J. H. WHITING.

DIRIGIBLE HEADLIGHT.

APPLICATION FILED AUG. 26, 1919.

1,360,841. **Patented Nov. 30, 1920.**

2 SHEETS—SHEET 1.

Fig. 1.

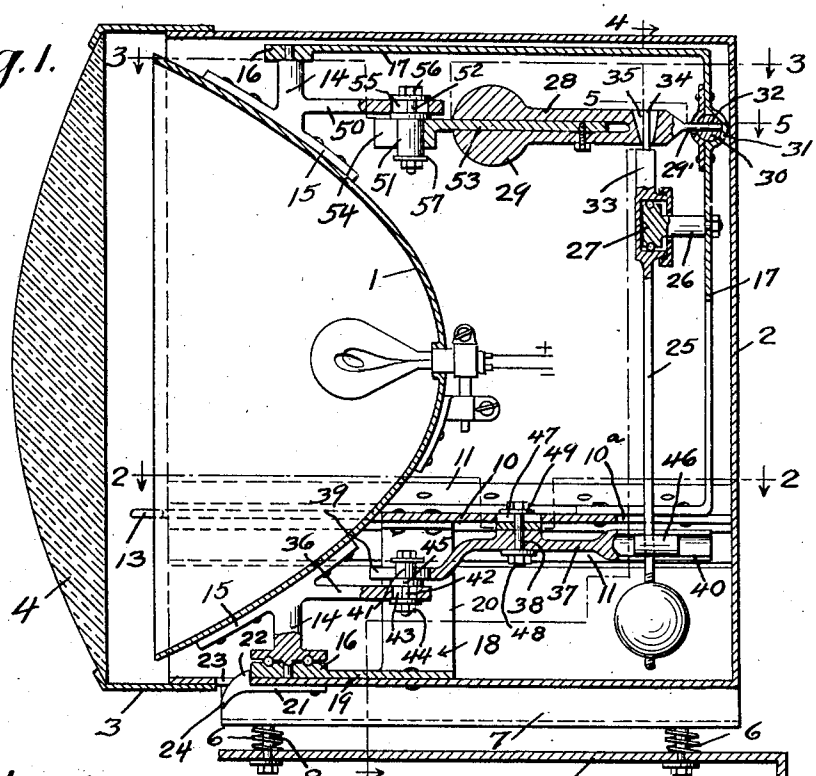


Fig. 4.

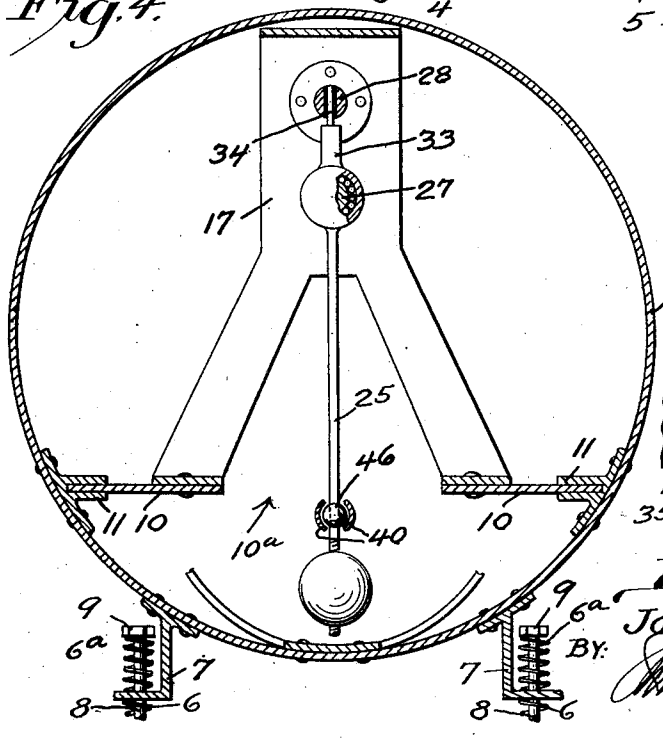
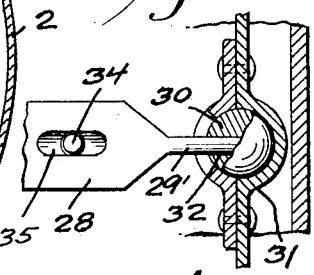


Fig. 5.



