March 30, 1954 R. W. BUTLER 2,673,905

TURN SIGNAL SWITCH

Filed July 11, 1951 5 Sheets-Sheet 1

Fig. 1.

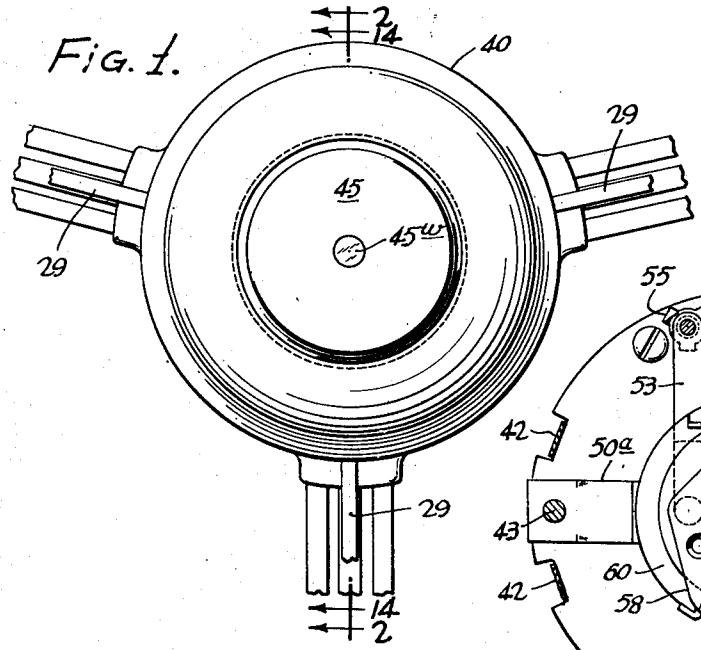


Fig. 3.

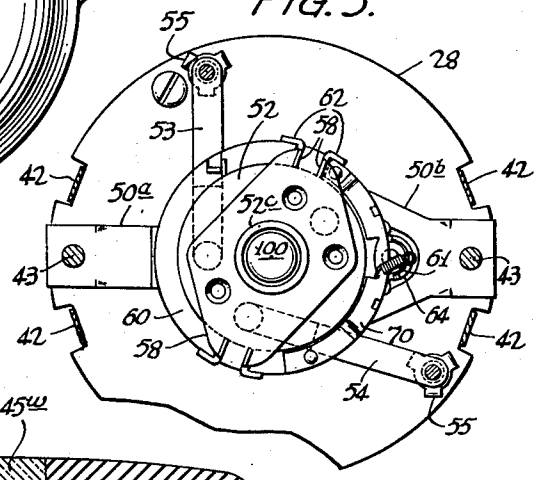
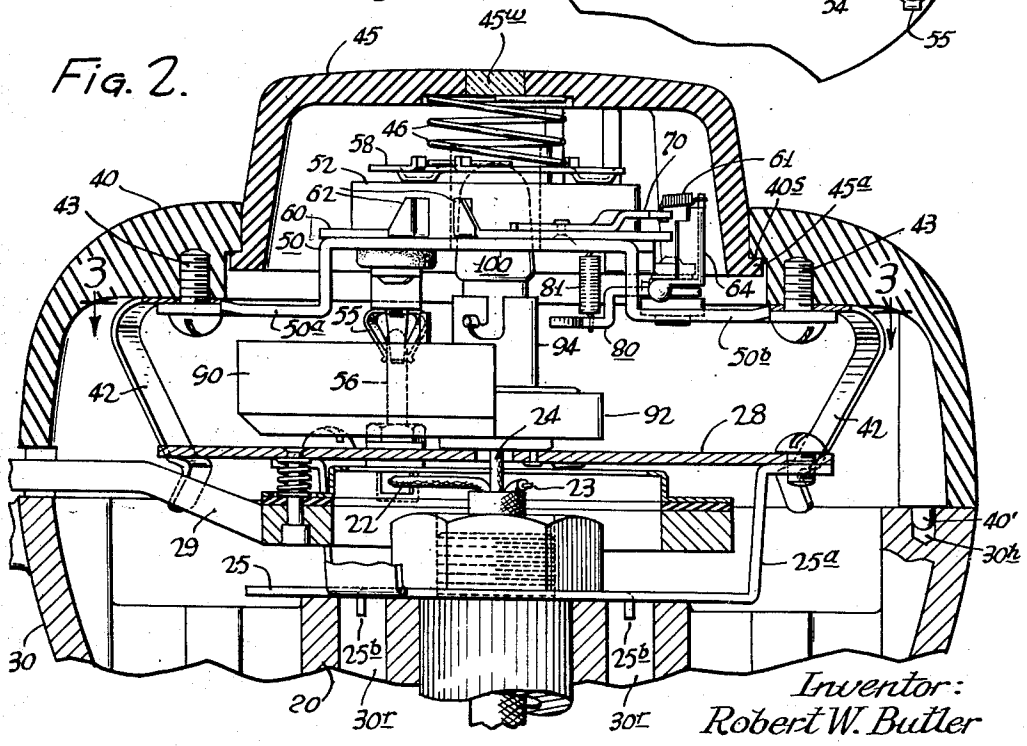


Fig. 2.



Inventor:
Robert W. Butler
by his Attorneys
Howson & Howson

March 30, 1954 R. W. BUTLER 2,673,905

TURN SIGNAL SWITCH

Filed July 11, 1951 5 Sheets-Sheet 2

Fig. 4.

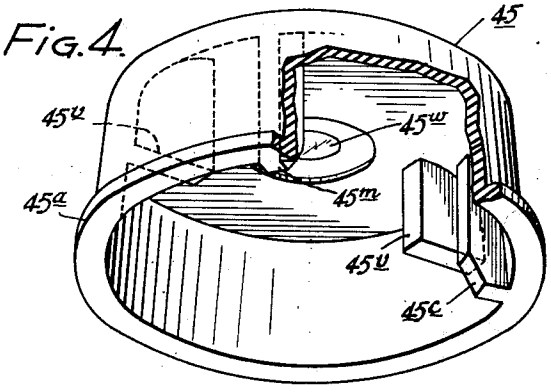


Fig. 4a.

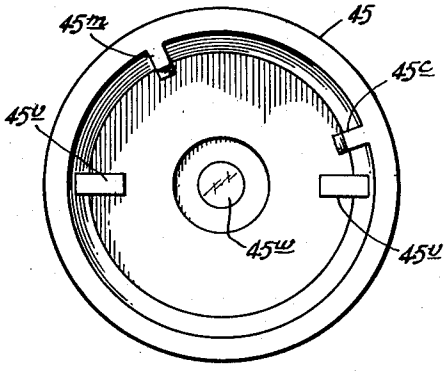


Fig. 5.

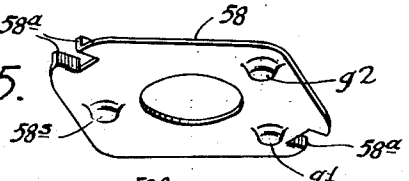


Fig. 6.

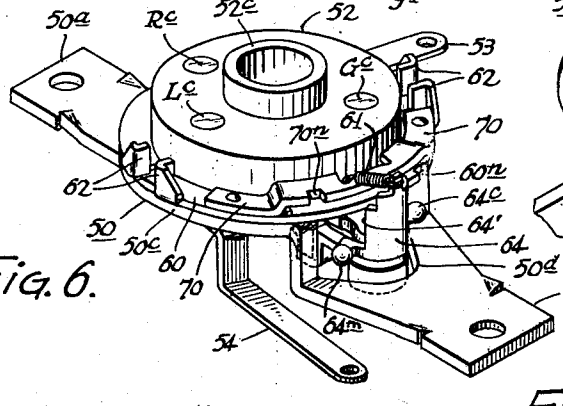


Fig. 7.

