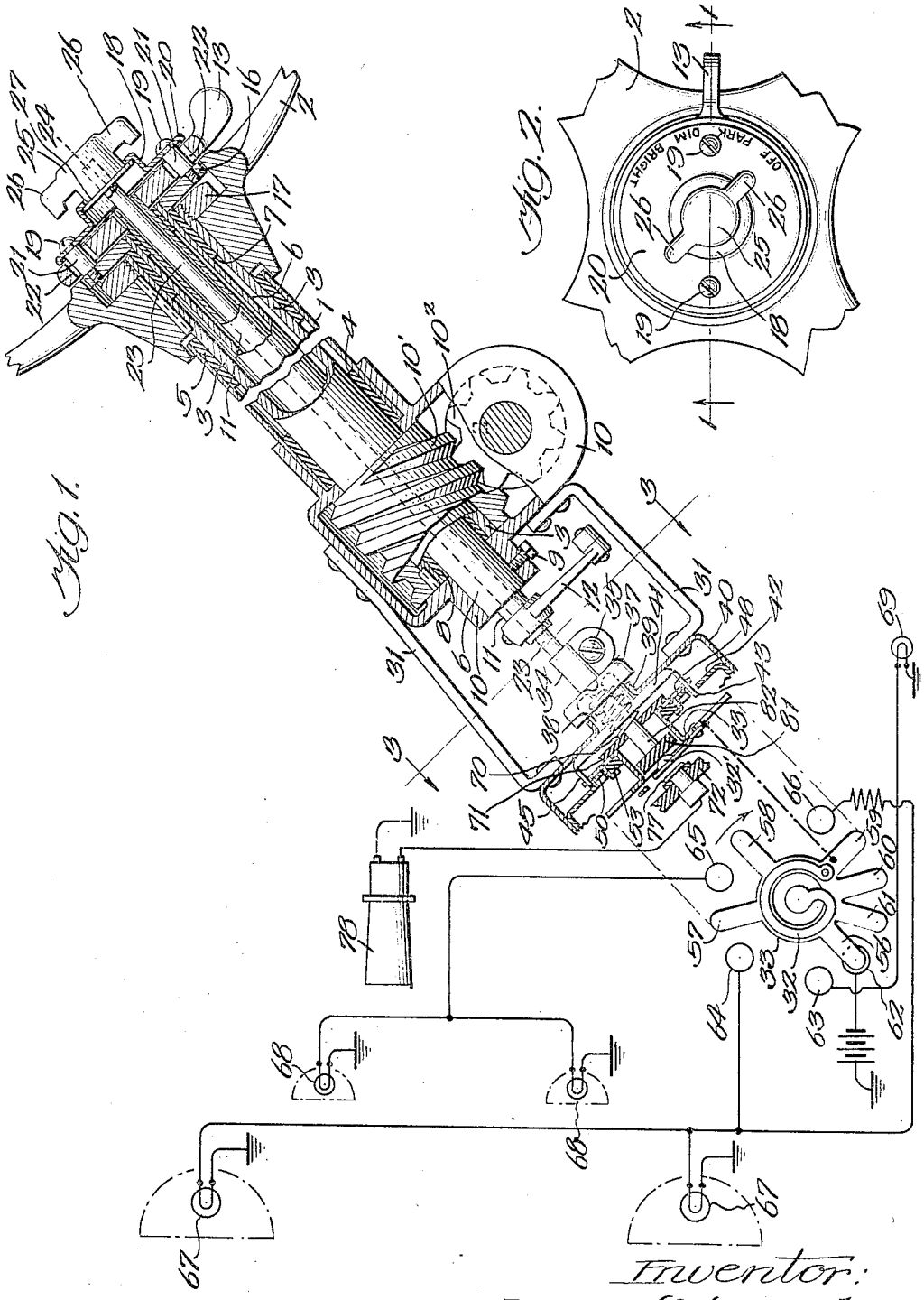
Feb. 11, 1930. H. A. DOUGLAS 1,746,887

SWITCHING MECHANISM

Filed May 5, 1928 3 Sheets-Sheet 1



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SWITCHING MECHANISM

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Fig. 3.

