



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 087 414 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
28.03.2001 Bulletin 2001/13

(51) Int Cl.7: **H01H 13/02**

(21) Application number: **00308278.1**

(22) Date of filing: **21.09.2000**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(72) Inventor: **Partridge, David**
West Wickham, Kent BR4 9AL (GB)

(74) Representative: **Quest, Barry et al**
Wilson, Gunn, M'Caw,
41-51 Royal Exchange,
Cross Street
Manchester M2 7BD (GB)

(30) Priority: **23.09.1999 GB 9922382**

(71) Applicant: **Gamesman Limited**
Crawley, West Sussex RH10 2QR (GB)

(54) **Switch assemblies**

(57) An electric push button switch particularly for an amusement or gaming machine has a base part (3) with a microswitch (15) and a lamp holder (16) which fits into the bottom of a threaded tube (4) with an enlarged head (5, 6) which is mounted on the outer surface of a machine panel (1). A push button (7) fits within the head (5, 6) and acts on the switch (15) via a slider (8) within the tube (4). The base part (3) fits detachably within the

end of the tube (4) by engagement of projections (24) on the base part (3) with holes (25) in the tube (4). The projections (24) are on the end of springy circumferentially extending arms (23) so that the projections can readily snap fit into and pull axially out of the holes (25) whilst ensuring precise circumferential location required to ensure correct operation of the switch (15) by the slider (8).

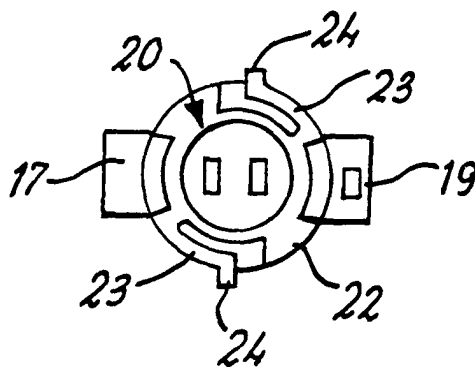


FIG. 5

EP 1 087 414 A1

Description

[0001] This invention relates to illuminated push button electrical switch assemblies.

[0002] A known illuminated push button electrical switch assembly, as commonly used in amusement and gaming machines, has a base structure with a microswitch and a lamp holder, and a tubular body part which fits around the lamp holder at one end and has a push button at the opposite end. Within the body part there is a slider element which is moved by the push button to operate the microswitch.

[0003] A switch assembly of this kind is described in GB 22882788. The slider element is a tubular structure with a pair of diametrically opposed feet for engagement with an operating member of the microswitch. The body part and the base structure are detachably interconnected by bayonet fittings i.e. by diametrically opposed radially outwardly extending pins on the base structure which engage diametrically opposed L-shaped slots in the adjacent peripheral region of the body part. The base structure is united with the body part with a push and twist movement which is intended to retain the base structure in the correct position relative to the body part so that one of the feet is aligned with the operating member of the microswitch.

[0004] This known arrangement allows easy engagement and disengagement of the body part and the base structure to facilitate assembly after insertion of the body part through a mounting hole in a panel, and to permit subsequent removal or disassembly for lamp replacement or other maintenance. However, since the bayonet fittings necessitate circumferential movement there is the possibility of the base structure and body part being incorrectly positioned, as a consequence of insufficient twisting of the body structure during assembly, or due to play in the bayonet fittings.

[0005] Particularly in the case of use in an amusement or gaming machine where the push button switch assembly is typically subjected to rapid, forceful repeated operation, any such incorrect positioning, even if relatively minor, can give rise to serious reliability problems.

[0006] An object of the present invention is to provide an alternative means of detachable interengagement between the base structure and the body part which is of a simple and convenient nature yet which can give reliable relative positioning of the base structure and body part.

[0007] According to the invention therefore there is provided an illuminated push button, electrical switch assembly comprising a base structure having a microswitch and a lamp holder, and a tubular body part adapted to fit around the lamp holder at an inner end region and having a push button at its opposite outer end region and an internal slider element adapted to be moved by the push button into operative interengagement with the microswitch, the base structure and the inner end region of the body part having interfitting elements to effect de-

tachable interconnection of the body part and the base structure, characterised in that the interfitting elements comprise at least one transverse projection engageable with a respective aperture, provided on respective ones of the base structure and the body part, the projection being a close fit in the aperture circumferentially of the tubular body part, and at least one of the projection and the inner end region of the body part being transversely resiliently deflectable.

[0008] With this arrangement, provision can be made for assembly and disassembly of the base structure and the body part by moving the base structure axially into and out of the inner end region of the body part to cause the projection to be deflected into and out of the aperture.

