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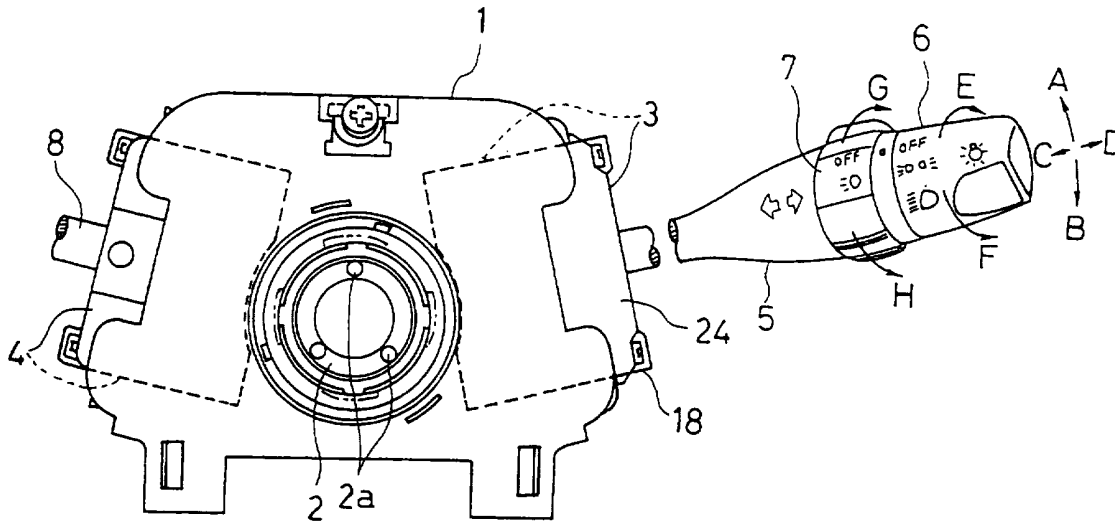
(56) Documents Cited
US 4404438 A

(58) Field of Search
UK CL (Edition O) **H1N**
INT CL⁶ **B60Q , B60R , H01H**

(54) **Switch assembly**

(57) A combination switch assembly for vehicles comprises a first switch 3 containing a flasher unit and a second switch 4 which are inserted into a body 1 from opposite sides of the body 1. The flasher unit (36, Fig 2) may be inserted in a through hole (27c) formed in a plate (27) of the first switch 3.

