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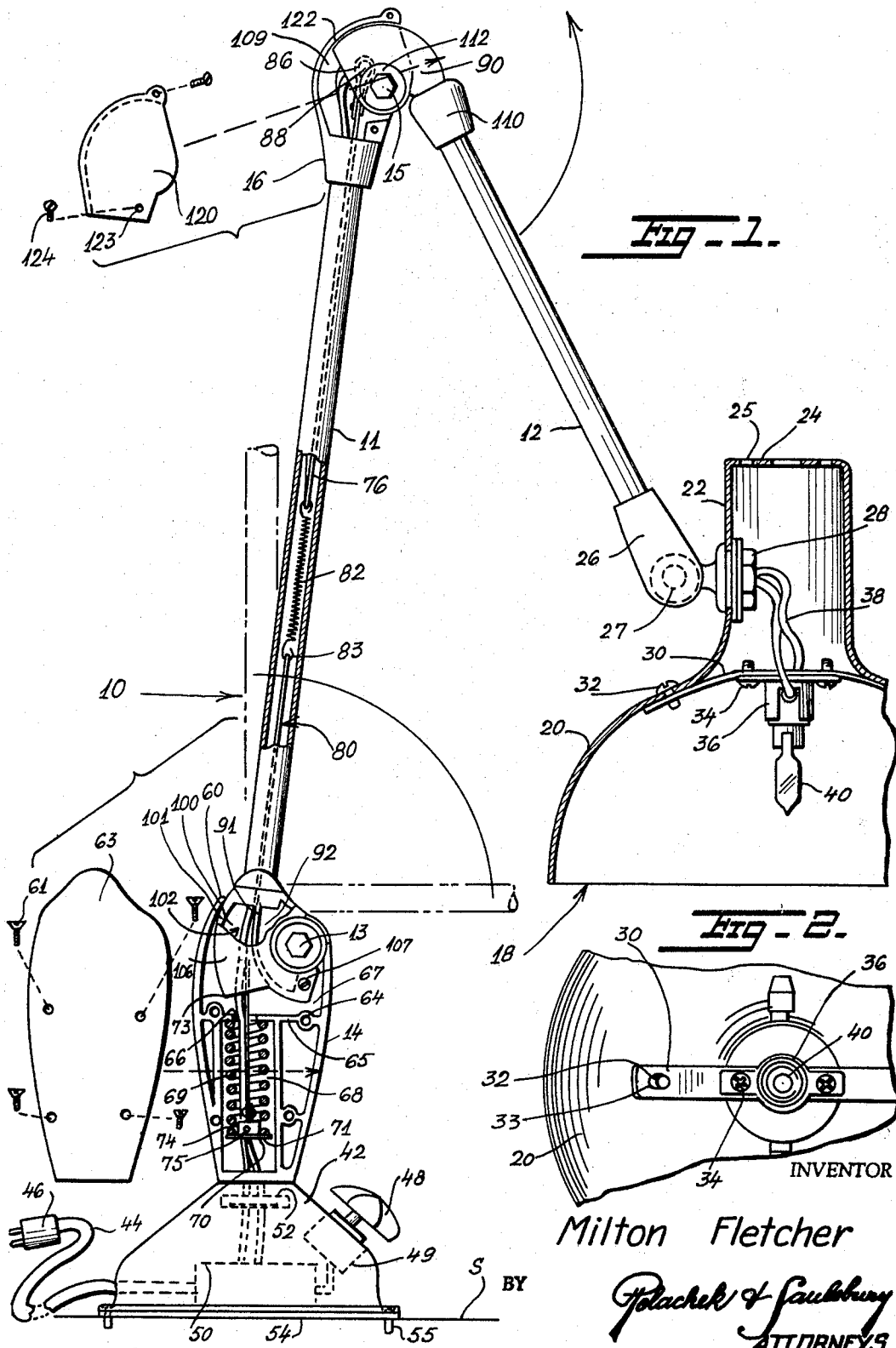
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3,476,931