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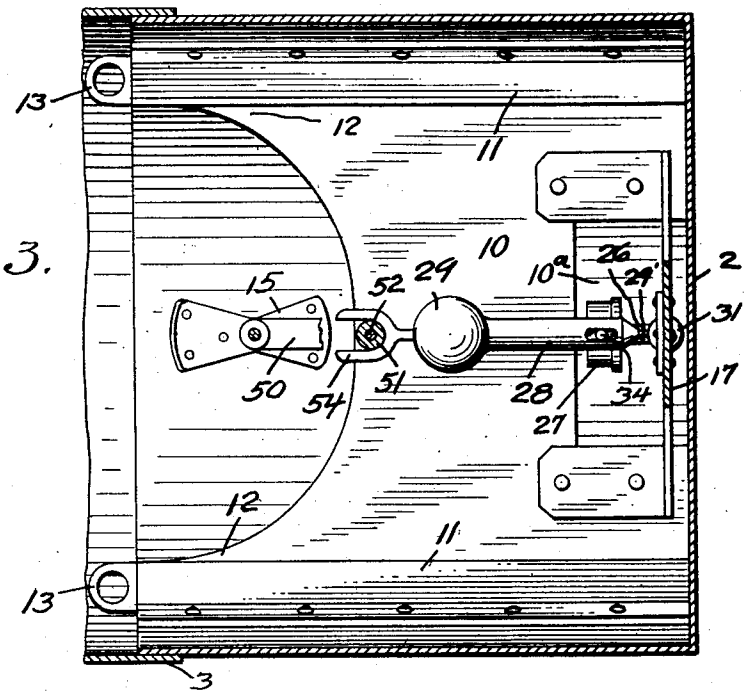
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2 SHEETS—SHEET 2.

Fig. 3.



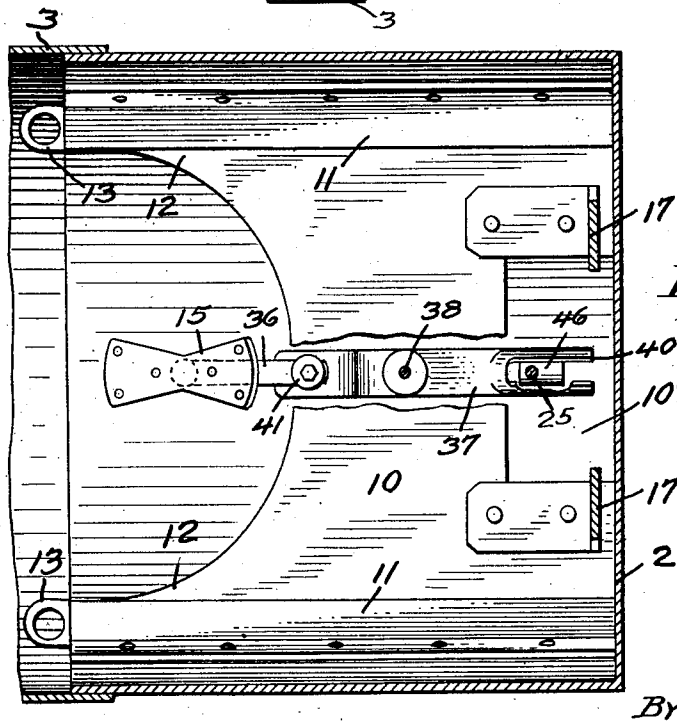


Fig. 2.

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UNITED STATES PATENT OFFICE.

JOHN HARVEY WHITING, OF PUNXSUTAWNEY, PENNSYLVANIA.

DIRIGIBLE HEADLIGHT.

