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HEADLAMP AIMER
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Our invention relates to means for aiming the head-lamps of motor vehicles or other conveyances. More particularly our invention relates to means for aligning headlamps of the type comprising an adjustable holder for a light projecting device of the reflector lamp type having an incandescent filament mounted at a definite, fixed location in the lamp envelope and a paraboloidal reflecting surface on the inner surface of the envelope. In such headlamps the holder provides an annular mounting seat for a mounting shoulder or shoulders on the peripheral portion of the lamp. The plane of the mounting seat on the holder and the mounting shoulder on the lamp is perpendicular to the axis of the paraboloidal reflector. The reflector axis, and thus the projected beam of light, may be aimed in a desired direction by adjusting the holder, as described in the U. S. Patent No. 2,146,314, D. K. Wright, issued February 21, 1939.

Another object of the invention is to provide simple, compact and efficient means for mechanically aiming headlamps of the above type. Another object of the invention is to provide means for mechanically aiming a pair of such headlamps so that the projected beams of light are parallel. Another object of the invention is to provide headlamp aiming means which is readily transportable and which requires a minimum of space for its use. Other objects and advantages of the invention will appear from the following detailed description thereof and from the accompanying drawings showing species thereof in which:

Fig. 1 is a fragmentary perspective view showing a pair of aiming devices embodying the invention mounted upon the headlamps of an automobile; Fig. 2 is a perspective view of one of the devices shown in Fig. 1; Fig. 3 is a similar view of another embodiment of the invention; Fig. 4 is a perspective view of a lamp support of a known type for which the devices of the invention are useful; Fig. 5 is a perspective view of another embodiment of the invention; Fig. 7 is a fragmentary, sectional view of a different type of support than that shown in Fig. 4 and means for removably securing an aiming device to said support, and Fig. 9 is a fragmentary, perspective view of a pendulum, pointer and scale useful in the embodiments of the invention shown in Figs. 1 to 6.

Referring to Figs. 1 and 4 of the drawings, the support for the reflector lamp is illustrated in detail in Fig. 4 wherein an annular, bowl shaped holder 10 having three orifices 11 therein is clamped onto the housing 12 by springs 13 and set screws 14 and 15. The springs 13 are secured to the housing 12. Said screws 14 and 15 engage with fixed, threaded sockets mounted at the top and side of said housing 12 and with ears 16 of holder 10. The holder 10 has a sloping portion which rests against a shoulder in the housing 12 in such manner that the holder 10 is movable with respect to the housing 12 when set screws 14 or 15 are turned. The housing 12 is rigidly bolted to a support in the shell 17 (Fig. 1) and has a passage therein to accommodate an electrical conductor terminating in a socket for the contacts of the reflector lamp. The lamp is clamped in the holder 10 by a holding ring which overlaps the peripheral portion of the lamp and which is fastened to the holder 10 by bolts engaging with the threaded holes in the ears 16 (only one of which is shown) of the holder 10. A trim ring covers the holding ring and has a tongue at the top thereof which engages with slot 18 on housing 12 and a projection at the bottom thereof which is bolted to the housing 12. This structure is well known and forms no part of the present invention.

Each of the headlamp aiming devices shown in Figs. 1 and 2 comprises a rigid, supporting plate 19 having equally spaced lugs 20 which engage orifices 11 of the holder 10. The perforated rim of the holder is 10 is the mounting seat or seating plane for the lamp. The shoulders 21 of the plate 19 rest against the rim of the holder 10. The lugs 20 and the shoulders 21 of the plate 19 are duplicates of these elements of the reflector lamp to be mounted in said holder 10 when aiming thereof has been completed. The seating plane of the holder 10 is normal to the longitudinal axis of said holder 10.