ADJUSTABLE LAMP STRUCTURE

Filed July 17, 1967

3 Sheets-Sheet 1



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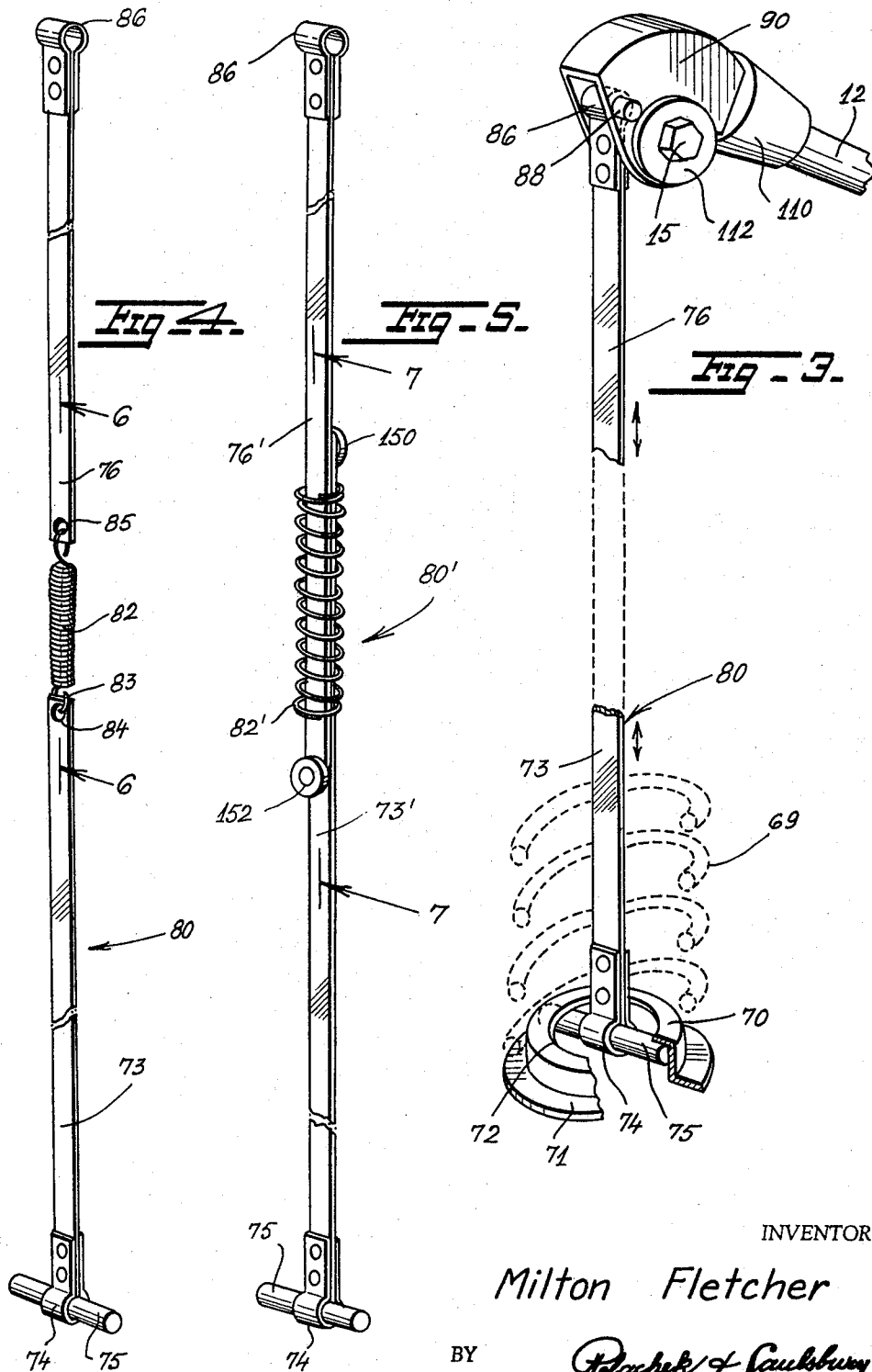
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