(12) UK Patent Application (19) GB (11) 2 046 996 A

(21) Application No **7912862**
(22) Date of filing **11 Apr 1979**
(43) Application published **19 Nov 1980**
(51) **INT CL³ H01H 13/48**
(52) Domestic classification **H1N** 441 45X 543 551 61X 626 649 654 664 700 705 740 749
(56) Documents cited **GB 1535810** **GB 1431091** **GB 1411589** **GB 1381729**
(58) Field of search **H1N**
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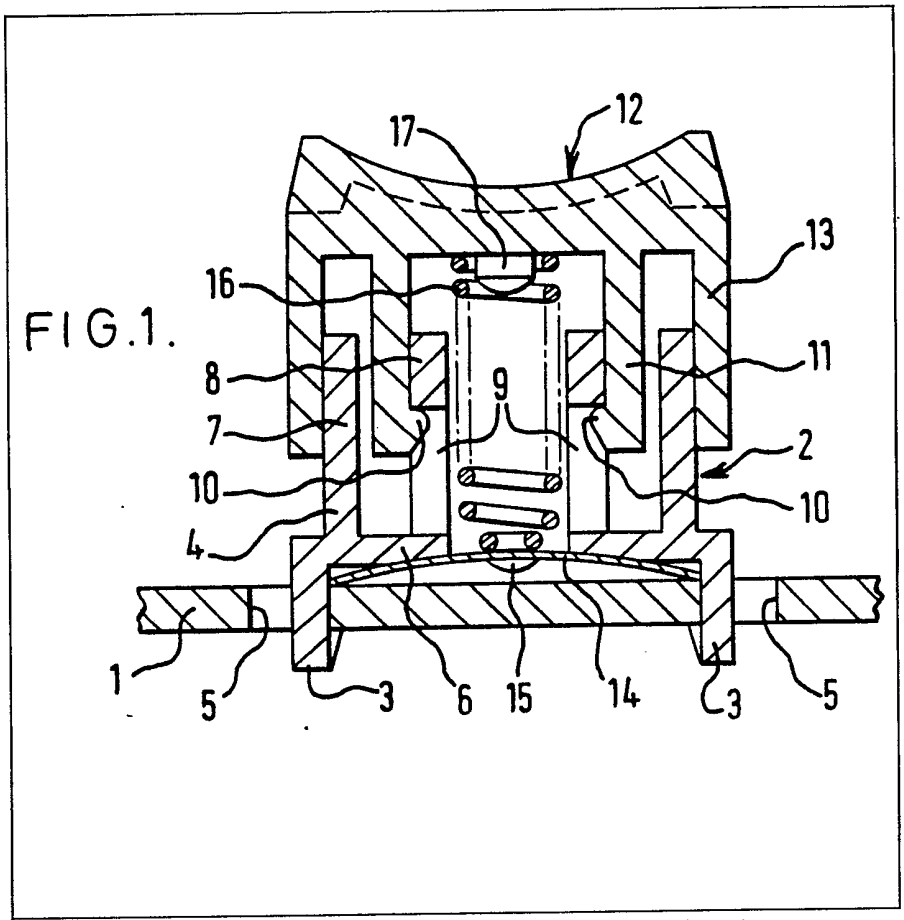
(54) **Electrical switch**

(57) This invention relates to retractive push-button switches for use with computer terminals, data recovery systems and the like. In order to provide an operating travel which is rather greater than the amount of travel actually required to operate a snap action click plate (14), there is provided a compression spring (16) between the click plate (14) and operating key (12). In its relaxed state, with the operating key in the outermost position as illustrated, the spring allows the click plate (14) to attain its relaxed position and when the key (12) is operated there is a period of lost motion until the spring (16) is sufficiently compressed to cause the click plate to snap to its operated condition. This gives an audible and tactile signal. A plurality of switches (2) may be snap-mounted on a p.c.b. (1) by means of feet (3), the plates (14) making permanent peripheral connections and having operational control contacts (15).

FIG.1.



