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3,333,094 7/1967 Steel..... 240/46.11

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[54] **AUTOMOBILE HEADLAMP**  
**10 Claims, 10 Drawing Figs.**

[52] U.S. Cl..... 246/46.07,

240/46.09

[51] Int. Cl..... F21v 15/02,

F21v 17/00

[50] Field of Search..... 240/46.03,

46.07, 46.09, 46.11; 313/110, 116, 117

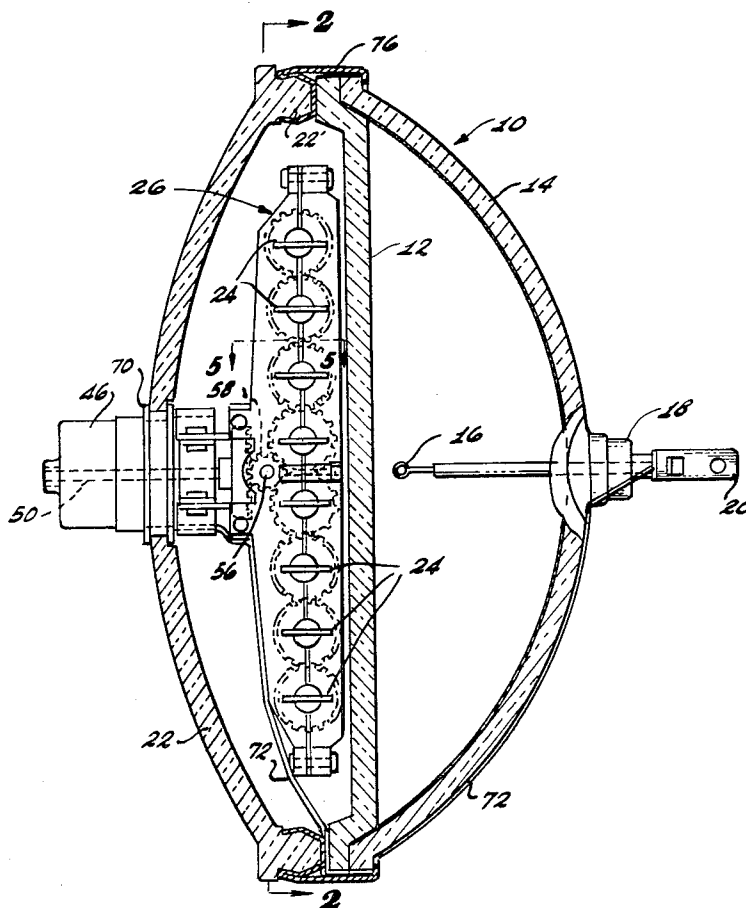
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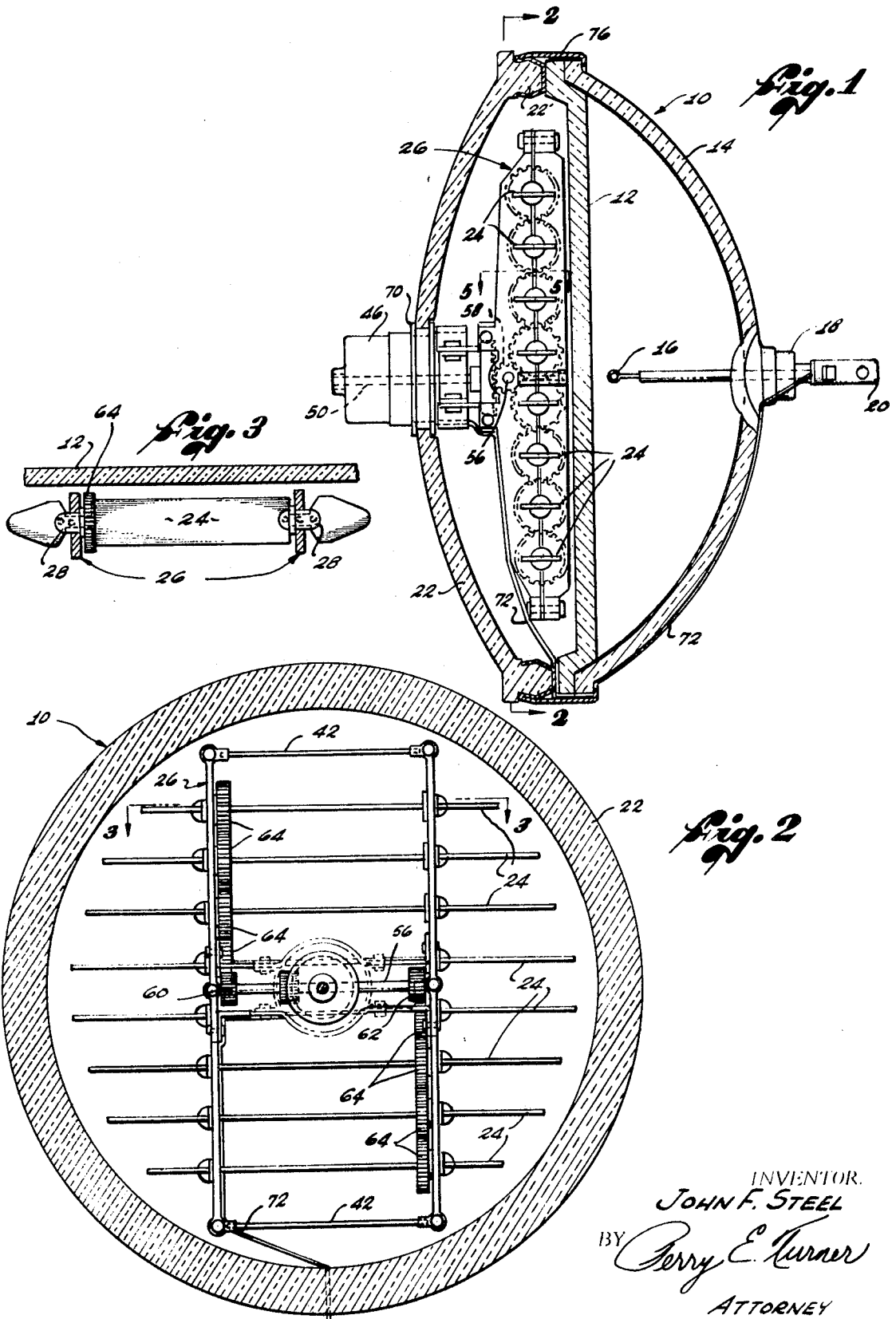
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**ABSTRACT:** A headlamp has a rear filament compartment and a forward compartment containing parallel louvers. The louvers above the axis are connected by gears near one side of the frame, and those below the axis are connected by gears near the other side of the frame. A transverse shaft, either the motor shaft or a shaft driven by a face gear on the shaft of a motor extending through the lens, carries end gears meshing the gears of the innermost louvers, which are between the motor and filament and prevent direct exposure of the motor to filament heat. Cushion elements prevent physical contact between the glass parts and the louver and motor assembly.





