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Yasuda

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[54] **AUTOMATIC TURN-SIGNAL CONTROLLER**

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[52] **U.S. Cl.** **200/61.27,** 74/2, 340/56

[51] **Int. Cl.** **H01h 3/16**

[58] **Field of Search** 200/61.27; 74/2; 340/56, 73

[56] **References Cited**

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Assistant Examiner—Gerald P. Tolin
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[57] **ABSTRACT**

An automatic turn-signal control device comprising an axially displaceable threaded member which is driven for rotation by a driving cable extended from the driving shaft of the vehicle with a speed reduction, a pair of pawls either of which can exclusively engage with or disengage from the threaded member, a pair of turn-signal switches which are closed or opened in response to the engagement or disengagement of either pawl, externally operable means to urge either of the pawls from a neutral position for automatically resetting either pawl to a neutral position away from its engagement with the threaded member at the point where the threaded member has attained a predetermined axial displacement, and means for automatically resetting the disengaged threaded member to its starting point.

7 Claims, 3 Drawing Figures

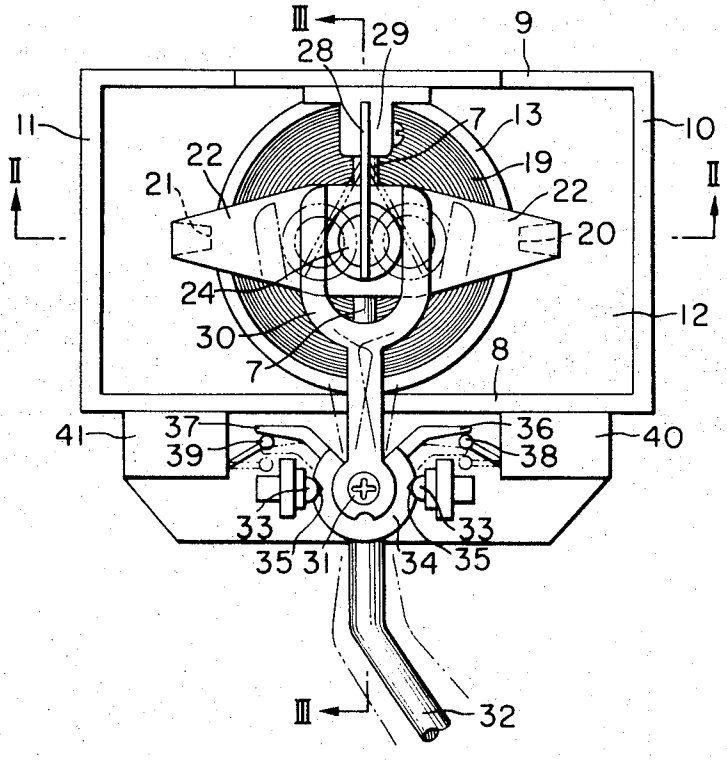

FIG. 1

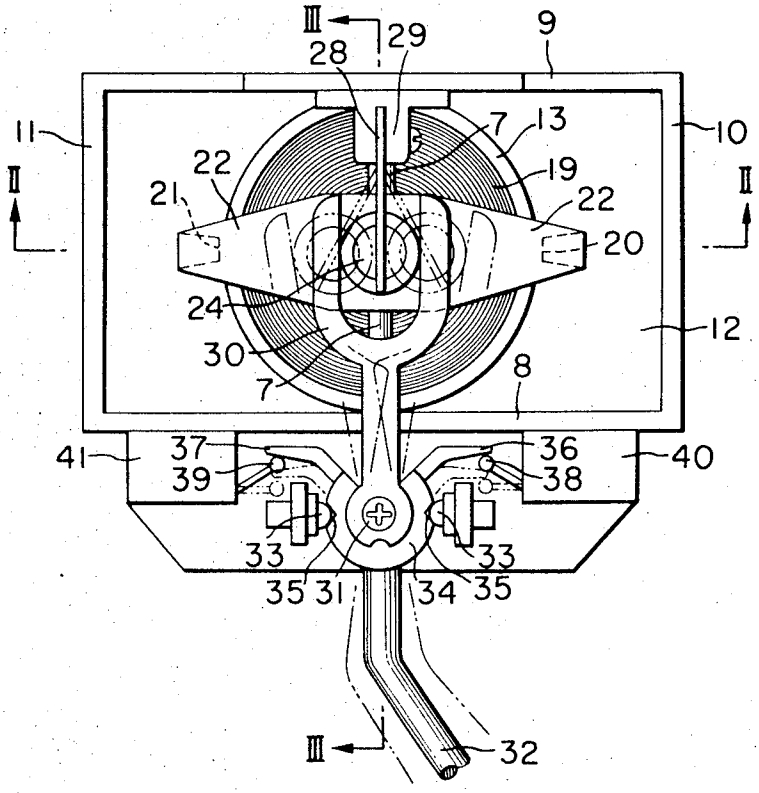
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FIG. 2