GB 2 046 996 A

The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

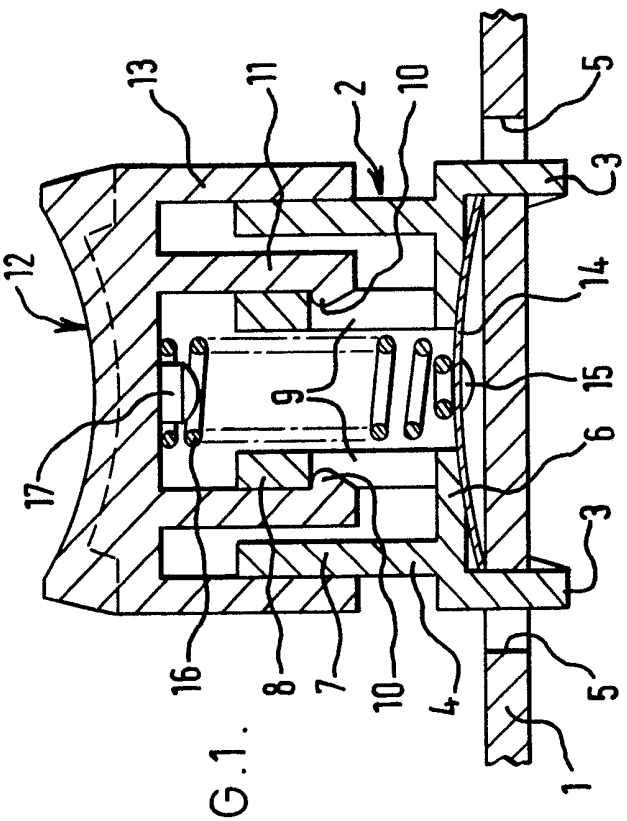

13
11
2
10
5
3
12
14
15
9
6
17
3
16
8
7
10
4
5
1

FIG.1.

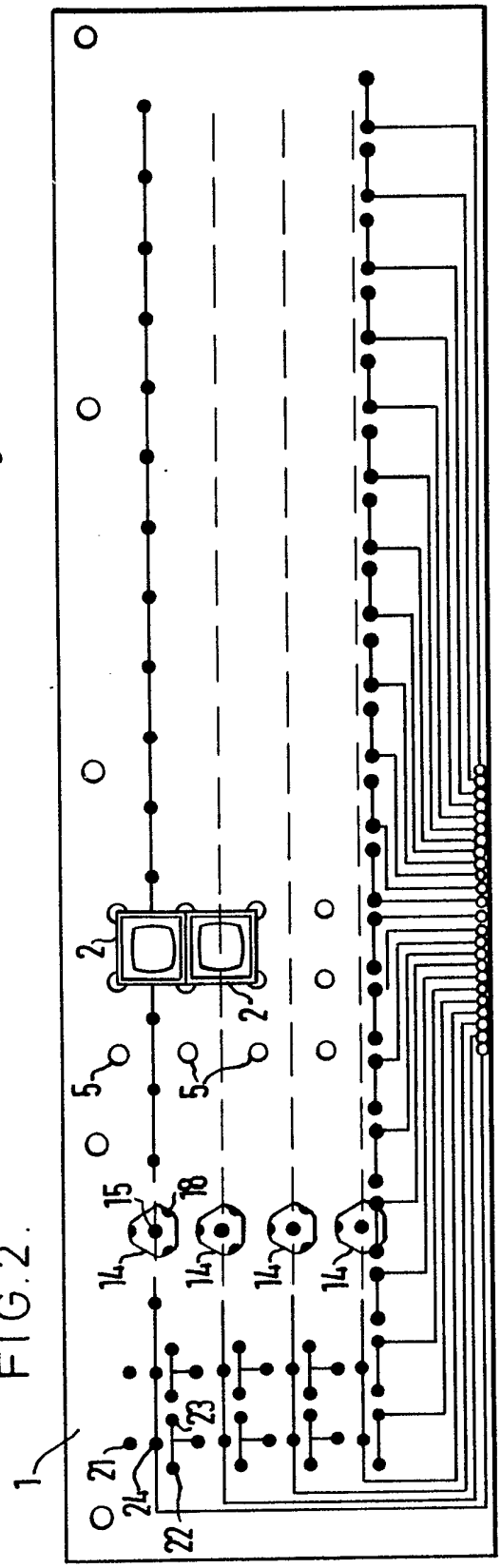

2
5
5
2
15
18
14
14
14
14
1
21
24
22
23

FIG.2.

SPECIFICATION

Electrical switch

This invention relates to electrical switches of the momentary action kind suitable for use in keyboard applications for computer terminal, data recovery systems and so forth.

In such switches, the usual configuration is a single pole make switch, and long life is a prerequisite. In order to meet this, use is made of so-called click plates are bistable plates which snap into a make position when pressed adjacent a centre zone and revert to the break position when the pressure is relieved. Equipment manufacturers require the operating movement of this type of switch to be in the region of 2.5 mm with a resonant click indicating operation of the switch contact.

When contact click plates are used the operating movement is usually in the region of 0.3 mm and the resonance of the contact click is damped by a virtue of the direct contact with the operating means.

A typical example of use of a click plate is shown in patent specification 1 430 399 which shows click plates of various shapes used to provide connection between peripheral contact points and a centre contact point, and also to bridge other conductors with which no contact is required.

According to the invention, there is provided a momentary action electrical switch comprising a manually operable push member, a contact click plate and a compression spring between the push member and the click plate, the said spring being adapted to urge the push member to an outer position while allowing the click plate to adopt its relaxed position, whereby when the push member is depressed the spring is compressed until it causes the click plate to snap into its operated condition without being engaged directly by the push member.

The insertion of a compression spring between the contact click plate and the operating key or push member allows for lost motion of the key to take place, so that the required operating movement can be achieved. Also, the pressure of the spring, in the relaxed state provides some contact pressure at the permenently made contact points, normally peripheral.