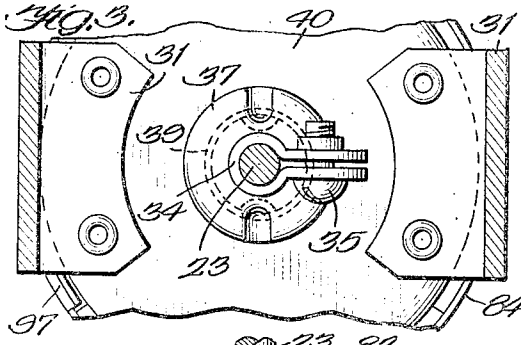


Fig. 4.

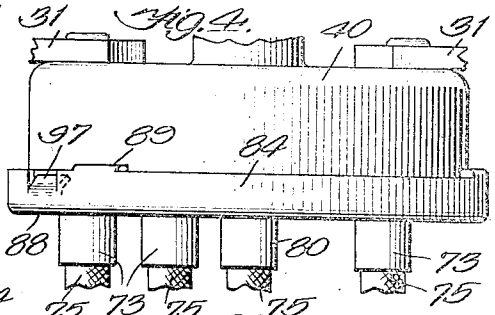


Fig. 5.

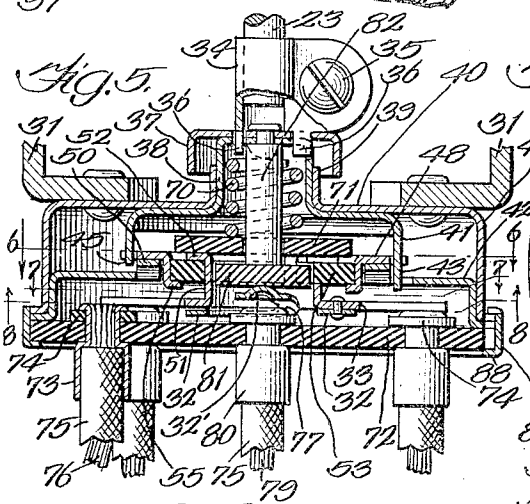


Fig. 7.

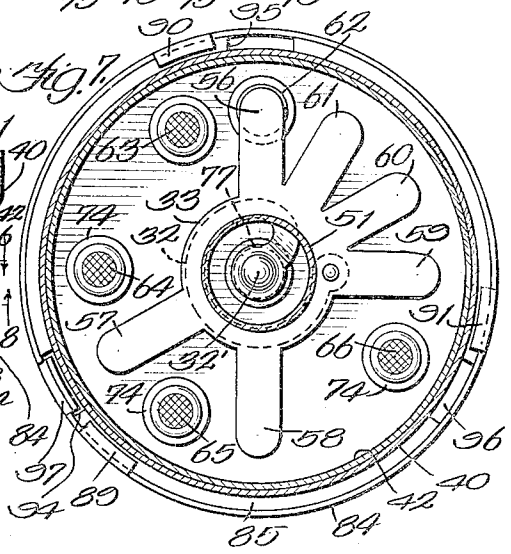


Fig. 6.