FIG. 1



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FIG. 1

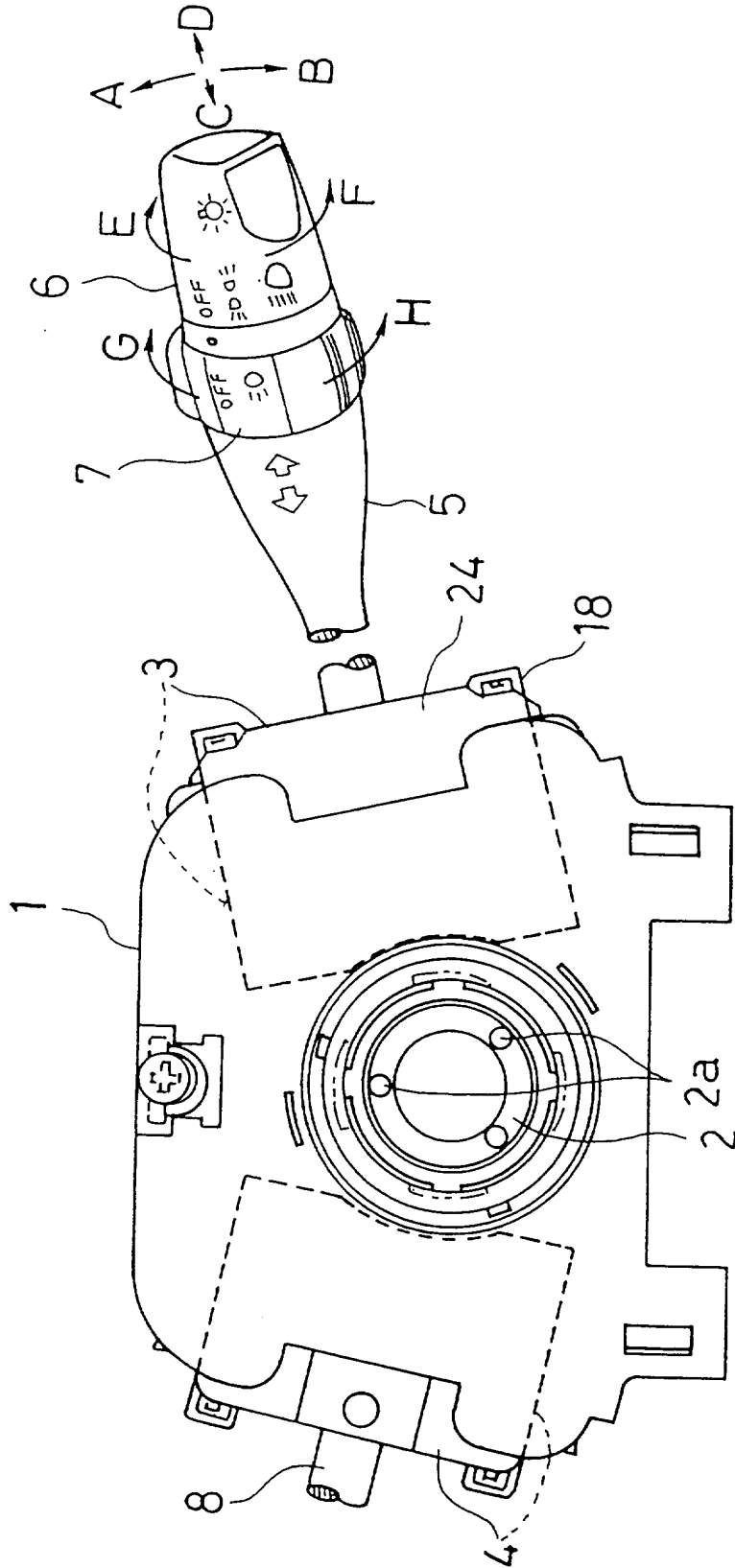


