

- [54] **DIRECTION INDICATOR SWITCHES**
 [75] Inventor: **Norman Wilkinson**, Barrowford
 near Nelson, England
 [73] Assignee: **The Lucas Electrical Company**
 Limited, Birmingham, England
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- [56] **References Cited**
UNITED STATES PATENTS
 2,739,196 3/1956 Spicer, Jr. 200/61.34
 2,815,412 12/1957 Spicer, Jr. 200/61.34
 3,201,536 8/1965 Fisher et al. 200/61.3 X
 3,264,422 8/1966 Masserant, Jr. et al. 200/61.34
 3,408,467 10/1968 Shenstone et al. 200/61.27

3,557,328 1/1971 Winogrocki et al. 200/61.27

FOREIGN PATENTS OR APPLICATIONS

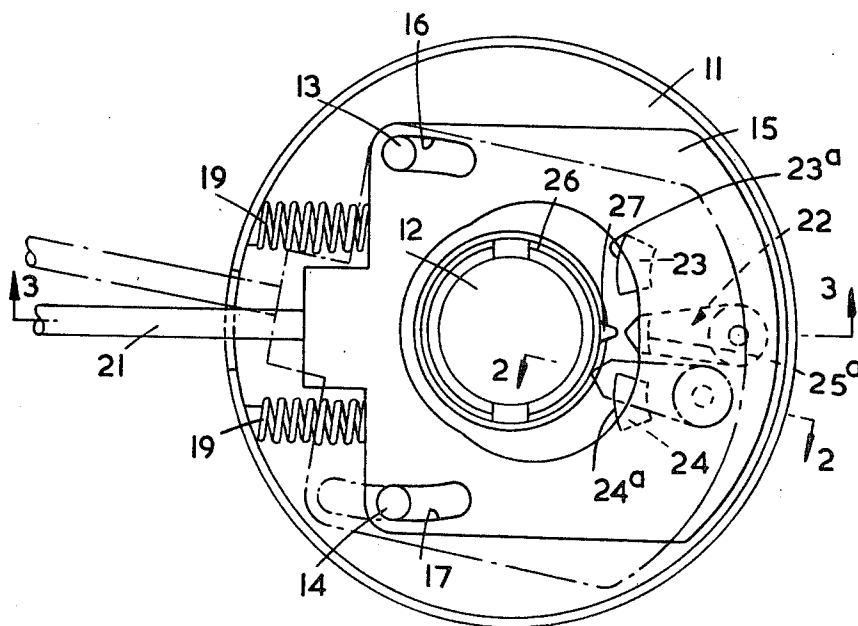
1,048,522 11/1966 United Kingdom..... 200/61.34

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[57] **ABSTRACT**

A direction indicator switch for a road vehicle includes a base supporting a manually movable member. The movable member is associated with switch contacts which are operable by movement of the member relative to the base from a central rest position to either of a pair of operative positions on opposite sides respectively of the rest position. The manually movable member is movable relative to the base from its rest position to a first of the operative positions about a first axis, and is movable relative to the base from its rest position to the second of the operative positions about a second axis. The first and second pivotal axes of the manually movable member are parallel to one another and are spaced apart, and the switch includes a detent arrangement for releasably retaining the member in either of its operative positions.