The plate 19 has an opening therein to accommodate the arm 22 having a hook 23 on the end thereof extending beyond the seating plane of the plate 19. Said arm 22 has transverse pins 24 and 25 extending therethrough on opposite sides of the plate 19 to limit the movement of said arm 22 with respect to the plate 19. A spring 26 is mounted on the arm 22 between the pin 25 and the back of plate 19. A rigid supporting frame comprising three metal brackets 27, 28, and 29 is fastened to the plate 19 in such position that the members 27, 28 and 29 are substantially normal to the seating plane of said plate 19. A spirit or bubble level 30 is supported on said frame member 28 by bolts 31 and 32. The bolt 32 passes through spring 23 which is compressed between member 29 and the spirit level 30, By
turning the nut on the bolt 32, the position of said spirit level 30 with respect to the seating plane of said plate 19 can be adjusted from a normal position to one at an angle thereto. By utilizing spirit level 30, aiming of the longitudinal axis of the holder 10 in a vertical direction and adjustment of the seating plane with respect to the vertical is readily accomplished as explained hereinafter.

The aiming units comprise means for establishing a reference line therebetween which is perpendicular to the straight ahead travel of the vehicle and parallel to the rear axle of the normal automobile. In the embodiment of the invention illustrated in Figs. 1 and 2, each of the units comprises a projector 34 for throwing a beam of light on a target 35 mounted on the other of said units. Said target 35 has a vertical hairline 36 thereon and said projector 34 has hairlines normal to each other and at 45° to the vertical. The projector 34 is so mounted on the frame 21, 28 and 29 that its axis of projection is parallel to the seating plane of the plate 19. The line 36 on the target 35 is spaced the same distance from said seating plane as the axis of projection of the projector 34. Thus, in each unit the line 36 is directly above the center of the projector 34.

Energy for the light source therein the projector 34 is obtained from the battery of the vehicle through the contact 37 which engages with a socket (not shown) in the housing 12. Insulated conductor 38 carries the current from said contact 37 to said projector 34. When a source of electrical energy is not readily available, as in automobile assembly lines, or the like, conventional flashlight batteries may be used in the projector 34.

In adjusting the holders 10 of the headlamps, the aiming units are used in pairs as in Fig. 1. Each unit is secured to the holder 10 in the headlamps by first resting the seating plane of the plate 19 against the rim of said holder 10 with the lugs 20 in the orifices 11. The arm 22 is then forced against the spring 26 until the hook 23 catches behind the inner edge of the holder 10. The force exerted by the spring 26 is sufficient to firmly clamp the unit in position. The top screw 14 of said holder 10 is then turned in the direction required to tilt the latter until the spirit level 30 indicates that it is in a horizontal position. If the spirit level 30 is normal to the seating plane of the plate 19 and the surface on which the vehicle rests is horizontal, then the seating plane of the holder 10 will be vertical and the longitudinal axis thereof horizontal. The axis of the reflector of the lamp mounted in said holder 10, when it is so adjusted, will be horizontal. The projected beam of light, due to the lens of the lamp, will be inclined downwardly 3 inches in 25 feet as is standard in aiming lamps of this type. When desired, the spirit level 30 is provided with a calibrated adjustment to correct for a sloping floor and to provide for different angles of declination of the beam from the horizontal, or both.

Similarly, the longitudinal axis of each of the holders 10 is aimed in a horizontal plane by turning the side screws 15. Thus, the point of intersection of the hairlines in the projected beam of light from each of projectors 34 may be brought onto the contrasting line 36 of the target 35 of the other of said units. When the holders 10 are so adjusted their longitudinal axes are parallel as are the axes of the paraboloidal reflectors in the lamps subsequently mounted in the holders 10. The beams of light emitted by lamp are then parallel to each other and the seating plane of each of the holders 10 is normal to the straight ahead travel of the vehicle. When desired, the targets 35 are calibrated, as shown in Figs. 1 and 3, to provide for adjustment of the seating plane of the holders 10 so that the parallel light beams from the lamps mounted therein are projected at any desired angle from the straight ahead travel of the vehicle.

After vertical and horizontal aiming of the longitudinal axis of each of the holders 10 has been completed, the aiming units are removed by releasing the hook 23. The reflector lamps may then be mounted on the headlamps.