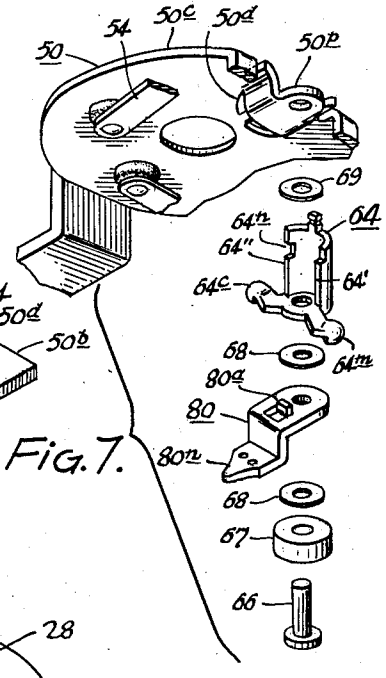
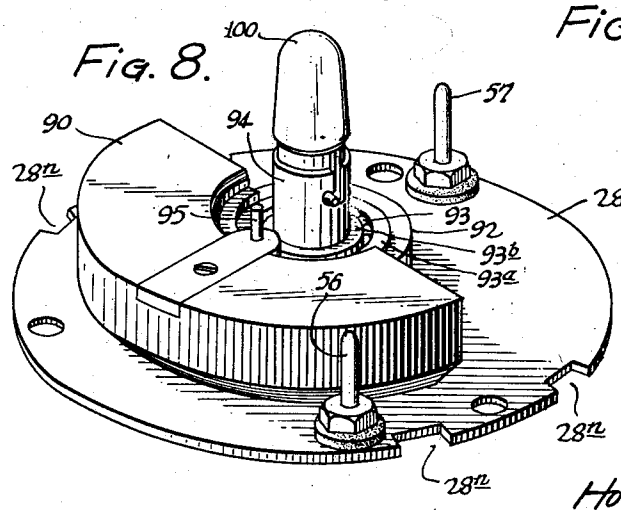


Fig. 8.



Inventor:
Robert W. Butler
by his Attorneys
Howson & Howson

March 30, 1954 R. W. BUTLER 2,673,905

TURN SIGNAL SWITCH

Filed July 11, 1951 5 Sheets-Sheet 3

Fig. 9a

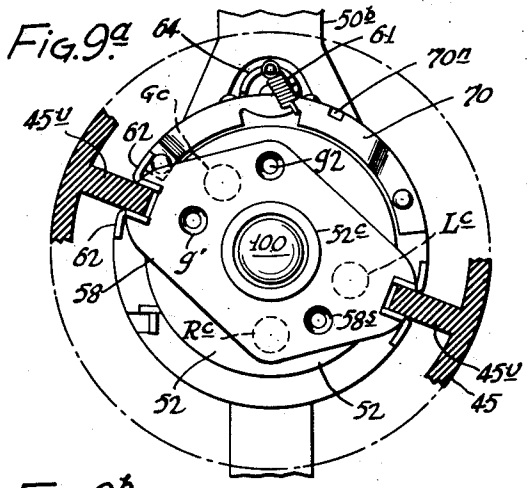


Fig. 10a

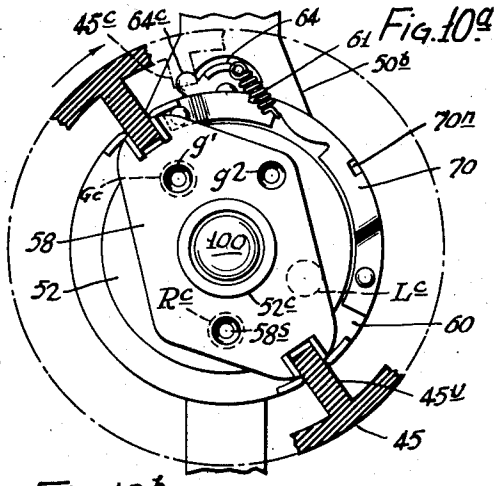


Fig. 9b

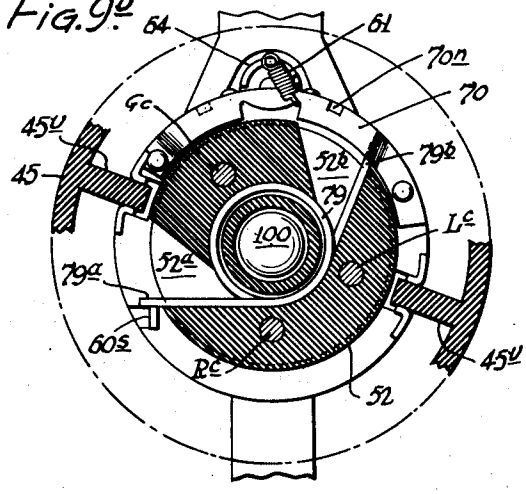


Fig. 10b

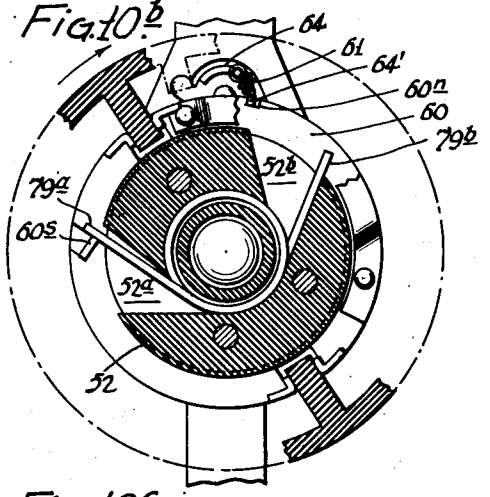


Fig. 9c

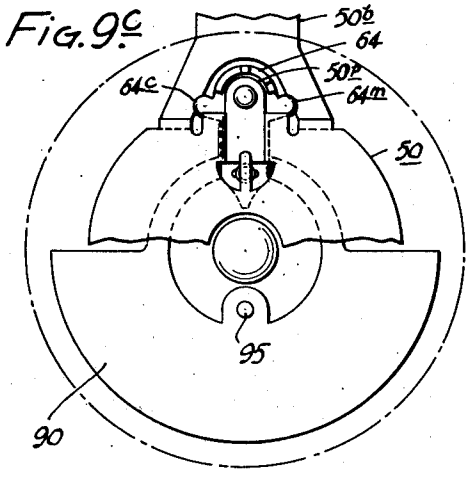
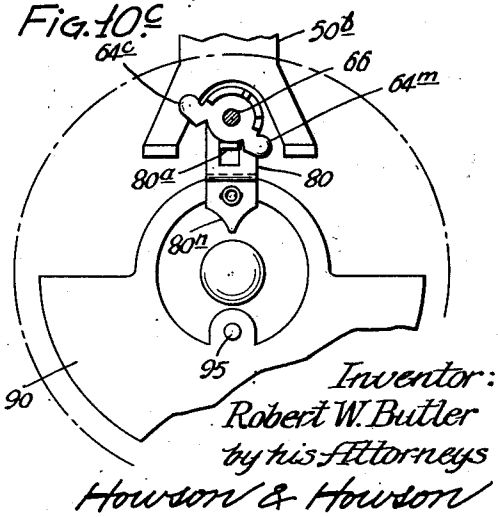