6 Claims, 5 Drawing Figures



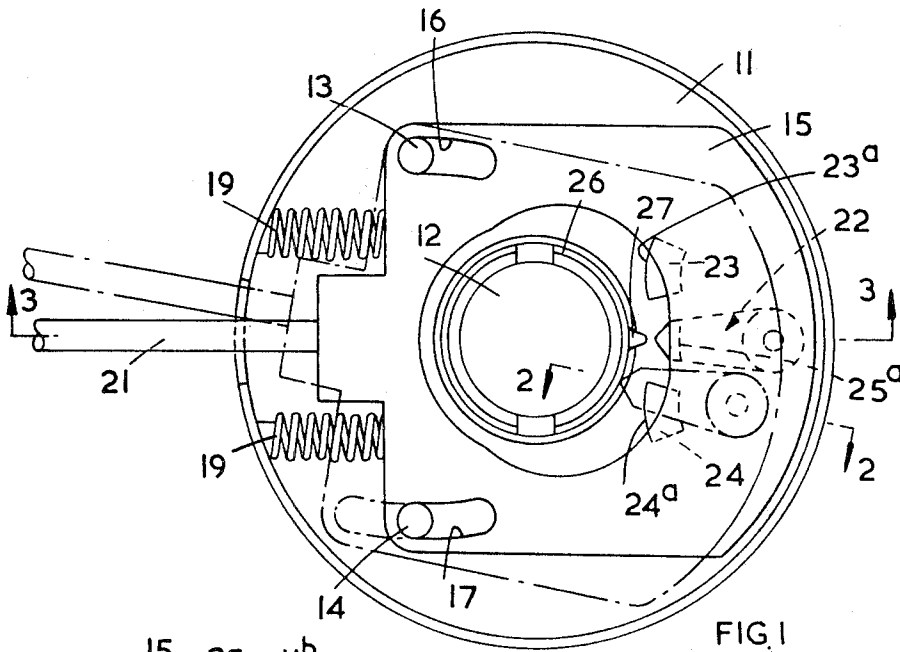


FIG. 1

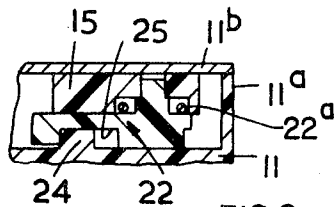


FIG. 2

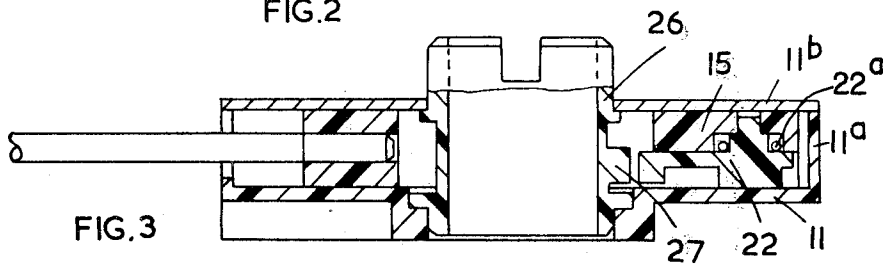


FIG. 3

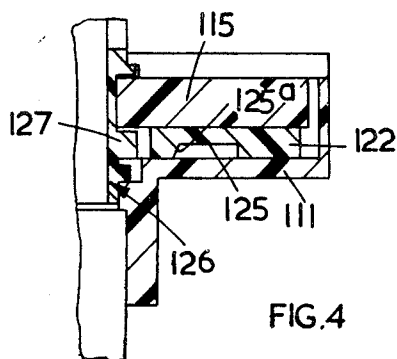


FIG. 4

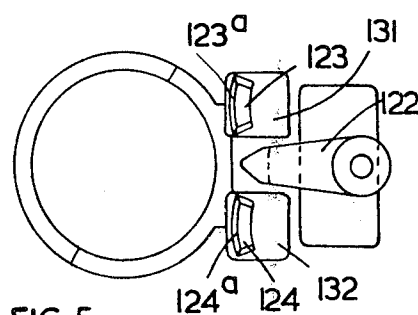


FIG. 5

DIRECTION INDICATOR SWITCHES

This invention relates to direction indicator switches for vehicles.

A direction indicator switch according to the invention includes a base, a manually movable member supported on the base for movement relative thereto, switch contacts operable by movement of the movable member relative to the base from a central rest position to either of a pair of operative positions on opposite sides respectively of the rest position, said member being movable relative to the base from its rest position to a first of said operative positions about a first axis and being movable relative to the base from its rest position to the second of said operative positions about a second axis, the second axis being parallel to and spaced from the first axis, and detent means for releasably retaining said member in either of its operative positions.

Preferably the member is coupled to the base by first and second spaced pin and slot connections, the slot of the second connection being shaped to permit said member to pivot about the axis of the pin of the first connection and the slot of the second connection being shaped to permit the member to pivot about the axis of the pin of the second connection. The member is resiliently urged so that in its rest position the pins engage the ends of their respective slots and the axes of the pins defining the first and second axes of movement of the member.

Conveniently the slots are formed in the member and the posts are upstanding from the base.

Preferably the detent means includes a single pawl pivotally mounted on the member and resiliently biased to a rest position relative to the member, and first and second lugs on the base and engaged by the pawl in the first and second operative positions of the member respectively, the engagement of the pawl with the first or second lug retains the member in its first or second operative position.

