

Jan. 4, 1944.

G. E. ROEDDING

2,338,541

LIGHTING FIXTURE

Filed May 4, 1942

6 Sheets-Sheet 1

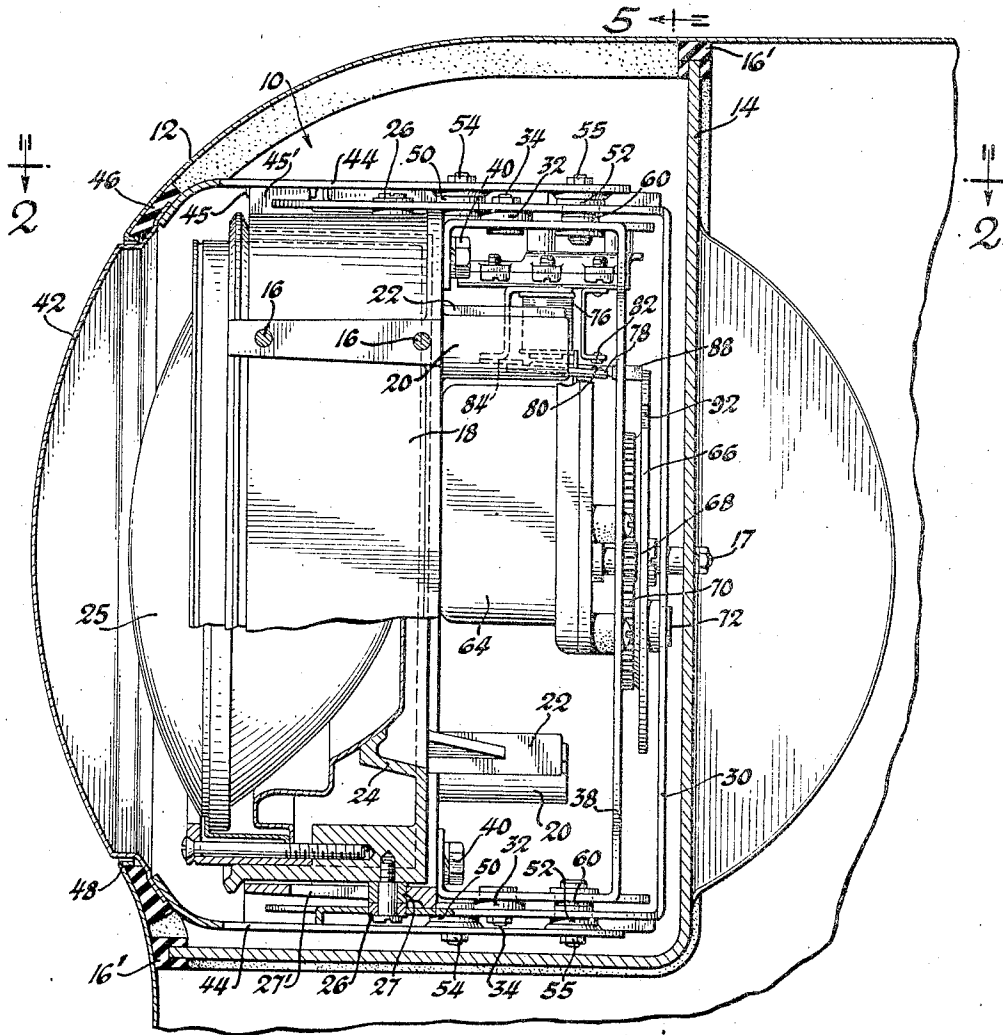


Fig. 1