FIG. 2

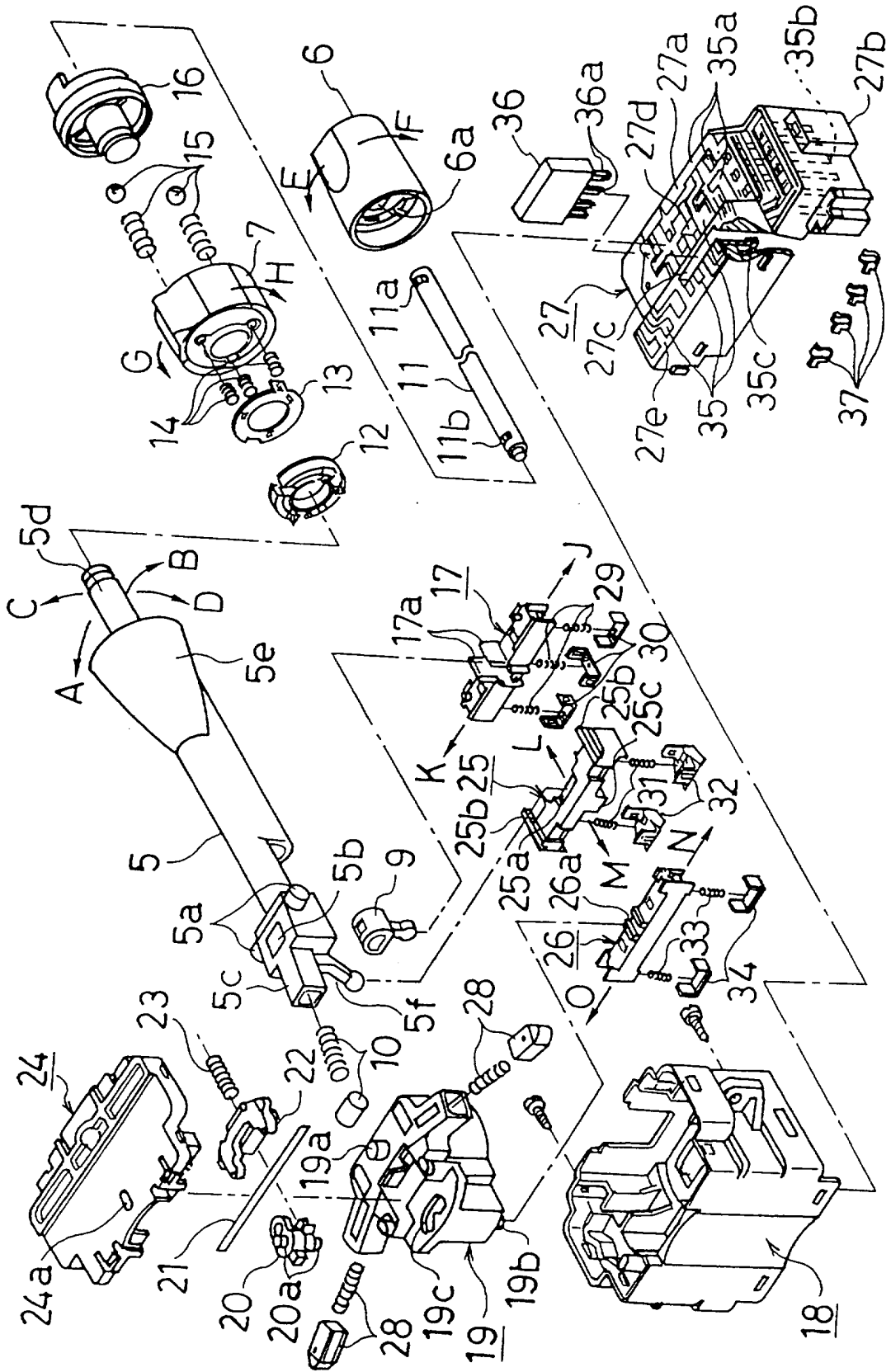
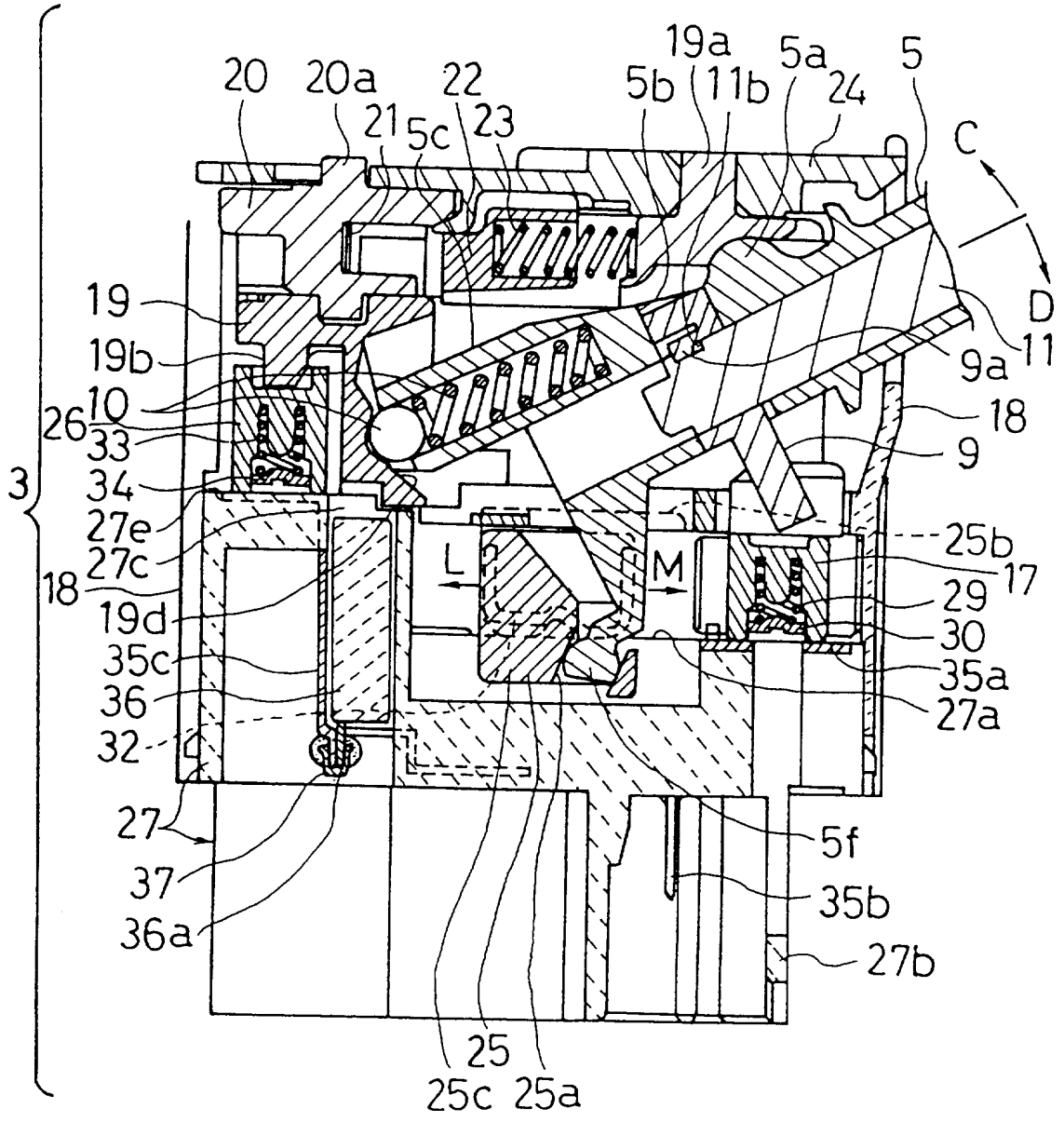