Desirably the pawl is arranged, in use, to be engageable by a striker rotating with the steering column of the vehicle in which the switch is employed, the pawl being clear of the path of movement of the striker when the member is in its rest position but being in the path of movement of the striker when engaged with either of the first and second lugs so that appropriate movement of the striker will pivot the pawl relative to the member to disengage the pawl from the respective lug freeing the member for return movement from its operative position to its rest position.

Conveniently the first and second lugs are supported on the base for movement in a direction generally parallel with the pivotal axis of the pawl, and are urged to a rest position in which they are engageable by the pawl by respective resilient means, each lug being capable of being moved against its resilient means to disengage the lug from the pawl.

Preferably, each lug and the pawl are provided with cam surfaces whereby movement of the pawl can cause the movement of the respective lug against its resilient means.

One example of the invention is illustrated in the accompanying drawings wherein:

FIG. 1 is a partly diagrammatic plan view of a direction indicator switch,

FIG. 2 is a scrap sectional view on the line 2—2 in FIG. 1,

FIG. 3 is a sectional view on the line 3—3 in FIG. 1,

FIG. 4 is a view similar to FIG. 3 of a modification and

FIG. 5 is a scrap plan view of the arrangement in FIG. 4.

Referring first to FIG. 1 to 3 of the drawings, the direction indicator switch includes a base 11 which is arranged to be connected to the stationary part of the steering column of a road vehicle, with the rotatable part 12 of the steering column extending through a centrally disposed aperture in the base 11. Upstanding from the base 11 and positioned at equal distances from the axis of the steering column 12 are a pair of pivot posts 13, 14. The posts 13, 14 extend through respective arcuate slots 16, 17 in a plate like movable member 15 of the switch. The member 15 of the switch is provided with centrally disposed aperture sufficiently large to permit predetermined movements of the member 15 relative to the shaft 12. The arcuate slot 16 of the member 15 has its center of curvature on the axis of the post 14, and similarly, the arcuate slot 17 has its center of curvature on the axis of the pivot post 13. A pair of compression springs 19 act between the base 11 and the member 15 to urge the member 15 to the right (as shown in the drawings) so that the posts 13, 14 engage the left hand ends of their respective slots 16, 17.

The base 11 is provided with a peripheral, upstanding wall 11a the free edge of which is engaged by a cover plate 11b, the base 11. The wall 11a and the cover plate 11b define a casing housing member 15. Secured to the member 15 and extending through the wall 11a is an operating lever 21, whereby the member 15 can be moved manually relative to the base 11.

The springs 19 urge the member 15 to a central, rest position in which the pins 13, 14 engage the left hand ends of their respective slots 16, 17. The member 15 can be moved clockwise, or counter-clockwise from this central rest position, and in order to move the member 15 generally clockwise the lever 21 is moved in a clockwise direction, and the member 15 pivots about the pivot post 13, therefore compressing the springs 19, the pin 14 moving along the slot 17. The length of the slot 17 of course governs the distance through which the member 15 can be moved. Similarly, in order to move the member 15 in a counter-clockwise direction from its rest position the lever 21 is moved in a counter clockwise direction and the plate 15 pivots about the pin 14, the pin 13 riding along the slot 16. Once again of course the springs 19 will be compressed.

The member 15 carries movable, electrical bridging contacts (not shown) which co-operate with fixed contacts (not shown) on the base 11. In the central rest position of the member 15 the moving contacts on the member 15 are spaced from the fixed contacts of the base, and so no electrical circuits are completed through the switch. When the member 15 is moved to its extreme clockwise position a first electrical circuit is completed by way of the fixed contacts, and similarly when the member 15 is in its extreme counter clockwise position a second electrical circuit is completed through the fixed contacts. The first and second electri-

cal circuits are associated with the direction indicator lamps of the vehicle employing the switch, and so for example completion of the first circuit energises the right hand direction indicator lamps while completion of the second circuit energises the left hand direction indicator lamps.