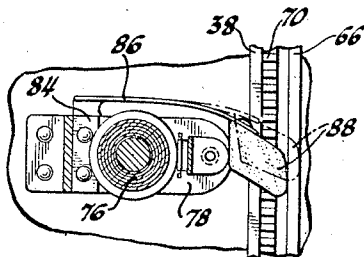


Fig. 7

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6 Sheets-Sheet 2

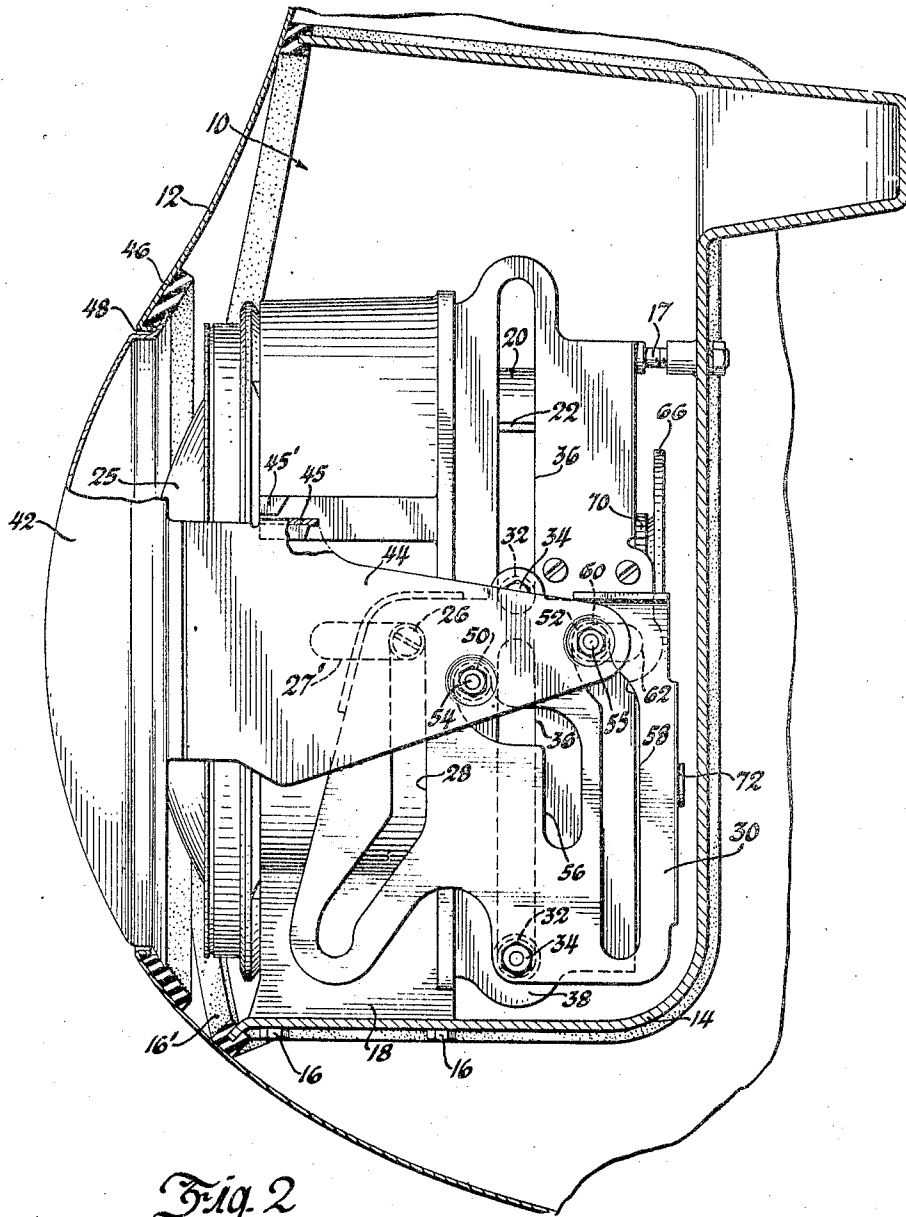