[0009] Assembly and disassembly can therefore be effected in a particularly simple and convenient manner, and, in the assembled condition the base structure can be reliably retained in a desired circumferential position relative to the body part having regard to the close circumferential fit between the projection and the aperture.

[0010] Most preferably, the projection is provided on the base structure and the aperture is provided on the body part. Preferably also, the projection is transversely resiliently deflectable and this may be achieved by providing the projection on a deflectable arm. The aperture may comprise a recess or a through hole. The resilience is preferably such as to give a snap fit.

[0011] The interfitting elements may comprise two projections, with respective apertures, as aforesaid, and these may be arranged at diametrically opposed locations so that the body part and the base structure can be selectively assembled in either of two different positions rotated through 180°.

[0012] A guide arrangement may be provided to direct axial movement of the base structure relative to the body part to bring the (or each) projection into engagement with the (or each) aperture. This may comprise a respective track (or channel) for the (or each) aperture which may be defined in any suitable manner, e.g. by raised ridges or a recessed portion or the like.

[0013] The body part may comprise a cylindrical structure which is threaded on its outer surface to receive a correspondingly internally threaded annular member, and which has an enlarged head at the outer end to receive and locate the push button, whereby the body part can be fixed in a mounting hole in a panel by clamping the panel between the head and the internally threaded annular member.

[0014] The head part, and correspondingly the push button, may be square or rectangular, or circular or of any other suitable shape.

[0015] The body part may be elongate with a relatively axially short head. Alternatively, the body part may be short and the head may be of similar or even greater axial length.

[0016] The push button and/or the head of the body part may be transparent or translucent to permit trans-

mission of illumination from a lamp in the lamp holder.

[0017] The internal slider element may take any suitable form. In the case where the base structure can be assembled with the body part in two different positions spaced by 180°, the slider element may have different parts for operative engagement with the microswitch respectively in the different positions. These different parts may comprise diametrically opposed axially projecting feet. The slider element may comprise a tubular element coaxially within the tubular body part.

[0018] A spring device may be provided between the body part and the slider element to resist pushing of the push button. This may comprise a helical coil spring which may fit between an internal projection at the inner end of the body part and a projection on the slider element at the outer end of the body part. Travel of the slider element under the action of the spring device may be limited by interengagement of the slider element and the inner end region of the body part. Conveniently the aforesaid feet may have outwardly turned ends for such limiting interengagement with the body part.

[0019] The lamp holder and microswitch may comprise attached separately encased components. Alternatively, they may be provided as printed circuit board components in a common housing.

[0020] The switch assembly of the invention is particularly suited for use in an amusement or gaming machine but may be used in any other suitable context.

[0021] The invention will now be described further by way of example only and with reference to the accompanying drawings in which:

Figure 1 is a side view of one form of a switch assembly according to the invention;
 Figure. 2 is an enlarged sectional view through the body part of the switch assembly;
 Figures 3 & 4 are enlarged plan and sectional views of details; and
 Figure 5 is an enlarged plan view of the base structure of the assembly.

[0022] The switch assembly shown in the drawings is for use for player operation in an amusement or gaming machine, such as a fruit machine, or poker machine, or other slot machine.

[0023] The switch assembly is mounted in a mounting hole of a panel 1 of the machine as indicated in Figure 1.

[0024] The assembly has a body part 2 and a base structure 3.

[0025] The body part 2 comprises a one-piece plastics moulding which has a cylindrical section 4 with an external thread along its entire length and an integral radially outwardly extending flat circular rim 5 at the outer end of the body part.

[0026] A circular collar 6 is attached around this rim and a transparent or translucent push button 7 of hollow disc-shaped form fits slidably within the head defined by the rim 5 and the collar 6. The push button 7 is provided

with decoration and/or information visible at its outer surface.

[0027] The push button 7 is formed integrally with the outer end of a slider element 8 within the cylindrical section 4. This slider element 8 comprises a moulded plastics cylindrical tube 9 with two axially projecting narrow strip-shaped feet 10 at diametrically opposed positions at its inner end. The feet 10 have radially outwardly turned ends 11.

[0028] This tube 9 is located coaxially within the cylindrical section 4 of the body part 2 and is of smaller diameter so that it can slide freely along the cylindrical section 4. The outwardly turned ends 11 of the feet 10 project beyond the cylindrical section 4. Thus, movement of the slider element 8 towards the outer end of the body part 2 is limited by engagement of the ends 11 with the periphery of the inner end of the cylindrical section 4 of the body part 2.