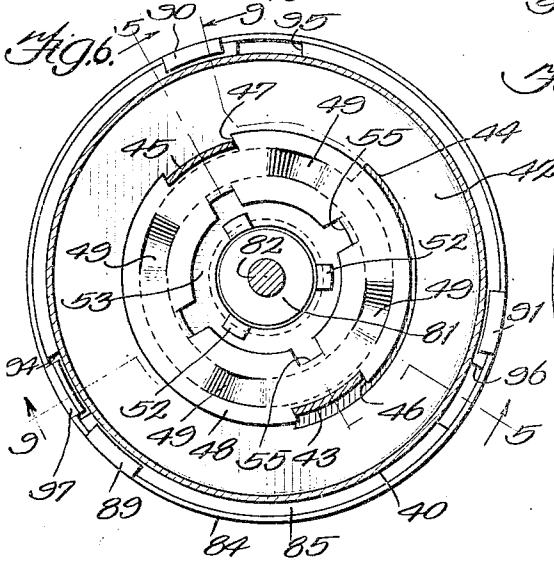
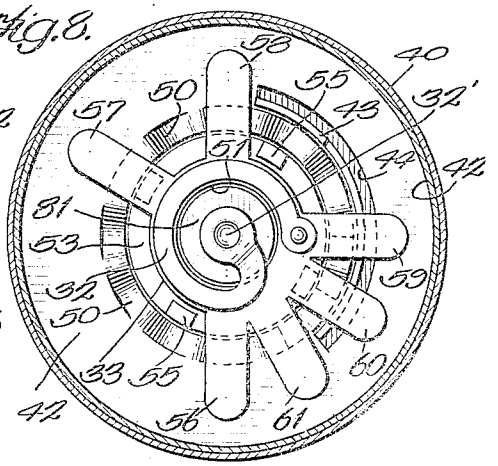


Fig. 8.



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SWITCHING MECHANISM

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Fig. 9.

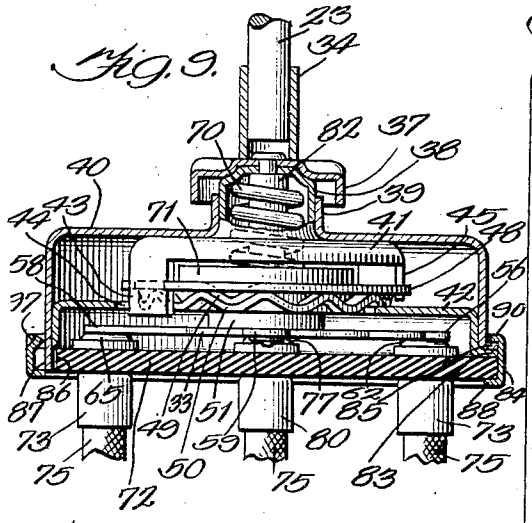


Fig. 10.

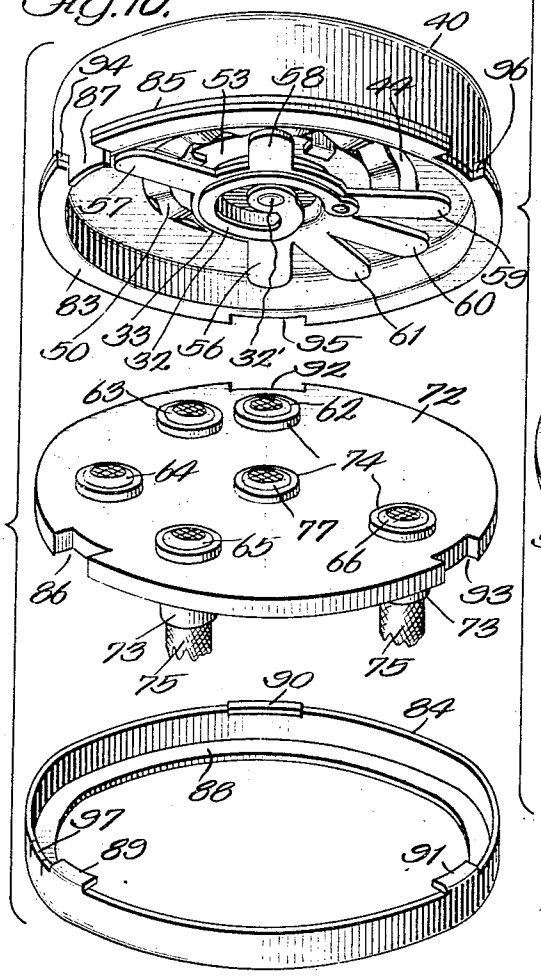
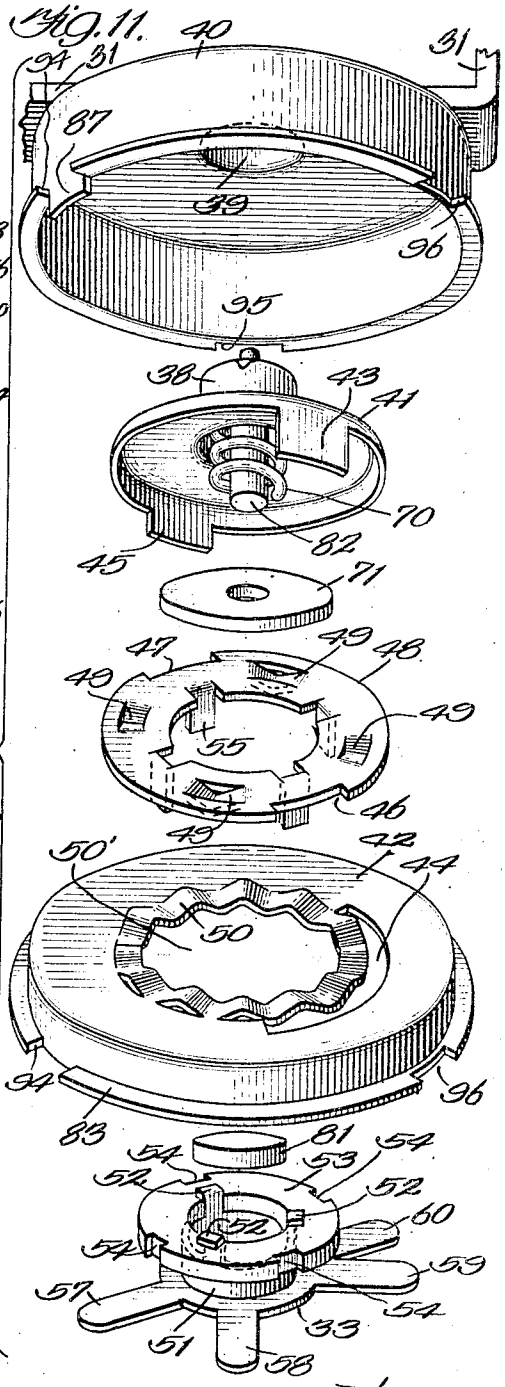