Fig. 2

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6 Sheets-Sheet 3

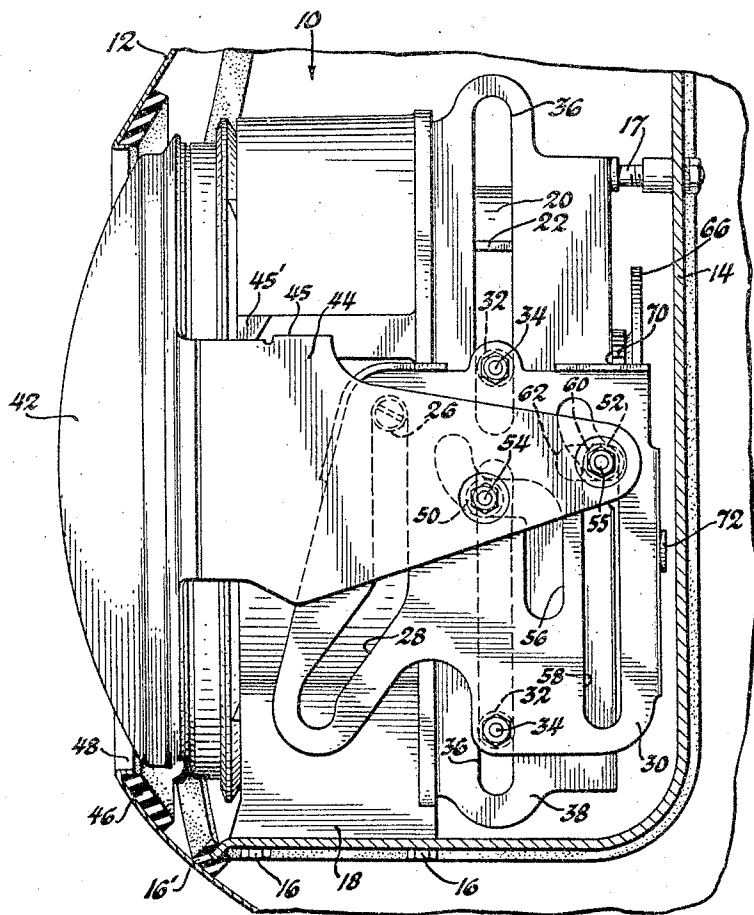


Fig. 3