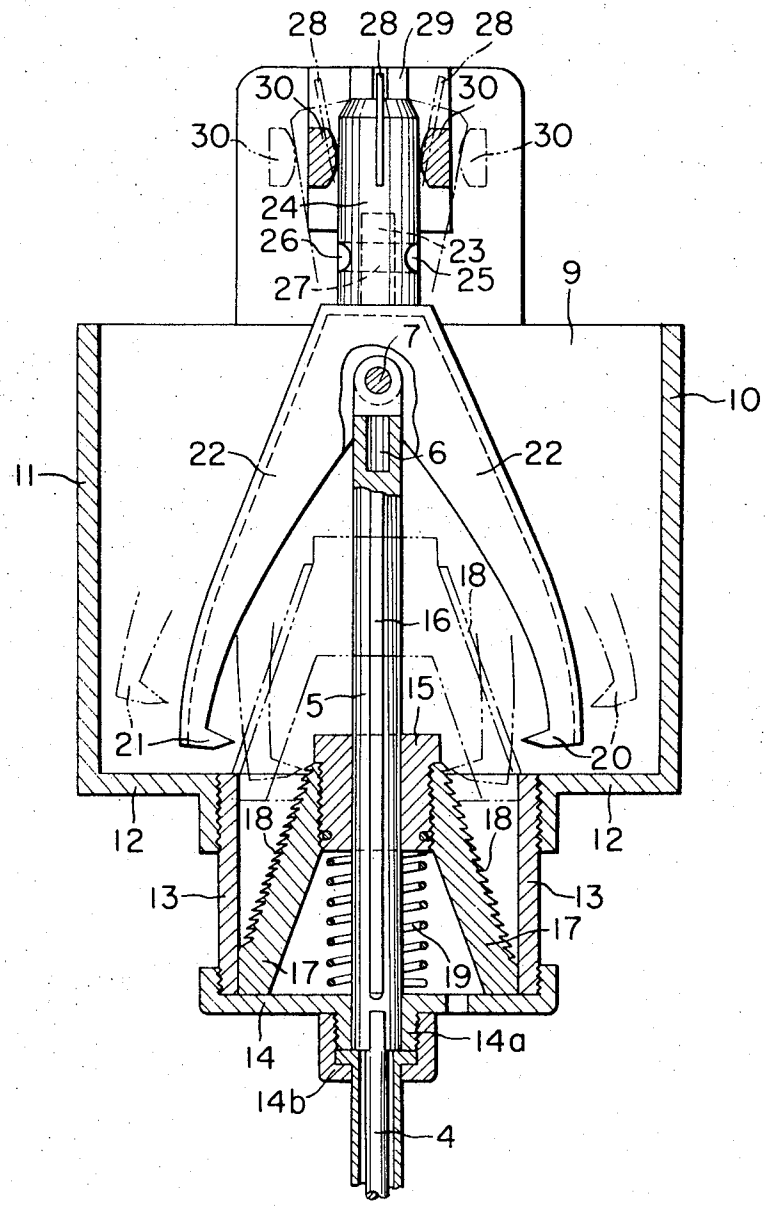
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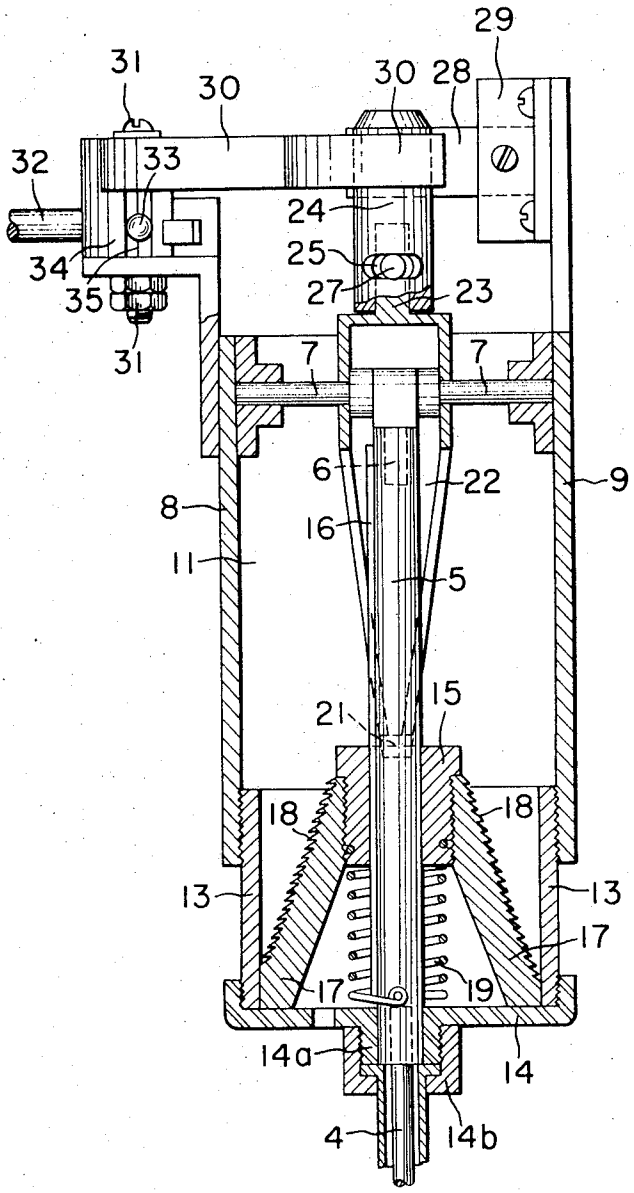
FIG. 3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AUTOMATIC TURN-SIGNAL CONTROLLER

This invention relates to an automatic control device which can positively and reasonably control the warning signal generation and termination on road vehicles, such as automobiles, motor cycles, and bicycles, when used by drivers turning intersections or changing lanes on highways.

