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(54) **Switch assemblies**

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Description

[0001] This invention relates to illuminated push button electrical switch assemblies. Document WO 85/02938 discloses a device according to the preamble of claim 1.

[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 according to claim 1.

[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 or 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 transmission 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 afore-said 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.

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), whereby 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), **characterised**

by the receiving aperture being within a recessed axially-extending channel, and at least one of the projection (24) and the inner end region of the body part (2) being transversely resiliently deflectable to permit push in and pull out axial assembly and disassembly of the base structure and body part guided by said channel.

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).
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).
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).

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).
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).
15. An assembly according to any one of claims 1 to 14 when used in an amusement or gaming machine.

Patentansprüche

1. Beleuchtete elektrische Druckknopfschalter-Baugruppe, aufweisend eine Basisstruktur (3), die einen Mikroschalter (15) und eine Lampenhalterung (16) enthält, sowie einen röhrenförmigen Körperteil (2), der dafür ausgelegt ist, an einem inneren Endbereich um die Lampenhalterung (16) herum zu passen, und der einen Druckknopf (7) an seinem gegenüber liegenden äußeren Endbereich sowie ein inneres Schiebeelement (8) besitzt, welches dafür ausgelegt ist, durch den Druckknopf (7) in Wirkverbindung mit dem Mikroschalter (15) gebracht zu werden, wobei die Basisstruktur (3) und der innere Endbereich des Körperteils (2) ineinander greifende Elemente enthalten, die eine lösbare Verbindung des Körperteils (2) und der Basisstruktur (3) bewirken, wobei die ineinander greifenden Elemente mindestens einen querlaufenden Vorsprung (24) umfassen, der mit einer entsprechenden Öffnung (25) in Eingriff gebracht werden kann, welche an der Basisstruktur (3) bzw. dem Körperteil (2) vorgesehen ist, wobei der Vorsprung (24) eng in der Öffnung (25) anliegt, rings um den röhrenförmigen Körperteil (2), **dadurch gekennzeichnet, dass** die aufnehmende Öffnung in einem axial verlaufenden ausgesparten Kanal angeordnet ist und, dass mindestens der Vorsprung (24) oder der innere Endbereich des Körperteils (2) in Querrichtung flexibel biegsam ist, um das axiale Zusammenfügen und Lösen in axialer Richtung durch Eindrücken bzw. Herausziehen der Basisstruktur und des Körperteils geführt durch den Kanal zu ermöglichen.
2. Baugruppe gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der Vorsprung (24) an der Basisstruktur (3) ausgebildet ist und die Öffnung (25) an dem Körperteil (2) ausgebildet ist.
3. Baugruppe gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der Vorsprung (24) in Querrichtung flexibel biegsam ist.
4. Baugruppe gemäß Anspruch 3, **dadurch gekennzeichnet,**

zeichnet, dass der Vorsprung (24) an einem biegsamen Arm (23) ausgebildet ist.

5. Baugruppe gemäß Anspruch 4, **dadurch gekennzeichnet, dass** sich der Arm (23) entlang des Umfangs erstreckt.
6. Baugruppe gemäß einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** die Öffnung (25) eine durchgehende Bohrung ist.
7. Baugruppe gemäß einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** sie zwei Vorsprünge (24) und zwei Öffnungen (25) besitzt.
8. Baugruppe gemäß Anspruch 7, **dadurch gekennzeichnet, dass** die Vorsprünge (24) einander genau gegenüberliegen.
9. Baugruppe gemäß Anspruch 8, sofern dieser abhängt von Anspruch 5, **dadurch gekennzeichnet, dass** sich die Arme in entgegengesetzten Richtungen erstrecken.
10. Baugruppe gemäß einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet, dass** eine Führungsanordnung (26) bereitgestellt wird, die die axiale Bewegung der Basisstruktur (3) in Bezug auf den Körperteil (2) steuert.
11. Baugruppe gemäß einem der Ansprüche 1 bis 10, **dadurch gekennzeichnet, dass** der Körperteil (2) eine zylindrische Struktur (4) aufweist, die an ihrer äußeren Oberfläche mit einem Gewinde versehen ist und die ein passendes, an der Innenseite mit einem Gewinde versehenes ringförmiges Element (27) aufnimmt und die einen vergrößerten Kopf (5, 6) an ihrem äußeren Ende aufweist, um den Druckknopf (7) aufzunehmen und zu fixieren.
12. Baugruppe gemäß einem der Ansprüche 1 bis 11, **dadurch gekennzeichnet, dass** das Schiebeelement (8) ein röhrenförmiges Element (9) umfasst, welches einander genau gegenüberliegende axial vorspringende Füße (10) besitzt, zur Wirkverbindung mit dem Mikroschalter (15).
13. Baugruppe gemäß einem der Ansprüche 1 bis 12, **dadurch gekennzeichnet, dass** ein Federelement (14) zwischen dem Körperteil (2) und dem Schiebeelement (8) angeordnet ist.
14. Baugruppe gemäß den Ansprüchen 12 und 13, **dadurch gekennzeichnet, dass** die Füße (10) nach außen gebogene Enden (11) haben, die mit dem Körperteil (2) in Eingriff gelangen, um den Hubweg des Schiebeelements (8) zu begrenzen.