FIG.3



SWITCH ASSEMBLY

This invention relates to a switch assembly. It particularly relates to a combination switch structure for vehicles including a flasher unit.

Japanese Unexamined Utility Model Publication No.85545/84 discloses a combination switch in which a so-called flasher unit is installed on a substrate and then that substrate is fixed to the bottom of a body. The aforementioned flasher unit comprises a plurality of electronic devices mounted on the substrate. Therefore the substrate and the entire body must be large. This is a problem of this conventional combination switch, which cannot be constructed as a so-called cassette type combination switch in which a first column switch and a second column switch are inserted into a body from the right and left of the body and mounted thereon, as disclosed in for example Japanese Unexamined Patent Publication No. 40961/84.

A preferred embodiment of the present invention may provide a structure enabling a flasher unit to be contained in a first switch of a conventional cassette type combination switch.

According to the present invention there is provided a combination switch structure in which a first switch and a second switch are inserted into a body from the right and left of the body and mounted thereto, and the first switch contains a flasher unit. This can lead to a

compact construction.

Preferably the flasher unit employs MOS (Metal Oxide Semiconductor) technology. Thus the first switch can be small, and the combination switch can be of the cassette type.

Preferably the flasher unit is disposed in a through hole formed in a plate of the first switch. This further assist compact construction, and helps to prevent the flasher unit from striking other components. This can improve performance and reliability.

Preferably the plate contains terminals connecting with the flasher unit in the through hole. Thus the flasher unit can be connected when disposed in the hole. This aids compactness and prevents the unit from contacting movable elements of the switch construction.