1,360,841. Specification of Letters Patent. Patented Nov. 30, 1920.

Application filed August 26, 1919. Serial No. 319,883.

To all whom it may concern:

Be it known that I, JOHN HARVEY WHITING, a citizen of the United States, residing at Punxsutawney, in the county of Jefferson and State of Pennsylvania, have invented new and useful Improvements in Dirigible Headlights, of which the following is a specification.

This invention relates to improvements in dirigible headlights, proposing a construction which is especially applicable to locomotives and which includes automatically acting mechanism of the general type disclosed in my U. S. Letters Patent No. 1,156,263 of October 12, 1915 for causing the projected rays of light to follow the roadway, thereby to illuminate its curves in either direction as well as its straight portions.

The principal objects of the invention are to provide mechanism which shall at all times effectively control a movable reflector, maintaining it steady in any position and during any operative movement, irrespective of the normal vibrations or shocks to which the vehicle may be subject, yet which shall be certainly and sensitively responsive to the influence relied on for causing the movement of the reflector in either direction accordingly as the track may bend in one direction or the other; to provide such mechanism in self contained relation to the reflector whereby the entire operating structure may, as a unit, be readily fitted in or removed from the casing provided for its protection against the elements; and to make provision in mechanism of the character stated for facile adjustment of the range of swinging movement of the reflector.

With the above objects in view the invention consists in certain novel features of structure and combination to be set forth as the description proceeds.

An embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a vertical central sectional view of a headlight in which the features of the invention are incorporated.

Figs. 2 to 5 are sectional views on the respective lines 2—2, 3—3, 4—4, and 5—5 of Fig. 1.

Similar characters of reference designate corresponding parts throughout the several views.

The reflector 1 and its controlling mechanism are mounted in a protecting casing 2 which may be of the usual form and is provided with the usual movably mounted lens-carrying frame 3, the lens 4 providing a normal closure for the front end of said casing. The casing is supported on the front end of the vehicle, *e. g.* from the smoke box of a locomotive, by a suitable bracket 5 and it is preferably resiliently mounted in order that the transmission of vibration to the inclosed parts may be effectively reduced. For this purpose it may be supported by expansive vertical springs 6 which exert their thrust against the bracket 5 and against angle members 7 secured externally to the casing at its lower side. The springs 6 are fitted on posts 8 which are secured fast to the bracket 5 and project slidably through openings in the members 7 above which they carry reacting springs 6^a bearing against the members 7 and also against retaining nuts 9.

The parts of the mechanism are supported directly or indirectly by a horizontal plate 10 located in the rear of the reflector and serving to center the same relatively to the lens. For this purpose the side edge portions of said plate are slidably fitted in suitable guides 11 provided on the casing 2. The front edge of the plate 10 is of concave curvature to conform to the outline of the reflector; and said plate is provided with forwardly projecting portions 12 lying at the sides of the reflector and preferably terminating in beads 13 or otherwise formed to provide finger pieces by means of which the plate, and with it all the other parts of the unit, may readily be inserted in or removed from the casing 2.

The reflector 1 is mounted to swing about an axis which is normally vertical and is fixed in relation to the casing 2. This axis is determined by a pair of diametrically alining pivot posts 14 having plates 15 for their attachment to the reflector. The posts 14 turn in suitable bearings 16 carried by upper and lower brackets 17 and 18, the lower bearing 16 preferably being of end thrust type. The bracket 17 includes an upright portion attached to the plate 10 adjacent its rear edge and a horizontal arm overhanging said plate. The bracket 18 includes a horizontal arm 19 adjacent the lower side of the casing 2 and a semi-circular hanger 20 for attachment to the under side of the plate 10, the arm 19 projecting forward from the hanger 20.

In order to secure the unit in operative

position the casing 2 is provided with an externally attached spring latch 21 whose engaging end 22 operates through an aperture 23 and has a cam formation. When the unit is inserted into the casing the horizontal part of the bracket 18, acting on the cam surface of the part 22, depresses and rides over the latch 21 whose end 22 normally acts as a stop or detent in coöperation with the shoulder afforded by the front end of the arm 19. The part 22 is provided with a projecting finger piece 24 by which it may be manually moved below the arm 19 in order to permit the removal of the unit from the casing as occasion may require.