Fig. 10c



Inventor:
Robert W. Butler
by his Attorneys
Howson & Howson

March 30, 1954 R. W. BUTLER 2,673,905

TURN SIGNAL SWITCH

Filed July 11, 1951 5 Sheets-Sheet 4

Fig. 11a

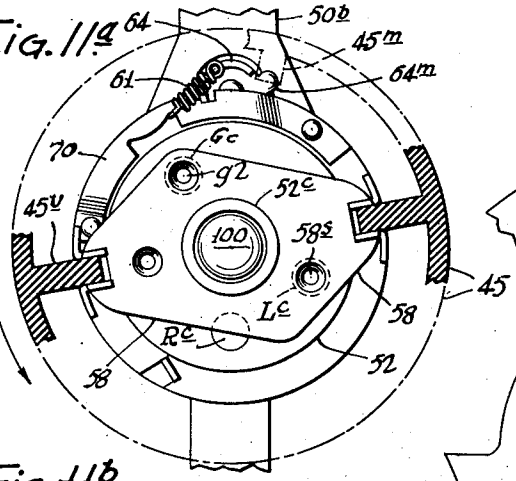


Fig. 11b

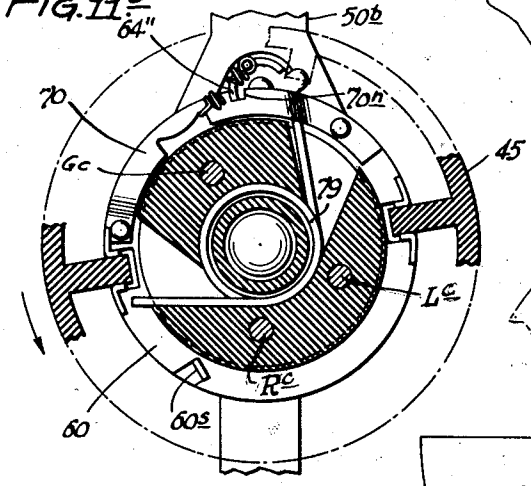


Fig. 11c

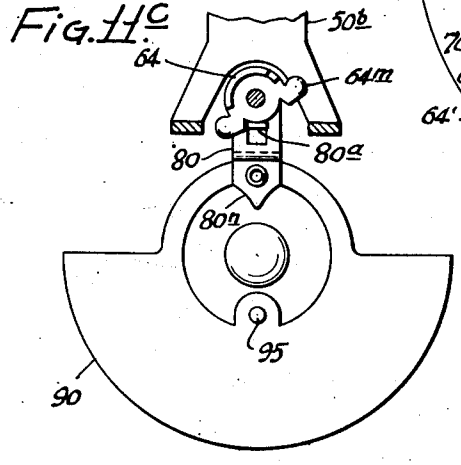


Fig. 12.

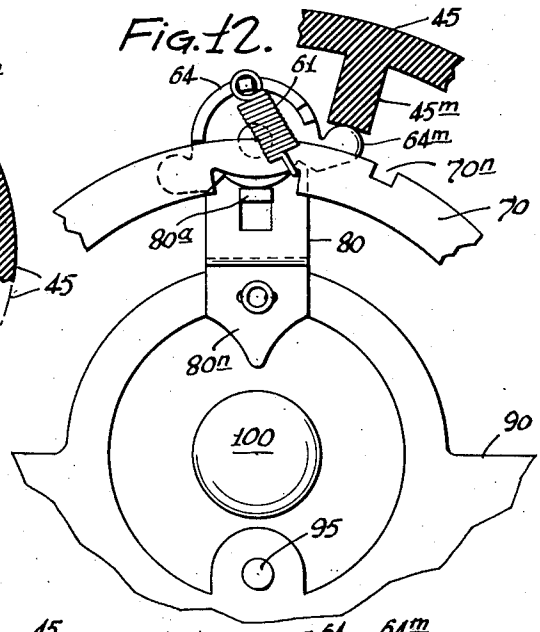
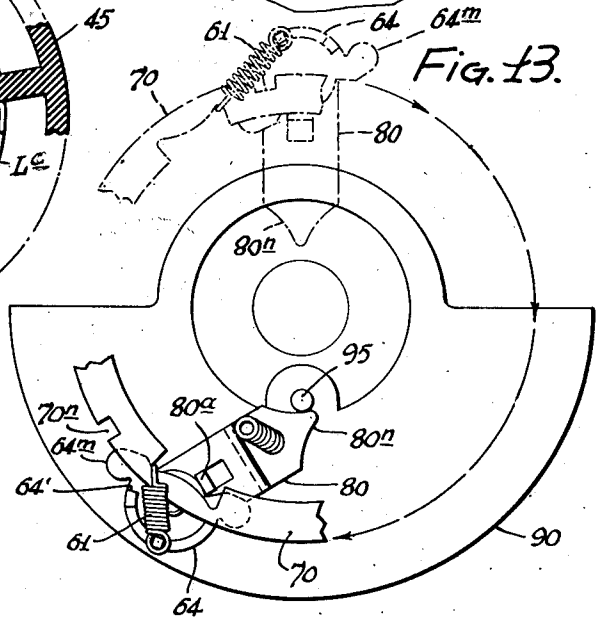


Fig. 13.



Inventor:
Robert W. Butler
by his Attorneys
Howson & Howson

March 30, 1954 R. W. BUTLER 2,673,905

TURN SIGNAL SWITCH

Filed July 11, 1951 5 Sheets-Sheet 5

Fig. 14.