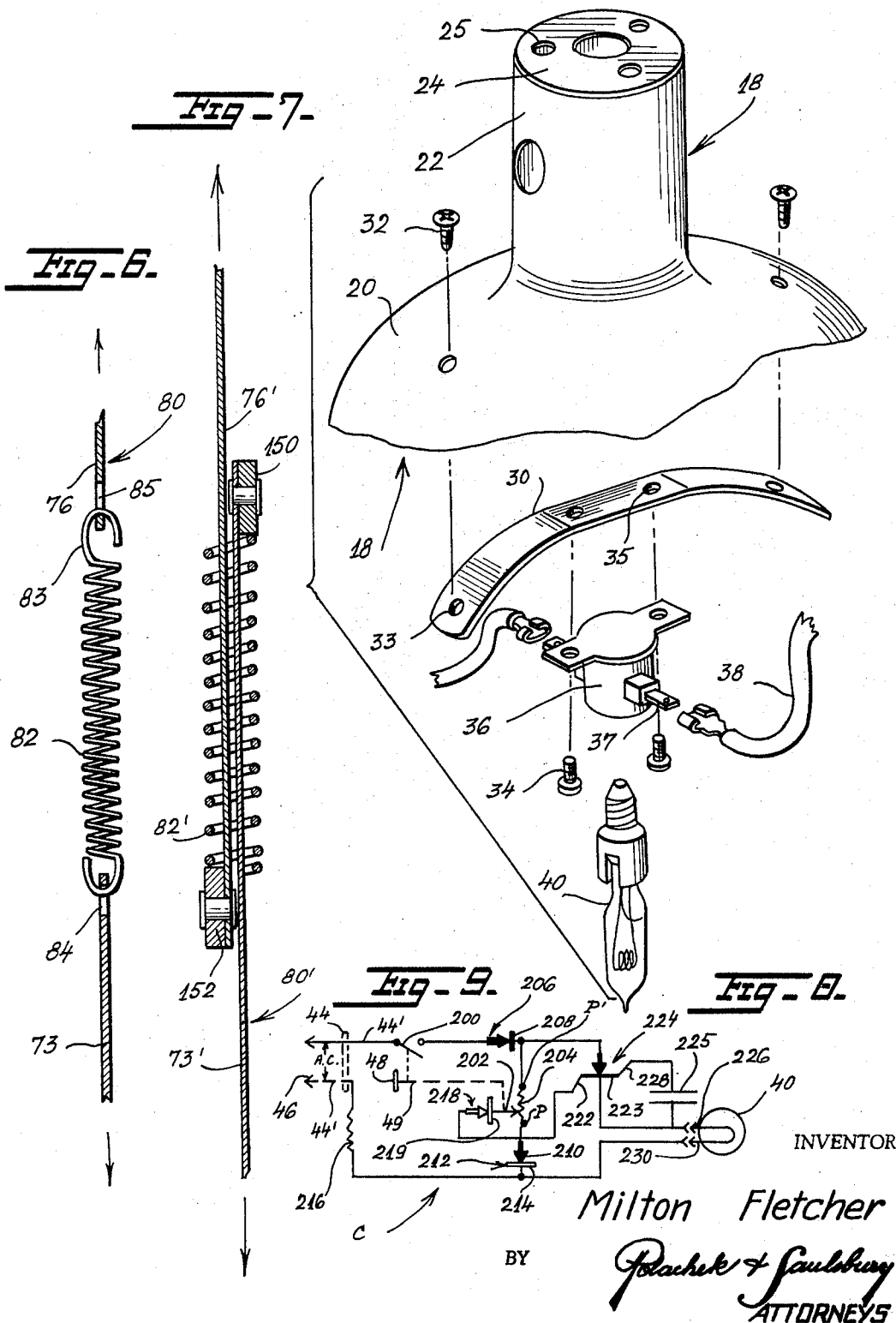
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ADJUSTABLE LAMP STRUCTURE
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10 Claims