[0029] The feet 10 can be resiliently squeezed towards each other to permit insertion of the slider element 8 into the cylindrical section 4 during initial assembly.

[0030] The slider element 8 has an internal circular shoulder 12 towards the outer end of the body part 2, and there is a similar circular shoulder 13 within the inner end region of the cylindrical section 4 of the body part 2, although the latter shoulder 13 has two diametrically opposed gaps to allow passage of the feet 10 of the slider element 8.

[0031] A helical coil spring 14 is disposed between the two shoulders 12, 13 and this urges the push button 7 and the slider element 8 outwardly, limited by the engagement of the feet ends 11 with the inner end of the cylindrical section 4 of the body part 2 as mentioned above.

[0032] The base structure 3 comprises two separately attached components, namely a microswitch 15 and a lamp holder 16.

[0033] The microswitch 15 has a rectangular body 17 with lower projecting terminals 18 and an upper projecting operating member 19.

[0034] The lamp holder 16 comprises a one-piece plastics moulding which has a lamp receiving part 20, integral lower legs 21 which straddle and are attached to the body 17 of the switch 15 and a central collar 22 which is cut away to define two arms 23 which extend circumferentially in opposite directions at diametrically opposed positions.

[0035] Each arm 23 has a pin-shaped projection 24 extending radially outwardly at its free end. The arms are resiliently deflectable so that they tend to retain their circumferential shape but the free ends can be temporarily pushed radially inwardly by application of manual pressure.

[0036] The inner end region of the cylindrical section 4 of the body part 2 is provided with diametrically opposed through holes 25 spaced by 90° from the gaps in the internal shoulder 13 and the feet 11.

[0037] These holes 25 are closely spaced from the periphery of the cylindrical section 4 and are of very slightly greater diameter than the pin-shaped projections 24.

[0038] The cylindrical section 4 has portions of reduced thickness 26 around the holes 25 extending up to the periphery of the section 4 so as to define straight-sided tapered channels on the internal surface of the cylindrical section 4 leading to the holes 25, such channels 26 being slightly wider than the diameter of the holes 25 and having scalloped edges 30 that allow easy alignment of the pins 24.

[0039] In use, the cylindrical section 4 of the body part 2 is pushed through the hole in the panel 1 and the body part 2 is fixed in position by means of an internally threaded annular member 27 which is screwed onto the cylindrical section 4 to clamp the panel 1 between the rim 5 and the member 27 (with an intervening washer 28).

[0040] A lamp 29 is inserted into the lamp holder 20 and the lamp 29 and the lamp holder 20 are pushed into the inner end of the cylindrical section 4 with the pins 24 aligned with the channels 26. The arms 23 are deflected inwardly by engagement of the pins 24 with the internal surface of the cylindrical section 4 within the channels 26 whereby the lamp holder 20 can be pushed to a position at which the pins 24 snap-fit into the holes 25.

[0041] The relative diameters of the lamp holder collar 22 and the internal surface of the cylindrical section 4 are such that the lamp holder 20 can be easily pushed in with the pins 24 aligned with the channels 26, but cannot be readily pushed in with the pins 24 aligned with thicker wall parts of the cylindrical section 4.

[0042] The pins 24 are pushed into the holes 25 by the resilience of the arms 23 and are a close fit within the holes 25. The base structure 3 is therefore held in precise position circumferentially relative to the body part 2. In this position, the arrangement is such that the out turned end of one of the feet 11 is closely over the operating member 19 of the microswitch 15. The push button 7 can now be pushed to cause the slider element 8 to move within the cylindrical section 4 against the action of the spring 14 to cause the switch operating member 19 to be depressed. On release, the push button 7 is moved back by the spring 14.

[0043] When desired, the base structure 3 can be removed from the body part 2 simply by pulling the lamp holder 20 out of the cylindrical section 4.

[0044] With this arrangement, the switch assembly and disassembly can be readily effected in a convenient manner, simply by moving the lamp holder 20 axially into and out of the body part 2. In the assembled condition, as a consequence of the close fit of the pins 25 in the apertures 24 the base structure 3 is accurately located circumferentially relative to the body part 2 whereby reliable operation of the microswitch 15 can be assured.

[0045] It is of course to be understood that the invention is not intended to be restricted to the details of the

above embodiment which are described by way of example only.