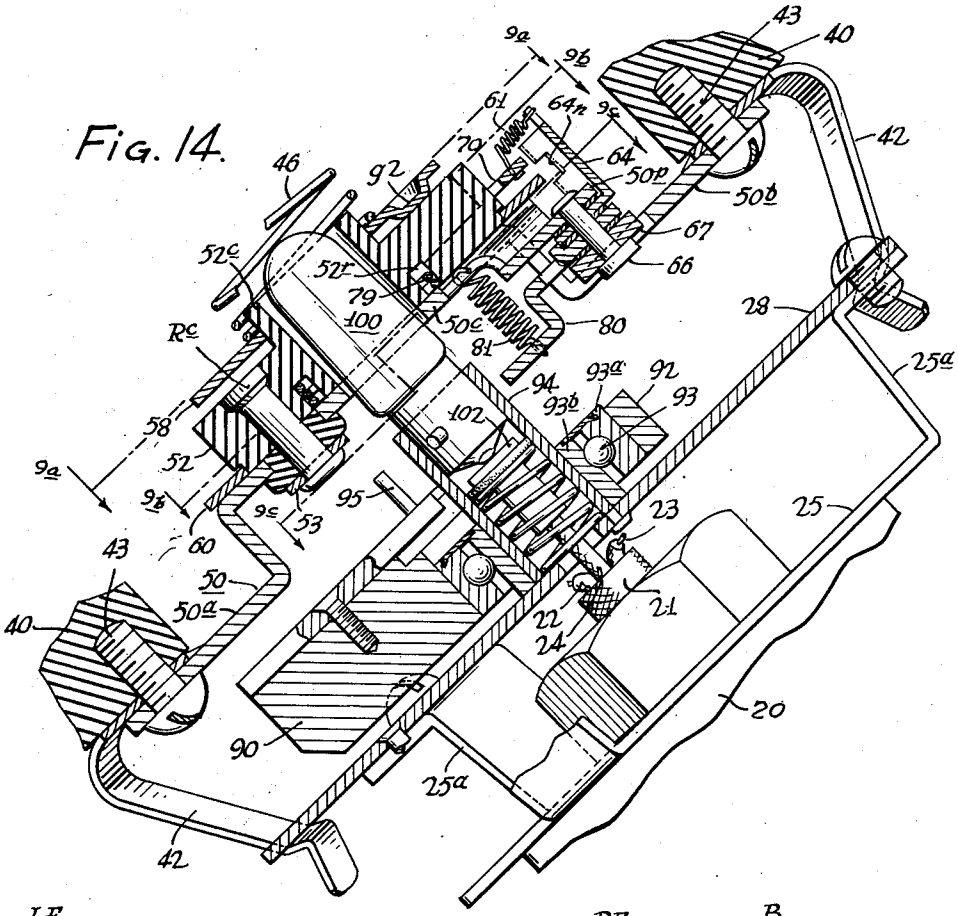
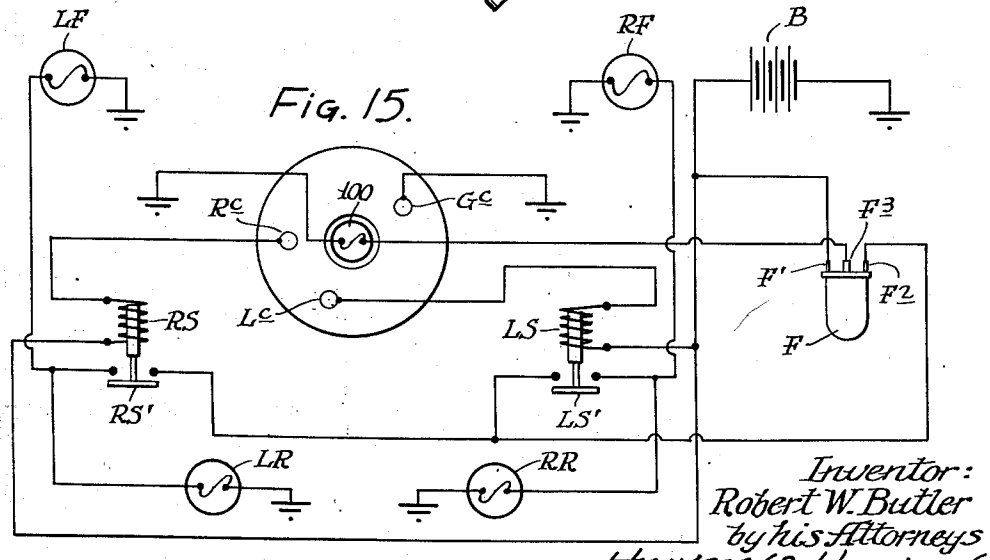


Fig. 15.



Inventor:
Robert W. Butler
by his Attorneys
Howson & Howson

Patented Mar. 30, 1954

2,673,905

UNITED STATES PATENT OFFICE

2,673,905

TURN SIGNAL SWITCH

Robert W. Butler, Moylan, Pa., assignor to United Specialties Company, Philadelphia, Pa., a corporation of Delaware

Application July 11, 1951, Serial No. 236,095

16 Claims. (Cl. 200—61.38)

1

This invention relates to directional signal devices for automobile steering wheels. More particularly it relates to manually operated directional signal apparatus including means for manual and automatic cancellation which may be housed entirely within the hub of the steering wheel at the top of the steering column and which requires no extending parts or levers.

Heretofore it has been common to provide directional signal apparatus for automobiles which are operated by levers or similar means which extend out from the steering column. Other various types of arrangements have also been provided but no satisfactory form has yet been devised wherein all the parts are housed within the hub of the steering column and in which the manipulation may be made by simply turning a knob which is easily accessible to the operator at the center of the hub cap of the steering wheel.

Therefore it is an object of my invention to provide a directional signal control device for automobile steering wheels which may be housed entirely within the hub of the steering wheel at the top of the steering column.

Another object of the invention is to provide a device of the foregoing type which may be easily opened up for inspection or repair in case necessity should arise.

Another object of my invention is to provide a device of the foregoing type wherein manual control of the apparatus is by a direction control knob situated in the center of the hub of the steering wheel.

Another object is to provide in a device of the foregoing type a means for cancelling the signal automatically as the steering wheel is returned to straight forward position after having made it turn at an intersection.

Another object of the invention is to provide a device of the foregoing type in which the movable contact and operating mechanism therefor is housed within one half of the apparatus which may be readily separated or pried apart from the other or lower half without disturbing the wiring connections, while at the same time permitting ready inspection and adjustment or repair if necessary.

Another object of the invention is to provide a device of the foregoing type which may be assembled on the steering column with minimum amount of rearrangement and accommodated to the usual arrangements of horn button ring operating mechanism.

Other objects and advantages of the invention will become apparent as it is described in connection with the accompanying drawings.

2

In the drawings:

Fig. 1 is a plan view of a hub of a steering wheel of an automobile designed to house the invention;

Fig. 2 is a longitudinal section view through the device on line 2—2 of Fig. 1;

Fig. 3 is a transverse section view of the invention taken along line 3—3 of Fig. 2;

Fig. 4 is a perspective view partly broken away of the direction control knob employed in the invention as illustrated in the preceding figures;

Fig. 4*a* is a bottom plan view of the direction control knob illustrated in Fig. 4;

Fig. 5 is a bottom perspective view of the movable or bridging contact member;

Fig. 6 is a perspective view of the supporting bracket and fixed contacts and a portion of the operating mechanism;

Fig. 7 is an exploded perspective view partly broken away of certain of the parts illustrated in Fig. 6;

Fig. 8 is a perspective view looking down upon the mounting plate and parts carried thereby;

Figs. 9*a*, *b* and *c* are transverse section views taken along lines 9*a*, 9*b* and 9*c* of Fig. 14 respectively and illustrating the parts in the neutral or straight forward position of the steering wheel;

Figs. 10*a*, *b* and *c* are views similar to views 9*a*, *b* and *c* showing the parts when the direction control knob has been moved for indicating intention to make a right turn;

Figs. 11*a*, *b* and *c* are views similar to views 9*a*, *b* and *c* but with the direction control knob moved to indicate intention to make a left turn;

Fig. 12 is a fragmentary plan view of certain parts showing their relation for manual cancellation of a previously given signal;

Fig. 13 is a fragmentary view showing the relation of the weight and its cancelling pin to the latch release lever on rotation of the steering wheel when starting to make a right turn;

Fig. 14 is a vertical section view taken along line 14—14 of Fig. 1;

Fig. 15 is a diagrammatic view of the circuit arrangements for the device embodying this invention.

Referring to the drawings and particularly to Figs. 2 and 14, the conventional steering column 20 is hollow and contains a cable 21 having three insulated conductors 22, 23 and 24 for electrical connections as will hereinafter appear. On the upper end of the column 20 is secured a stamped sheet metal spider member comprising central plate portion 25 from which three fingers 25*a* spaced at equal distances around the periphery

of the plate extend upwardly at substantially right angles to the plate. The upper ends of the fingers are out-turned at right angles to afford support for a flat circular mounting plate 28. Supported beneath the mounting plate 28, as illustrated, is a conventional horn mechanism comprising spokes 29 which extend in equally spaced positions radially outward to a horn ring not shown. Since the details of the horn mechanism form no part per se of the present invention, they need not be described.