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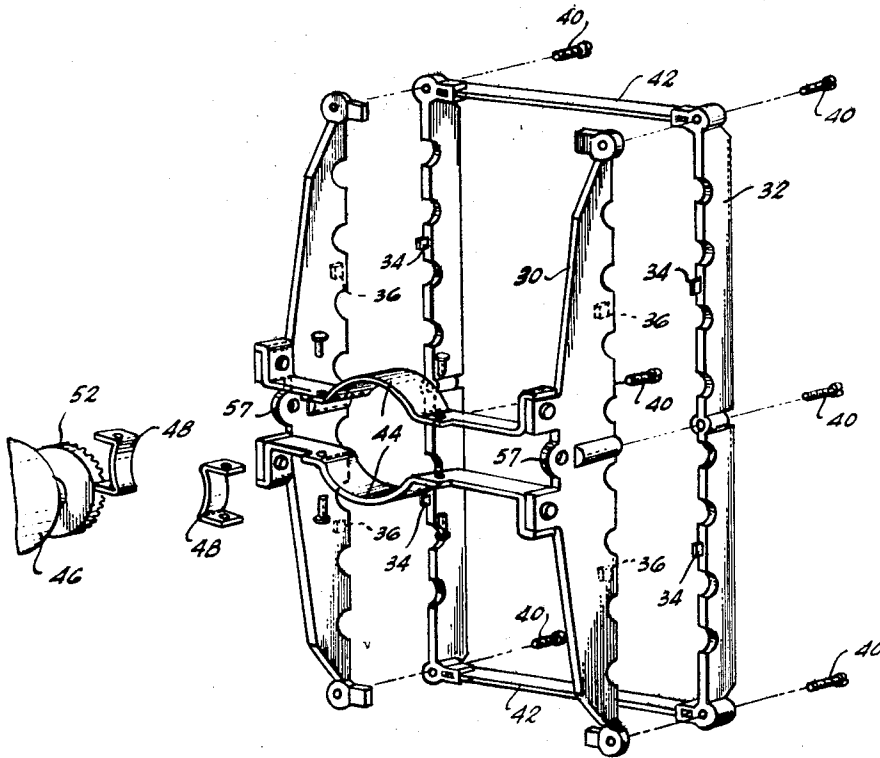


