Jan. 22, 1963 D. C. HILDEBRECHT 3,075,073

ADJUSTABLE SPOTLIGHT

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Fig. 1

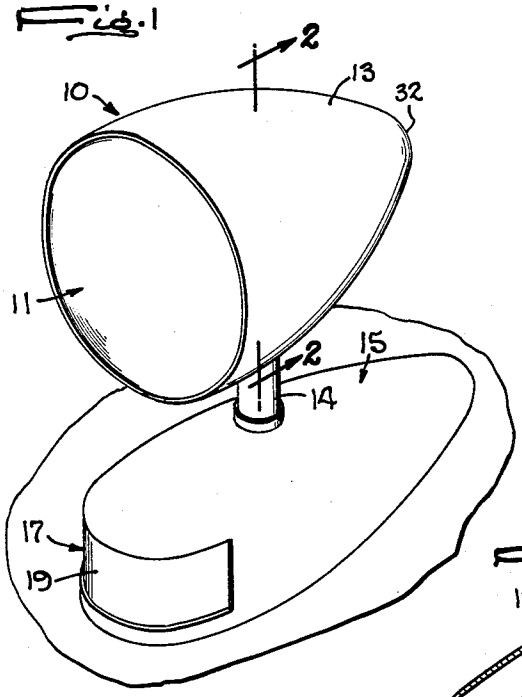


Fig. 2

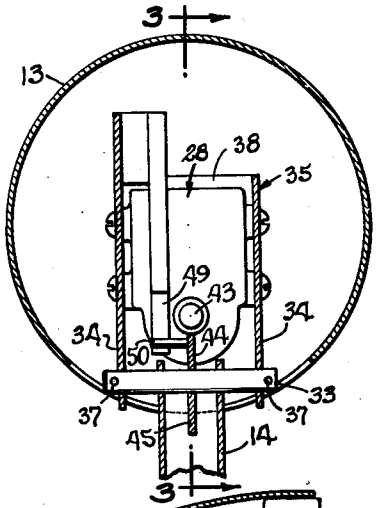


Fig. 3

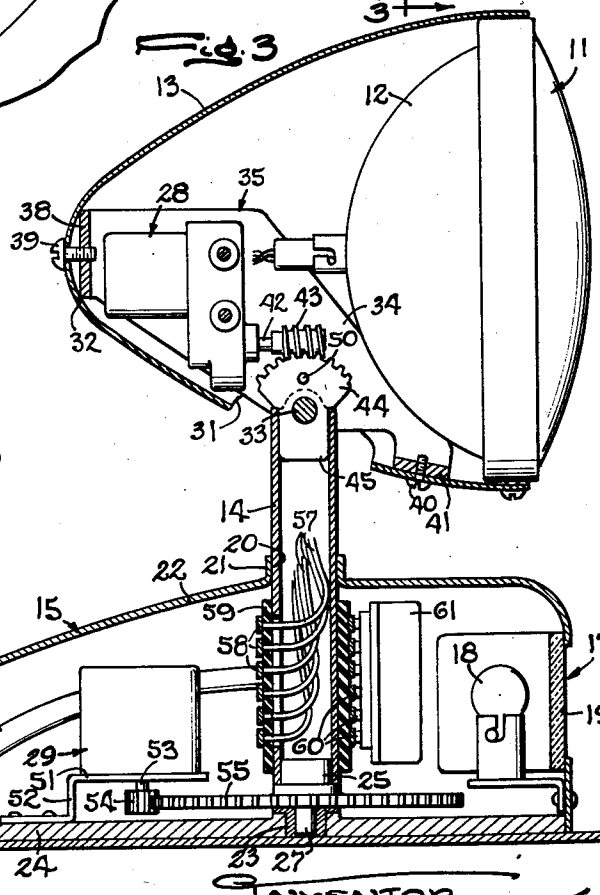
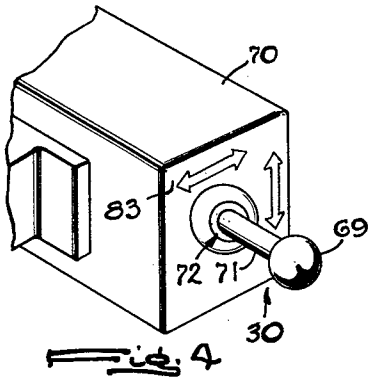


