig. 5, and,

Fig. 7 is a perspective view representation of a further alternative arrangement of the clip

members of Fig. 5.

Referring to Fig. 1, a key mechanism for a keyboard, for example a computer keyboard, includes a shaft 1 to which is attached a top member 2 by the depression of which an operator effects operation of the key mechanism. Two similar arms 3 and 4 are attached to the shaft 1 and extend in opposite directions along a line orthogonal to and in a plane containing the axis of the shaft 1. The arms 3 and 4 have respective rectangular flanges 5 and 6 at their outer ends. The shaft 1, the arms 3 and 4, and the flanges 5 and 6, are accommodated in a complementary housing 7 which includes guide portions for the shaft 1, the arms 3 and 4, and the flanges 5 and 6, respectively. The shaft 1 and its guide portion of the housing 7 are provided with complementary splines (not shown) to prevent twisting of the shaft 1 in its guide. The arms 3, 4 extend beyond the shorter edges of the top member 2.

Referring to Fig. 2, the key mechanism is movable along the axis of the shaft 1 and is intended to effect the closure of an electrical switch contact located below the key mechanism on the application of a downward force to the top member 2. The key mechanism is biassed to its uppermost position by resilient means (not

shown) in contact with the lower part of the shaft 1. The dimensions of the arms 3 and 4 and the housing 7 are such that the flanges 5 and 6 are able to contact only the inner walls of their respective guide portions of the housing 7 in the event of the shaft 1 tilting under the effect of an off-centre force applied to the top member 2. The arms 3 and 4 are accommodated between parallel wall members which join the shaft guide portion and the flange guide portion of the housing 7.

Referring to Fig. 3, a downward force F applied at or near an edge of the top member 2 causes tilting of the shaft 1 in addition to forcing it downwards. The arms 3 and 4 also tilt, causing the leading edge of the flange 6 to come into binding contact with the inner wall of its guide portion of the housing 7. The trailing edge of the flange 5 is brought into sliding contact with the inner wall of its guide portion of the housing 7 and the arm 4 is able to rotate about the region of contact between the flange 6 and the adjacent wall of the housing 7 under the influence of the downward force which acts on the arms 3 and 4 through the shaft 1. The overall result is that the shaft 1 and the arms 3 and 4 move downwards under the action of the force F irrespective of the position at which the force F is applied.

The top member 2 is generally rectangular in plan and has its major axis lying generally parallel with the arms 3 and 4, when viewed from above. However, it will be appreciated that it may be possible to provide arm configurations which depart from the arrangement of the lines through the arms 3 and 4 being orthogonal to the axis of the shaft 1 and parallel to the major axis of the top member 2, while still providing the result of causing the shaft 1 and arms 3 and 4 to move downwards under the action of a force such as F irrespective of the position at which the force is applied.

The result is provided by means of a key mechanism which includes stabilising arms so arranged in guides as to provide a counter moment to tilting of the arms caused by an operating force applied to the key mechanism.

Referring to Fig. 4, a key mechanism for a keyboard, for example, a computer keyboard, is represented as a shaft 1 to which is attached a generally L-shaped top member 8, arms 3, 4, and 9 attached to the shaft 1 and terminating in respective flanges 5, 6 and 10, and a housing 11 providing guide portions for the shaft 1 and the flanges 5, 6 and 10. The arms 3 and 4 are orthogonal to and lie in a plane containing the axis

of the shaft 1. The arm 9 is also orthogonal to the axis of the shaft 1 and lies in a plane containing the axis of the shaft 1 and extends generally in the direction of the rectangular extension of the top member 8 creating the L-shape from a basic rectangular shape. The arms 3, 4, 9 extend beyond the boundary of the top member 2.

The key mechanism represented by Fig. 4 operates in the same manner as is illustrated by Fig. 3, any tendency for the shaft 1 to tilt being communicated to the stabilising arms 3, 4, and 9 which provide a counter moment to oppose the tilt. As suggested above in relation to the arrangements represented by Figs. 1 and 2, orientations of the arms 3, 4 and 9 other than those shown may be employed to produce the stabilising action referred to above.