Fig. 11.



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Patented Feb. 11, 1930

1,746,887

UNITED STATES PATENT OFFICE

HARRY A. DOUGLAS, OF BRONSON, MICHIGAN

SWITCHING MECHANISM

Application filed May 5, 1928. Serial No. 275,338.

My invention relates to switching mechanism, being of particular use in connection with switching mechanism that is located at the lower ends of steering columns for the purpose of controlling either or both signaling and lighting circuits.

The invention has for one object the provision of the improved assembly of the actuated portions of the switching mechanism and the moving contacts thereof with stationary contacts that are complemental to the moving contacts. These stationary contacts are suitably assembled with a contact carrier, preferably in the form of a disc, and apart from the balance of the switching mechanism whereafter the contact carrier and the balance of the switching mechanism are brought into assembly. In the preferred embodiment of the invention, the circuit wires that extend to said contact are also assembled with the contacts and the carrier for these contacts before such contact carrier is placed in position although the invention is not to be thus limited. The invention has for another object the provision of an improved housing or casing for the switching mechanism and an improved construction and interrelation of a structural part that serves to hold the switching mechanism in adjustment and contiguous portions of the structure.

The invention has other features and characteristics and will be more fully explained by reference to the accompanying drawings in which Fig. 1 is a diagram of the circuit connections that is inclusive of a portion of the structure taken on line 1—1 of Fig. 2; Fig. 2 is a top view of the structural portion of Fig. 1; Fig. 3 is a sectional view on line 3—3 of Fig. 1; Fig. 4 is a side view of a lower portion of the structure; Fig. 5 is a sectional view of a portion of the structure, taken on line 5—5 of Fig. 6; Fig. 6 is a sectional view taken on line 6—6 of Fig. 5; Fig. 7 is a sectional view on line 7—7 of Fig. 5; Fig. 8 is a sectional view on line 8—8 of Fig. 5; Fig. 9 is a sectional view on line 9—9 of Fig. 6; Fig. 10 illustrates three cooperating portions in separated relation; and Fig. 11 illustrates other cooperating portions in separated relation.