Ordinary automatic turn-signal control devices are so designed that a protuberance formed on the handle shaft of a vehicle turns off the contact of a turn-signal switch at the point where the handle shaft has completed a certain angular displacement. They have the following disadvantages: (*a*) In the case where a motorist turns his car to the left or right at an intersection with the handle not turned beyond a predetermined angle, for example on a three-forked road where the road is branched at an angle of 120°, the vehicle completes its turning movement and resumes running straightly forward before the resetting projection on the handle shaft has been displaced to the resetting position. Consequently, the vehicle runs while continuing the flashing of lamps on the particular side of the vehicle, unless the turn signal is reset by hand. This dangerously puzzles and misguides the drivers of oncoming and following vehicles and pedestrians alike, and can be a source of traffic accidents or other troubles. (*b*) There is a dead point where the angular displacement position of the resetting projection on the handle shaft coincides with that of an actuating arm for the turn-signal switch. Any attempt of the driver to switch on the turn signal at that dead point will be in vain because the projection keeps the arm from moving to the switching position. Naturally the turn signal will not work at the dead point. (*c*) It sometimes occurs that, after the turn signal has been switched on at an angular displacement position a little distance past the dead point, the driver is compelled to turn back the handle slightly to steer clear of an oncoming vehicle or pedestrian. In such a case the projection often resets the arm, thereby concluding the signalling in the midst of the turning movement and making it necessary for the driver to turn on the signal switch once again. (*d*) With the construction of an ordinary turn signal described above, it is impossible to have the signal turned off automatically after it has been switched on to change the lane for the vehicle by reason of overtaking or otherwise and the vehicle has accordingly moved to the new lane. Unless it is turned off by hand, the turn signal will continue to work and flash the lamps unnecessarily just in the same way as described in (*a*) above.

It is an object of the present invention to provide a novel and unique automatic turn-signal control device which can eliminate the foregoing disadvantages, generate warning signals positively and easily at any time desired, and accurately and automatically terminate the signalling upon conclusion of the turning movement of the vehicle when the angle of turning is insufficient as well as when it is sufficient, without prematurely ceasing the signalling in the course of the turning movement.

The concept of this invention may be briefly summarized as follows. Because the various disadvantages of the conventional devices are ascribable to the construction whose switching action is based on the angular displacement of the handle shaft, it may be considered advisable to base the action on some other factor.

Then the idea of dependency upon time may occur to one skilled in the art. However, time is not a desirable factor in that it proves inconvenient or useless in traffic jams. The present invention succeeds in solving all of the foregoing problems by basing the switching action on the distance that the vehicle covers for its turning motion. More particularly, the invention resides in a construction comprising an axially displaceable threaded member which is driven for rotation by a driving cable extended from the driving shaft of the vehicle with a speed reduction, a pair of pawls either of which can exclusively engage with or disengage from the threaded member, and a pair of turn-signal switches which are closed or opened in response to the engagement or disengagement of either pawl, either of said pawls being urged by externally operable means from a neutral position into exclusive engagement with the threaded member, either pawl being automatically reset to a neutral position away from its engagement with the threaded member at the point where the threaded member has attained a predetermined axial displacement, while the disengaged threaded member being automatically reset to its starting point.

The construction according to the present invention will be described in more detail below in conjunction with the accompanying drawings showing an embodiment thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a top plan view of the turn signal control device of this invention;

FIG. **2** is a vertically sectional front elevation taken on the line **2—2** of FIG. **1**; and

FIG. **3** is a vertically sectional side elevation taken on the line **3—3** of FIG. **1**.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. **1, 2** and **3**, the front end portion of a driving cable is shown extended from the driving shaft of a vehicle with a speed reduction indicated at **4** as branched out from a speed-meter driving cable (not shown). The spindle **5** is connected to the front end portion of the driving cable to be driven thereby. A support pin **6** rotatably supports the upper end portion of the spindle **5**, and a support bar **7** which pivotally supports the main stem of the support pin. The front and rear frames **8** and **9**, turnably bear the both ends of the support bar in place. Also shown are a pair of side frame **10, 11**, which are interconnected at the bottoms with a bottom plate **12**. The bottom plate **12** is formed with a round hole in the center in threaded engagement with a sleeve **13** which also serves as a guide skirt for a hollow cone **17**. A bottom cover **14** is in threaded connection with the lower end portion of the sleeve **13**. Adjacent the center of the bottom cover **14** is provided a bearing **14a** which supports the spindle **5**. A connector **14***b* in threaded engagement with the bearing **14***a* connects a flange formed at the upper end of the driving cable to a recess at the lower end of the spindle **5**. A boss **15** is axially slidable over the spindle along a key **16**. On the boss **15** is securely mounted a hollow cone **17**, having on its outer surface a continuously spiralled thread **18** which is sharply serrated. A tension spring **19** is secured at the lower end to the spindle and at the upper end to the boss **15**.