*Fig. 4*

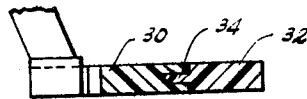
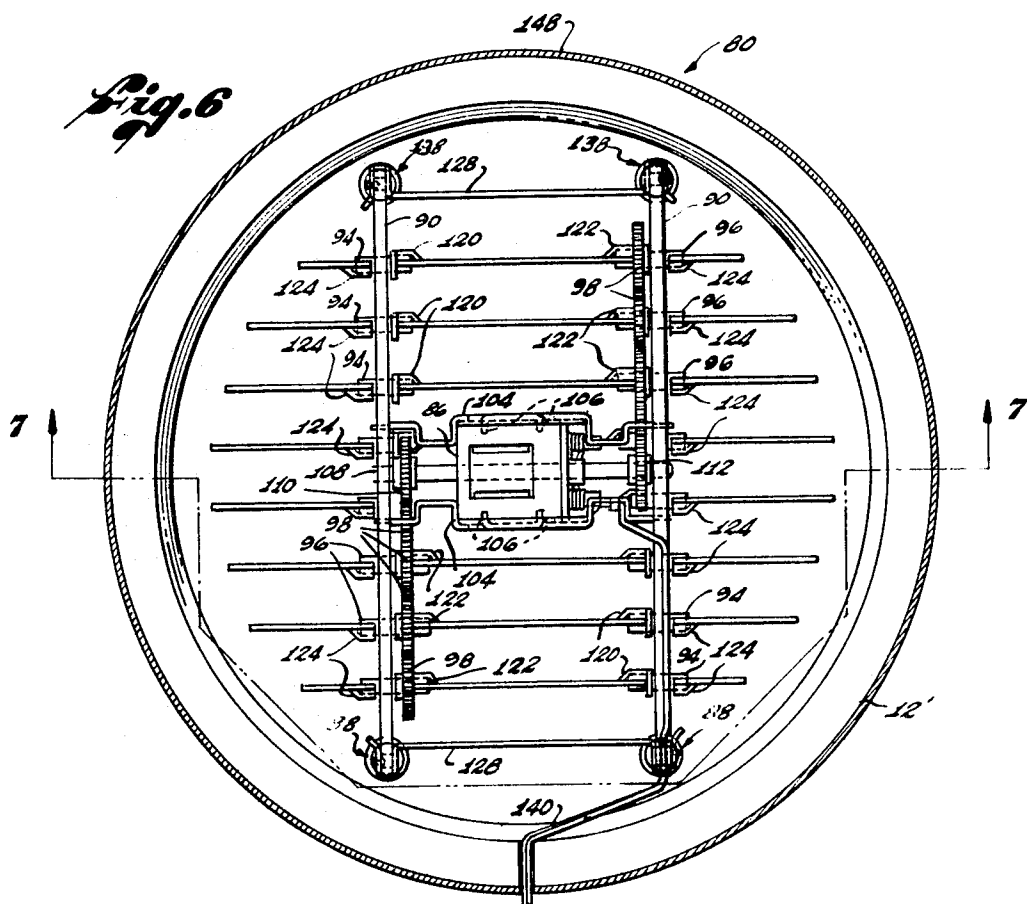
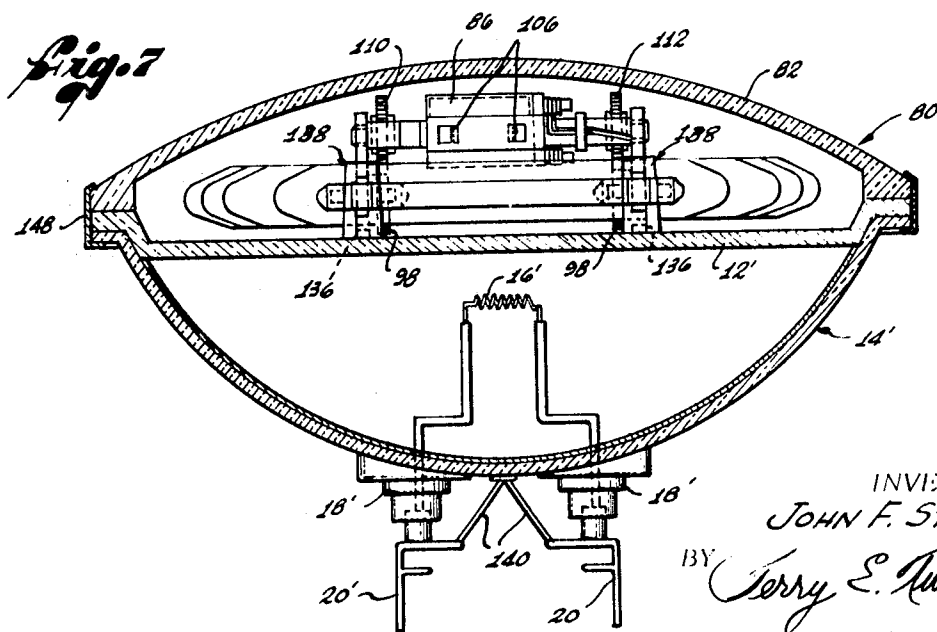