Referring to Fig. 5, a key arrangement for a keyboard, for example a computer keyboard, includes a top member 20 by the depression of which an operator effects operation of a key mechanism (not shown) which includes a shaft 21. The key arrangement of Fig. 5 is shown inverted, downward movement of the top member 20 being upward movement in Fig. 5. The movable top member 20 is supported from a base member by means of a bar member having cranked end portions 22 and 23 joined by a straight middle portion 24. The cranked end portions 22

and 23 of the bar member are held by respective clip members 25 and 26 formed integrally with the top member 20 and the straight middle portion 24 of the bar member are held by retaining and support members 27, 28, 29 and 30 formed integrally with the base member.

Referring to Fig. 5, a retaining member 27 includes a first portion orthogonal to the base member and extending from its lower surface and a second portion parallel to the base member, while a support member 28 is of solid rectangular form with a depression 33 for accommodating the circular transverse cross-section middle portion 24 of the bar in alignment with a jaw formed between the second portion of the retaining member 27 and the lower surface of the base member. The retaining member 27 and support member 28 are spaced slightly but together provide a retaining jaw. The retaining member 27 is formed integrally with the base member by the co-operative action of upper and lower parts of a moulding tool, the second portion of the retaining member 27 being made partly by a projection of the upper part of the moulding tool which leaves an aperture 31 in the base member. The retaining member 29 and the support member 30 are functionally the same as the member 27 and 28, respectively, and are positioned on the opposite side of the middle portion 24 of the bar member from the members 27 and 28.

As may be seen in Fig. 5, the clip members 25 and 26 and the retaining and support members 27, 28, 29 and 30 provide four jaws which face in the same direction in order to facilitate the insertion of the rod members 22, 23, 24 into the jaws with minimal difficulty.

Referring to Fig. 6 and then to Fig. 7, retaining and support members may alternatively be arranged as groups of two retaining members 27 and 40 straddling a support member 28 or a retaining member 27 straddled by two support members 28 and 41. The spacing between the retaining and support members may be varied from a retaining and a support member being immediately adjacent to each other to a mixture of support and retaining members evenly spaced along the middle portion 24 of the bar member 22, 23, 24. Alternatively, the arrangement shown in Fig. 5 may be modified by providing a continuous support member extending from the position of the support member 28 to the support member 30 or a continuous central retaining member may be provided with flanking support members.

Claims:

1. A key mechanism, for a keyboard, including a shaft arranged to transmit an operating force applied to the key mechanism, stabilising arm members connected to the shaft, and guide members for the arm members, the arm and guide members being so arranged as to provide a moment to counter tilting of the shaft caused by the application of an operating force.

2. A key mechanism, for a keyboard, as claimed in claim 1, wherein the arm members extend from the shaft in directions orthogonal to the shaft axis and terminate in flanges, the inner surfaces of which flanges lie immediately adjacent to guide members which are arranged parallel to the shaft.

3. A key mechanism, for a keyboard, as claimed in claim 1 or claim 2, wherein the arm members extend in directions orthogonal to the axis of the shaft and lie in a plane passing through the axis of the shaft.

4. A key mechanism, for a keyboard, as claimed in claim 1 or claim 2, wherein the arm members extend in directions orthogonal to the axis of the shaft and lie in more than one plane passing through the axis of the shaft.

5. A key assembly, for a keyboard, including a top member bearing or adapted to bear a symbol representative of the key function, a shaft connected to the top member arranged to transmit an operating force applied to

the top member, stabilising arm members connected to the shaft, and guide members for the arm members, the arm and guide members extending in directions dependent on the shape of the top member and being so arranged that any binding force will result in a moment to counter tilting of the shaft caused by an operating force to the top member, releasing the binding.

6. A key assembly, for a keyboard, as claimed in claim 5, wherein the arm members extend from the shaft in directions orthogonal to the shaft axis and terminate in flanges, the inner surfaces of which flanges lie immediately adjacent to guide members which are arranged parallel to the shaft.

7. A key assembly, for a keyboard, as claimed in claim 5 or claim 6, wherein the arm members extend in directions orthogonal to the axis of the shaft and lie in a plane passing through the axis of the shaft.