Preferably the flasher unit comprises lead terminals and the lead terminals are connected with the aforementioned terminals of the plate by means of clips, thus facilitating the construction process, e.g. in reducing the soldering work.

An embodiment of the present invention will now be described in detail with reference to the accompanying drawings in which:

Fig. 1 is a front view partially in cross section showing an embodiment of the present invention,;

Fig. 2 is an exploded perspective view of a first switch of an embodiment of the present invention; and

Fig. 3 is an enlarged sectional view of the first

switch.

Fig. 1 shows a body 1 of a combination switch for vehicles, which body is intended to be screwed to a steering column (not shown).

5 A cylindrical tube 2 having cancel pins 2a in its centre portion is rotatably mounted in the body 1. First (3) and second (4) switches have been inserted into the body 1 from the right and the left respectively and mounted thereon.

10 The first switch 3 may provide the functions of a turn signal switch, a passing switch, a main dimmer select switch, a lighting switch, and a fog lamp switch. The turn signal switch makes a respective turn signal lamp blink when an operating lever 5 is operated to the
15 left or right indicated by the arrows A and B respectively. The passing switch makes the headlights instantaneously light up if the operating lever 5 is operated upward as indicated by the arrow C. The main dimmer switch changes the headlights between main beam
20 and dimmer (or dipped) states if the operating lever 5 is operated up/down as indicated by the arrows C and D respectively.

 The lighting switch turns on/off the headlights and side lights if a first rotating knob 6 provided on the
25 front end of the operating lever 5 is turned in directions indicated by the arrows E, F. The fog lamp switch turns on/off the fog lamp when a second rotating knob 7 is turned in directions indicated by the arrows G,

H.

A second switch 4 has a pivoting operating lever 8 and may provide the function, of for example, a wiper/washer switch. The operating lever 8 can be operated up/down and to the right and left like the
5 aforementioned operating lever 5 and incorporates controls for front and rear screen wipers, in the form of rotary switches at a front end thereof.

The operating lever 5 of the aforementioned first
10 switch 3 is rotatable in directions indicated by the arrows C,D with respect to a shaft 5a as shown in Fig. 2. The operating lever 5 is a substantially cylindrical operating member and contains a through hole 5b in which an actuating lever 9 is disposed, the through hole 5b
15 being formed in the vicinity of a transverse shaft 5a. The operating lever 5 has a first cylindrical portion in which a moderating member 10 is disposed at one end thereof and a shaft 11 at the other end thereof. Further, the operating lever 5 has a second cylindrical
20 portion 5d on which a substrate 12, a movable contact piece 13, a contact spring 14, the second rotating knob 7, moderating members 15, and a fixing member 16 are disposed.

The operating lever 5 has a second actuating lever
25 5f formed integrally therewith under a portion in the vicinity of the first cylindrical portion 5c, the second actuating lever 5f being floatingly engaged with an engaging hole 25a in a second movable element 25. If the

operating lever 5 is operated in directions indicated by the arrows C,D, the second movable element 25 is moved linearly in directions indicated by the arrows L,M, thereby realizing the main dimmer section and passing function.

A first rotating knob 6 has an axial hole 6a formed in the centre thereof. An elastic fixing pawl (not shown) formed in the axial hole 6a is engaged with a fixing groove 11a in the shaft 11 so that the first rotating knob 6 is fixed to the shaft 11. If the first rotating knob 6 is rotated in directions indicated by the arrows E, F, the operating lever 9 fixed to the other end of the shaft 11 moves the first movable element 17 linearly in directions indicated by the arrows J,K thereby turning on/off the headlights.

A second rotating knob 7 is an operating member having a substantially doughnut shape and if the knob 7 is rotated in directions indicated by the arrows H,G, the fog lamp is turned on/off. The second rotating knob 7 fixes the movable contact piece 13 through the contact springs 14 on a side of a case 18 and has moderating members 15 on the side facing the first rotating knob 6. The second rotating knob 7 is mounted on the second cylindrical portion 5d of the operating lever 5 and is rotatably nipped by a trumpet shaped enlarged portion 5e of the lever and the fixing member 16 which is fixed to the second cylindrical portion 5d.