*Fig. 5*

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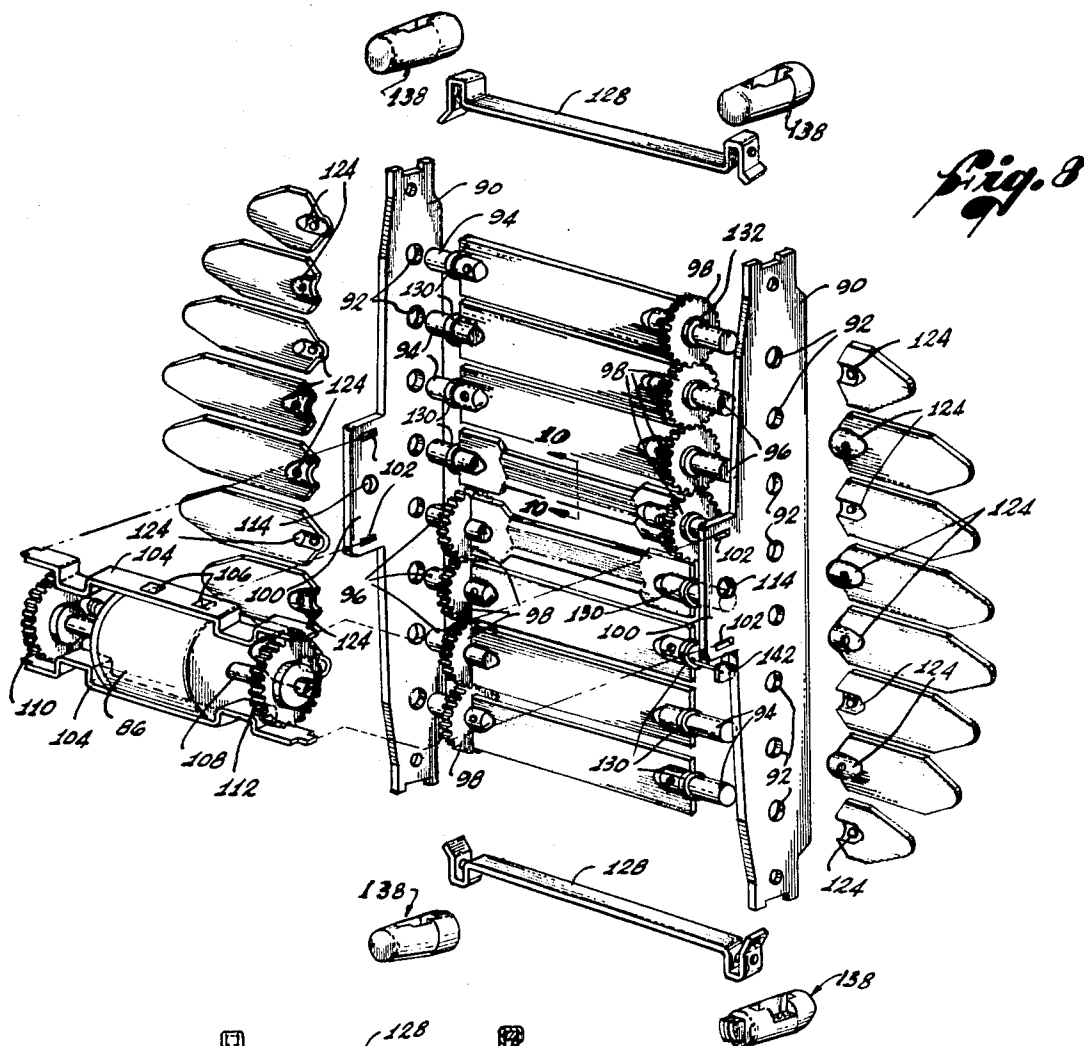


*Fig. 8*

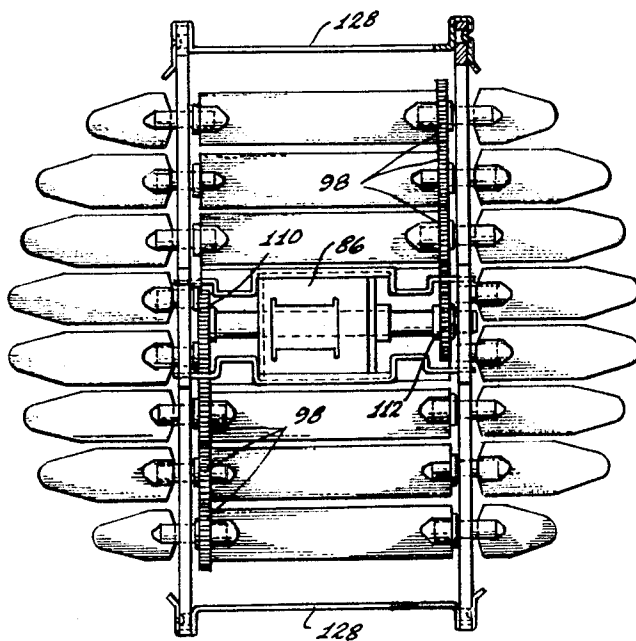
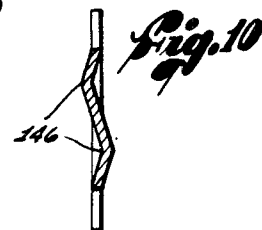


*Fig. 9*



## AUTOMOBILE HEADLAMP

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

This invention relates to automobile headlamps with built-in light-interrupting means for reducing glare.

## 2. Description of the Prior Art

The known prior art is that disclosed in may U.S. Pat. No. 3,333,094, entitled "Means for Removing Glare of a Light Beam," issued July 25, 1967. Said patent covers a headlamp having a filament in a rear compartment formed by a transparent plate that is heat sealed to the reflector, and a plurality of motor-operable light-interrupting louvers in a forward compartment formed by a lens that is secured to the transparent plate without such high heat, as with bonding material or mechanical-clamping means. Because the lens can be secured to the transparent plate at temperatures substantially below that required for sealing the transparent plate to the reflector, the louvers can be put in place after such fusing and without and possibility of heat damage to the louver assembly or to a motor therefor placed in the louver compartment.

In such a lamp, I have found the highest temperature in the louver compartment are those portions along and parallel to the lamp axis that are aligned with the filament. The hottest spot, which may reach 500° F., is the portion of the transparent plate nearest the filament. This factor indicates that a motor for the louvers should be located at one end of the frame in which the louvers rotate, where the ambient temperature is substantially lower, e.g., 350° F.