As is well known, the curves of railroad tracks are "banked," that is to say, the outer rail of the curve is suitably elevated relatively to the inner rail whereby the car or locomotive is tilted laterally while taking the curve; and these conditions are utilized in providing for the automatic movement and control of the reflector. The actuating element of the operating mechanism is a weighted pendulous rod 25 which is hung from a supporting post 26 projecting forward from the upright part of the bracket 17 and which always seeks a perpendicular position. The plate 10 has a clearance or opening 10^a through which the rod 25 projects. Through the other elements of the mechanism the rod 25 controls the angular position of the reflector. When both of the rails are at the same elevation, as for a straight track, the rod 25 and the axis 14 are in a common perpendicular plane taken longitudinally central of the reflector and the reflector is held in a position wherein its axial center A is in the said common plane, the rays of light thereby being projected straight ahead in an extension of said plane. However, when the locomotive or car leans in taking a curve, the casing 2 is tilted laterally relatively to the rod 25, which, maintaining its perpendicular position, will then extend at an angle to the axis 14, that is to say, the axis 14 is tilted laterally at an angle to the perpendicular plane while the rod 25 still remains in said plane; under such conditions the reflector 1 is pivotally moved about the then inclined axis 14 whereby the axis of the projected rays of light will be at a lateral angle to said plane and the rays will sweep across and illuminate the curved portion of the track. At the end of the curve the mechanism operates in a similar manner to restore the reflector to its normal position. The relative movement of the rod 25 about the post 26 should be without binding or sensible frictional resistance and for this purpose a suitable roller bearing 27 is provided. However, the rod 25 must not be responsive to normal vibrations or shocks, that is to say, it must be steady, or substantially so, in its normal, or any operative, position as well as in its operative relative movements. A counter-balance lever 28 is accordingly provided. This lever bears a weight 29 at its outer end and is so arranged and connected to the rod 25 that normal forces tending to move said lever and rod are rendered ineffective, the counter-balance lever acting to render the reflectors insensitive to small vibrations, road shocks or side sway of the engine upon which the headlight is mounted. The lever 28 projects forward and horizontally from the upright part of the bracket 17 and normally lies in the same perpendicular plane as the rod 25 and axis 14. At its inner end it is formed with a reduced axial stem 29 which has an axially slidable and also a pivotal relation to the bracket 17. For this purpose a universal joint connection is provided which comprises a ball 30 having a diametrical bore into which the stem 29 projects and an inclosing spherical socket 31 having a suitable opening or clearance 32 for the stem 29, the socket 31 being of any suitable construction and associated in any suitable manner with the upright part of the bracket 17. As shown in Fig. 5, said bracket is formed with a stamped recess which provides one half of said socket and the mating or companion half is formed in a plate secured by rivets or otherwise to said bracket. The rod 25 is provided above the post 26 with an alining extension 33 having a reduced axial tang 34 which projects through an opening 35 in the lever 28, the opening 35 flaring longitudinally from its lower to its upper end.

The relative pivotal movements of the rod 25 may be transmitted to either or both of the posts 14, the latter arrangement being disclosed and preferred. The connections which act on the separate posts, although having certain features in common, are not duplicates, but rather equivalents.