8. A key assembly, for a keyboard, as claimed in claim 5 or claim 6, wherein the arm members extend in directions orthogonal to the axis of the shaft and lie in more than one plane passing through the axis of the shaft.

9. An arrangement for supporting a long relatively narrow top member for a keyboard including a linking rod member having a straight middle portion terminated by cranked end portions, clip members integral with the top member holding the end portions of the linking rod member,

and retaining and support members integral with a base member holding the middle portion of the linking rod member, a retaining member and a support member displaced from each other along the middle portion of the linking rod member together acting as clip means for the linking rod member.

10. An arrangement for supporting a long relatively narrow top member for a keyboard, as claimed in claim 9, wherein the support member is a solid rectangle with a rod-accommodating depression, and the retaining member is an L-shaped member, both members projecting from a surface of the base member to provide between them a rod-accommodating aperture.

11. An arrangement for supporting a long relatively narrow top member for a keyboard, as claimed in claim 9 or claim 10, wherein a support member is accompanied by two retaining members, one on each side, or a retaining member is accompanied by two support members, one on each side.

12. A base member including clip means for holding a rod member away from a surface of the base member, wherein the clip means includes a support member and a retaining member spaced apart along the line on which a rod member held by the clip means would lie, the support member being a leg of a generally U-shaped member and the retaining member being the remainder of the generally U-shaped member.

13. A base member, as claimed in claim 12, including clip means for holding a rod member away from a surface of the base member, wherein a support member is accompanied by two retaining members, one on each side, or a retaining member is accompanied by two support members, one on each side.

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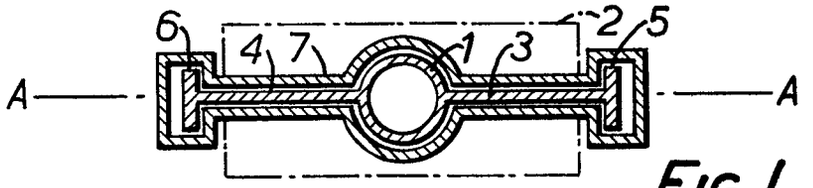

FIG. 1.

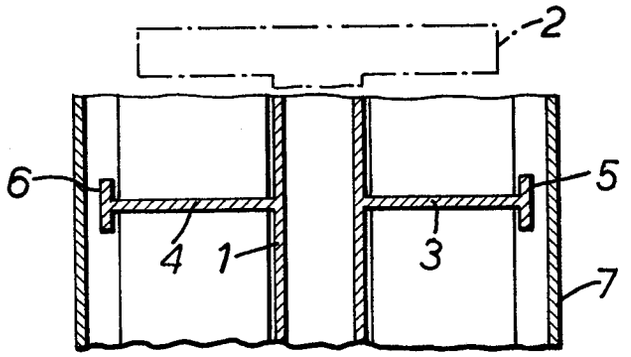

FIG. 2.

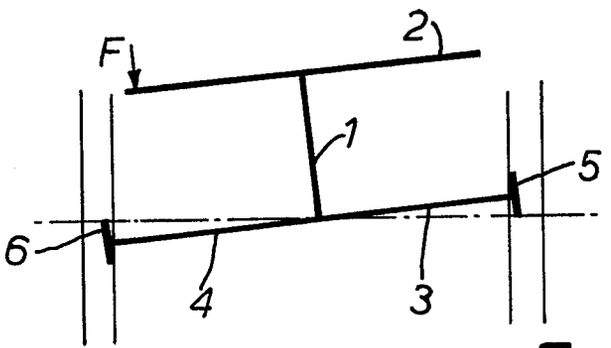

FIG. 3.

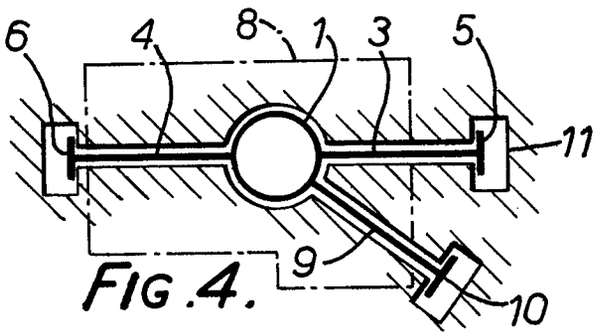

FIG. 4.