Fig. 4



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Fig. 5

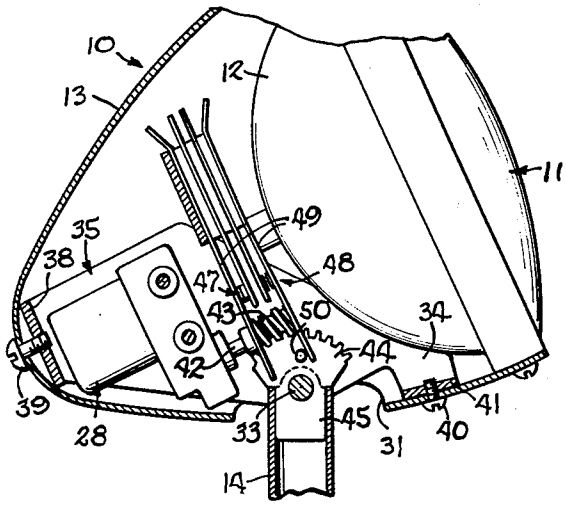


Fig. 6

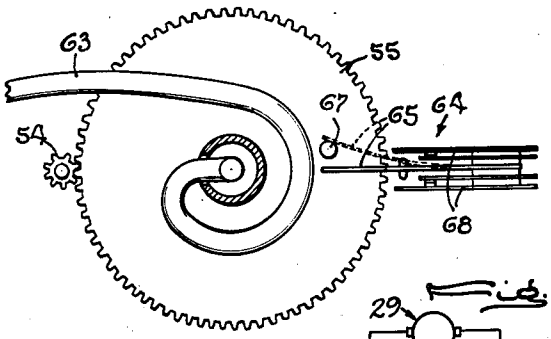


Fig. 7

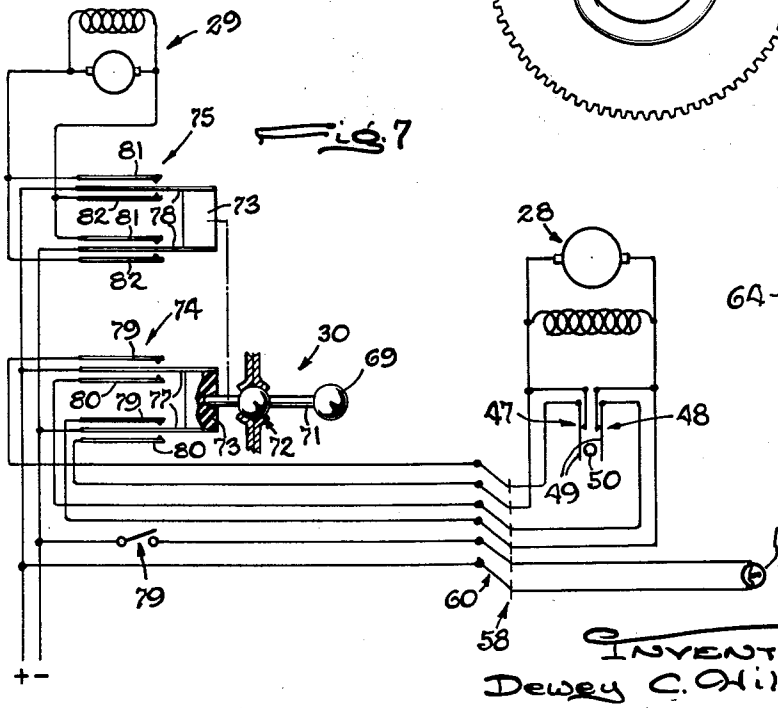
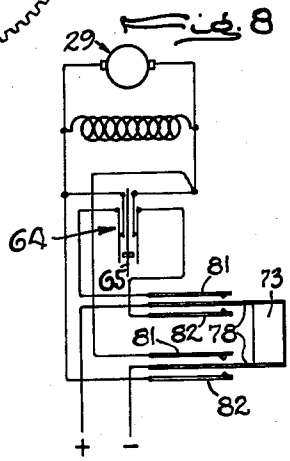


Fig. 8



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ADJUSTABLE SPOTLIGHT

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The invention relates to a mechanism for adjustably positioning a spotlight or the like to project the beam thereof in different directions.