The lower post 14 is provided with a rearwardly projecting arm 36 preferably lying normally in the perpendicular plane common to the rod 25 and axis 14. A horizontal lever 37 pivoted between its ends as at 38 to the plate 10, and arranged below said plate, is employed as an operative connection between the rod 25 and the arm 36. Said lever has at its front end a fork 39 and at its rear end a fork 40. The arm 36 carries at its rear end a projection 41 which extends between the arms of the fork 39 and preferably comprises an anti-friction roller mounted on a stem 42, the latter projecting through a longitudinal slot 43 in the arm 36 whereby it may be adjusted lengthwise of said arm and being secured in position by a nut 44 coöperating as a clamping element with a bearing collar 45 fixed on said stem. The arms of the fork 40 are cross-sectionally

curved along axes of a circle and provide retaining bearings for a sliding and rocking block 46 of cylindrical form. The block 46 has a diametrical slotted opening through which the rod 25 projects. It will be apparent that a relative movement of the rod 25 about its pivot 26 in consequence of the tilting of the casing 2 as the locomotive or car leans in taking a curve will result in a movement of the lever 37 about its pivot 38, this, in turn, through the arm 36 rocking the reflector in the lateral direction in which the casing may be tilted, the degree of the movement of the reflector being dependent on the degree of tilt of the casing 2. The pivot 38 is mounted in the plate 10 for adjustment longitudinally of the casing 2 in order that the "throw" or range of movement of the reflector may be regulated as desired; said pivot accordingly projects through a slot 47 in said plate, being secured in position by a clamping nut 48 and coöperating collar 49.

The upper post 14 is provided with a rearwardly projecting arm 50 similar to the arm 36 and which at its rear end carries a projection 51, preferably comprising a friction roller mounted on a stem 52. The lever 28 is preferably utilized for the operation of the arm 50 and for this purpose is formed with an axial bore in which is rotatably secured a rod 53 terminating in a fork 54 located beyond the upright 29. The projection 51 extends between the arms of the fork 54 and is mounted for adjustment lengthwise of the arm 50 in order that the "throw" of the reflector may be regulated as desired. Preferably, the stem 52 projects through a longitudinal slot 55 in the arm 50 and is secured in position by a clamping nut 56 and coöperating collar 57. As in the case of the lever 37 and arm 36 a relative movement of the rod 25 about its pivot 26 in consequence of the tilting of the casing 2 as the locomotive or car leans in taking a curve will result in a deflection of the reflector in the lateral direction in which the casing may be tilted, the movement of the rod 25 being transmitted by its extension 33, through the lever 28 and fork 54, to the arm 50 and reflector 2.

The pivot 38 is adjusted rearward to increase the range of movement of the reflector and forward to decrease it. The stem 52, however, is adjusted forward to increase the range of movement of the reflector and rearward to decrease it. Where the operating connections are provided both above and below as shown, the regulation of the range of movement of the reflector requires adjustments in the manner described of both the pivot 38 and the sleeve 52. Provision for such regulation is desirable in view of variations in the engineering standards of different railroads for curves of the same degree and of the manifest advantage of selecting the range of movement of the reflector with reference to the "banking" of the curves of the particular road upon which the reflector may be used. The adjustment of the stem 42 is provided for, not with reference to regulation of the range of movement of the reflector, but merely as a precautionary measure and to eliminate any possibility of a binding action between the lever 37 and the arm 36, where said lever and arm function in connection with similarly functioning parts acting on the upper pivot post 14.

I claim:—

1. In a headlight, the combination with a casing, a removable and replaceable unit mounted therein and comprising a reflector pivotally mounted for lateral movement in either direction, a supporting element carrying said reflector, means for holding said element in a fixed position relative to said casing, automatic means carried by said element for moving said reflector, said automatic means including a pendulous weighted rod arranged to maintain a perpendicular position in any angular position of said casing and element, said reflector moving means including a counter-balance weight connected to said pendulous rod above its pivot whereby the rod will tend to maintain a perpendicular position under any minor sidewise impulse such as shifting, sidesway or vibration.

2. In a headlight, the combination of a casing having oppositely arranged guide channels, a horizontal plate having a sliding fit in said channels, thereby being removable from said casing, brackets carried by said plate, a reflector pivotally connected to said brackets for lateral movement in either direction, said plate having forwardly projecting grasping portions located at the sides of said reflector, and automatic means carried by said plate for moving said reflector, said automatic means including a pendulous weighted rod arranged to maintain a perpendicular position in any angular position of said casing and plate.