The structure illustrated is inclusive of a stationary tubular steering column 1 which is suitably anchored upon the vehicle and above the upper end of which the steering vehicle wheel 2 is mounted and keyed to the hollow vehicle steering shaft 3. This steering shaft is adapted to turn within bearings 4 and 5 that surround it and are surrounded by the column which carries these bearings. Said steering shaft 3 encloses a hollow rod 6 which is coaxial with the shaft and column, this hollow rod being spaced apart from the shaft 3 by bearing sleeves 7 and 8 and being held stationary by a set bolt 9 which passes through the lower end of the gear casing 10 which is in fixed relation to the steering column. This gear casing encloses the worm 10′ that is fixed upon the steering shaft 3 and the worm wheel 10^2 through which the shaft 3 and the worm 10′ operate the steering ground wheels. Another hollow shaft 11 is surrounded by the aforesaid column, shaft and hollow rod and is coaxial therewith, this shaft 11 being coupled with gas controlling lever mechanism of which a part 12 is illustrated and having a control lever 13 upon its upper end and above the wheel whereby it may be turned. A flange 16 is fixed upon the upper end of the stationary rod 6 and overlies the bearing sleeve 7, the upper end of the steering shaft 3 and the nut 17 which is screwed upon the upper end of the steering shaft to maintain the steering wheel 2 in assembly with this shaft.

The inverted cup 18 is held in a stationary position by means of screws 19 which pass through the flange 20 of the cup and into the stationary flange 16 upon the stationary rod 6. The portion 20 may also serve, if desired, as an escutcheon plate, Fig. 2, having thereon designations of the different circuit adjustments that correspond to the different adjustments of the lighting circuits. Spacing sleeves 21 hold the cup in spaced apart relation to the flange 16 to accommodate the lever 13 which has arcuate slots 22 through which the screws 19 and spacing sleeves 21 are passed, these slots being of sufficient lengths to permit the lever 13 to turn throughout the desired range.

The rod 23 is rotatable and slidable within the hollow shaft 11. The lower end of this rod extends below the steering column and its upper end passes through and terminates above the steering wheel 2. The upper end portion of the rod 23 is square as indicated at 24. A knob 25 having diametrically opposite wings 26 with which the thumb and index finger may be engaged is fixed upon said square rod end 24. Said knob has a flange 27 which is received within the cup 18 and engages the end wall of the cup, this cup end wall having a hole in it through which said knob passes. By merely turning the knob, the rod 23 may be turned to operate the lighting switch, and by depressing the rod, the horn or signal will be sounded or operated, as will more fully appear.

The switching mechanism which is controlled by the rod 23 is carried at the lower end of a bracket structure 31 which is mounted upon the lower end of the stationary steering column 1 by being secured to the gear casing 10. A spring 32 presses upon the rod 23 longitudinally of its axis to normally maintain this rod together with the handle thereon in the uppermost position along the axis of this rod. This spring is secured to a contact actuator 33. It is in the form of a resilient metallic plate. A clip 34 is clamped upon the lower end of the rod 23 by the screw 35. This clip has downwardly projecting tongues 36 which pass through the hood 37 and the top wall of the socket portion 38 which is surrounded by said hood. The rod 23 is thus coupled with said socket portion. The socket portion 38 is slidable within the sleeve continuation 39 of the inverted cup 40. This inverted cup 40 is held stationary by being secured to the brackets 31. The socket portion 38 is expanded below the top wall of the inverted cup as indicated at 41, the top wall of the inverted cup 40 thus serving as a stop for the part 41.