To enclose all of the parts of the invention, I provide at the hub of the steering wheel a lower hollow circular shell member 30 which is covered by a hollow cap member 40. This may be made from metal, or plastic, or any other suitable materials. The lower part 30 of the housing is caused to turn with the steering column by reason of feet 25b bent down or struck out of the plate portion 25 of the spider member and lying within recesses 30r formed in the central or bearing portion of the housing member 30.

The upper or cap part 40 of the housing is caused to rotate with the lower portion 30 by reason of the engagement of a pin 40' embedded in or formed as part of the upper housing part 40 and extending down into a hole 30h formed in the lower part 30. The cap part 40 of the housing has a large central opening therein which is concentric with the axis of the steering column and is undercut forming a shoulder 40s against which a flange 45a of a hollow, cup-shaped, circular direction control knob 45 abuts. The direction control knob can be rotated by hand within the opening in the cap 40. To hold the flange 45a engaged with the shoulder 40s, a spring 46 presses upon the inside of the surface of the direction control knob.

In order to detachably mount the cap 40 in such a manner that it may readily be removed or pried away from the bottom part 30 of the housing, four or any suitable number of spring fingers 42 are bolted or otherwise suitably secured to the inside top surface of the cap member 40. The fingers 42 are preferably symmetrically placed and extend down to the mounting plate and have a V-bend at their ends to engage in notches 28n provided in the periphery of plate 28. By pressing down the cap until the spring fingers 42 engage with the periphery of the plate 28, the parts are secured detachably in such a manner that they will not rotate relatively to each other.

Referring now particularly to Figs. 2, 4–8 and 14, it may be observed that a U-shaped stamped sheet metal mounting bracket, designated generally by the numeral 50, is secured to the under side of the top of the cap member 40. All of the parts moved by rotation of the direction control knob 45 are carried by this bracket 50. The bracket comprises a disc-shaped flat central portion 50c from which two arms 50a, 50b extend in opposite directions and are offset from the plane of the central portion 50c. The arms are secured to the cap 40 by the same bolts 43 which secure the spring fingers 42 thereon. As may be seen in Figs. 6 and 14, a thick insulating disc 52 is secured against the top surface of the supporting bracket 50 and has a collar 52c extending from its upper face. The disc 52 and collar 52c have registering central openings to accommodate a tell-tale electric lamp bulb and permit it to be seen through a window 45w in the center of the direction control knob 45. Mounted in the insulating disc 52 are stationary contacts Rc, Lc, and Gc which may all be in the shape of rivets having enlarged heads flush with the surface of the disc 52c. The opposite ends of these rivets extend through insulating bushings in apertures provided in the supporting bracket 50. The contact Gc is a ground contact and is not bushed nor insulated from the supporting bracket 50. The right and left directional contacts Rc, Lc, however, have bus bar connections 53 and 54 at their inner ends, said inner ends being peened over thus to secure the bus bars to the contacts and at the same time to secure the insulating disc 52 upon the supporting bracket 50 as may be best seen in Fig. 14. In order to make a detachable electrical connection between the bus bars 53 and 54 with the electric circuit whose conductors come up through the cable 21 in the steering column, there is provided on each of the bus bars a socket contact 55 in the form of several spring fingers which face each other and receive between them a connector contact prong 56 or 57 (Figs. 2, 3 and 8). The prongs 56, 57 may be mounted upon the lower mounting plate 23 in spaced positions and conventionally insulated therefrom by bushings. The circuit wires 22 and 23 may be connected to the prongs 56 and 57 respectively by soldering or in any other suitable fashion.

In order to bridge the contacts Rc or Lc to the ground contact Gc, a bridging contact plate 58 is provided as illustrated in Fig. 5. This plate has a large central aperture to fit around the sleeve 52c of the insulating disc 52 and is caused to rotate by rotation of the direction control knob. For this purpose, the directional control knob has provided on its inside inwardly extending radial vanes 45v in diametrically opposite positions. These vanes are adapted to fit between and be engaged by lugs 58a struck up adjacent the peripheral edges of the bridging contact 58 at diametrically opposite positions. Pressed out from the lower surface of the bridging contact are three contact buttons 58s and g1 and g2. The contact button 58s normally lies between the stationary contacts Rc, Lc. As the bridging contact plate 58 is moved clockwise or counter-clockwise, the button 58s selectively engages the right directional contact Rc or the left directional contact Lc. At the same time one or the other of the contact buttons g1 or g2 will become engaged with the ground contact Gc. Connecting contact Rc or Lc with Gc will complete a circuit to give an indication for right or left turn as will hereinafter appear.

In order to hold the direction control knob in position with one or the other of the contacts Rc, Lc engaged by the selector contact 58s, a flat return ring 60 is provided in position to slide upon the upper surface of the central portion 50c of the supporting bracket 50. In order to hold the return ring in such position and permit its rotation around and relative to the insulating disc 52, the lower surface of that disc at its peripheral edge is undercut forming a small shoulder overlying the upper surface of the ring 60 as may be seen in Fig. 14. In order to cause the ring to rotate with the direction control knob 45, a pair of abutments 62 are provided in diametrically opposite positions on the ring and extending toward the direction control knob. The abutments of each pair lie on opposite sides and are engaged by the radial vanes 45v. In the periphery of the return ring 60, a notch 60n is provided for one edge of a latch member 64 to enter when the return ring is rotated in clockwise direction, i. e.

when the direction control knob is rotated to give indication of the intention to make a right turn. In order to provide a support from which the latch **64** and parts associated therewith may be suspended, the supporting bracket **50** adjacent one arm **50***b* thereof is punched to form an opening **50***d* and is pressed, adjacent the opening, to form a platform **50***p* intermediate the planes of the portion **50***c* and the extending arms **50***a*, **50***b*. The platform has an aperture in which is mounted the pivot of the latch. Said pivotal axis comprises a rivet **66** which depends from a platform **50***p*. Mounted upon the pivot **66** in the order indicated (see Fig. 7), are a spacing washer **67**, anti-friction washers **68** above and below a latch release lever **80**, the latch **64** and a washer **69**. All of said parts have circular apertures therein so that they may be slipped over the rivet **66** which then may have its end extend through the opening in the platform **50***p* and peened over whereby all of said parts are secured upon said rivet which depends below said platform **50***p*.

The latch member **64** as may be seen from Figs. 2, 6, 7 and 14 has a semi-cylindrical portion concentric with the pivot rivet **66**. A pair of arms **64***c*, **64***m* angularly spaced extend substantially radially in angularly spaced positions from the lower portion of the latch member **64** to provide means for manual release of the latch as will hereinafter more fully appear. Extending up from the top edge of the latch is a finger forming an anchor for one end of a biasing spring **61**. The other end of said spring is anchored in a wide notch or raceway cut in to an arcuate segmental member **70**. This segmental member is secured on top of the return ring **60** by rivets or in any suitable fashion. Said arcuate segmental member has its ends lying flat upon the top surface of the return ring and its central portion pressed out of plane of said ends so as to be spaced from the surface of the return ring but parallel thereto. In the periphery of said central portion near one end is a notch **70***n* which is adapted to be engaged by the opposite side (**64''**) of the latch member from the side (**64'**) which engages in the notch **60***n* of the return ring.