The extreme clockwise, and counter clockwise positions of the member 15 are first and second operative positions of the member 15, and detent means is provided for retaining the member 15 releasably in either of the first and second operative positions. The detent means includes a pawl 22 which is pivotally mounted on the member 15, and lies between the member 15 and the base 11. The pawl 22 is positioned on the side of the axis of the shaft 12 remote from the pins 13, 14, and is spring urged by a torsion spring 22a to a central, rest position relative to the member 15, in which it extends radially towards the shaft 12, when the member 15 is in its central, rest position. The detent means further includes a pair of lugs 23, 24 upstanding from the base 11. The lugs 23, 24 are equally spaced on opposite sides of the radial axis of the pawl 22 when the pawl 22 and member 15 are in their rest positions. The lugs 23, 24 present arcuate surfaces 23a, 24a to the shaft 12 the surface 24a being curved about an axis coincident with the pivotal axis of the pawl 22 when the member 15 is in its first operative position, and the surface 23 being curved about an axis coincident with the axis of pivotal movement of the pawl 22 when the member 15 is in its second operative position. The radii of curvature of the surfaces 23a, 24a are equal, and the face of the pawl 22 presented to the base 11 is undercut intermediate the pivotal axis of the pawl and the free end of the pawl to define a channel 25 in which either of the lugs 23, 24 can be received. The channel 25 presents a curved surface 25a to the pivot axis of the pawl, the surface 25a having its center of curvature on the axis of pivotal movement of the pawl 22 and the radius of curvature being equal to the radii of the surfaces 23a, 24a.

Mounted for rotation in the casing 11, 11a, 11b is a striker collar 26 which in use is keyed to the shaft 12 to rotate therewith. Projecting radially outwardly from the collar 26 is a striker 27 the free end of the striker 27 describing a circle of movement, in use, within the casing of the switch and in a plane containing the pawl 22. The detent mechanism of the switch operates in the following manner.

Considering movement of the switch to its first operative position the lever 21 is moved in a clockwise direction and the member 15 pivots about the post 13. Initially, the pawl 22 moves with the member 15 and is held in its rest position relative to the member 15 by its own centering spring. As the member 15 approaches the first operative position a side face of the pawl 22 abuts a side face of the lug 24 and thereafter as the member 15 continues to move the pawl 22 is caused to pivot relative to the member 15 against the action of its centering spring. Since the member 15 is moving about the axis of the post 13, rather than about the axis of the shaft 12 the pawl includes a component of movement, as the member 15 moves, radially inwardly. The pawl 22 and the lug 24 are so arranged that as the member 15 achieves its first operative position the channel 25 aligns with lug 24 so permitting the pawl 22 to return to its center position under the action of its centering spring, the lug 24 being accommodated in the channel 25 with the surface 25a of the pawl abutting the surface

24a of the lug 24. During the movement of the member 15 from its central, rest position to its first operative position the springs 19 are compressed, and so urge the member 15 back towards its central position. However, the engagement of the surface 25a with the surface 24a provides a locking action retaining the member 15 in its first operative position.

When the member 15 is in its central, rest position the free end of the pawl 22 lies outside the circle of movement of the striker 27. However, when the pawl 22 is engaged with the abutment 24, or the abutment 23 the free end of the pawl lies within the circle of movement of the striker 27. Thus reverting again to the situation where the member 15 is held in its first operative position by engagement of the surface 25a of the pawl with the surface 24a of the lug 24, then during negotiation of the turn which is being indicated the steering shaft 12 will initially be rotated in a clockwise direction. Thus the striker 27 will engage the pawl 22 and will cause the pawl 22 to pivot in a counter clockwise direction relative to the member 15. During the movement the pawl 22 does not become disengaged from the lug 24, the lug 24 being sufficiently long to ensure that the surfaces 24a, 25a are still engaged when the pawl has been pivoted sufficiently far to permit the striker 27 to pass. Thus the initial movement of the steering shaft does not cancel the switch. However, towards the end of the negotiation of the turn the steering shaft 12 will be rotated in a counter clockwise direction to return the vehicle to a straight course. Thus the striker 27 will again engage the pawl 22, and this time will cause the pawl 22 to move in a clockwise direction relative to the member 15. This movement of the pawl under the action of the striker 27 disengages the pawl from the lug 24, and in so doing releases the detent action freeing the member 15 for return to its rest position under the action of the springs 19. It will be appreciated, that provided the lever 21 is not held the springs 19 will return the member 15 to its rest position. However, if the lever 21 is held to retain the member 15 in its first operative position then when the pawl 22 has been pivoted sufficiently far to permit the striker 27 to pass then the centering spring of the pawl 22 will return the pawl 22 into engagement with the lug 24 so that the member 15 will once again be latched in its first operative position.

The operation of the detent assembly when the member 15 is moved to its second operative position is exactly as described above with the exception that the lug 23 is involved rather than the lug 24.