However, a motor placed at either end of the frame blocks a substantial portion of the beam from the reflector. Further, the very small space between the lens and transparent plate at the ends of a frame drastically limits the motor size, and needed drive connections to the louvers present in undesirably large load to such a small motor.

Still further, when any element in the louver compartment is in physical contact with the transparent plate or the lens, there is an undesirable transmission of vibrations from the louver and motor assembly to the glass. It is therefore desirable to provide means to prevent such vibrations from reaching any portion of the glass of the lens and transparent plate, while at the same time supporting the assembly so that it is stable in position and operation.

## SUMMARY OF THE INVENTION

My invention embraces a headlamp having a rear filament compartment and a forward louver compartment formed by a transparent plate between the reflector and the lens, wherein a motor is held by the louver support frame on the lamp axis, with louvers between the motor and filament, and wherein the louver and motor assembly is held in fixed position out of physical contact with the lens and transparent plate.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation view in section of an improved headlamp of my invention, showing the motor strapped to the frame and extending through a central opening in the lens;

FIG. 2 is a sectional view taken along the line 2—2 of FIG. 1;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is an exploded view of the associated portions of the frame and motor of the lamp of FIG. 1;

FIG. 5 is a sectional view taken along the line 5—5 of FIG. 1;

FIG. 6 is a front elevation view, partly in section, of another embodiment of a headlamp of my invention, wherein the motor is strapped to the frame with its shaft extending between the sides of the frame;

FIG. 7 is a sectional view taken along the line 7—7 of FIG. 6;

FIG. 8 is an exploded view of the louver and motor assembly of the lamp of FIG. 6;

FIG. 9 is a front elevation view of the parts of FIG. 8 after assembly, showing the louvers in beam blocking position; and

FIG. 10 is a sectional view along the line 10—10 of FIG. 8.

## DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

Referring to FIGS. 1-5, a headlamp 10 has a transparent plate 12 and reflector 14 which are heat sealed adjacent their peripheries, thus defining a rear compartment for a filament 16 which has its ends extending through insulator supports 18 to electric terminals 20 for connection to the automobile electrical system.

The lamp 10 has a lens 22 which is secured at its periphery to the transparent plate 12. Transparent plate 12 and lens 22 define a forward compartment for louvers 24 that are rotatably supported in the sides of a frame 26. As best seen in FIG. 3, each louver is composed of a center segment located between the sides of the frame and end segments outside the frame, such center and end segments being connected by journals 28, 29 which extend through and are rotatable in the sides of the frame. The louver segments may be formed of a thin strip of aluminum, which may be black enameled or anodized, or a strip of steel having a black oxide coating. Aluminum louvers may be of the order of 0.032 inch thickness; steel louvers may be 0.020 inch thick. The journals preferably are steel.

In this latter connection, and as can best be seen with reference to FIG. 4, the frame is a split frame formed of two sections 30, 32 having side portions in which the confronting edges have spaced, semicircular notches which, when the frame portions are secured together, define bearing surfaces for the journals. To aid assembly of frame portions 30, 32 to properly align their semicircular notches, they may be provided with suitable mating portions, such as spaced tongues 34 and grooves 36 in their confronting edges (see FIG. 5). The frame sections preferably are formed of material which insures excellent bearing surfaces for the journals, e.g., glass-filled nylon, powdered metal or the like.

Assembly of the louvers and frame is effected by placing the louvers with their journals resting in the semicircular notches of the rear frame portion 32, and then putting the forward frame portion 30 in place and securing the assembly together, as by threaded bolts 40. Rigidity of the frame is enhanced by braces 42.

The forward frame portion 30 carries motor support braces 44 extending between the sides thereof. The center portions of the braces 44 are curved to permit the end of the housing of a motor 46 to be inserted and held therebetween. Additionally, diametrically opposed motor tie-in frame elements 48 are positioned against the motor housing and are located between and secured at their ends to the frame braces 44.

Referring to FIGS. 1 and 4, the motor is shown positioned with its shaft 50 on the axis of the lamp 10. At its inner end, the shaft carries a face gear 52 which is adapted to rotate the louvers 24 simultaneously. In this connection, the referring to FIGS. 1-3, the ends of a louver drive shaft 56 are rotatable in the sides of the forward frame portion 30, as in tabs 57 between braces 44, and carries a spur gear 58 which meshes with teeth of the face gear 52. On the ends of the shaft 56 are gears 60, 62. One gear 60 is adapted to drive a gear train formed of respective gears 64 carried on the journals 28 of half the louvers 24. The other shaft gear 62 is adapted to drive a gear train formed of respective gears 64 carried on the journals 28 of the remaining louvers.

When the frame portions are secured together as above described, the transverse louver drive shaft 56 has previously been mounted in place on the forward frame portion. The louvers are positioned with their journals resting in the semicircular notches of the rear frame portion, with the gears of the upper half of the louvers being in mesh, and with the gears of the lower half of the louvers being in mesh. Further, each louver is thus positioned so that all louvers are either in fully

closed position, i.e., lying in a common plane, or in fully open position, i.e., in parallel planes. Then the forward frame portion is placed on the rear frame portion so that the gears 60, 62 on the ends of the shaft 56 respectively mesh with the gears 64 on the innermost louvers, whereupon the two frame portions are secured together. Then the motor housing is inserted between the braces 44, with the face gear 52 in mesh with the intermediate gear 58 on the shaft 56, and the tie-in frame elements 48 are secured in place.