15. Baugruppe gemäß einem der Ansprüche 1 bis 14, welche in einem Spielautomaten zum Einsatz kommt.

Revendications

1. Ensemble commutateur électrique lumineux à bouton poussoir comprenant une structure de base (3) comportant un microcommutateur (15) et une douille de lampe (16), et une partie de corps tubulaire (2) adaptée pour s'ajuster autour de la douille de lampe (16) au niveau d'une région d'extrémité interne et comportant un bouton poussoir (7) au niveau de sa région d'extrémité externe opposée et un élément coulissant interne (8) adapté pour être déplacé par le bouton poussoir (7) en prise fonctionnelle mutuelle avec le microcommutateur (15), la structure de base (3) et la région d'extrémité interne de la partie de corps (2) comportant des éléments s'ajustant ensemble afin d'effectuer une interconnexion détachable de la partie de corps (2) et de la structure de base (3), grâce à quoi les éléments s'ajustant ensemble comprennent au moins une saillie transversale (24) pouvant venir en prise avec une ouverture respective (25), prévue sur l'une respective de la structure de base (3) et de la partie de corps (2), la saillie (24) étant en ajustement serré dans l'ouverture (25) sur la circonférence de la partie de corps tubulaire (2), **caractérisé en ce que** l'ouverture de réception se trouve à l'intérieur d'un canal creux s'étendant axialement, et au moins l'une de la saillie (24) et de la région d'extrémité interne de la partie de corps (2) pouvant être déviée élastiquement transversalement pour permettre l'assemblage axial par poussée et le désassemblage axial par traction tiré de la structure de base et de la partie de corps guidées par ledit canal.
2. Ensemble selon la revendication 1, **caractérisé en ce que** la saillie (24) est prévue sur la structure de base (3) et l'ouverture (25) est prévue sur la partie de corps (2).
3. Ensemble selon la revendication 1 ou 2, **caractérisé en ce que** la saillie (24) peut être déviée élastiquement transversalement.
4. Ensemble selon la revendication 3, **caractérisé en ce que** la saillie (24) est prévue sur un bras pouvant être déviée (23).
5. Ensemble selon la revendication 4, **caractérisé en ce que** le bras (23) s'étend de manière circonferentielle.
6. Ensemble selon l'une quelconque des revendications 1 à 5, **caractérisé en ce que** l'ouverture (25)

est un trou débouchant.

7. Ensemble selon l'une quelconque des revendications 1 à 6, **caractérisé en ce qu'il** y a deux saillies (24) et deux ouvertures (25).
8. Ensemble selon la revendication 7, **caractérisé en ce que** les saillies (24) sont diamétralement opposées.
9. Ensemble selon la revendication 8 lorsqu'elle dépend de la revendication 5, **caractérisé en ce que** les bras s'étendent dans des directions opposées.
10. Ensemble selon l'une quelconque des revendications 1 à 8, **caractérisé en ce qu'un** agencement de guidage (26) est prévu pour diriger un mouvement axial de la structure de base (3) par rapport à la partie de corps (2).
11. Ensemble selon l'une quelconque des revendications 1 à 10, **caractérisé en ce que** la partie de corps (2) comprend une structure cylindrique (4) qui est filetée sur sa surface externe afin de recevoir un élément annulaire fileté de façon correspondante à l'intérieur (27) et qui possède une tête élargie (5, 6) au niveau de l'extrémité externe afin de recevoir et positionner le bouton poussoir (7).
12. Ensemble selon l'une quelconque des revendications 1 à 11, **caractérisé en ce que** l'élément coulissant (8) comprend un élément tubulaire (9) qui possède des pieds faisant saillie axialement et opposés diamétralement (10) pour une prise fonctionnelle avec le microcommutateur (15).
13. Ensemble selon l'une quelconque des revendications 1 à 12, **caractérisé en ce qu'un** dispositif à ressort (14) est prévu entre la partie de corps (2) et l'élément coulissant (8).
14. Ensemble selon les revendications 12 et 13, **caractérisé en ce que** les pieds (10) possèdent des extrémités tournées vers l'extérieur (11) qui viennent en prise avec la partie de corps (2) afin de limiter le déplacement de l'élément coulissant (8).
15. Ensemble selon l'une quelconque des revendications 1 à 14 utilisé dans une machine de divertissement ou de jeu.