Claims

1. An illuminated push-button electrical switch assembly comprising a base structure (3) having a microswitch (15) and a lamp holder (16), and a tubular body part (2) adapted to fit around the lamp holder (16) at an inner end region and having a push button (7) at its opposite outer end region and an internal slider element (8) adapted to be moved by the push button (7) into operative interengagement with the microswitch (15), the base structure (3) and the inner end region of the body part (2) having interfitting elements to effect detachable interconnection of the body part (2) and the base structure (3), characterised in that the interfitting elements comprise at least one transverse projection (24) engageable with a respective aperture (25), provided on respective ones of the base structure (3) and the body part (2), the projection (24) being a close fit in the aperture (25) circumferentially of the tubular body part (2), and at least one of the projection (24) and the inner end region of the body part (2) being transversely resiliently deflectable.
2. An assembly according to claim 1 characterised in that the projection (24) is provided on the base structure (3) and the aperture (25) is provided on the body part (2).
3. An assembly according to claim 1 or 2 characterised in that the projection (24) is transversely resiliently deflectable.
4. An assembly according to claim 3 characterised in that the projection (24) is provided on a deflectable arm (23).
5. An assembly according to claim 4 characterised in that the arm (23) extends circumferentially.
6. An assembly according to any one of claims 1 to 5 characterised in that the aperture (25) is a through hole.
7. An assembly according to any one of claims 1 to 6 characterised in that there are two projections (24) and two apertures (25).
8. An assembly according to claim 7 characterised in that the projections (24) are diametrically opposed.
9. An assembly according to claim 8 when dependent on claim 5 characterised in that the arms extend in opposite directions.

10. An assembly according to any one of claims 1 to 8 characterised in that a guide arrangement (26) is provided to direct axial movement of the base structure (3) relative to the body part (2). 5
11. An assembly according to any one of claims 1 to 10 characterised in that the body part (2) comprises a cylindrical structure (4) which is threaded on its outer surface to receive a correspondingly internally threaded annular member (27) and which has an enlarged head (5, 6) at the outer end to receive and locate the push button (7). 10
12. An assembly according to any one of claims 1 to 11 characterised in that the slider element (8) comprises a tubular element (9) which has diametrically opposed axially projecting feet (10) for operative engagement with the microswitch (15). 15
13. An assembly according to any one of claims 1 to 12 characterised in that a spring device (14) is provided between the body part (2) and the slider element (8). 20
14. An assembly according to claims 12 and 13 characterised in that the feet (10) have outturned ends (11) which engage the body part (2) to limit travel of the slider element (8). 25
15. An assembly according to any one of claims 1 to 14 when used in an amusement or gaming machine. 30