ABSTRACT OF THE DISCLOSURE

A desk or table lamp has an articulated bracket structure having two pivotable arms with an internal two-part link connected by spring means so that one arm can be adjustably set independently of the other arm. The lamp also includes a miniature lamp bulb connected in circuit with a solid state transistorized dimmer circuit.

The invention relates to the art of articulated lamp structures and embodies improvements over the structure described in United States Patent 2,665,870.

In Patent 2,665,870, a lamp bracket structure is described in which a flexible link in the form of a metallic ribbon of fixed length is employed in association with cam means for adjusting two pivotable arms on a hollow fixed support. It has been found in practice that the arms are independently pivotable to a very limited extent. This condition is objectionable but cannot be avoided as the prior structure is arranged. The condition has been corrected in the present invention by providing a two-part link with a pair of flexible ribbon sections slidable longitudinally with respect to each other against tension in a coil spring connecting both ribbon sections.

The prior lamp structure also was constructed to house tubular fluorescent lamps. Such lamps require a massive ballast transformer. The light emitted by the lamps has a relatively low intensity per square inch of area illuminated. In the present invention by contrast light is concentrated at a point source and is emitted at high intensity by a miniature lamp bulb. The lamp bulb is energized at low voltage by a solid-state transistorized dimmer circuit which avoids the use of a massive transformer for voltage step-up or step-down purposes. This arrangement provides the further advantage of rendering the emitted light readily variable in intensity, which is not possible with fluorescent lamps.

It is therefore one object of the invention to provide a lamp fixture with an improved hinged bracket structure having independently pivotable and adjustable arms.

A further object is to provide a lamp fixture with a miniature, high intensity, iodine quartz incandescent lamp bulb energized by a solid-state, transistorized dimmer circuit from an alternating current supply line.

For further comprehension of the invention and of the advantages and objects thereof, reference will be had to the following description and accompanying drawings and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

FIGURE 1 is a side elevational view partially in section of a lamp assembly embodying the invention, parts being broken away and other parts being removed to show internal construction.

FIG. 2 is a fragmentary bottom plan view of the lamp housing.

FIG. 3 is an enlarged perspective view of parts of a flexible link and part of one bracket arm.

FIG. 4 and FIG. 5 are perspective views of two different flexible links.

FIG. 6 and FIG. 7 are enlarged sectional views on the lines 6—6 and 7—7 respectively.

FIG. 8 is an exploded perspective view of parts of the lamp housing.

FIG. 9 is a diagram of the electric circuit employed in the lamp assembly.

Referring first to FIGS. 1, 2 and 3, there is shown lamp assembly 10 including a jointed bracket comprising inner rigid tubular arm 11 and outer rigid tubular arm 12. Arm 11 is journaled on a pivot pin 13 threadedly engaging a hollow support 14, for limited angular displacement on a horizontal axis corresponding to the pivot pin axis. Bracket arm 12 is mounted on a hinge pin 15 threadedly engaging a fitting 16 at the upper and outer end of arm 11, the axis of hinge pin 15 being horizontal and parallel to the axis of pivot pin 13.

A lamp housing 18 is carried by arm 12. This housing has a substantially hemispherical reflector 20 open at its lower end. The reflector has a tubular axial neck 22 integral therewith. The neck has a circular end wall 24 provided with ventilation openings 25. A fitting 26 at the outer end of arm 12 is provided with a ball and socket connection 27 secured by nut 28 to one side of neck 22. By this arrangement the lamp housing is rotatable on a horizontal axis diametral of neck 22. Inside the reflector 20 is a bracket bar 30 secured by screws 32 engaged in threaded holes 33 at its ends to the housing diametrically of the neck 22; see FIGS. 1, 2 and 8. Secured to the center of the bar 30 by screws 34 seated in threaded holes 35 of the bar is a cylindrical socket 36. This socket has radially extending terminal lugs 37 to which electric wires 38 are connected. A miniature, high intensity, low voltage lamp bulb 40 can be screwed into the socket in a position axially of the housing 18.