Another inverted cup 42 is slipped within and snugly fits the skirt of the cup 40, the cup 42 being shallower than the cup 40 to afford a space between the end walls of these two cups for the accommodation of some of the parts of the structure. These two cups are held in fixed relation in a manner that will appear. The expanded portion 41 of the socket 38 is received within this space between the two cups and has a tongue 43 which projects through the arcuate slot 44 in the upper end wall of the cup 42. The part 41 has another tongue 45 which is shorter than the tongue 43. Said tongues 43 and 45 respectively enter notches 46 and 47 in the switch actuating plate 48. By turning the rod 23, the portion 41 is turned to turn the actuating plate 48, the extent to which this plate is turned being determined by the ends of the slot 44 which serve as stops that are engageable by the tongue 43. Said actuating plate is provided with a number of detent or cam formations 49 that are preferably of V form and which are arranged in a circular row that is concentric with the plate 48. The top wall of the stationary inverted cup 42 is formed with an annular corrugated track 50 which is coaxial with the row of detent or cam formations 49 and, generally speaking, corresponds in shape thereto whereby the plate 48 may be held in various positions to which it is turned to maintain any selected adjustment of the lighting circuits. The switch contact plate 33 is suitably coupled with the switch actuating plate 48 so that whenever the rod 23 is turned, said switch contact plate is also turned to change the lighting circuit adjustment.

As illustrated, the plate 33 is formed with an upwardly extending tubular continuation 51 which has tongues 52 projecting from its upper end, these tongues being received within notches formed within the bore of the insulating ring 53 which is provided with notches 54 that receive the tongues 55 that depend from the switch actuating plate 48. The switch contact plate 33 has radiating contacting fingers 56, 57, 58, 59, 60 and 61. These fingers are so disposed with respect to each other and are so related to the circular row of contacts 62, 63, 64, 65 and 66 as to have control of the circuits of the main head lamps 67, the parking lamps 68 and the tail lamp 69, as will be readily understood by reference to Fig. 1. The rod 23 and the knob 25 are normally maintained in their uppermost position mainly by the coiled spring 70 which abuts upon the insulating ring 71 that rests upon the plate 48 and the overturned upper ends of the tongues 52, the upper end wall of the inverted cup 42 taking the downward thrust of the spring, the upward thrust of the spring being taken by the upper end wall of the inverted cup 40 through the intermediation of the part 41, the upper end of the spring engaging the inturned annular shoulder of the socket 38, as illustrated most clearly in Fig. 9.

Said contacts 62 to 66 inclusive are provided upon a contact carrier which is preferably in the form of an insulating disc 72 which is assembled with the balance of the structure in accordance with my present invention. These contacts are of any suitable construction. As illustrated, they are inclusive of metallic sleeves 73 having reduced upper ends that pass through the disc 72 and which ends are clinched over insulating rings 74. The lower portions of the sleeves 73 snugly receive the serving 75 of the circuit wires 76. Each circuit wire is preferably made of a number of strands which are led through the upper reduced portions of the sleeves 73. The upper ends of these strands are soldered to the extreme upper ends of said sleeves, the solder being ground flat so that

the contact fingers 56, 57, 58, 59, 60 and 61 may have extended engagement therewith. These fingers press downwardly upon the contacts that are complemental thereto with sufficient force to maintain proper circuit closing engagement, the contacting ends of these fingers being forced slightly upwardly by the contact complemental thereto as the fingers ride on these contacts, the fingers flexing downwardly as they leave these contacts.

Said contact carrier or insulating disc 72 also carries another contact 77 at its center, this contact being included in the signaling circuit that contains the horn or other signaling device 78. The signaling wire 79 is connected with and takes part in forming this contact, this wire passing through and being assembled with a metallic sleeve 80 which is similar to the sleeve 73. The assembly of the wire 79 with the sleeve 80 is similar to the assembly of the wires 76 with the sleeves 73. The spiral metallic contact spring 32 has its free and contacting end 32′ in alignment with the contact 77. A disc 81 is surrounded by the ring 53 and the tubular plate continuation 51 and is engaged by a plunger rod 82 which passes through the bore of the spring 70 and has a reduced upper end which is in riveted connection with the end walls of the hood 37 and socket 38. The knob 25 may be depressed when the rod 23 is in any position to which it is turned for the purpose of bringing the contacting end 32′ into engagement with the contact 77 to close the horn circuit, this circuit being thus adapted to be closed when the light circuits are in any adjustment.