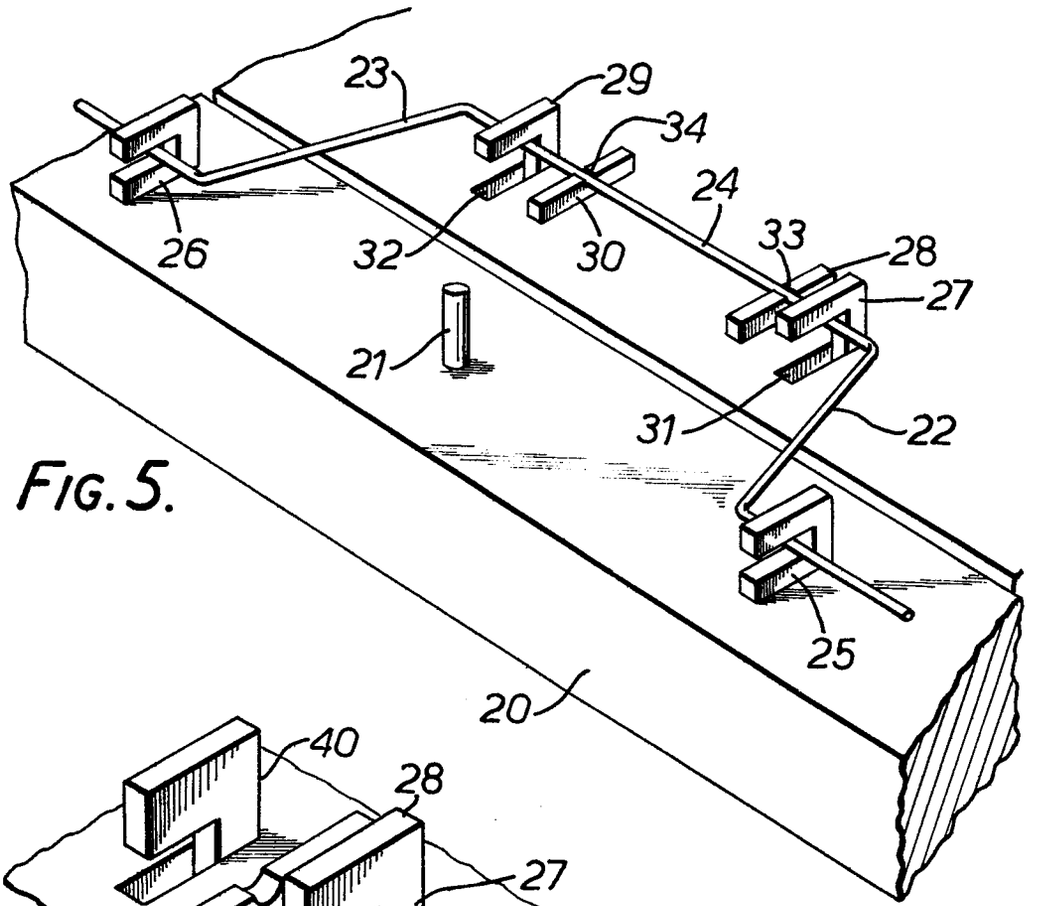

FIG. 5.

FIG. 6.

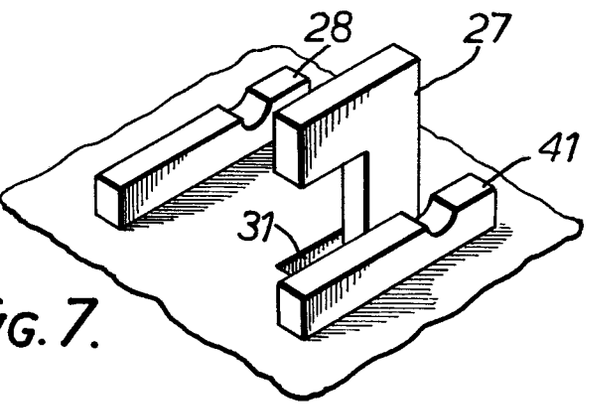

FIG. 7.