A pair of pawls 20 and 21 protrude inwardly from the lower end of a bell crank 22 bifurcated from the support bar 7. Upon a rightward or leftward inclination of the bell crank 22, either the pawl 20 or 21 provided at the right or left, as the case may be, will exclusively engage the thread 18. From the upper center of the bell crank 22 a column 23 protrudes with a cap 24 thereon. On both sides of the cap a pair of lateral slots 25, 26 are formed, and a pair of protuberances 27 formed on both sides of the column loosely fit in the slots, in such a manner that the cap 24 is secured to the column 23 by the protuberances with a slight allowance for circumferential displacement. A leaf spring 28 is loosely inserted in a vertical slit formed in the center at the head of the cap 24. It is fixed at the base end to a bracket 29 which in turn is anchored to the rear frame 9. The spring has a bend point in the center so that when bent rightward or leftward the spring remains bent and refuses to be turned back to the straight position. A bifurcated arm 30 holds the cap within its U-shaped bifurcation with a pivot 31 for the bifurcated arm and an operating lever 32 for the arm. Pressure balls 33 fasten the operating lever in its neutral position. For this purpose the balls are urged forward into engagement with grooves 35 formed in the portions of the boss 34 surrounding the pivot 31. The balls allow for an angular displacement of the lever 32 when the lever is so displaced in defiance of the pressures being exerted thereby. A pair of microswitch actuating horns 36, 37 protrude from the both sides of the boss 34 for the lever 32, and are associated with the contacts 38, 39, respectively, of a pair of microswitches 40, 41.

When the vehicle is running straight forward the operating lever 32 is in the position indicated by solid lines, with the pair of pressure balls 33 fitted in the grooves 35 to keep the boss 34 from turning. The bifurcated arm 30 therefore maintains the cap 24 in the upright position against the biasing action of the leaf spring 28. Accordingly, the pair of pawls 20, 21 formed in the lower ends of the legs of the bell crank 22 are kept away from engagement with the threaded portion 18, thus leaving the portion 18 in its starting point with the boss 15 under the downward urging of the spring 19. The hollow cone is normally running idle as it is driven, through the key 16, by the spindle 5 directly coupled to the driving cable 4.

When it becomes necessary to light the right or left side flasher lamps in order to turn the vehicle at an intersection or change its lane on a highway, the driver turns the operating lever 32 for an angular displacement in the direction where the vehicle is to turn, just in the same manner as with a conventional turn signal. For example, if the driver turns the lever 32 clockwise, the angular displacement of the lever tilts the bifurcated arm 30 via the pivot 31 to the right as viewed in FIG. 1. Also, the microswitch actuating horn 36 on the boss 34 moves the contact 38 to connect the microswitch 40, thereby allowing the side flashers (not shown) on that side of the vehicle to flash. At the same time, the cap 24 is tilted rightward by the bifurcated arm 30, whereas the bell crank 22 is inclined leftward with the support bar 7 as the fulcrum until the pawl 20 meshes with the threaded portion 18. Then, because the threaded portion 18 is continuously revolving, the pawl 20 runs along the thread, with the result that the hollow cone 17 gradually ascends with the boss 15 in sliding contact with the spindle 5 against the downward urging of the spring 19. Since the threaded portion 18 extends over the truncated conical surface of the hollow cone 17, the radius of engagement between the threaded portion 18 and the pawl 20 increases in direct proportion of the distance that is covered by the vehicle after the switching of the turn signal. As a result, the cap 24 which supports the pawl 20 through the bell crank 22 gradually returns to the upright position in defiance of the spring 28. This motion is accompanied by the movement of the bifurcated arm 30 to toward its neutral position. Then the pressure balls 33 fit in the grooves 35 of the boss 34, and the pawl 20 is disengaged from the thread of the threaded portion 18. Upon the disengagement of the pawl 20, the threaded portion 18 is brought back to its original point by the tension of the spring 19. In this way all the parts are reset to their initial positions, the microswitch 40 being cut off by the return of the horn 36 to its normal position. The side flashers are not automatically put off. If the operating lever 32 is turned counterclockwise for an angular displacement in the other direction, the microswitch 41 and the pawl 21 on the other side of the controller are actuated and, by the same procedure above described, the flashing by the turn signal is automatically stopped after the veicle has run a certain distance, for example after a run of 200 meters, from the point where the turn signal was switched on.