With the louver and motor assembly thus completed, the motor housing is inserted through a central opening in the lens 22 (see FIG. 1). The housing extends through a seal ring or grommet 70, which has an outer channel or groove to snugly receive the surrounding wall portion of the lens. The sealing element may be a split ring or a single piece.

With the motor 46 thus held in the lens 22, the lens 22 is secured to the transparent plate 12. In a manner disclosed in my aforesaid patent, the lens is secured to the transparent plate at a temperature substantially below that required for heat sealing the transparent plate to the reflector 14. The lens and transparent plate may be secured together with a suitable bonding material that withstands the high temperatures encountered, e.g., silicone bonding material, at room temperature or such higher temperature as required for the bonding material. By thus securing the lens to the transparent plate without such heat as was required to fuse the transparent plate to the reflector, I avoid any possibility of heat damage to the frame, louvers, gears, and the motor and its leads while mounting such parts in place.

The motor leads referred to are indicated at 72 in FIGS. 1 and 2. Preferably one of the confronting faces of the lens and transparent plate is grooved, and the leads 72 are attached to one leg of the forward frame portion 30, and thence from the end of the frame and through the groove to the exterior of the lamp. As shown in FIG. 1, the leads 72 extend along the back surface of the reflector 14, and are connected at their ends to the electrical terminals of the filament 16. As explained in my aforesaid patent, the motor and filament circuits are thus connected in parallel to the same source of power, whereby the motor and louvers are in continuous operation while the dashboard control knob is positioned for operating the headlamps.

An additional feature which may be incorporated in the above-described assembly is a heat dissipating element 76 (see FIG. 1). As shown, the peripheral portion of the lens 22 has a pronounced rim 22', and a portion of the element 76 embraces the rim 22'. Thus, a substantial surface area of the element 76 is exposed to the interior of the louver compartment, whereby heat in such compartment is conducted to the exterior of the lens 22. Outside the lamp, the element 76 is shown with a band portion which spans the rim 22' and the peripheral portions of the transparent plate 12 and reflector 14, and its end is bent over the lip. By this means, there is a continuing dissipation of heat from the louver compartment during operation of the lamp.

The heat dissipating element 76 preferably is self-retaining and physically holds the lens 22 to the transparent plate 12. The portion of the element which embraces the rim 22' may be provided with a coating of silicone rubber to aid its placement and adherence to the rim. For the same purpose, the inner surface of the outer band portion of the element 76 is similarly coated. Desirably, the rim 22' and the portion of the element 76 into which the rim 22' fits are shaped to be self locking. In assembly, the element 76 is anchored on the reflector 14 as above indicated, and then the rim portion 22' of the lens 22 is forced into the mating portion of the element 76. Additionally, if desired, the parts may be bonded together by means of a suitable epoxy cement on the confronting radial faces of the transparent plate 12 and the element 76.

Referring now to FIG. 2, it can readily be seen that my louver and motor assembly is one in which there is minimum blockage to the reflected beam when the louvers are in fully open position. When the louvers are in fully closed position, substantially all of the significant part of the beam is fully

blocked. Due to the gear arrangements, adjacent ones of the upper louvers rotate in opposite directions, as do adjacent ones of the lower louvers. (The middle two louvers, of course, rotate in the same direction). But all arrive at their fully open and fully closed positions simultaneously. The motor operates the transverse drive shaft 56 at a speed, e.g., 3,400 r.p.m., such that the beam emerging from the lens 22 appears to the eye to be uninterrupted.

Although the motor 46 is supported on the lamp axis, and therefore in direct line with the filament 16, my arrangement is one which effectively screens the motor from direct exposure to filament heat. In this connection, it will be noted that the center segments of the two middle louvers are directly between the motor and filament. While these louvers are rotating, substantially all of that portion of the beam between them emerges from the lens, except that part with which the motor is directly aligned. Further, these center segments serve to substantially reduce the exposure of the motor to the filament heat.

Another advantage of my louver and motor assembly is that the loads on the ends of the louver drive shaft 56 are substantially equal. As will readily be seen upon inspection of FIG. 2, the gears on the ends of the drive shaft operate gear trains of equal makeup. Also, by thus driving the louver gears from the lamp axis, the load on the motor is at a minimum.

Referring again to FIG. 1, it will be noted that the edges of the frame nearest the transparent plate 12 are spaced from the transparent plate. The frame is thus floating with respect to the transparent plate. Rotation of the frame is prevented by the combined effects of the leads 72 and the friction between the grommet 70 and the lens and motor housing. The grommet 70, which preferably is a flexible element, e.g., of neoprene, silicone rubber or the like, serves as a cushion. Thus, the lens and transparent plate cannot be subjected to mechanical damage due to operation or vibrations of the motor and parts of the louver assembly.