Conveniently, the electrical contacts of the switch are so arranged that the first and second electrical circuits are completed before the member 15 reaches the position in which it will be latched by the pawl 22. The circuits are in fact completed a short distance before the point at which the pawl 22 engages the side surface of either of the lugs 23, 24. It will be appreciated therefore that the lever 21 can be used to move the member 15 to a position such that the first, or second, electrical circuit is completed, but wherein if the lever 21 is released the member 15 will return to its rest position without the action of the striker 27. It is chosen that this position should be at the point at which the pawl 22 engages the side surface of the lug 23 or the lug 24 so that it will be readily identifiable to the operator of the switch as a result of the resistance to movement imparted by the centering spring of the pawl.

It will be appreciated that the switch can also be cancelled manually from either of its operative positions to its rest position. Once again considering the switch in its first operative position the pawl 22 will be engaged with the lug 24, the pin 13 will be at the left hand end of the slot 16, and the pin will be at the right hand end of the slot 17. To return the switch to its rest position manually the lever 21 is moved in a counter clockwise direction. The member 15 cannot, however, re-trace its path of movement in achieving the first operative position from the rest position since this would involve a component of movement of the pawl in a direction prevented by the lug 24. The path of movement followed by the switch components has not been determined but a point is reached during the manual movement at which the pawl disengages from the lug 24, and thereafter the member 15 is centered with respect to the base 11 by the springs 19.

In a modification of the above switch, FIGS. 4 and 5, the basic switch is as described above but differs in that the detent means includes in place of the lugs 23, 24 a pair of lugs 123, 124 which are integral parts of respective sliders 131, 132 mounted in the base 111 for sliding movement parallel to the axis of pivotal movement of the pawl 122. The sliders 131, 132 are spring urged to rest positions relative to the base 111 wherein the lugs 123, 124 project above the surface of the base 111. Additionally, the surfaces 123a, 124a and the end surfaces of each of the lugs 123, 124 are chamfered so that the lugs taper from a maximum adjacent the base 111 to a minimum at their free ends. Furthermore, the surface 125a of the pawl 122 is chamfered so as to correspond to the chamfer of the surfaces 123a, 124a.

The operation of the modified switch is similar to that described above with the following exceptions.

The manual cancelling procedure is as described above and does in normal circumstances require the surface 125a of the pawl to slide along the surface 123a of the lug 123, or of course the surface 124a of the lug 124, to achieve disengagement of the pawl from the lug. However, the situation can arise where the striker 127 of the collar 126 engages the pawl 122, and so prevents such sliding movement. The provision of the spring loading of the lugs 123, 124 and the tapering nature of the lugs and the surface 125a ensures that manual cancelling can be achieved even if the striker 127 is impeding movement of the pawl 122. In such circumstances the force applied manually to the member 115 to return it to its rest position is sufficient to overcome the spring force urging the lug 123, or the lug 124, to its rest position, and the cam action between the surface 125a and the surface 123a, or 124a, causes the slider 131 or 132 to be depressed into the base 111 to permit the pawl 122 to ride over the lug to achieve the rest position of the member 115. As soon as the pawl 122 has disengaged from the lug the lug will of course, be returned by its spring to the rest position in readiness for a further operation of the switch.

As described with reference to FIGS. 1 to 3, the contacts associated with the first and second electrical circuits which can be completed through the switch are arranged so that the first and second circuits are completed prior to the member 115 achieving its first and second operative positions. The circuits are in fact completed at the point in the movement of the member 115 where the pawl 122 engages the end of the respective lug. This feature provides the facility of moving the

member 115 to a position where upon release the member 115 will return automatically to its rest position, and wherein the desired electrical circuit is completed. The feature is of course of particular use when changing lanes on a motor way where there may well be insufficient movement of the steering shaft of the vehicle to cancel the switch from either of its operative positions. The centering spring of the pawl 122 provides resistance to movement of the member 115 fully into the operative positions, and so the operator of the switch can readily determine the points at which the circuits are completed, but at which upon release of the member 115 the switch will cancel automatically back to its rest position.