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6 Sheets-Sheet 4

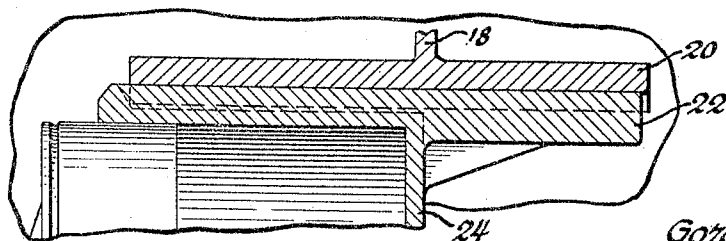
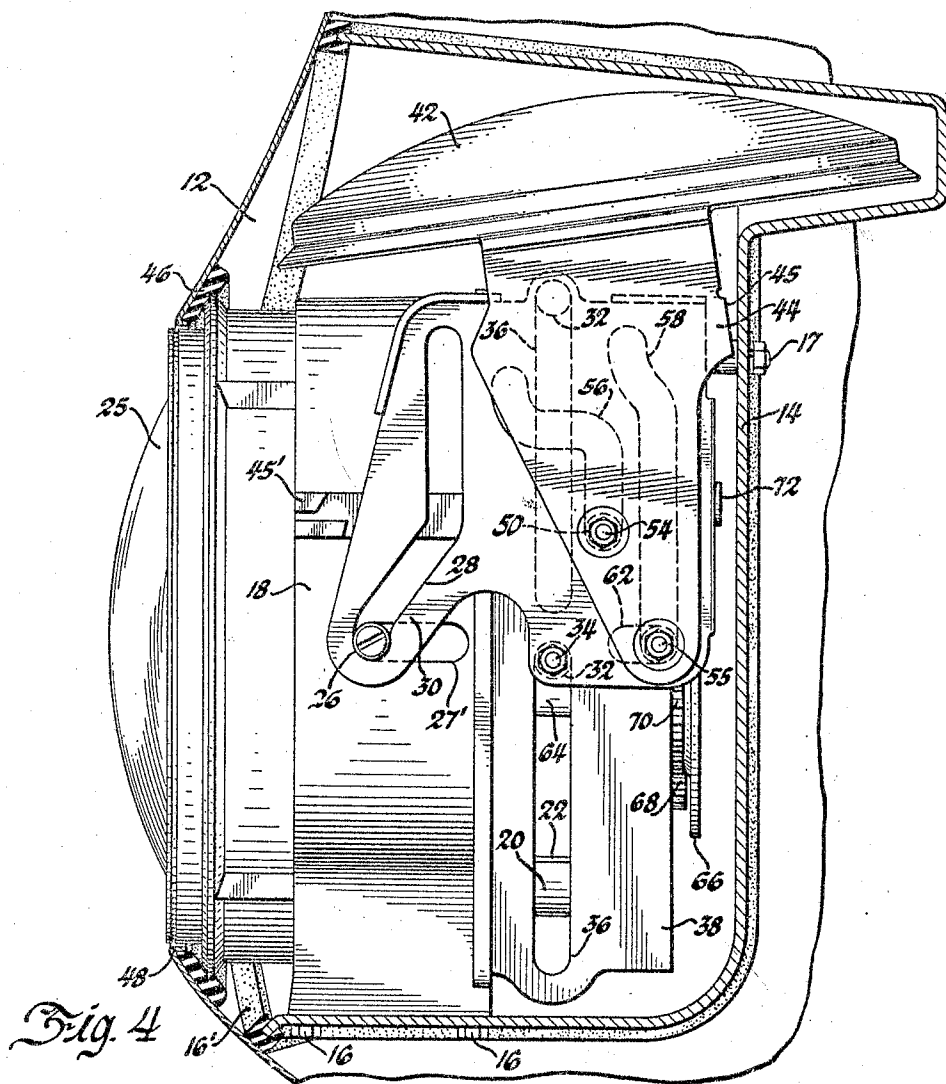