The rate of the compression spring is such that in the outward position of the key the pressure exerted by the spring on the contact click plate is insufficient to cause operation of the contact click plate, but sufficient to hold the key in its released position. Depression of the key increases the force exerted by the compression spring until the contact click plate snaps over. This must occur before the key is fully depressed.

Due to the lack of direct contact with the contact click plate it is difficult for the operator to influence the speed of the contact click plate operation, which gives a resonant click when making contact with the printed circuit board.

The switch is intended for use in keyboard systems where the individual units are snapped into locating holes pierced in printed circuit boards, which carry the required circuitry and form switch banks or keyboards.

The compression spring permits the switch contact to be held under pressure onto the printed circuit board circuitry. By this means the contact can be used as an enectrical bridge, particularly with reference to row and column switching arrangements.

Printed circuit boards at present used in row and column switching are usually doubled sided, copper coated, S.R.B.P. boards with through plated connections. The bridging contact permits switch circuitry to be accommodated on single sided, copper coated S.R.B.P. with an appreciable saving in cost and greater reliability.

The invention will be further described with reference to the accompanying drawing, in which:

Figure 1 is a sectional view through an electrical switch constituting a preferred form of the invention; and

Figure 2 is a plan view of the typical keyboard layout.

Figure 1 shows a portion of a printed circuit board 1, and one momentary action push switch 2 mounted in position thereon. Figure 2 shows the board 1 and switch 2. It will be appreciated that in a typical keyboard operation there might be eighty switches mounted on a single board, e.g. in a four by twenty matrix as in Figure 2. In such an arrangement the switches will be mounted close together and by means of snap extensions 3 at the corners of generally square bodies 4, would be attached to holes in the board. A typical hole, as shown at 5, would accommodate extensions 3 at the corners of four adjacent switch bodies.

The switch 2 illustrated in Figure 1 has its body 4 attached to the board 1, and the body 4 consists of a centrally apertured base 6, an upstanding outer wall 7 and a central tubular guide portion 8. The guide portion 8 is provided with a pair of slots 9 which receive and guide projections 10 on a pair of depending snap legs 11 of a push member or operating key generally indicated by 12. It will be seen from the shape of the projections 10 that the operating key 12 may be snapped on to the body 2 and not thereafter easily removed. The operating key 12 also has an outer wall 13 which is a sliding fit over the outer wall 7 of the body 2.

Between the base 6 of the body 2 and the printed circuit board 1, there is mounted a click plate 14 having a central contact portion 15 and two or more peripheral contact portions (shown at 18 in Figure 2).

A compression spring 16, located in place by a stud 17 in the operating key 12, acts between the operating key 12 and the click plate 14.

In the relaxed position illustrated, the force exerted by the spring is sufficient to push the operating key 12 to the outer position defined by abutment of the projections 10 on the ends of the slots 9, and also allows the click plate to maintain its relaxed position and provides contact pressure between the contact portions 18 and the board 1. Upon compression of the operating key 12, there is a period of lost motion until the spring 16 is compressed sufficiently to overcome the inherent bias of the click plate and

snap it to the operating position when the central contact 15 makes with a co-operating contact (not show) on the printed circuit board 1. At the same time, an audible click is emitted by the click plate 14 and the sudden snapping over the click plate also gives a tactile signal to the finger of an operator on the operating key 12. The operator then releases the operating key 12, and the spring 16 then rapidly causes the key to revert to its outer illustrated position and allows the click plate 14 to reverts to its relaxed position.

In the arrangement shown in Figure 2 the click plate 14 provides connection between the peripheral contact zones (e.g. 21, 22, 23) on the board 1 in the relaxed condition, and connects them to a central contact 24 when clicked over. Such an arrangement enables a line of keys to be supplied with power without the need for a continuous printed conductor to all of them. It is thus possible for the printed conductors for row and column switching arrangements to be accommodated on one side of a printed circuit board.

Various modifications may be made within the scope of the invention.

CLAIMS

1. A momentary action electrical switch comprising a manually operable push member, a contact click plate and a compression spring between the push member and the click plate, the said spring being adapted to urge the push member to an outer position while allowing the click plate to adopt its relaxed position, whereby when the push member is depressed the spring is compressed until it causes the click plate to snap into its operated condition without being engaged directly by the push member.

2. An electrical switch as claimed in claim 1, in which the push member is in the form of an operating key slidably guided in slots in a switch body.

3. An electrical switch as claimed in claim 2, in which the operating key is adapted to snap into the slots.

4. An electrical switch as claimed in claims 1, 2 or 3, comprising snaps means for securing the switch to a printed circuit board or other base.

5. A momentary action electrical switch substantialy as hereinbefore described with reference to the accompanying drawing.

Printed for Her Majesty's Stationery Office by Croydon Printing Company Limited, Croydon Surrey, 1980.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.