The primary object of the present invention is to provide in an adjustable spotlight a novel mechanism of the above character with which the beam may be adjusted through at least a full horizontal revolution and tilted through a wide vertical arc, and which may be remotely controlled quickly and accurately by means readily accessible to the operator.

Another object is to mount the lamp and the motors of the adjusting mechanism in a novel manner so that they are protected in service use against exposure to rain or splashing water.

The invention also resides in the novel control means for selectively energizing the motors to effect horizontal and vertical adjustments either separately or simultaneously.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

FIGURE 1 is a perspective view of a spotlight incorporating the novel features of the present invention.

FIG. 2 is a fragmentary sectional view taken along the line 2—2 in FIG. 1.

FIG. 3 is an enlarged fragmentary sectional view taken along the line 3—3 in FIG. 2.

FIG. 4 is a fragmentary perspective view of the selector.

FIG. 5 is a view similar to a portion of FIG. 3 but showing a different position of the parts.

FIG. 6 is a fragmentary sectional view taken in a horizontal plane through the base housing and showing a modification of the invention.

FIG. 7 is a diagram of the circuits of the novel adjusting mechanism.

FIG. 8 is a diagram showing the circuits of the modification illustrated in FIG. 6.

As shown in the drawings for purposes of illustration, the invention is embodied in a spotlight 10 adapted to be adjustably positioned to project a beam of light in different directions, and including for this purpose a lamp 11 mounted in a shallow, cup-shaped reflector 12 nested in the open end of a generally cup-shaped lamp casing 13. The latter is supported on the end of a tubular shaft 14 projecting outwardly from a hollow base housing 15 which is adapted to be mounted on the exterior of a vehicle, for example on an automobile or on the deck of a boat, or on the roof of a building and may include a clearance light or running light 17 formed in one of its ends by a lamp 18 and an appropriately colored lens 19.

To permit turning of the lamp casing 13 in a horizontal plane, the shaft is journaled in the housing for rotation about a fixed axis in a bearing 20 formed intermediate the ends of the shaft by an annular flange 21 turned outwardly around the hole in the top wall 22 through which the shaft projects, and the inner end of the shaft is journaled in a bushing 23 seated in a recess in the bottom wall 24 of the housing. In this instance, a cylindrical plug 25 is pressed into the shaft with a stem 27 concentric with the shaft and journaled in the bushing to support the shaft while permitting it to turn freely.

The present invention contemplates a novel mechanism for adjusting the position of the lamp 11 through at least a full horizontal revolution and a wide vertical arc by

means of reversible electric motors 29 and 28 protected against exposure to the elements and remotely controllable quickly and accurately by a selector 30 readily accessible to the operator of the vehicle. To achieve these ends, the lamp casing 13 is pivoted on the shaft 14 for tilting about an axis extending transversely of the shaft with the tilting motor 28 mounted within the casing, while the motor 29 for turning the shaft preferably is enclosed within the base housing 15.

Herein, the upper end of the shaft projects into the casing through an elongated slot 31 in the underside thereof intermediate the lip of the casing and its closed end 32 and a pin 33 inserted through alined holes adjacent the upper end of the shaft pivotally supports the casing on the shaft. The opposite ends of the pin extend laterally from the shaft and through registering holes in the legs 34 of a bracket 35 secured inside the casing, and cotter pins 37 inserted through holes in the ends of the pin 33 outside the legs 34 maintain the pin 33 in place. Preferably the bracket is generally U-shaped with the crosspiece 38 fastened in the closed end of the casing as by a machine screw 39 and its legs are inclined downwardly toward the lower wall of the casing and each secured to the lower wall adjacent the lamp 11 by screws 40. The latter are threaded into ears 41 turned inwardly from each leg and lying against the casing.