Fig. 8

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6 Sheets-Sheet 5

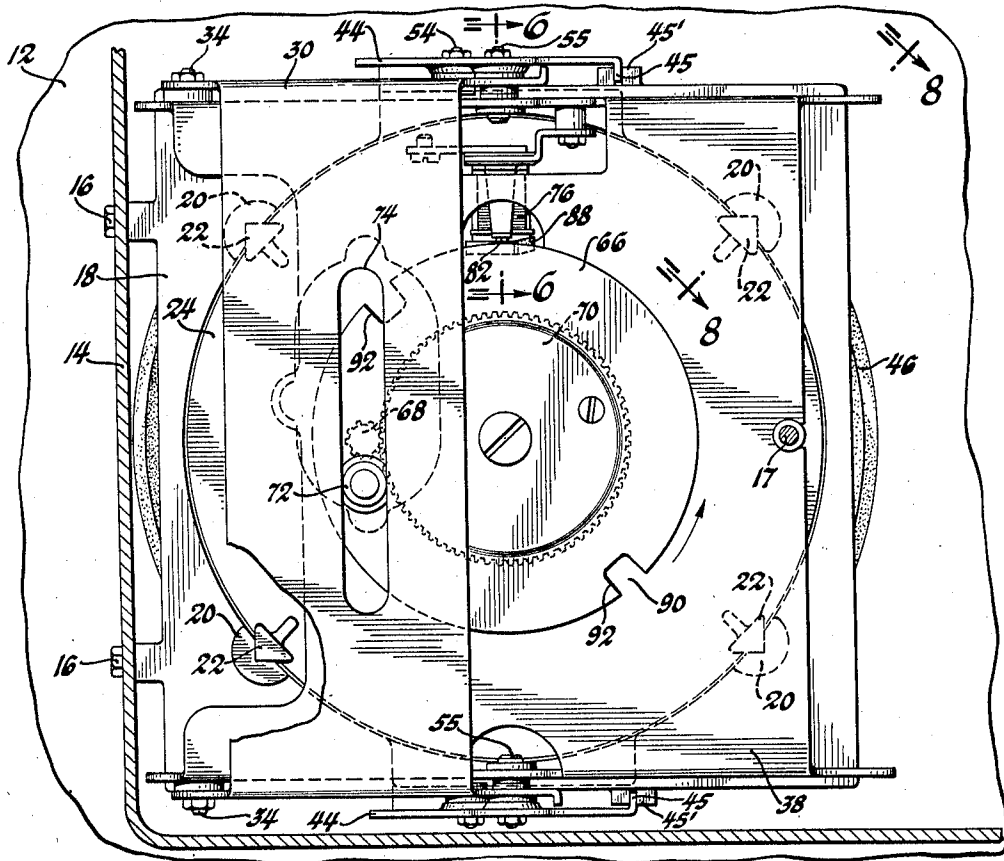


Fig. 5

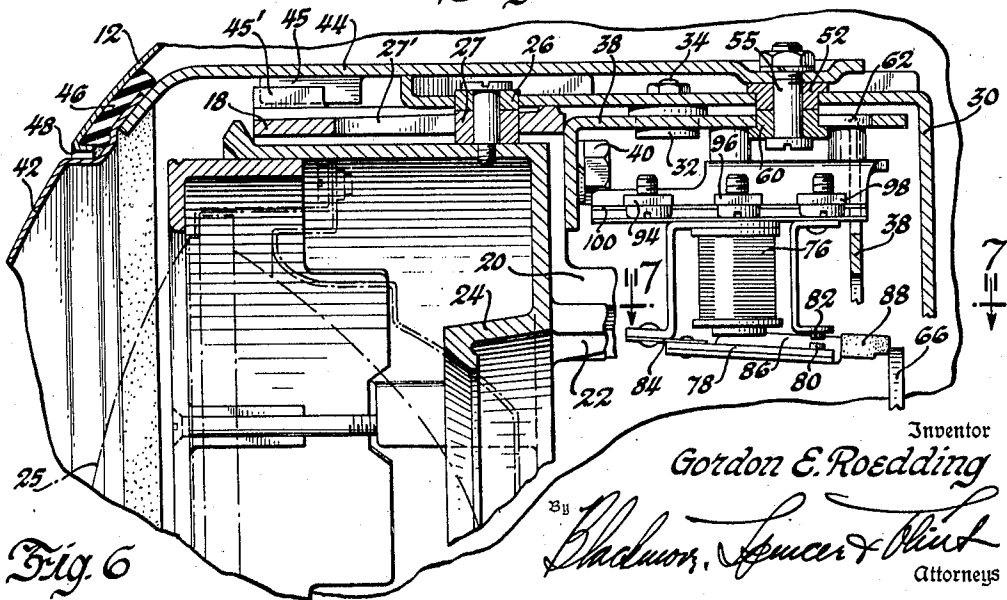


Fig. 6

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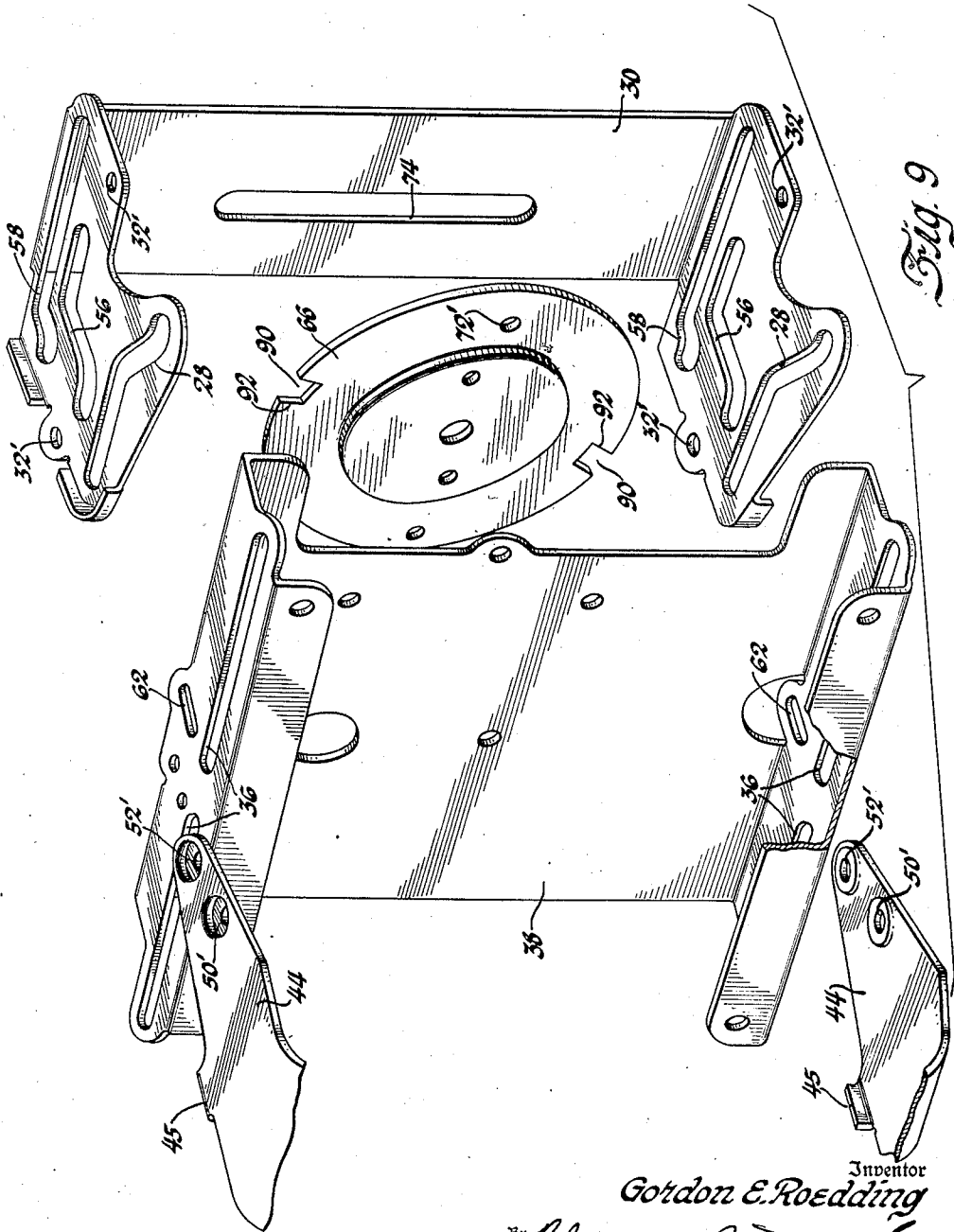
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6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

2,338,541

LIGHTING FIXTURE

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Application May 4, 1942, Serial No. 441,655

7 Claims. (Cl. 240—7.1)

This invention relates to a lighting fixture, the light emitting surface of which may be covered when the light is not in use, as in disappearing headlamps and retractable landing lights for aircraft.

It is the object of this invention to provide a "disappearing lamp" mechanism in which a shield or cover member for the light emitting surface is moved out of lamp covering position and the lamp itself is then moved into operating position. An electric motor may be provided to actuate the mechanism. More specifically, the lamp shield is reciprocated and pivoted out of lamp covering position after which the lamp is reciprocated into operating position. The various movements are correlated by a cam plate having cam slots therein, and the cam plate is actuated by a rotary drive plate.

Figure 1 of the drawings is a side elevation view with parts broken away and in section.

Figure 2 is a view in section substantially on line 2—2 of Figure 1.

Figure 3 is similar to Figure 2 except that the lamp shield is shown at the end of its reciprocating stroke and just prior to the start of the pivoting movement for uncovering the lamp.