The wires 38 pass through the ball connection 27 then through arms 12 and 11 and hollow support 14 in turn. The wires terminate at an electric circuit assembly 50 located inside a hollow stand or base 42 of the lamp assembly. An electric cord 44 is connected to the circuit assembly and terminates at a plug 46 which can be plugged into a suitable alternating current supply receptacle. On base 42 is provided a knob 48 which controls a combination ON-OFF switch and potentiometer 49 located inside the base and connected to the circuit assembly 50. The lamp can be run off a transformer located in the base and included as part of the electric circuit assembly 50 and controlled by an ON-OFF switch included in the potentiometer 49 or the separate circuit thereof.

At its lower end the hollow support 14 is provided with a boss 52 having a cylindrical bore through which pass wires 38. The boss 52 is rotatably anchored in the top of the base 42 so that the support 14 can be adjustably rotated on a vertical axis on the base. The base has a bottom plate 54 which can be attached by screws 55 to a suitable supporting surface S. Alternatively the base can be attached by a suitable screw clamp (not shown) to surface S.

The hollow support 14 is formed at its top with an opening 60 suitably dimensioned to permit a substantially 90° movement of arm 11 on pivot pin 13 between a substantially vertical position and a substantially horizontal position, as indicated in FIG. 1. Access to the interior of the support 14 is provided for by a removable cover 63 which constitutes one side of the support and is removably secured in place by means of bolts 61 threadedly engaged in holes 64 of the support. The interior of the support is divided by a transverse partition 65 having an opening 66 into an upper or cam compartment 67 and a lower or spring compartment 68.

A coil compression spring 69 preferably of uniform diameter is confined in the lower compartment 68 with the upper end of the spring bearing on partition 65 in

substantial alignment with the opening 66. A dished spring fitting 70 suitably dimensioned so as to be telescopically received easily within the spring bore is provided with an annular seat 71 for engaging the end of the spring and compressing the spring against the partition 65 after the manner shown in FIG. 1. The spring fitting is provided with a central hole 72 suitably dimensioned to permit wires 38 and a flexible link section 73 to be threaded there-through coaxially of spring 69; see FIG. 3. Link section 73 has an eye 74 at its lower end; see FIG. 4. Eye 74 is engaged on and receives a pin 75 passing through the eye. The pin is anchored in fitting 70.

Link section 73 is part of a two-part link assembly 80 as shown to best advantage in FIGS. 1, 3, 4 and 6. Both link sections 73 and 76 are flexible metal ribbons of fixed length. The link assembly 80 however is self-adjustable in length by means of a coil spring 82 which has loops 83 at opposite ends engaged in a hole 84 at the upper end of link section 73 and in a hole 85 at the lower end of link section 76. An eye 86 is formed at the upper end of link section 76. A pin 88 engaged in this eye is anchored to opposite sides of hinge housing 90 formed as a fitting on the upper, inner end of arm 12. The link assembly 80 thus extends from the bottom of spring 69 in support 14 longitudinally up through arm 11 and terminates at arm 12 a short distance radially above pin 15. If an upward pull is exerted on the link assembly by turning arm 11 down or clockwise as viewed in FIG. 1, this pull will be transmitted via link section 73 to pin 75 and then to the bottom of spring 69 so as to compress the spring axially. The wires 38 which pass through the spring 69 and fitting 70 do not interfere with compression of the spring or movement of the link section. The relative tensions of springs 69 and 82 so selected and adjusted that spring 69 yieldably bears the load when arm 11 along with the arm 12 and lamp housing 18 are rotated about pin 13. Link section 73 bears against a curved camming surface or rim 91 of a cam 92.