If either of the pawls in engagement with the threaded portion is disengaged by manual resetting of the operating lever 31 while the vehicle is in the midst of its turning movement, the threaded portion 18 at once returns by itself to its starting point. If the necessity arises immediately thereafter to engage either pawl with the threaded portion 18 by the operating lever 32, the driver can light the side flasher lamps over the predetermined distance of travel from the point of engagement where the threaded portion 18 is in its starting point.

As another embodiment of the present invention, it is possible to provide the threaded portion 18 on a cylindrical drum, so that the drum can be urged upward by the engagement of the portion with either pawl until it pushes open the inner base portion of the bell crank 22 to disengage the pawl from the threaded portion. The same effect may be achieved by providing the threaded portion 18 in the form of internal threading on the inner wall of the cylindrical drum, in engagement with either of the pawls 20, 21 which protrude outwardly, not inwardly.

The automatic resetting means for the threaded portion 18 may take the form of gravity or weight, or the tension spring may be replaced by a compression spring to obtain, naturally, the same effect.

With the construction and operation above described, the present invention permits automatic control of a turn signal in relation to the distance of travel of the vehicle carrying the control device. Thus, because the signal generation is terminated without fail after a run of the vehicle over a predetermined distance, there is no possibility of the vehicle running with the side flasher lamps on after the vehicle has resumed straight running following a turn. As long as the vehicle stays within the predetermined distance, for example due to a traffic congestion, the signal generation is continued regardless of time. There is no danger of the rotational angle of the steering handle causing any inability, premature termination, or impossibility of auto-

matic termination, of the signal generation. Even when the signal is regenerated immediately after the signalling has been stopped by hand, the signalling can be resumed from the starting point of the predetermined distance. The control device of the present invention can thus achieve these and other advantageous effects which are never attainable with the conventional devices.

What is claimed is:

1. An automatic turn signal control device communicating with a driving cable extending from the driving shaft of a vehicle with a speed reduction means for actuating and then deactuating the turn signals after a turn comprising an axially displaceable threaded member connected for rotation with said driving cable and normally running idle as it is driven; a pair of pawls, each of said pawls being engageable and disengageable with said threaded member; a pair of turn signal switch means operative in response to either of said pawls; external means for urging either of said pawls from a neutral position into engagement with said threaded member so as to indicate a turn; means for automatically resetting either of said pawls to a neutral position away from engagement with said threaded member at a point where said threaded member is at a predetermined axial displacement, and means for automatically resetting said disengaged threaded member to its starting point.

2. The device of claim 1 wherein said external means for urging said pawls from a neutral position is a manual operating lever which is angularly displaceable in the direction the vehicle is indicated as turning and returned to the neutral position after completion of the turn.

3. The device of claim 1 wherein said threaded member has on its outer surface a continuously spiralled thread which is sharply serrated.

4. The device of claim 1 wherein said pawls are formed at the lower ends of a bell crank bifurcated from a support bar.

5. The device of claim 4 wherein upon inclination of said bell crank one of said pawls engages said threaded member.

6. The device of claim 1 wherein said threaded member is a truncated hollow cone having the threaded portion extending over the outer conical surface.

7. The device of claim 1 wherein said means for resetting said threaded member is a spring means.

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