Between the reflector 12 and the closed end 32 of the casing is a substantially closed chamber into which the shaft 14 projects and in which the tilting motor 28 is mounted. Preferably this is a direct-current motor which may be operated on the power supplied by the battery of a boat or automobile. In this instance, the motor is mounted adjacent the closed end 32 and the pin 33 is generally tangent to the casing adjacent its center of gravity so that the weight of the casing is balanced around the pin and a relatively small tilting motor may be used. Herein, the motor is disposed between the legs of the bracket with the motor shaft 42 extending forwardly and above the end of the shaft 14, and is held in place by screws inserted through the legs and threaded into bosses on opposite sides of the motor. Current is supplied to the motor as well as the lamp 11 through conductors running through the shaft 14.

Means is provided to convert the rotary motion of the motor shaft 42 into tilting of the lamp casing about the pin 33. In this instance, this means takes the form of a worm 43 on the drive shaft meshing with a worm wheel segment 44 formed with a neck 45 inserted in the shaft 14, the neck having a hole therein adapted to be alined with the holes in the shaft to receive the pin 33. Thus, the segment 44 is made a rigid extension of the shaft 14 and upon rotation of the motor shaft 42 in opposite directions, the worm travels back and forth along the segment to tilt the casing and the lamp in the desired direction. To limit tilting of the casing in each direction and thereby to prevent the worm from running off the segment, limit switches 47 and 48 may be provided in the circuits of the motor 28 to be opened automatically when the casing reaches the desired maximum degree of tilt. Herein, these switches comprises flexible leaves 49 supported by the bracket 35 to swing with the casing and each adapted to be bent away from a fixed contact in the motor circuit (FIG. 7) upon engaging an actuating pin 50 as shown in FIG. 5, the pin 50 being interposed between the leaves and secured in a fixed position on the segment.

The motor 29 for rotating the supporting shaft 14 also may be a direct-current motor driven from the vehicle's battery. Preferably this motor is mounted in the base housing on a plate 51 secured at one end to the bottom wall 24 of the housing and offset upwardly at 52 so that the motor shaft 53 is supported parallel to the shaft 14

with a pinion 54 meshing with a gear 55 mounted on and concentric with the shaft 14, the gear 55 in this instance being formed on the plug 25. Thus the turning motor is coupled to the shaft 14 and is operable when energized to swing the lamp horizontally in opposite directions.

In the preferred embodiment of the invention, means is provided to transfer current to and from conductors 57 disposed within and rotating with the shaft thereby to prevent twisting of the conductors and permitting continuous rotation of the shaft. As shown in FIG. 3, this means comprises a plurality of slip rings 58 axially spaced along the shaft and separated therefrom by an insulating sleeve 59, and a plurality of fixed contacts, in this instance brushes 60 supported adjacent the shaft on a bracket 61 secured to the housing, each of the brushes being contiguous to one of the rings. Thus, as the rings turn with the shaft, current is transmitted from the power line 62 through the brushes and rings to the conductors 57 in the shaft, the conductors comprising a plurality of leads each connected to one of the rings.

In the alternative construction illustrated in FIGS. 6 and 8, the conductors are enclosed in a flexible cable 63 running down the shaft from the casing and into the housing through a hole in the shaft, and sufficient slack is provided to permit the cable to wrap around the shaft as the latter turns. In this instance, however, suitable limit switches 64 should be provided in the turning motor circuits, as shown in FIG. 8, to de-energize the motor 29 at a predetermined point in each direction of rotation to prevent damage to the cable or the motor from excessive wrapping and tightening of the cable. This may be accomplished by a flexible actuating leaf 65 mounted in the housing and overlying the gear 55 in the path of a pin 67 (FIG. 6) rotating with the gear. As the pin contacts the leaf, the latter is bent to one side or the other and against a switch arm 68 to open one of the switches 64 and de-energize the motor.

While each of the motors may be controlled individually, it is desirable to select the various circuits for energizing the motors either individually or simultaneously and each in the appropriate direction by selective manipulation of the handle 69 of a single control member or selector 30 (FIGS. 4 and 7). To this end, the selector is housed in a case 70, which conveniently may be mounted on the instrument panel of the vehicle, and is movable in different directions from a normal, neutral position to energize the proper motor or motors to swing the beam of the lamp in the direction corresponding to the direction of movement of the selector. Herein, the selector comprises a lever 71 universally pivoted intermediate its ends in a ball-and-socket joint 72 which permits the handle to be rocked diagonally as well as in vertical and horizontal planes.