Cam 92 is located in the upper compartment 67 of support 14. The cam is journaled concentrically on the pivot pin 13 for limited angular displacement on the pivot pin axis. The link section 73 engages the curved cam surface 91 in running relation thereto which serves to maintain the link assembly in determined radially spaced relation to the cam or pivot pin axis. The curved cam surface 91 has such a radius that the longitudinal axis of spring 69 is tangent to or substantially tangent to the cam surface throughout the arc of movement of the cam. Thus the direction of pull on spring 69 by the link assembly will at all times coincide with the spring deflection axis so as to maintain uniform action of the spring, but the spring deflection will be directly proportional to the angle of movement of the cam.

A segmental fitting 100 integral with and forming part of cam 92 serves as a combined closure for the opening 60 in support 14 and as a socket for threadedly receiving the arm 11. To this end, the fitting 100 is provided with a circular rim portion 101 concentric with the rotational axis of the cam in radially spaced relation to the cam rim 91 so as to provide an annular passage 102 along which the link section 73 may move as the cam is angularly displaced. The passage 102 at one end receives hollow arm 11 through which the link assembly 80 extends from its point of tangency with cam rim 91.

Although there is little if any tendency for the link section 73 to move axially of pivot pin 13 and hence out of passage 102 provision is made for closing the side opening of the passage by means of a cover plate 106 of suitable configuration which is removably secured to the cam by means of bolts 107 let through openings in the cover plate into threaded engagement with the cam and its extension 100.

Arms 11 and 12 terminate each at its hinge end in semi-circular hinge housings 109 and 90, respectively, concentric with the hinge axis of hinge pin 15. The housing 109

is provided with threaded fitting 16 threadedly engaging the end of lever arm 11 while housing 90 is provided with a similar fitting 110. Spring washers 112 are mounted on hinge pin 15 between the head thereof and one side of hinge housing 90 to permit varying the compression pressure on the hinge housing and hence the resistance offered to freedom of movement of the lever arms on the hinge pin, by suitable manipulation of the hinge pin which threadedly engages the housing 109.

A housing closure cover 120 of suitable configuration can be mounted on the housing 109 in overlying engagement with the circular rim flange 122 of the housing and the fitting 16. The cover 120 is apertured at 123 for the passage of cover retaining bolts 124 and let into threaded engagement with the rim flange 122 and fitting 16 respectively.

As will be apparent from FIG. 1, the link pin 75 fixes the location of connection of the link section 73 but it does not fix the location of connection of link section 76 since this section is attached to spring 82. Arm 12 can be rotated with respect to arm 11 without materially changing the tension on spring 69 since spring 82 will contract and expand according to the position of arm 12. If link assembly 80 has a fixed length as in the lamp structure of the prior patent mentioned above, then turning arm 12 down would tend to increase tension on spring 69 which in reacting would tend to pull inclined arm 11 to a vertical position. This undesirable action is avoided in the present invention, since arms 11 and 12 are substantially independently adjustable by the interposition of spring 82 between the link sections. Link section 73 always moves on cam surface 91 when arm 11 is turned around pin 13, but this action does not necessarily occur when arm 12 is turned on pin 15. In this important respect the invention departs from the mode of operation of the prior known lamp structure. Arm 12 thus has more freedom of motion than formerly.

FIGS. 5 and 7 show another link assembly 80' which can be substituted for link assembly 80. In assembly 80 coil spring 82' encircles juxtaposed ends of link sections 73' and 76'. A stop washer 150 is secured at the upper end of lower link section 73' just above spring 82'. Another stop washer 152 is secured at the lower end of upper link section 76' just below the spring 82'. The two link sections can slide longitudinally of each other to shorten and lengthen the link assembly by alternately compressing spring 82' and allowing it to expand. The spring action is opposite from that of spring 82 in link assembly 80 where lengthening the link assembly is effected by stretching spring 82 and shortening the assembly is effected by allowing the spring to contract. In both assemblies 80 and 80' however, the lengthening and shortening of the link assembly is accomplished under control of the coil spring which connects the two link sections of each assembly. Other parts of link assembly 80' corresponding to those of assembly 80 are identically numbered.