The embodiments of the invention illustrated in Figs. 3 and 5 are similar in all respects to that shown in Figs. 1 and 2 except for the means of establishing the reference line between the units. In this embodiment of the device illustrated in Fig. 3, the reference line between the units, only one of which is illustrated, is established by a sighting arrangement consisting of a peep sight 33, a mirror 40 and an apertured member 41 having a hairline 42. Elements 39 and 42 are in the same plane and the hairline 42 on the target 35 of the opposite units coincides with hairline 42 in the mirror 40 of the unit through which the sight is made, then the seating plane of the holder 10 on which the plate 19 is mounted is normal to the straight ahead travel of the vehicle.

The aiming units illustrated in Fig. 5 are each provided with a sub-frame member 43 which is secured to the plate 19, as shown. A flexible strip 44, such as a phosphor bronze strip, is interposed between plate 19 and frame 43 to permit transverse movement of the latter with respect to the former. The frame 43 has spaced holders 45 and 46 bolted thereto at the free end thereof to accommodate a straight, rigid bar 47 extending from one unit to the other which serves as a reference line for the plates 19 of the aiming units. The holder 46 is rigid and has spaced cylindrical elements 48 welded to the thermostatic holder 49. The holder 45 is resilient and has a projection 49 thereon which is rounded in cross-section. The bar 47 is thus easily inserted into and removed from the holders 45 and 46 and is firmly clamped between the parts 48 and 49.

The spirit level 30 is supported by hinge 50 bolted to plate 18 and by the support 51 also bolted to plate 19. The relative position of the spirit level 30 and seating plane of the plate 19 is adjusted by turning the nut on bolt 32 as described in connection with the device illustrated in Figs. 1 and 2. Vertical aiming of the longitudinal axis of the holder 10 of Fig. 4 is accomplished in the same manner described in connection with Figs. 1 and 2. The frame 43 has a pointer 52 rigidly secured thereto which overlaps the support 51. The end of pointer 52 is opposite a calibrated scale 53 on plate 54 which is fastened to support 51. The position of the end of pointer 52 with respect to the relative position of the frame 43 and the seating plane of the plate 19. In aiming the longitudinal axis of the holder 10 when the aiming units are mounted on the headlamps, the side screw 15 thereof is turned until the end of the pointer 52 is opposite the proper line on the plate 54. Both units are similarly adjusted so that the reflector lamps subsequently mounted in the headlamps emit parallel beams in the direction of the
straight-ahead travel of the automobile, or at a desired angle to said direction.

Other means of establishing the reference line between the units are used, when desired. For example, a taut string or wire extending between the units over a support spaced from the plate 19 and passing over a calibrated scale on said support is useful for establishing such a line. This structure is illustrated in Fig. 6 of the drawings in which line 55 is held taut between the units by the spring 51, which passes over the support 57 and the calibrated scale 53. In those instances where the holder 10 is not capable of accommodating the hook 23, the holding ring for the reflector lamp may be utilized for the purpose of supporting the aiming unit on the headlamp in the same manner that the reflector lamp is supported thereby. This is shown in Fig. 7 of the drawings, in which the parts of the plate 19 which engage the holding ring 58 and the holder 10 have approximately the same dimensions and configuration as the corresponding parts of the holder 10 for apparatus illustrated in Fig. 7, the plate 19 is clamped between said holder 10 and the holding ring 58. The holding ring 58 is fastened to holder 10 by a number of spaced bolts and nuts 59, one of which is shown in the drawings.

While we prefer to refer the aiming device to a spirit level for the purpose of aiming the longitudinal axis of the holder 10 at any desired angle from the horizontal, we contemplate the use of other devices operated by gravity for this purpose. For example, as shown in Fig. 8, a pendulum 60 and pointer 61 may be used and adjustment of the position of thePART 2, 3, 4.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An apparatus for aiming a spaced pair of vehicle headlamps each having an adjustable lamp holder provided with a seating plane for peripherally supporting a reflector lamp, said apparatus comprising a pair of aiming units, one for each of said holders, said units comprising means for making contact with said seating plane, means for establishing a straight line between said units which is perpendicular to the straight ahead travel of the vehicle and means on each of said units for indicating the angular relation between the seating plane of said holder and said straight line, said line establishing means being so spaced from and so secured to said contact making means that the latter is movable in a horizontal angular path about its own center.