Mounted on a block 73 on the inner end of the lever 71 are two double-pole, double-throw switches 74 and 75 (FIG. 7), one 74 operable when actuated by predetermined movements of the lever to energize the tilting motor 28 in opposite directions, and the other 75 controlling the turning motor 29. Preferably the blades 77 of the switch 74 are supported above and below the block 73 while the blades 78 of the switch 75 are on opposite sides of the block. Thus, when the handle is moved downwardly, the blades 77 are swung against upper contact plates 79, one connected to each side of the tilting motor, and the motor is energized to lower the beam. Upward movement of the handle presses the blades 77 against lower contact plates 80 to reverse the circuit through the tilting motor and raise the beam. Similarly, movement of the handle in a horizontal plane completes circuits through the turning motor 29 to adjust the beam horizontally. When the handle is pressed to the left, as viewed in FIG. 4, the blades 78 contact the plates 81 on the right of each blade, and when the handle is moved to the right, the blades 78 contact plates 82, energizing the turning motor in the opposite direction.

While the motors may be energized separately, as above described, it will be readily apparent that they may be actuated simultaneously to effect a rapid oblique adjustment simply by moving the selector handle diagonally in the desired direction of adjustment. For example, by swinging the handle toward the upper left corner 83 of the case, both switches are actuated to raise the beam and turn is to the left at the same time. As shown in FIG. 7, a manually operable switch 79 may be included in the lamp circuit for turning the lamp 11 on and off. In some installations, as on a boat, it may be desirable to provide more than one selector for controlling a light from different locations. For example, on selector may be installed on the bridge and another in the cabin or the cockpit for convenient access at all times.

From the foregoing, it will be seen that a spotlight embodying the present invention may be directed quickly and easily in the desired direction simply by moving the control lever in that direction, the spotlight being swingable through at least one horizontal revolution and a wide vertical arc. Further, with the casing itself mounted to tilt about a horizontal axis, the lamp and the reflector may be sealed tightly in the open end of the casing to prevent the entry of rain and splashing water which might damage the motor, the only opening into the casing being the slot 31 in the underside thereof.

I claim as my invention:

1. In an adjustable spotlight, the combination of, a hollow base housing, a tubular shaft journaled in said housing to rotate about a fixed axis and projecting at one end from said housing, a reversible motor mounted in said housing and connected to said shaft, means for energizing said motor alternately in opposite directions to turn the shaft back and forth about said axis, an arcuate gear segment disposed above said one end portion of said shaft and having a portion telescoping into the shaft, a pin projected through alined holes in said gear portion and said shaft adjacent said one end thereby locking said segment to the shaft, a bracket having legs disposed on opposite sides of said gear and each pivoted on said pin, a cup-shaped lamp casing disposed over said one end and secured to said bracket, a second reversible motor mounted on said bracket and having a motor shaft extending over said segment, a worm gear on said motor shaft meshing with said segment, and means for energizing said second motor alternately in opposite directions whereby said worm travels along said segment and tilts said casing back and forth about said pin.

2. In an adjustable spotlight, the combination of, a support, a shaft journaled on said support to turn about a fixed axis and projecting outwardly at one end from said support, an arcuate gear segment disposed over and having a portion telescoping with said one end, a pin projected through alined holes in said portion and said shaft thereby locking said segment to the shaft, a bracket pivoted on said pin and extending generally radially to one side of said shaft, a cup-shaped lamp casing disposed over said one end and secured to said bracket, means for rotating said shaft about said axis, a reversible electric motor having a shaft extending over said segment, a gear on said motor shaft meshing with said segment, and means for energizing said motor alternately in opposite directions to drive said gear whereby the latter travels along said segment and tilts said casing back and forth about said pin.

References Cited in the file of this patent

UNITED STATES PATENTS

1,611,267	Case	Dec. 21, 1926
2,754,411	Dohrmann	July 10, 1956
2,859,331	Grimes	Nov. 4, 1958
2,898,450	Tochon	Aug. 4, 1959