On rotation of the direction control knob and concomitant rotation of the return ring, the end of the spring **61** which is attached to the return ring segment **70** moves into one corner of the raceway in which it is anchored and then is carried a small way around the insulating disc **52** applying tension to and causing rotation of the latch member **64** in a clockwise direction around its own pivot **66**. This causes the vertical edge **64'** of the latch member **64** to press upon the periphery of the return ring **60**. When the rotation of the return ring has proceeded sufficiently to bring the notch **60***n* under the edge **64'**, the edge **64'** will snap into said notch thus preventing reverse rotation of the return ring. In order positively to prevent the opposite side **64''** of the latch **64** from interfering with the clockwise rotation of the return ring, a notch **64***n* is cut into the vertical edge **64''** at the level of the return ring. Since the edge **64'** at its uppermost portion would ride along and press upon the periphery of the arcuate segmental member **70**, the edge **64'** is thus positively prevented from entering the notch **60***n* under all circumstances. Only the edge **64'** thus can enter the notch **60***n*.

Upon it being desired to give indication of a proposed left turn, the direction control knob is

rotated in a counter-clockwise direction thus causing the movable contact **58** and the return ring **60** to move counter-clockwise also. Such rotation carries the end of the biasing spring **61** and imparts tension to it which is applied to the latch member **64** causing it to rotate in a counter-clockwise direction about its own pivot. At the start of such counter-clockwise rotation of the latch, its edge **64''** engages and slides along the periphery of the arcuate segmental member **70** until the notch **70***n* comes into register with the edge **64''** at which time that edge will enter the notch **70***n*. Only the top portion of the edge **64''** enters the notch **70***n*, that being permitted by reason of the lower or intermediate portion of the latch being cut away adjacent the periphery of the return ring **60**. Thus, the periphery of the ring does not interfere with the entrance of the edge **64''** into the notch **70***n*.

In order that the edge **64'** shall not interfere with said counter-clockwise rotation in case there should be any tendency for that edge to engage the periphery any time, the top corner of the edge **64'** is cut away adjacent the periphery of the segmental arcuate member **70**. Furthermore, the edge **64'** will ride upon the periphery of the return ring **60** and hence the edge **64'** will be prevented from moving into the notch **70***n*.

Therefore only that edge of the latch which is designed to enter into the notch either **60***n* or **70***n* as the case may be is permitted to do so to perform the latching functions above described.

The return ring **60**, control knob **45** and movable contact **58** are normally maintained in a middle or neutral position wherein the fixed contacts Rc and Lc are uncontacted. To that end, a return spring **79** is seated in a circular recess **52***r* (Fig. 14) in the bottom surface of the insulating disc **52** concentric with its axis. The ends **79***a*, **79***b* of the spring extend out beyond the periphery of the member **52** and can be moved within segmental recesses **52***a*, **52***b* formed in the bottom of member **52**. The spring ends normally press against the sides of recesses **52***a*, **52***b* as indicated in Fig. 9*b*. One spring end **79***b* extends between the return ring **60** and the arcuate segmental member **70** and on counter-clockwise rotation of the ring is tensioned and moves to the position shown in Fig. 11*b* biasing the ring **60** for clockwise return rotation. The other spring end engages a stop lug **60***s* struck up out of the return ring and on clockwise rotation of the ring is tensioned and moves to the position of Fig. 10*b* biasing the ring for counter-clockwise return rotation.

It is very desirable in directional signals that the indication given of intention to make a right or left turn be cancelled and the parts restored to neutral position as soon as the turn has been completed. To accomplish that purpose a latch release member **80** of the form illustrated in Fig. 7 is provided. This latch release member may conveniently be stamped from sheet metal into substantially Z-shape, one end portion being pivotally mounted upon the pivot **66** and the other end having a pointed nose **80***n* adapted to be engaged on one side or the other by a cancelling pin as will hereinafter appear. A latch release lug **80***a* is struck up at right angles out of the mounting portion of the latch release member in position to permit limited movement relative to the latch **64**. Further movement will cause the latch **64** to pivot about its pivot **66**.

With direction signal having been set by manipulation of the direction control knob pre-

paratory to making a turn, the operator will now turn his steering wheel in the direction he intends to go. Rotation of the steering wheel will carry with it all of the aforementioned parts. In order to cause cancellation of the signal after the turn has been completed, it is necessary that some part remain substantially stationary with respect to the rotation of the steering wheel during the negotiation of the turn. Moreover, this part must not cause cancellation while the wheel is making the turn but only as the wheel is rotated reversely after the turn is completed.

To this end, I provide a relatively heavy weight which, as illustrated, may conveniently be in the form of a semi-circular thick disc of metal 90. Formed integrally with this weight 90 is a circular bearing portion 92 which has a circular bore and into which fits a roller bearing 93 having an outer raceway 93*a* and an inner raceway 93*b*. The bearing is mounted upon a hollow hub or axle 94 which in turn is mounted upon the mounting plate 28 coaxially with the steering column and the axis of the return ring and insulating disc 52. Normally the steering wheel of an automobile is positioned substantially as illustrated in Fig. 14 so that the weight being on a roller bearing will always hang down into the position indicated in Fig. 14. Minor swings to and fro of the weight will be of no consequence as will appear from what follows. Mounted upon the weight 90 in any suitable fashion is a cancelling pin 95 which extends parallel to the axis of rotation of the weight but is spaced therefrom and positioned so as to engage the nose of the latch release lever 80 as the steering wheel is rotated.

Assuming the direction control knob has been rotated for a right turn, the parts will be as illustrated in Figs. 10*a*, *b* and *c*. Now when the steering wheel is rotated, the latch release lever and its pilot will move as a unit about the pivotal axis of the weight 90. This will cause the surface of the nose nearest to the pin 95 to strike the pin after the steering wheel has been rotated 180°. Such rotation will cause idle clockwise rotation of the latch release lever about its own pivot 66 because the release lug 80*a* will move in the space between the two wings 64*m* and 64*c* of the latch member 64. Upon reverse rotation of the steering wheel, however, the opposite side of the nose of the latch release lever 80*n* will engage the cancelling pin 95 which will then cause counterclockwise rotation of the latch release lever. This will cause the release lug 80*a* to engage the right wing 64*m* of the latch 64 (as viewed in Fig. 10*c*) to cause counter-clockwise rotation of the latch 64. Thus the latch will be disengaged from the notch 60*n* of the return ring and that ring may then return to its initial position under the urge of its return spring 79.

A similar function takes place when the parts are moved in position to indicate a desire to make a left turn. Such operation and function will be clear from the description of the operation of the device hereinafter given.

A tell-tale electric light bulb 100 may be conveniently mounted in the hollow axle 94. For this purpose a bayonet slot may be cut into the upper end of the axle 94 to receive a bayonet pin on the socket of the lamp 100. A center contact 102 may be located within the axle 94 and spring-pressed to engage the center contact of the lamp bulb. The conductor 24 may be soldered or otherwise attached in any conventional fashion to the insulated center contact 102 and the axle 94 may be grounded.