The provision of this feature can give rise to a problem in that if the member 115 is being held in a position where for example the pawl 122 engages the end of the lug 124 and the steering wheel is turned to negotiate a right hand turn then the striker 127 can abut against the pawl 122 and further steering movement will be resisted by abutment of the pawl 122 with the end of the lug 124. The end faces of the pawls 123, 124 are chamfered as described above so that the abutment of the striker 127 with the pawl 122 when the pawl 122 is abutting one of the end surfaces of the lugs does not prevent steering movement of the steering shaft of the vehicle. Thus if such a situation arises the turning force applied to the steering shaft overcomes the spring force holding the lug in its rest position, by virtue of the cam action between the pawl and the end surface of the lug, and so depresses the respective lug into the base to permit the pawl 122 to ride over the top of the lug, and thus permit the steering movement of the steering shaft to continue. The springs acting on the member 115, when in an operative position, to return it to its rest position are not sufficiently strong to cause the pawl 122 to ride over the lug 123 or 124, that is to say the springs acting on the member 115 are not sufficiently strong to overcome the spring urging slider 131 or 132 to its rest position.

It will be noted from the drawing that both ends of each lug are chamfered. The outer ends of the lugs play no part in the switch action and are chamfered merely so that standard components can be used. Thus both lugs are identical whereas without chamfering the outer ends of the lugs it would be necessary to produce two different lugs.

It will be apparent that in both of the above described constructions the pins 13, 14 could be provided on the cover plate if desired, and moreover could, if desired, be provided on the member 15, 115 with their corresponding slots either in the base 11, 111 or the cover plate. Furthermore while it is desirable to utilize a pair of springs 19 disposed on opposite sides of the transverse axis of the member 15, 115 (when the member is in its rest position) a single spring preferably aligned with said transverse axis could be utilized.

The provision of the two different pivot axes of the member 15, 115 for movement to the two different operative positions minimizes the problem of "fly through" which is found with certain direction indicator switches where the member equivalent to the member 15, 115 pivots about a single axis for both operative positions. "Fly through" is the involuntary movement of the movable member of the switch from one operative position through the central position and into the other operative position during automatic cancelling

operation of the switch. It is believed that the above described switch is not so susceptible to "fly through" owing to the change in the axis of pivotal movement which must occur as the member 15, 115 attempts to pass through its central position in a potential "fly through" situation.

In a minor modification of either of the constructions described above, the slots 16, 17 are enlarged adjacent their ends remote from the pins in the rest position. Thus the slots are not properly arcuate since they are not parallel sided. Accordingly, although the slots still permit the movement of the member 15, 115 about the opposite pin the pins do not ride along the slots in the sense that they slide along the slot walls. The widening of the slots minimizes the possibility of the member jamming against the pins during hand cancelling if the member is moved bodily against the action of the springs towards the steering column axis.

I claim:

1. A direction indicator switch mechanism including a base, a manually movable member, means supporting said manually movable member on the base for relative movement thereto from a central rest position about a first axis, in one direction, to a first operative position on one side of said central rest position, and, about a second axis, in a direction opposite to said one direction to a second operative position on the opposite side of central rest position from said first operative position, said second axis being parallel to and spaced from said first axis, and the mechanism further including detent means comprising a single pawl, means pivotally mounting said pawl on said member, resilient means biasing said pawl to a rest position relative to said member, and, first and second lugs on the base, said first and second lugs being engaged by the pawl in the first and second operative positions of the member respectively, and the engagement of the pawl with the first or second lug retaining the member in its first or second operative position respectively.

2. A switch as claimed in claim 1 wherein the member is coupled to the base by first and second spaced pin and elongate slot connections, the elongate slot of the second connection permitting the member to pivot about the axis of the pin of the first connection and the elongate slot of the second connection permitting said member to pivot about the axis of the pin of the second connection, said member being resiliently urged so that in its rest position the pins engage the ends of their respective elongate slots and the axes of the pins defining the first and second axes of movement of the member.

3. A switch as claimed in claim 2 wherein the slots are formed in said member and the posts are upstanding from the base.

4. A switch as claimed in claim 1 wherein the pawl is arranged, in use, to be engageable by a striker rotating with the steering column of the vehicle in which the switch is employed, the pawl being clear of the path of movement of the striker when said member is in its rest position but being in the path of movement of the striker when engaged with either of said first and second lugs so that appropriate movement of the striker will pivot the pawl relative to said member to disengage the pawl from the respective lug freeing the member for return movement from its operative position to its rest position.

5. A switch as claimed in claim 1 wherein said first and second lugs are supported on the base for movement in a direction generally parallel with the pivotal axis of said pawl, and are urged to a rest position in which they are engageable by said pawl by respective resilient means, each lug being capable of being moved against its resilient means to disengage the lug from the pawl.

6. A switch as claimed in claim 5 wherein each lug and the pawl are provided with cam surfaces whereby movement of the pawl can cause said movement of the respective lug against its resilient means.

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