2. An apparatus for aiming a spaced pair of vehicle headlamps each having an adjustable lamp holder provided with a seating plane for peripherally supporting a reflector lamp, said apparatus comprising a pair of aiming units, one for each of said holders, said units comprising means for making contact with said seating plane, means for establishing a straight line between said units which is perpendicular to the straight ahead travel of the vehicle and means on each of said units for indicating the angular relation between the seating plane of said holder and said straight line, said line establishing means being so spaced from and so secured to said contact making means that the latter is movable in a horizontal angular path about its own center.

3. An apparatus for aiming a spaced pair of vehicle headlamps each having an adjustable lamp holder provided with a seating plane for peripherally supporting a reflector lamp, said apparatus comprising a pair of aiming units, one for each of said holders, said units comprising means for making contact with said seating plane, means for establishing a straight line between said units which is perpendicular to the straight ahead travel of the vehicle and means on each of said units for indicating the angular relation between the seating plane of said holder and said straight line, said line establishing means being so spaced from and so secured to said contact making means that the latter is movable in a horizontal angular path about its own center.

4. An apparatus for aiming a spaced pair of vehicle headlamps each having an adjustable lamp holder provided with a seating plane for peripherally supporting a reflector lamp, said apparatus comprising a pair of aiming units, one for each of said holders, said units comprising means for making contact with said seating plane, means for establishing a straight line between said units which is perpendicular to the straight ahead travel of the vehicle and means on each of said units for indicating the angular relation between the seating plane of said holder and said straight line, said line establishing means being so spaced from and so secured to said contact making means that the latter is movable in a horizontal angular path about its own center.

5. An apparatus for aiming a spaced pair of vehicle headlamps each having an adjustable lamp holder provided with a seating plane for peripherally supporting a reflector lamp, said apparatus comprising a pair of aiming units, one for each of said holders, said units comprising means for making contact with said seating plane, means for establishing a straight line between said units which is perpendicular to the straight ahead travel of the vehicle and means on each of said units for indicating the angular relation between the seating plane of said holder and said straight line, said line establishing means being so spaced from and so secured to said contact making means that the latter is movable in a horizontal angular path about its own center.

6. A device for aiming a vehicle headlamp having an adjustable lamp holder provided with an annular seating plane for peripherally supporting a reflector lamp, said device comprising a supporting member engageable with the seating plane of said holder, a frame mounted on said supporting member and means on said frame and spaced from said supporting member for indicating the angular relation between the seating plane of said holder and a line normal to the straight ahead travel of the vehicle, said supporting member being movable in a horizontal angular path about its own center.

7. An apparatus for aiming a spaced pair of vehicle headlamps each having an adjustable lamp holder provided with a seating plane for peripherally supporting a reflector lamp, said apparatus comprising a pair of aiming units, one for each of said holders, each of said units comprising means for making contact with said seating plane, means for clamping said unit to one of said holders, a light projector attached to said unit and having its axis of rotation parallel to the seating plane of said holder when said unit is clamped thereto and a target attached to said unit and having a contrasting line directly above
the center of said projector, said light projector also having intersecting hairlines thereon which are projected onto the target of the opposing unit for indicating when said seating plane is parallel to the reference line established between said units by said projector and said target.

3. An aiming device comprising a supporting plate having projects on the front face thereof arranged in a circle with shoulder portions at the sides of said projections, means for clamping said supporting plate to a headlamp holder with said projections fitting into orifices in an annular mounting seat, a frame extending outward from and normal to the back face of said plate, a level indicator carried by said frame and so disposed thereon as to indicate the position of said plate with respect to the vertical, means also carried by said frame for establishing, between said aiming device and a similar device mounted on the other headlamp of a vehicle, a reference line between the two devices which is perpendicular to the straight ahead travel of the vehicle.

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