Figure 4 is a top plan view showing the shield pivoted out of lamp covering position and showing the lamp in its operating position.

Figure 5 is a view in section substantially on line 5—5 of Figure 1.

Figure 6 is a view in section substantially on line 6—6 of Figure 5.

Figure 7 is a view in section substantially on line 7—7 of Figure 6.

Figure 8 is a view in section substantially on line 8—8 of Figure 5, and

Figure 9 is an exploded view in perspective of the bracket, cam plate, drive plate, and shield operating arms to show details of the cam slots and the relationship of these parts to each other.

Where the invention takes the form of a disappearing headlamp for a motor vehicle, as shown here, a housing space 10 may be formed by a portion of the vehicle body such as fender 12 and partition 14 secured to fender 12. Partition 14 may, if desired, be mounted in a resilient, substantially channel-shaped member 16'. A support 18 for the component parts of the operating mechanism may be secured to partition 14 in any suitable manner as by cap screws 19 and stud 17 (Figure 2). Support 18 is provided with a plurality of rails 20, one of which is shown in detail in Figure 3. Rails 20 provide sliding support for runners 22 of lamp mounting 24. Any of a num-

ber of conventional lighting units, such as unit 25, may be mounted in lamp mounting 24 by any conventional mounting means. It is not necessary to detail the lamp and its mounting means here. Lamp support 24 is provided with one or more projections 26 which are engaged in cam slots 28 of cam plate 30. The embodiment shown in the drawings is provided with upper and lower operating mechanisms which are substantially identical. It will, of course, be understood by those skilled in the art that, under some circumstances, it will suffice to provide the device with only one operating mechanism; i. e., either the upper or the lower projection 26 and slot 28 will suffice. However, providing actuating means at two points has some advantages, among which are smoother action and less likelihood of binding of the moving parts. It will often be found desirable to make the projection in the form of a roller, although it will of course be understood that the invention need not take this form. In the drawing, two rollers, 26 and 27, are shown. Roller 27 engages guide slot 27' in support 18.

At the start of the uncovering stroke or cycle of the mechanism, the parts occupy the relative positions shown in Figure 2. When the mechanism is put in motion cam plate 30 moves upward, as seen, in Figure 2, guided by projections 32, which again may be rollers, secured to cam plate 30 by fastening means 34 which extend through holes 32' in the cam plate. Projections 32 are guided in slots 36 of bracket 38. Bracket 38 is secured to support 18 by any suitable means such as cap screws 40. Figure 2 shows that, as cam plate 30 starts its uncovering stroke, cam slot 28 is parallel to the direction of motion of cam plate 30. There is, therefore, no motion imparted to projections 26 and the lamp. It is not until cam plate 30 reaches that portion of its stroke at which the forwardly directed part of slot 28 reaches projection 26 that forward motion is imparted to the projections and the lamp mounting. From this point on in the uncovering stroke of the cam plate, the lamp is moved forward into operating position.

Attention is now directed to shield 42 which serves to cover the light emitting surface of lighting unit 25. In the case of a completely enclosed lamp, shield or cover 42 may be considered a door. Shield 42 is provided with one or more operating arms or actuators 44. Arms 44 are guided into place in the lamp covering position of shield 42, and are held there, by inwardly extending lugs 45 engaging guide slots 45' in support 18. As was stated above in con-

nection with reciprocation of the lamp mounting, shield 42 can be supported and moved by just one arm. It will, however, be found that two arms to support and operate shield 42 will give greater strength and smoother action. A gasket 46 of any suitable resilient substance such as rubber may be provided to furnish a substantially dust proof seal about opening 48.