3. In a headlight, the combination of a casing, a horizontal plate removably fitted in said casing, brackets carried by said plate, a reflector pivotally connected to said brackets for lateral movement in either direction, one of the brackets having an upright portion, a pendulous weighted rod pivotally mounted in said upright portion for transverse movement in a vertical plane, a lever pivotally mounted in said upright portion for transverse movement in a horizontal plane, said lever projecting forward from said upright portion and having a counter weight at its outer end, said rod having an alining extension above its pivot, a pivotal movement-transmitting connection between said extension and said lever and

connections for transmitting movement from said rod to said reflector.

4. In a headlight, the combination of a casing, a reflector pivotally mounted therein for lateral swinging movement in either direction, a pendulous weighted rod mounted for swinging movement in a transverse vertical plane, a horizontal lever pivoted at a point in the rear of said rod and in normal perpendicular alinement with the pivot thereof for transverse swinging movement in a horizontal plane, said lever having a counter weight at its outer end, said rod having an alining extension above its pivot, a pivotal movement-transmitting connection between said extension and said lever, and connections for transmitting movement from said rod to said reflector.

5. In a headlight, the combination of a casing, a reflector pivotally mounted therein for lateral swinging movement in either direction, a pendulous weighted rod mounted in the rear of said reflector for swinging movement in a transverse vertical plane, a horizontal lever mounted in perpendicular alinement with the pivot of said rod for transverse swinging movement in a horizontal plane, a movement-transmitting connection between said lever and said rod above the pivot of said rod, and a movement-transmitting connection between said reflector and said rod below the pivot of said rod.

6. In a headlight, the combination of a casing, a reflector pivotally mounted therein for lateral swinging movement in either direction, a pendulous weighted rod mounted in the rear of said reflector for swinging movement in a transverse vertical plane, a horizontal lever mounted in perpendicular alinement with the pivot of said rod for transverse swinging movement in a horizontal plane, a movement-transmitting connection between said lever and said rod above the pivot of said rod, a movement-transmitting connection between said reflector and said rod below the pivot of said rod, and a movement-transmitting connection between said reflector and said lever.

7. In a headlight, a casing, a plate removably mounted in said casing, a pivotally mounted reflector having support from said plate, said reflector being movable about a vertical axis and having a rearwardly projecting arm, an actuating element having support from said plate and automatically responsive by gravity to changes in the angular position of said plate and casing, and operating connections between said actuating element and said arm, said operating connections including a counter-balance weight adapted to maintain said reflector against movement under conditions of minor sidewise impulses and vibration.

8. In a headlight, the combination of a casing, a reflector pivotally mounted therein for movement about a vertical axis, a pendulous weighted rod mounted for swinging movement in a transverse vertical plane, movement-transmitting connections between said rod and said reflector below the pivot of said rod and other movement-transmitting connections between said rod and said reflector above the pivot of said rod, the latter connections including a lever acting with counter-balancing effect on said rod.

9. In a headlight, the combination of a casing, a reflector pivotally mounted therein for movement about a vertical axis, a pendulous weighted rod mounted therein for swinging movement in a transverse vertical plane, and movement-transmitting connections between said rod and said reflector, said connections including an arm projecting from said reflector, a stem adjustably mounted on said arm, a forked rod adapted to cooperate with said stem and a counter-balance member mounted on said last-named rod, said counter-balance member being formed with an aperture therethrough whereby it is adapted to surround the upper end of said pendulous weighted rod.

10. In a headlight, the combination of a casing, a reflector mounted therein to swing about a vertical axis, a pendulous weighted rod mounted therein for movement in a transverse vertical plane, and movement-transmitting connections between said rod and said reflector including an arm projecting rearward from said reflector and provided with a projection, a horizontal lever pivoted intermediate its ends and having at its front end a fork for engagement with said projection, said lever also having a fork at its rear end and a block having an opening through which said rod projects, said block being mounted for rocking and sliding movement in the fork at the rear end of said lever.

In testimony whereof I have hereunto set my hand.

JOHN HARVEY WHITING.