In accordance with my invention, the contacts 62 to 66 inclusive and 77 are assembled with the contact horn disc 72 before this contact carrying disc is assembled with the cup shaped switch casing 40. After said contact carrying disc has had its contacts assembled therewith, the disc is placed upon the flange or rim 83 of the inverted cup 42 whereafter an assembling collar 84 is assembled with said disc 72 and said flange or rim 83 and also the flange or rim 85 in the cup shaped casing portion 40. In order that the contacts may be properly positioned, the disc 72 is formed with a notch 86 which receives a tongue 87 constituting a downward continuation of the skirt of the cup 40. The assembling collar 84 is preferably formed with an inturned annular shoulder 88 which engages the bottom of the disc 72 along the edge of this disc. Said assembling collar is provided with inwardly bent tongues 89, 90 and 91 which respectively pass through the notches 86, 92 and 93 in the disc 72 and respectively through the notches 94, 95 and 96 in the flanges or rims 83 and 85. After these tongues have passed through these notches, the collar is turned to bring these tongues out of register with these notches and above the flange or rim 85 whereby the collar is held in place and serves to hold the disc 72 in place. After the collar has been turned, the tongue 97 is inwardly clinched as indicated most clearly in Figs. 4, 6, 7 and 9, this tongue entering the notch 94 whereby the collar is held from being accidentally turned. The notch 86 is deeper than the notches 92 and 93 inasmuch as the notch 86 has to accommodate the tongue 87 in addition to permitting the passage therethrough of the tongue 89.

The disc 72 thus constitutes a closure for the cup 42 and the cup 42 constitutes a closure for the cup 40. It will be seen that I have provided a rotatable switch actuating member which is received within both cups 40 and 42, this switch actuating member having a portion, constituted of the parts 55, 53 and 51, which passes through and is movable within the central opening 50′ formed in the end wall of the inner cup 42. It will also be seen that the contact 32′ is controllable by the reciprocable switch actuating member 23, 38, 81 and 82, this switch actuating member having a portion that passes through the aforesaid opening 50′ in the end wall of the cup 42.

Changes may be made without departing from the invention.

Having thus described my invention, I claim:

1. The combination with two cup shaped members, one within the other and having their end walls spaced apart; a switch actuating member received within both cups and having a portion passing through and movable within an opening formed in the end wall of the inner cup; and complemental switch contacts within the latter cup, one of these contacts being connected with said actuating member to be controlled thereby.

2. The combination with two cup shaped members, one within the other and having their end walls spaced apart; a switch actuating member received within both cups and having a portion passing through and movable within an opening formed in the end wall of the inner cup; and a switch having complemental switch contacts within the latter cup, one of these contacts being connected with said actuating member to be controlled thereby, the actuating member and the end wall of the inner cup having complemental holding formations for maintaining the switch in selected position.

3. The combination with two cup shaped members, one within the other and having their end walls spaced apart; a rotatable switch actuating member received within both cups and having a portion passing through and movable within an opening formed in the end wall of the inner cup; a switch having complemental switch contacts within the latter cup, one of these contacts being connected with said actuating member

to be controlled thereby; a socket portion connected with said actuating member and having a portion interposed between the end walls of the cup shaped members; a rotatable and reciprocable switch actuating rod aligned with said socket and coupled with said rotatable switch actuating member, the outer cup shaped member being interposed between said rod and the inner cup shaped member; a spring within said socket and pressing at one end against the end wall of the inner cup shaped member and pressing at its other end against said rod whereby the rod is normally maintained in its outermost position; and a second switch which is also controlled by and operated upon longitudinal movement of the rod.

4. The combination with two cup shaped members, one within the other and having their end walls spaced apart; a rotatable switch actuating member received within both cups and having a portion passing through and movable within an opening formed in the end wall of the inner cup; a switch having complemental switch contacts within the latter cup, one of these contacts being connected with said actuating member to be controlled thereby, the actuating member and the end wall of the inner cup having complemental holding formations for maintaining the switch in selected position; a socket portion connected with said actuating member and having a portion interposed between the end walls of the cup shaped members; a rotatable and reciprocable switch actuating rod aligned with said socket and coupled with said rotatable switch actuating member, the outer cup shaped member being interposed between said rod and the inner cup shaped member; a spring within said socket and pressing at one end against the end wall of the inner cup shaped member and pressing at its other end against said rod whereby the rod is normally maintained in its outermost position; and a second switch which is also controlled by and operated upon longitudinal movement of the rod.