35

40

45

50

55

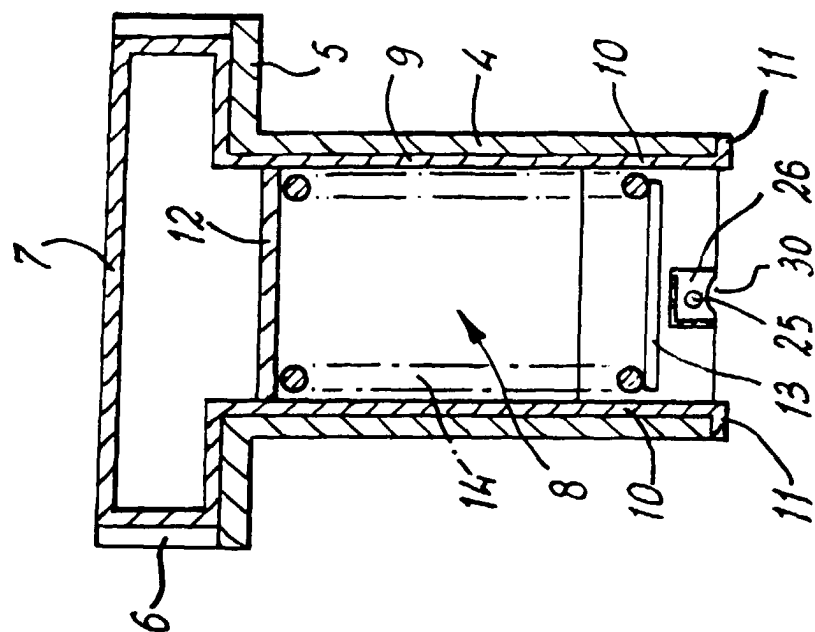


Fig. 2

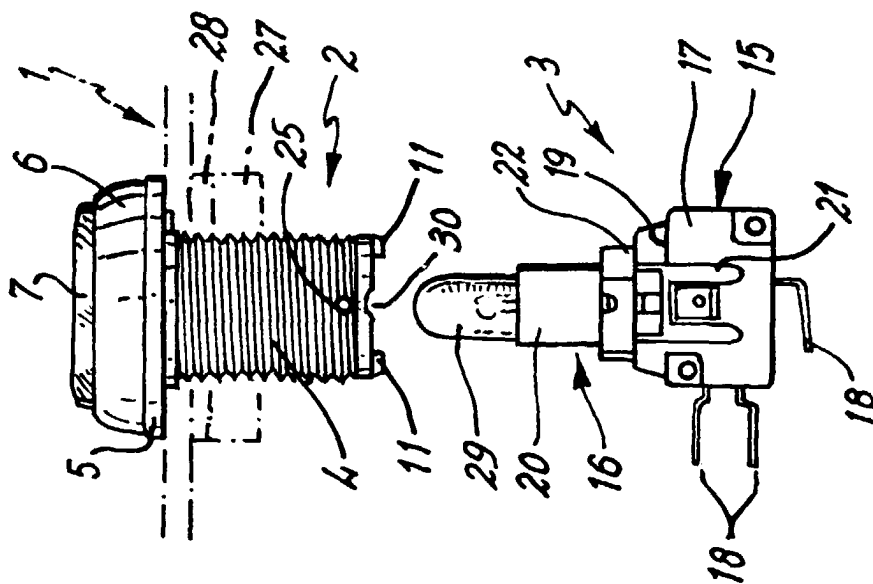


Fig. 1

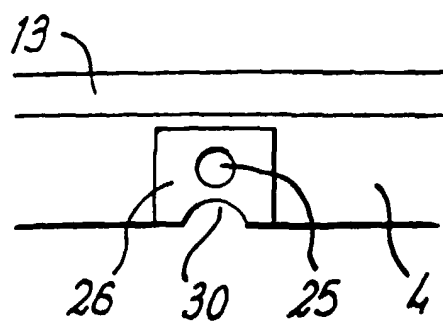


Fig. 3

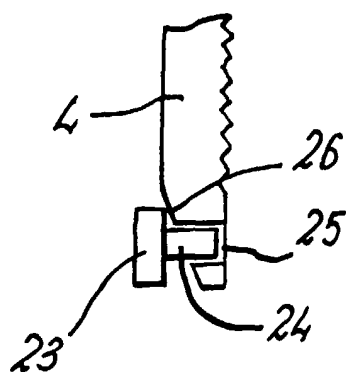


Fig. 4

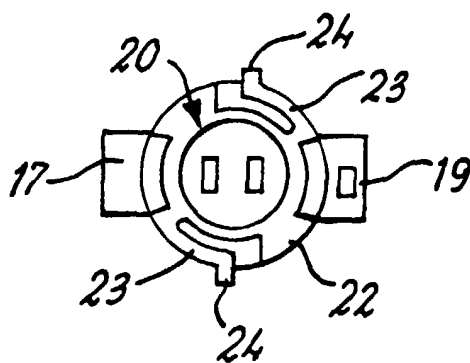


Fig. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 30 8278

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.7)
X	GB 2 202 678 A (HERRERA RICARDO ROMERO) 28 September 1988 (1988-09-28)	1,3,4, 6-8, 12-15	H01H13/02
Y	* page 3, line 14 - line 22; figures 1-5 * ---	2,10,11	
Y	EP 0 342 703 A (OMRON TATEISI ELECTRONICS CO) 23 November 1989 (1989-11-23) * column 8, line 50 - column 9, line 7; figures 1,3,5A,5B,6 * ---	2,10,11	
X	WO 85 02938 A (ALLEN BRADLEY CO) 4 July 1985 (1985-07-04) * page 8, line 23 - page 10, line 22; figures 1-4 * ---	1-4,6,8, 10,11	
D,A	GB 2 288 278 A (ALBERICI SNC DI AUGUSTO ALBERI) 11 October 1995 (1995-10-11) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			H01H
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		12 December 2000	Ramírez Fueyo, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 30 8278

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-12-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2202678 A	28-09-1988	ES 2003022 A	01-10-1988
		US 4871890 A	03-10-1989
EP 0342703 A	23-11-1989	JP 1292714 A	27-11-1989
		JP 2730052 B	25-03-1998
		JP 1296516 A	29-11-1989
		AT 157194 T	15-09-1997
		DE 68928261 D	25-09-1997
		US 4968860 A	06-11-1990
		US 5165530 A	24-11-1992
WO 8502938 A	04-07-1985	BR 8307764 A	24-12-1985
		EP 0168386 A	22-01-1986
		JP 61500993 T	15-05-1986
GB 2288278 A	11-10-1995	IT B0940044 U	18-09-1995