As shown in Fig. 3, the actuating lever 9 is mounted

at an end of the shaft 11 by engaging its elastic fixing pawl with a fixing groove in the shaft 11. The actuating lever 9 is rotated together with the shaft 11 and the first rotating knob 6 and is engaged with fixing protrusions 17a such that a rotation of the first rotating knob 6 is converted to a linear motion of the first movable element 17.

The moderating member 10 comprises for example a coil spring and a cylindrical moderating piece. The moderating member 10 is contained in a first cylindrical portion 5c as shown in Fig. 3 and in contact with a moderating groove 19d formed in an internal wall of a movable base 19. The substrate 12 has fixing contact points for containing the movable contact piece 13 and is fitted in the opening portion 5e. The moderating members 15 comprise coil springs and steel balls and are mounted to the second rotating knob 7. The steel balls of the moderating members 15 are pressure-fitted into moderating grooves formed in an internal face of the fixing member 16 on a side of the second rotating knob 7.

The case 18 is closed at the top by a lid member 24 through a movable plate 19, a cancel cam 20, a leaf spring 21, a cam guide 22 and a coil spring 23 which are disposed on top of the case 18. The case 18 is closed beneath by a plate 27 through a first movable element 17, a second movable element 25 and a third movable element 26, these elements being disposed under the case 18. The case 18 contains the aforementioned parts and is engaged

in the body 1 and screwed thereto.

The movable plate 19 has moderating members 28 each resiliently mounted on the right and left and is rotated together with the operating lever 5 in directions indicated by the arrows A, B with respect to a shaft 19a. The movable plate 19 has a third operating lever 19b formed on a bottom thereof such that it protrudes to engage with an engaging portion 26a of the third movable element 26. If the operating lever 5 is operated in a direction indicated by the arrows A, B the third movable element 26 is moved linearly in a direction indicated by the arrows N, O thereby turning on a turn signal lamp.

The cancel cam 20 has a vertically-extending shaft 20a having a lower part which is floatingly engaged with a groove 19c in the movable plate 19, and an upper part which is floatingly engaged with an oval hole 24a in the lid member 24. Both ends of the leaf spring 21 are held by the lid member 24 so that the leaf spring 21 presses the cancel cam 20 in its centre. A cam guide 22 is mounted on the movable plate 19 and urged by the coil spring 23 toward the aforementioned cancel cam 20. The lid member 24 is fitted to an upper opening end of the case 18.

The first movable element carries movable contact pieces 30 for the front lamp switch through contact springs 29, the movable contact pieces 20 and the contact springs being disposed below the first movable element 29. If the first rotating knob 6 is rotated, the first

movable element 17 moves together with the contact spring 29 and the movable contact pieces 20 over a first plate surface 27a of the plate 27 in directions indicated by the arrows K,J.

5 The second movable element 25 carries movable contact pieces 32 for the main dimmer switch and passing switch through contact springs 31, the movable contact pieces 32 and the contact springs 31 being disposed below the second movable element 25. If the operating lever 5
10 is operated in directions indicated by the arrows C,D the second movable element 25 moves together with the contact springs 31 and the movable contact pieces 32 over the first plate surface 27a in directions indicated by the arrows L,M.

15 An engagement hole 25a of the second movable element 25 is oval. If the operating lever 5 is operated in the directions indicated by the arrows A, B, the second operating lever 5f moves to the engaging hole such that the operating lever 5f is free and the second movable
20 element 25 is not moved. Reference numeral 25b designates guide arms which slide along internal walls of the case 18 so as to prevent the second movable element 25 from being loose. Reference numeral 25c designates a guiding protrusion formed on a bottom face of the second
25 movable element 25, which is engaged with a guiding hole 27d in the first plate surface 27a. The second movable element 25 is guided by the guiding arms 25b and the guiding protrusion 25c such that it moves linearly in a

desired direction without being loose.