Referring now to FIGS. 6 and 7, there is shown a lamp 80 wherein a transparent plate 12' is heat sealed to a reflector 14' to provide a compartment for a filament 16', the ends of which extend through insulator supports 18' to terminals 20', all as described for the corresponding parts in the preceding embodiment. In this embodiment, the lens 82 is to be secured to the transparent plate 12' (also without such heat as required for the fusion of the transparent plate to the reflector), does not have a central opening for the motor. In this embodiment a motor 86 is completely contained within the louver compartment. However, as in the preceding embodiment, the motor 86 is also supported on the lamp axis so as to present minimum interference with or blockage of the beam, and wherein there are louvers directly between the motor and filament to provide the type of protective heat screen heretofore mentioned.

Referring to FIGS. 8-10 along with FIGS. 6 and 7, the frame 88 is not a split frame, but is one in which the sides are single metal plates 90 having spaced openings 92, the walls in which provide smooth bearing surfaces of the louver journals 94, 96. As in the embodiment of FIGS. 1-5, one journal 96 of each louver carries an integral gear 98 at one end of the center segment of the louver, such gears 98 on the upper louvers being adjacent one side plate 90, and the gears 98 on the lower louvers being adjacent the other side plate 90.

The side plates 90 have forwardly extending portions 100 to which the motor 86 is secured. In this connection, the frame portions 100 have respective pairs of vertically spaced slots 102. The housing of the motor 86 is captured between diametrically opposed motor tie-in frame elements 104, the ends of which have small tongue extensions which enter the openings 102. The tie-in elements 104 capture the housing of the motor by virtue of tongue and groove arrangements wherein inwardly struck tongues 106 of both elements 104 extend into mating slots or grooves in the motor housing.

As shown, the motor 86 has a shaft 108 extending out of both ends of its housing, with respective gears 110, 112 car-

ried on its ends. As with the gears 60, 62 on the ends of the transverse shaft 56 in the embodiment of FIGS. 1-5, the gears 110, 112 mesh respectively with the gears on the innermost louvers. In the arrangement shown, openings 114 midway between the slots 102 are provided for the ends of the motor shaft 108.

The above-described parts are shaped and assembled in a novel manner. The center and end segments of the louvers are separate stampings, e.g., steel strips 0.020 inch thick, having a black oxide finish. When formed, depressions 120, 122 are stamped in the ends of the center segments to nestably receive the inner ends of the journals 94, 96. All of the end segments of the louvers, regardless of length, are stamped at their inner ends with identical depressions 124 to nestably receive the outer ends of the journals 94, 96, which extend the same distance past the outer faces of the plates 90.

For each center segment, the depressions 120, 122 are placed over and welded to the journals 94, 96. By means of suitable jigs, the center segments are assembled with the associated gears 98 in mesh and the motor 86 with the tie in elements in place are positioned with the motor shaft gears 110, 112 in mesh with the respective gears 98 of the center louver segments. Then the plates 90 are moved laterally inwardly and onto the journals 94, 96, the tie-in elements 104 and the shaft 108. To aid in holding this subassembly together and to provide rigidity, frame braces 128 are clipped over the ends of the plates 90. Then the subassembly and end segments of the louvers are moved together to nest the outer ends of the journals 94 in the depressions 124 and the metal in the depressions is welded to the journals. Preferably, and as shown, the depressions 120, 122, 124 are provided with shoulders which limit the inner positions of the ends of the journals therein. Also, I prefer to form the journals 94, 96 with annular shoulders 130, 132 to prevent the gears 98 and the opposite ends of the center segments from rotating against the plates.

After the above-described assembly is completed, it is positioned against the transparent plate 12' as shown in FIG. 7, and the lens 82 is secured in place. In this connection, the transparent plate 12' is shown provided with projections 136 to facilitate attaching the louver and motor assembly to the transparent plate, as by cushions or pads 138 (FIG. 8) fitted over the ends of the braces 128 and the plates 90.

In this latter connection, each pad has an opening shaped to snugly fit over the end of the plate 90, and has a well in one end to fit snugly onto a projection 136. The pads are sufficiently long that when the lens is put in place, the forward ends of the pads are engaged by the lens, and the pads are compressed between the lens and transparent plate. Further, the length of the pads when thus compressed is such that no part of the plates 90 touches the transparent plate or the lens. Due to the noncircular shapes of the ends of the plates 90 (and braces 128) and the mating surfaces of the pads thereon, and since the pads are anchored to the transparent plate, the louver and motor assembly cannot be dislodged.

Additionally the pads, which are of a material adapted to withstand the high temperatures, e.g., silicone rubber, function as cushions. Thus, the glass of the lens and transparent plate do not touch any portion of the louver and motor assembly, and are cushioned against shock and vibrations from any of the parts of such assembly.

Referring to FIGS. 6 and 7, the motor leads 140 are shown directed along the forward edge of one of the plates 90, and thence through a groove in the transparent plate 12'. As in the preceding embodiment, the leads 140 are directed along the back of the reflector 14' for connection to the terminals 20'. To aid in positioning the motor leads within the louver compartment, one of the plates 90 may be provided on one edge near the motor with a small leg or hook 142 (FIG. 8) around which the leads may be passed, and the pad 138 on the near end of that plate may be provided with a groove to snugly hold the leads. Of course, the leads are thus positioned and lead to the exterior before the lens is secured in place.