5. The combination with two cup shaped members, one within the other and having their end walls spaced apart; a rotatable switch actuating member received within both cups and having a portion passing through and movable within an opening formed in the end wall of the inner cup; a switch having complemental switch contacts within the latter cup, one of these contacts being connected with said actuating member to be controlled thereby; a socket portion connected with said actuating member and having a portion interposed between the end walls of the cup shaped members; a rotatable and reciprocable switch actuating rod aligned with said socket and coupled with said rotatable switch actuating member, the outer cup shaped member being interposed between said rod and the inner cup shaped member; a spring within said socket and pressing at one end against the end wall of the inner cup shaped member and pressing at its other end against said rod whereby the rod is normally maintained in its outermost position; and a second switch which is also controlled by and operated upon longitudinal movement of the rod, the contacts of the second switch also being within the inner cup, said rod also having actuating relation with the movable contact of the second switch and within the inner cup.

6. The combination with two cup shaped members, one within the other and having their end walls spaced apart; a rotatable switch actuating member received within both cups and having a portion passing through and movable within an opening formed in the end wall of the inner cup; a switch having complemental switch contacts within the latter cup, one of these contacts being connected with said actuating member to be controlled thereby, the actuating member and the end wall of the inner cup having complemental holding formations for maintaining the switch in selected position; a socket portion connected with said actuating member and having a portion interposed between the end walls of the cup shaped members; a rotatable and reciprocable switch actuating rod aligned with said socket and coupled with said rotatable switch actuating member, the outer cup shaped member being interposed between said rod and the inner cup shaped member; a spring within said socket and pressing at one end against the end wall of the inner cup shaped member and pressing at its other end against said rod whereby the rod is normally maintained in its outermost position; and a second switch which is also controlled by and operated upon longitudinal movement of the rod, the contacts of the second switch also being within the inner cup, said rod also having actuating relation with the movable contact of the second switch and within the inner cup.

7. A switch having complemental movable and stationary contacting portions; a casing therefor; a closure for the casing and carrying the stationary contacting portion; and a collar assembled with the casing and having an internal shoulder engaging the outer face of said closure to hold it in assembly with the casing.

8. A switch having complemental movable and stationary contacting portions; a casing therefor inclusive of a cup shaped member having a notched flange; a closure disc for said cup shaped member and engaging the outer side of said flange; a collar having an internal shoulder engaging the outer face of said closure and formed with an inwardly bent tongue passed through the notch of the flange, said collar being turned

to have the end of said tongue engaged with the side of the flange that is opposite the flange side engaged by said disc.

9. The structure of claim 8 wherein the collar carries an additional tongue that is clinched into holding engagement with the casing.

10. The structure of claim 1 wherein the switch has a stationary contacting portion and including a disc portion which constitutes a closure for the inner cup and carries said stationary contacting portion.

11. The structure of claim 2 wherein the switch has a stationary contacting portion and including a disc portion which constitutes a closure for the inner cup and carries said stationary contacting portion.

12. The structure of claim 3 wherein both switches have stationary contacting portions and including a disc which constitutes a closure for the inner cup and carries said stationary contaction portions.

13. The structure of claim 4 wherein both switches have stationary contacting portions and including a disc which constitutes a closure for the inner cup and carries said stationary contaction portions.

14. The structure of claim 5 wherein both switches have stationary contacting portions and including a disc which constitutes a closure for the inner cup and carries said stationary contaction portions.

15. The structure of claim 6 wherein both switches have stationary contacting portions and including a disc which constitutes a closure for the inner cup and carries said stationary contaction portions.

In witness whereof, I hereunto subscribe my name.

HARRY A. DOUGLAS.