FIG. 9 shows circuit C employed in the lamp. In this circuit power supply cord 44 terminates in a plug 46 which can be plugged into a suitable alternating current supply such as a standard 115 volts, 60 cycles per second source. Switch 200 is an ON-OFF switch connected in series with wire 44' of the power line. This switch is part of potentiometer-switch 49. The switch is ganged with movable arm 202 of potentiometer 204. Knob 48 on base 42 of the lamp assembly 10 is conveniently accessible for control of the potentiometer switch. A semi-conductive rectifier 206 is connected in series with switch 200. The variable resistor portion of the potentiometer is connected between anode 208 of rectifier 206 and cathode 210 of another diode rectifier 212. The anode 214 of diode 212 is connected to wire 44' of the power line via a fixed current limiting resistor 216. Another diode rectifier 218 has its anode 219 connected to arm 202 of the potentiometer and its cathode 220 connected to gate 222

of a gate controlled silicon rectifier 224. This transistor-rectifier is normally cut off and not conducting except when it is triggered to conduct by application of a voltage of proper polarity and magnitude to gate 222. The base or anode 223 of the rectifier 224 is connected one terminal 226 of the lamp bulb 40. A smoothing capacitor 225 is connected between terminal 226 and secondary gate 228 of the rectifier. The other terminal 230 of the lamp bulb is connected to power line wire 44".

In operation of this circuit, the lamp bulb draws only D.C. current since the alternating current is rectified by rectifier 208 and diode 212 in a half wave rectifier arrangement. The current drawn from the line is divided between potentiometer 204 and the lamp bulb. The division is determined by the setting of the potentiometer arm 202. Thus intensity of emitted light is conveniently and uniformly controlled. The potentiometer switch 49 is arranged so that when knob 48 is initially turned the switch 200 will close and will remain closed in all other rotational positions of the knob 48 as the intensity of light is uniformly controlled. Initially the arm 202 will be located at point P on potentiometer 204 so that more current passes through diode 212 than through the lamp bulb. Gradually as the knob 48 is turned, arm 202 moves up toward point P' when full load will be applied to the lamp bulb. The rectifier 224 will be rendered conducting only when the voltage peaks applied via gate 222 approach maximum so that a non-flickering light is emitted by the lamp bulb. Capacitor 225 smooths out the voltage between voltage peaks to keep the lamp bulb at maximum brilliance for the voltage applied.

It will be understood that the circuit C is capable of transforming standard 115 volts, 60 cycles per second alternating current to lower voltages suitable for operating a miniature, high intensity incandescent lamp or an iodine quartz lamp at any intensity within maximum rated power dissipation specifications for the lamp. The circuit provides several advantages over conventional circuits since it employs no conventional massive step-down or variable iron core transformers. Since no iron core elements are required, this results in a substantial weight reduction as well as a substantial increase in useful life. The circuit can be potted to provide superior shock and vibration resistance characteristics. The efficiency of the circuit will be found superior over prior transformer circuits. The avoidance of inductors in the circuit avoids production of sparking at the terminals of switch 200 which increases its life. For a given size lamp bulb a smaller circuit package will be required, with consequent less heat dissipation in the circuit. The built in current limiting features of the circuit provide relatively slow turn-on which results in longer life of the lamp bulb.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

I claim:

1. A lamp assembly comprising a hollow base, a hollow support rotatably affixed to said base in axially vertical position, said support having an upper cam compartment and a lower spring compartment, an apertured wall separating said compartments, a first coil spring in the lower compartment surrounding said aperture and abutted at one end against the apertured wall, a link assembly comprising a pair of flexible ribbon-like link sections of fixed length and another coil spring joining said sections so that the link sections are movable relative to each other against bias in said other spring for lengthening and shortening the link assembly, one end of one of the link sections extending through the first coil spring and being connected at the other end of the first coil spring for compressing the same, a cam in said upper compartment mounted on a first pivot pin for limited angular displacement

on a normally horizontal axis, said cam having a curved rim portion in relatively movable engagement with said one link section for maintaining the same in predetermined radially spaced relation to said normally horizontal cam axis, an elongated first tubular arm connected at one end to said cam and extending outwardly therefrom for turning the cam, a second tubular arm, a second pivot pin pivotally connecting one end of the second arm to the other end of the first arm, a lamp housing rotatably supported at the other end of the second arm, said link assembly extending through the first arm, with one end of the other link section being joined to the second arm at a point spaced radially from said second pivot pin, whereby rotation of said first arm with respect to said support slides the one link section along said curved rim portion of the cam and compresses the first spring to balance the arms and lamp housing, at said first pivot pin and whereby rotation of the second arm moves the other link section with respect to the first link section against tension in the second spring to balance the second arm and lamp housing at said second pivot pin.

2. A lamp assembly as recited in claim 1, wherein said other coil spring is connected at opposite ends to other ends of the two link sections respectively so that longitudinal movement of the other link section away from and toward the one link section respectively stretches and contracts the said other coil spring.

3. A lamp assembly as recited in claim 1, wherein said other coil spring surrounds the other ends of the two link sections, said other ends of the two link sections slidably abutting each other, said other ends of the two link sections having stop members thereon abutting opposite ends of said other spring so that longitudinal movement of the other link section away from the one link section to lengthen said link assembly contracts said other coil spring, and so that longitudinal movement of the other link section toward the one link section to shorten the link assembly expands said other coil spring.

4. A lamp assembly as recited in claim 1, further comprising a socket supported in said lamp housing for receiving a miniature, high intensity low voltage incandescent lamp bulb, wires electrically connected in circuit with said socket and extending through said tubular arms and said support to said base, and a power rectifier and voltage reducing circuit in the base, said wires being connected to said circuit for supplying rectified current of reduced voltage to said lamp bulb.

5. A lamp assembly as recited in claim 4, wherein said circuit is a transistorized solid-state circuit having a potentiometer arranged to control intensity of light emitted by said lamp.

6. A lamp assembly as recited in claim 2, further comprising a socket supported in said lamp housing for receiving a miniature, high intensity low voltage incandescent lamp bulb, wires electrically connected in circuit with said socket and extending through said tubular arms and said support to said base, and a power rectifier and voltage reducing circuit in the base, said wires being connected to said circuit for supplying rectified current of reduced voltage to said lamp bulb.

7. A lamp assembly as recited in claim 6, wherein said circuit is a transistorized solid-state circuit arranged to control intensity of light emitted by said lamp.

8. A lamp assembly as recited in claim 3, further comprising a socket supported in said lamp housing for receiving a miniature, high intensity low voltage incandescent lamp bulb, wires electrically connected in circuit with said socket and extending through said tubular arms and said support to said base, and a power rectifier and voltage reducing circuit in the base, said wires being connected to said circuit for supplying rectified current to said lamp bulb of reduced voltage.

9. A lamp assembly as recited in claim 8, wherein said circuit is a transistorized solid-state circuit having a po-

tentiometer arranged to control intensity of light emitted by said lamp.

10. A lamp assembly as recited in claim 5, wherein said circuit includes an alternating current power supply line, said potentiometer being connected across said line power supply line, a gate controlled rectifier connected in series with the lamp bulb so that the rectifier and lamp bulb are connected in parallel with the potentiometer, whereby the intensity of light emitted by the lamp bulb is uniformly controllable by the potentiometer setting.

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