It is desirable to be able to cancel, manually at any time, a signal which has been set for indicating a turn. I therefore provide on the inside of the direction control knob 45 two manual cancelling lugs 45*c*, 45*m* which are preferably molded integrally with the control knob and extend radially inward at spaced points. The lower or outer corners of the manual cancelling lugs are bevelled to form a cam surface. When the direction control knob is rotated clockwise and set for a turn, the manual cancelling lug 45*c* will be directly above one of the arms 64*m*, 64*c* of the latch member 64. For a right turn, the manual cancelling lug 45*c* will be over the latch arm 64*c* as outlined in dot and dash lines in Figs. 10*a* and 10*b*. By pressing down on the direction control knob 45 against the effort of the holding spring 46, the cam surface on the manual cancelling lug 45*c* will engage and cause rotation of the latch member 64 in a counterclockwise direction. That will disengage the edge 64′ from the notch 60*n* and permit cancellation of the setting.

When the mechanism has been set for a left turn indication, the manual cancelling lug 45*m* will be located directly above the latch arm 64*m* (see dot and dash lines in Figs. 11*a* and 11*b*). Again by pressing on the manual control knob the cam surface of the lug 45*m* will cause a clockwise rotation of the latch about its own pivot thus cancelling the setting by releasing the latching engagement of the parts.

The electric circuit is illustrated in Fig. 15. The battery B which is the source of power is grounded on one side to the frame of the auto; on the other side it connects directly to three different points, one is a terminal F′ of the flasher F, the second is one terminal of the solenoid of a left signal relay LS, the third is one terminal of the solenoid of the right signal relay RS. The terminals at the opposite ends of the right and left relay solenoids are connected respectively to the stationary controller contacts Rc and Lc, the third stationary controller contact being grounded. The right and left relays each have a pair of stationary contacts adapted to be bridged by a bridging contact RS′, LS′ to complete the circuit when the particular relay is energized. A stationary contact of one relay is connected to a stationary contact of the other and in turn connected to a second terminal F^2 of the flasher. The other stationary contacts of the right and left relays are connected respectively to the front and rear right and front and rear left indicator lamps RF, RR and LF, LR.

When the control knob is turned so as to complete the circuit between the stationary contacts Gc and Rc of the control switch the right relay Rs is energized and causes bridging of its stationary contacts. This completes the circuit from the battery B through the flasher F via terminals F′ and F^2 through the stationary contacts of the relay and to the signal indicating lights RF—RR or LF—LR as the case may be. Signals cannot simultaneously be given for indicating turns in both directions because there is only one bridging contact and it is not possible for that contact to complete the circuit from the stationary contact Lc and Rc to Gc simultaneously.

To give the driver a visual signal showing that the turn indicator is operative, there is a third terminal F^3 provided upon the flasher which is connected with one terminal of the tell-tale lamp

100, the other terminal of this lamp being grounded. Thus, whenever the flasher is operating the tell-tale light will flash also. The flasher is of a common type which becomes operative only when current is running through it as is caused for example by the operation of the right or left control relays.

The operation of the device is as follows:

With the auto proceeding along the highway prior to coming to an intersection, the parts will be in the positions illustrated in Figs. 1 and 9*a*, *b* and *c*. The driver desiring to make a right turn will rotate the direction control knob 45 in clockwise direction. Such rotation causes simultaneous clockwise rotation of the bridging contact 58 and the return ring 60 by reason of the engagement of the radial vanes 45*v* within the direction control knob with the lugs 58*a* of the bridging contact and the abutment shoulders 62 of the return ring. During this operation the steering wheel will be maintained in straight-ahead direction and thus the control knob will move relatively to the steering hub housing and the parts fixedly attached thereto.

The rotation of the direction control knob 45 will be continued until the contact buttons 58*s* and *g*2 engage the stationary contact button Rc and the ground contact button Gc. At that point the direction control knob together with the bridging contact and the return ring, will all become latched with the bridging and fixed contacts Rc, 58 and Gc in engagement. This latching is accomplished by the following means and in the following manner.

The rotation of the direction control knob for a right turn places the parts in the position shown in Figs. 10*a*, *b* and *c* which may be compared with the neutral position of Figs. 9*a*, *b* and *c*. As the return ring rotates in clockwise direction from the position of Fig. 9*a* to the position of Fig. 10*a*, the end of the latch spring 61 first slides into the left corner of the spring notch in the return ring 60 and then becomes increasingly tensioned. The tension is imparted to the latch member 64 causing it to move in a clockwise direction about its own pivot which causes the edge 64′ of the latch to ride on the edge of periphery of the return ring during the movement of that ring until the notch 60*n* of the return ring comes in register therewith, whereupon the latch snaps into the notch. This holds the return ring against reverse rotation under the action of the return spring 79. In this position of the parts, the right signal lamps RF, RR are caused to flash indicating that a right turn is to be made. During all of the foregoing, the steering wheel has been held in straight ahead position.

Now when the driver starts to make his right turn, he will rotate the steering wheel clockwise. This causes all of the parts of the device except the weight 90 and the cancelling pin 95 carried thereby also to move in a clockwise direction. The nose 80*n* of the latch release lever 80 (as viewed in Figs. 10*c* and 12) will eventually come in contact with the cancelling pin 95 which has been held stationary by the gravitational effect of the weight. Such engagement causes the latch release lever to pivot idly clockwise about its own pivot 66 during continued clockwise rotation of the steering wheel, without disengaging the latch 64 from the return ring notch 60*n*. During this rotation, the release lug of the latch release lever will simply move in the space toward the arm 64*c* of the latch; but by the time it has

reached that arm, the nose of the latch release lever has moved past the cancelling pin. The centering spring 81 will then move the latch release lever 80 back to its mid-position.

Upon completion of the right turn the driver will then rotate the steering wheel in counter-clockwise direction to return it to its normal, straight-forward position. Such counter-clockwise rotation of the steering wheel will cause the opposite side of the nose 80*n* of the latch release lever to engage with the cancelling pin 95 which still remains stationary because of the gravitational effect of the weight. Thus, the latch release lever is caused to move in the opposite direction, namely counter-clockwise about its own pivot 66, and in so doing the releasing lug 80*a* will engage with the arm 64*m* of the latch disengaging the latch from the notch in the return ring. Thereupon the return ring 60, bridging contact 58 and control knob 45 are permitted to return to their original position under the force of the return spring 79.

When the driver desires to indicate a turn to the left from thes traight-forward position, he will rotate the direction control knob counter-clockwise prior to his arrival at the intersection, while the steering wheel is in its straight-forward position. This rotation of the direction control knob will simultaneously cause counter-clockwise rotation of the bridging contact member 58 and the return ring 60 in the same manner as when making a right turn but in the opposite direction. Such counter-clockwise rotation of the direction control knob and the return ring causes tension of the latch spring 61 after the end of the spring has moved over into the right corner of the latch spring notch in the return ring 60. On the effort of the spring being transmitted to the latch member 64 causing it to move in a counter-clockwise direction about its own pivot 66, the edge 64″ of the latch will ride along the periphery of the upper segment 70 of the return ring until the notch 70*n* in that segment comes in register with the edge of the latch member whereupon the edge of the latch member will snap into said notch and will hold the retnrn ring against reverse movement.

This latching engagement will hold the parts with the movable contact button *g*1 in engagement with the fixed contact Gc and the movable contact button 58*s* in engagement with the stationary contact button Lc. Thus a left direction signal indication will be given.

Upon reaching the intersection, the operator will rotate his steering wheel counter-clockwise. The parts will then all turn with the steering wheel and its hub until the latch release lever 80 comes into engagement with the cancelling pin 95. On continued movement in a counter-clockwise direction the latch release lever will move idly past the pin in the manner described but in the opposite direction from the right hand turn.