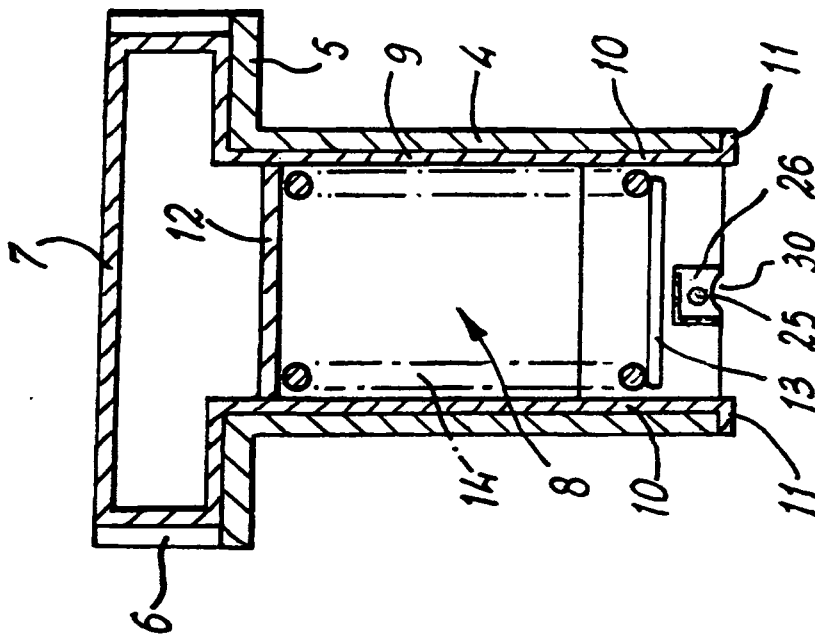


Fig. 2

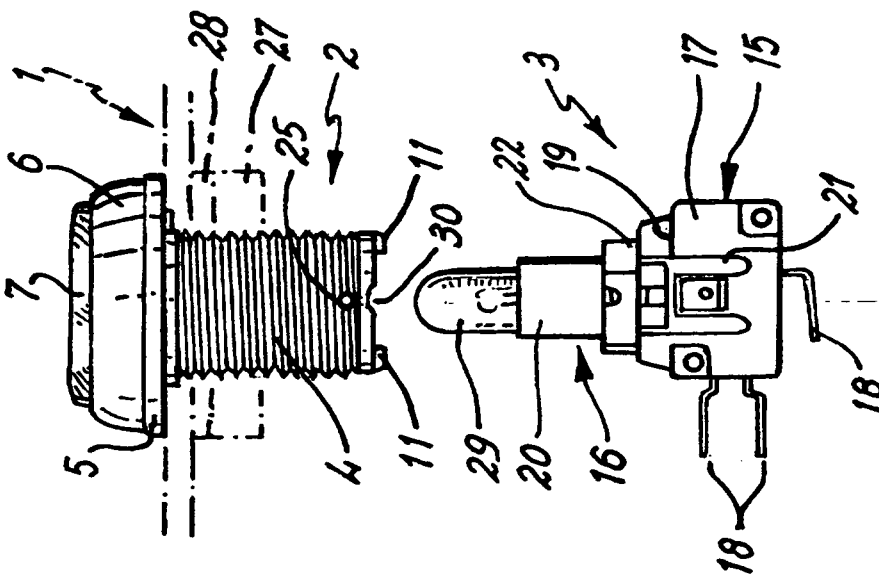


Fig. 1

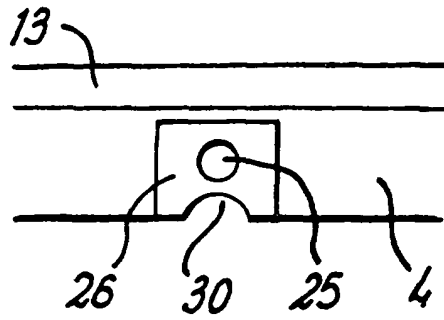


Fig. 3

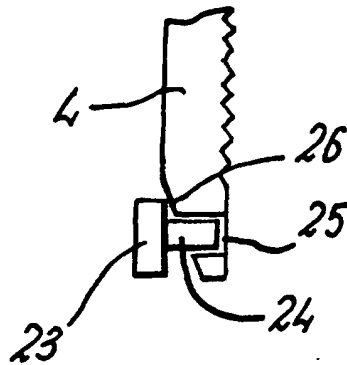


Fig. 4

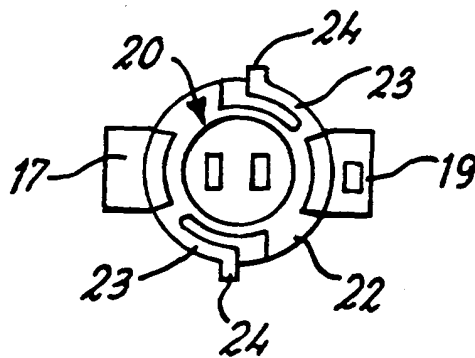


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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