The third movable element 26 carries movable contact pieces 34 for the turn signal switch through contact springs 33, the movable contact pieces 34 and the contact springs 33 being disposed under the third movable element 26. If the operating lever 5 is operated in directions indicated by the arrows A,B the third movable element 26 moves together with the contact springs 33 and the movable contact pieces 34 over a second plate surface 27e of the plate 27 in directions indicated by the arrows N,O. An engaging portion 26a comprises for example two rail shaped protrusions and if the operating lever 5 is operated in directions indicated by the arrows C,D, the third operating lever 19b moves in the engaging portion 26a such that the lever 19b is free, but the third movable element is not moved.

The plate 27 is formed by insert molding of resin with a conductive plate 35 and mounted to the lower opening portion of the case 19. The plate 27 has a first plate surface 27a and a second plate surface 27e. The first movable element 17 and the second movable element 25 are placed on the upper second plate surface 27e. The plate 27 is formed integrally with a connector portion 27b and insert-molded with the conductive plate 35. A through hole 27c in which a flasher unit 26 is disposed is formed in the second plate surface 27e.

The conductive plate 35 comprises a fixed contact plate 25a disposed on the first plate surface 27a and the

second plate surface 27e, a terminal 25b disposed on the connector portion 27b and a terminal 35c disposed in the through hole 27c. The terminal 35c is bent so as to coincide with a bottom end of lead terminal 36a of the flasher unit 36 in the vicinity of a lower opening end in the through hole 27c. The terminal 35c is coupled with the aforementioned lead terminal 36a via clips 37 made of U-shaped metallic plates in the through hole 27c and soldered thereto.

10 The flasher unit 36 comprises for example MOS or the like components and is connected with respective terminals 35c in the through hole 27c and disposed in the through hole 27c.

15 Because the flasher unit 36 is constructed with compact electronics such as MOS and disposed within the through hole 27c in the plate 27, the size of the plate 27 can be reduced. Thus the size of the first switch 3 can be reduced and the combination switch containing the flasher unit 26 can be of cassette type, thereby allowing the first switch 3 to be fitted to the body 1.

20 Further, because unit 26 is disposed in the through hole 27c, there is no possibility that the flasher unit 36 may be in contact with other members when the plate 2 is assembled to the case 18. Thus, assembly performance of the plate 27 can be improved thereby preventing the flasher unit 36 from striking other members and being damaged.

25 Further, because the flasher unit 26 is disposed in

the through hole 27c formed in the second plate surface 27e, space saving can be realized and the third movable element 26 is not blocked from sliding. Still further, because the bottom end of the lead terminal 36a is

5 connected with the terminal 35c with the clips 37 and to be soldered, the soldering procedure is facilitated.

CLAIMS

1. A combination switch structure for vehicles, comprising a body, a first switch and a second switch which are inserted into the body from the right and left of said body, respectively and mounted thereto, said
5 first switch containing a flasher unit.

2. A combination switch structure for vehicles as claimed in claim 1 wherein said flasher unit comprises MOS. (metal oxide semiconductor) technology.

10 3. A combination switch structure for vehicles as claimed in claim 1, or claim 2 wherein said flasher unit is disposed in a through hole formed in a plate of said first switch.

15 4. A combination switch structure for vehicles as claimed in claim 3 wherein said plate contains terminals connecting with said flasher unit in said through hole.

20 5. A combination switch structure for vehicles as claimed in claim 4 wherein said flasher unit comprises lead terminals and said lead terminals are connected with said terminals of said plate by means of clips.

6. A combination switch structure substantially as herein described with reference to and as illustrated in the accompanying drawings.



Application No: GB 9713231.0
Claims searched: 1-6

Examiner: Peter Corbett
Date of search: 27 August 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.O): H1N
Int CI (Ed.6): B60Q; B60R; H01H
Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	US 4404438 (HONJO)	-

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.