As the turn around the intersection is completed and the operator rotates the steering wheel in clockwise direction to bring the vehicle in straight-ahead position, the opposite side of the latch release lever 80 will engage with the cancelling pin 95 causing the release lug 80*a* to engage the arm 64*c* of the latch and rotate the latch clockwise about its own pivot releasing it from the return ring. Thereupon the return ring, movable contact and control knob are free to return to neutral position. This causes separation of the contacts and extinguishes the direc-

tional signal. The parts are now restored in position for another right or left turn.

From the foregoing, it may be observed that I have provided a direction signal control device including automatic as well as manual cancelling means wherein the parts are housed entirely within the hub of the steering wheel column housing. The invention avoids the need for having levers located underneath the steering wheel or the horn ring which are more difficult to operate and which are liable to be caught in a portion of the clothing of the operator to undesirably give a signal when no turn is to be made.

Many modifications within the scope of the invention will occur to those skilled in the art. Therefore I do not limit the invention to the embodiment disclosed.

What I claim is:

1. In combination with an auto steering wheel and steering shaft, a direction signal controller comprising a housing, means to mount said housing coaxially on the steering shaft, a manual control knob mounted rotatably in said housing having neutral, right signal and left signal positions, electric contact means operated by said knob on rotation clockwise or counter-clockwise to give different signals, and weighted means pivotally mounted within said housing operated by rotation of the steering wheel to cause return of said knob and contact means to neutral position after the steering wheel has been turned to a predetermined extent.

2. The combination as claimed in claim 1 wherein said weighted means within said housing is maintained substantially stationary during rotation of the steering wheel, and including means engageable with the weighted means operated by rotation of the steering wheel to cause return to neutral position of said knob and contact means.

3. In combination with an automobile steering wheel and steering shaft, a direction signal controller comprising a housing, electric contact means contained within said housing to actuate directional signals, a control member mounted in said housing and manually rotatable in either direction to set said contact means in certain positions, cancelling means within said housing operated by rotation of said steering wheel to unset said contact means, and weighted means pivotally mounted within said housing normally maintained in a predetermined position by gravitational force operable to engage and actuate said canceling means upon rotation of said steering wheel.

4. The combination as claimed in claim 3 including means operated by manually depressing said control member to cancel a previous setting for a turn.

5. In combination with an automobile steering wheel and steering shaft, a direction signal controller comprising a housing, electric contact means contained within said housing to actuate directional signals, a control member mounted in said housing and manually rotatable in either direction to set said contact means in certain positions, means operated by depressing of the control member causing the cancellation of the previous setting for a turn.

6. In combination with an automobile steering wheel and steering shaft, a direction signal controller comprising a plural part housing, means forming part of said housing and being manually operable to set the device to indicate a turn, electric contact means in said housing actuated by said manual operation to operate a signal, means responsive to depressive movement of a housing part to cancel a previous setting, and gravity-actuated means within said housing responsive to turning of the steering wheel to automatically cancel any setting.

7. In combination with an automobile steering wheel and steering shaft, a direction signal controller comprising a plural part housing, means forming part of said housing and being manually operable to set the device to indicate a turn, electric contact means in said housing actuated by said manual operation to operate a signal, means responsive to depressive movement of a housing part to cancel a previous setting, a pivoted weight in said housing, means whose position is controlled by said weight, and means within said housing actuated by said last mentioned means and responsive to turning of the steering wheel to automatically cancel any setting.

8. In combination with an automobile steering wheel and steering shaft, a direction signal controller comprising a plural part housing, certain of the parts of said housing being manually operable to set the device to indicate a turn, electric contact means in said housing actuated by said manual operation to set a signal, means within said housing responsive to turning of the steering wheel to automatically cancel a setting, a pivoted weight in said housing, and means whose position is controlled by said weight to cause actuation of said automatic cancelling means.

9. In combination with an automobile steering wheel and steering shaft, a direction signal controller comprising a plural part housing, means forming part of said housing and being manually operable to set the device to indicate a turn, electric contact means in said housing actuated by said manual operation to operate a signal, a pivoted weight in said housing, means whose position is controlled by said weight, cancelling means in said housing responsive to turning of the steering wheel and cooperating with said weight controlled means to automatically cancel a setting, and means responsive to manual movement of said housing part to cancel any setting.

10. In combination with an automobile steering wheel and steering shaft, a direction signal controller comprising a plural part housing, means forming part of said housing and being manually operable to set the device to indicate a turn, electric contact means in said housing actuated by said manual operation to operate a signal, certain of said housing parts being separable and one part being fixed to the steering shaft, resilient engaging means on the other part holding the housing together and permitting forcible removal intact of one housing part from the other, and means within said housing responsive to turning of the steering wheel to automatically cancel any setting.

11. The combination as claimed in claim 10 wherein the removed housing part carries said manually operable means.

12. The combination as claimed in claim 11 including manually operable means comprising a part of said housing to cancel a previously set signal.

13. In combination with an automobile steering wheel and steering shaft, a direction signal controller comprising a plural part hous-

ing, means forming part of said housing and being manually operable to set the device to indicate a turn, electric contact means in said housing actuated by said manual operation to operate a signal, and means within said housing responsive to turning of the steering wheel to automatically cancel any setting, a pivoted weight in said housing, and means whose position is controlled by said weight to cause actuation of said automatic cancelling means, and means detachably holding said housing parts together and permitting forcible separation intact of one part from another.

14. In combination with an automobile steering wheel and steering shaft, a direction signal controller comprising a housing having separable parts, one part being attached fixedly to the steering shaft, the other part carrying electric contact means to operate a signal, a manually operable member rotatably mounted in said other part to set said contact means to indicate a turn, said steering shaft carrying a weight rotatably mounted thereon, cancelling means normally maintained in substantially fixed position engageable by said weight and operable upon rotation of the steering wheel to automatically cancel a signal setting, and means permitting separation of said one housing part from the other with the parts it carries intact.

15. In combination with an automobile steering wheel and steering shaft, a direction signal controller comprising a housing having separable parts, one part being attached fixedly to the steering shaft, the other part carrying electric contact means to operate a signal, a manually operable member rotatably mounted in said housing to set said contact means to indicate a turn, latch means to hold said contact means in the position in which it is set, releasing means mounted adjacent said latch means actuatable to disengage the latch means from the contact means to release the contact means from the set position, said steering shaft carrying a weight rotatably mounted thereon, and cancelling means on said weight normally maintained in substantially fixed position by said weight and engaged by said releasing means on rotation of the steering wheel to automatically cancel a signal setting.

16. In combination with an automobile steering wheel and steering shaft, a direction signal controller comprising a housing having separable parts, one part being attached fixedly to the steering shaft, the other part carrying electric contact means to operate a signal, a manually operable member to set said contact means to indicate a turn, said manually operable member being part of the housing and rotatable in a housing part, latch means to hold said contact means in the position in which it is set, releasing means mounted adjacent said latch means actuatable to disengage the latch means from the contact means to release the contact means from the set position, means operable by said manually operable member to engage said releasing means and manually cancel a signal setting, said steering shaft carrying a weight rotatably mounted thereon, and cancelling means on said weight normally maintained in substantially fixed position by said weight and engaged by said releasing means on rotation of the steering wheel to automatically cancel a signal setting.

ROBERT W. BUTLER.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,196,705	Murray	Apr. 9, 1940
2,216,881	Hammond	Oct. 8, 1940
2,296,021	Chapman	Sept. 15, 1942