Referring to FIGS. 8 and 10, I show what may be done in a space so restricted that is cannot accommodate both the motor and center segments of the two middle louvers as wide as the remaining center segments. As shown, the middle portions of the segments confronting the motor housing as they rotate. For strength such center segments maybe shaped with longitudinal corrugations, indicated at 144. Alternatively, of course, I may use a greater number of louvers with identical rectangular center segments thus reinforced.

As in the manner previously described, the lens 82 may be secured to the transparent plate 12' with a suitable bonding material. Alternatively, or in addition, these parts may be secured together by a metal band 148 (FIGS. 6 and 7). As shown, the band 148 spans the peripheral edges of the lens 82, transparent plate 12' and reflector 14', and has its ends turned against the remote lips of the lens and reflector.

Due to high ambient temperature within the louver compartment of such lamps, e.g., 350° F., and due to the fact that the hottest spot, i.e., the portion of the transparent plate nearest the filament, is a somewhat higher temperature, e.g., 500° F., I prefer that all parts be made of material which withstand even higher temperatures, and wherein the moving parts will operate reliably at the temperatures encountered. Therefore, it is to be understood that my invention embraces the use of stationary and moving parts of rigid plastic materials capable of functioning reliably at such temperatures. For the same reason, while materials mentioned herein for sealing and/or cushioning purposes are known which withstand temperatures well above 500° F., my invention embraces such element made of any synthetic materials which will withstand such heat.

From the foregoing, it will be apparent that various modifications can be made in the embodiments illustrated and described without departing from the spirit and scope of my invention. Accordingly, I do not intend that my invention be limited, except in accordance with a reasonable interpretation of the appended claims.

In the claims:

1. In an automobile headlamp of the type including a reflector and a transparent plate secured at their respective peripheries to define a rear compartment, a lens secured to an opposite peripheral surface of the plate to define a forward compartment, an incandescent filament disposed in the rear compartment to project a light beam through the plate and the lens, and a plurality of rotatable louvers mounted within the forward compartment on a frame, the improvement in combination therewith comprising a motor for rotating the louvers through drive means at a speed such that the light beam appears uninterrupted, the motor being supported on a frame integral with the louvers support frame and being disposed centrally with respect to the lens and within the forward compartment.

2. An automobile headlamp according to claim 1 wherein the motor extends through an opening in the central portion of the lens but out of physical contact with the lens and the plate.

3. An automobile headlamp according to claim 2 wherein the motor is further supported by an annular resilient element disposed in the opening in the central portion of the lens.

4. The combination of claim 1, wherein said frame means has parallel side elements, and said louvers are parallel and each has center and end segments;

respective journals between each end segment and the ends of the associated center segment,

said journals extending through said side elements and rotatable therein;

a horizontal louver drive shaft on the axis of said lens;

a gear on each end of said shaft;

gears on the journals of the louvers above said shaft being rotatable from one of the shaft gears;

and gears on the journals of the louvers below said shaft being rotatable from the other shaft gear.

5. The combination of claim 4, wherein said shaft is the shaft of said motor.

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6. The combination of claim 4, wherein said motor has a shaft on the axis of said lens;  
and gear means coupling said motor shaft and said louver drive shaft.

7. The combination of claim 5, including a housing for said motor having diametrically opposed slot;  
and tie-in braces with tongues extending into said slot,  
said braces being held in said side elements.

8. The combination of claim 7, including resilient pads attached to the ends of the side elements of said frame,  
said pads being compressed between said lens and transparent plate.

9. The combination, for an automobile headlamp or the like, of a louver and motor assembly comprising:  
a pair of spaced vertical plates each having an equal number of spaced openings therein,  
each opening one plate being coaxial with an opening in the other plate;  
a journal in each opening;  
a louver center segment extending between and welded to the inner ends of each pair of coaxial journals;  
a respective louver end segment welded to and extending

from the outer end of each journal;  
a respective gear on one journal of each coaxial pair,  
the gears on the journals above the center of said plates being adjacent one plate and meshed for simultaneous rotation,  
the remaining journal gear being adjacent the other plate and meshed for simultaneous rotation;  
a shaft rotatably supported at its ends in said plates with its axis parallel to a line through the centers of said plates;  
respective gears on said shaft meshing with the innermost journal gears;  
motor means for driving said shaft;  
and braces between said plates and supporting said motor means in fixed relation to said plates.

10. The combination of claim 9, wherein said shaft is the shaft of said motor means,  
said motor means having a housing with pairs of diametrically spaced openings;  
and tongues in said braces extending into said housing openings.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,604,922

Dated September 14, 1971

Inventor(s) John F. Steel

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 9, "in may U.S." should read --in my patent No.--.

Column 2, line 73, delete the second occurrence of ", and with the gears of the lower half of the louvers being in mesh".

Column 4, line 15, delete the extra sentence "While these louvers are directly between the motor and filament."

Column 4, line 57, "surfaces of the" should read --surfaces for the

Column 6, line 5, "the motor housing as they rotate" should read --the motor are made narrower so they will clear the motor housing as they rotate--.

Column 6, line 30, "such element" should read --such elements--.

Signed and sealed this 21st day of March 1972.

(SEAL)  
Attest:

EDWARD M. FLETCHER, JR.  
Attesting Officer

ROBERT GOTTSCHALK  
Commissioner of Patents