Arm 44 may be provided with two projections 50 and 52, which again may be rollers held in place by securing means 54 and 55 which extend through openings 50' and 52', respectively, in arms 44. Projection 50 rides in slot 56 of cam plate 30 and projection 52 rides in cam slot 58 of cam plate 30. It should be noted, however, that projection 52 is provided with an extension 60 which may again be a roller which engages slot 62 in bracket 38. Engagement of extension 60 in slot 62 is what provides arm 44 with the fulcrum for its pivoting action to swing shield 42 out of covering position into uncovering position. In studying the exploded view of Figure 9, it should be remembered that, in the assembly, slot 58 of cam plate 30 is disposed immediately above slot 62 of bracket 38. At the start of the uncovering stroke, as seen in Figure 2, projection 52 is at the upper end of slot 58 and projection 60 is at the forward, or left, end of slot 62. As the mechanism moves from the position shown in Figure 2 to the position shown in Figure 3, the upper ends of slots 58 and 58, which are seen in Figures 2 and 3 to have the same contour, act upon projections 50 and 52 to reciprocate arm 44 and shield 42 substantially straight back, away from opening 48. In the position shown in Figure 3, the long, lower portion of slot 58 is in contact with projection 52. This portion of the slot is parallel to the direction of motion of cam plate 30. Slot 58 will therefore contribute nothing additional to the movement of projection 52. Furthermore, inasmuch as slots 58 and 62 are disposed at right angles to each other, and since projections 52 and 60, which are located in the aforesaid slots, are secured to the same pin 55, this pin will be held against all movement of translation. It will be noted, however, that continued upward movement of cam plate 30 as seen in Figure 3 will bring the substantially horizontal portion of cam slot 56 to bear against projection 50, causing arm 44 to pivot about pin 55 as an axis. This pivoting movement will continue until shield 42 and arm 44 have reached the position shown in Figure 4, at which point the upper end of the long straight portion of slot 56 will be in engagement with projection 50. Continued upward movement of cam plate 30 will then have no further effect upon shield 42 and arm 44. It is, however, during this continued upward movement of cam 30, as seen in Figures 2, 3 and 4, that the forwardly directed portion of cam slot 28 engages projection 26 to move the lamp mounting and its lighting unit into operating position. This final operating position is shown in Figure 4.

Cam plate 30 may be reciprocated by any desirable means such as a rack and pinion connection to a crank. However, I have found it expedient to provide an electric motor drive for cam plate 30 with means for automatically arresting the motion of the cam plate in either the operating or the covered position of the lamp. To this end I have provided electric motor 64 which rotates a drive plate 66 through a gear reduction consisting of pinion 68 and gear

70. Drive plate 66 is provided with a projection 72, which may be a roller, secured to the drive plate by a fastening means which engages opening 72' in the drive plate. Projection 72 rides in slot 74 of cam plate 30.

It will, of course, be understood by those skilled in the art that the mechanism thus far described is a fully operative mechanism. Power can be supplied to electric motor 64 to rotate drive plate 66 until cam plate 30 has moved shield 42 and lamp mounting 24 to the positions desired by the operator, whereupon the power circuit may be broken manually. However, it will readily be appreciated that some automatic means of shutting off the power supply to motor 64 is desirable. To this end I have provided a relay consisting of an electromagnet 76 having an armature 78 on which is mounted a movable contact 80 which cooperates with fixed contact 82. Armature 78 is mounted for pivotal movement at one end by a leaf spring 84, as shown in Figure 6. To one side of armature 78 is secured leaf spring 86 (see particularly Figure 7), at the outer end of which is mounted a dog 88 of insulating material. When the magnet is energized, armature 78 is attracted to the magnet to close contacts 80 and 82, raising dog 88 and permitting spring 86 to bias dog 88 rearwardly so that it rests on the periphery of drive plate 66, as shown in dotted lines in Figure 7. Recesses 90, which may be notches, are provided at predetermined points in the periphery of drive plate 66. When the drive plate rotates to the angular position at which one of notches 90 is directly under dog 88, the dog drops down into the notch, separating the contacts 80 and 82 to break the motor circuit. Upon continued rotation of drive plate 66 the trailing edge 92 of recess 90 engages dog 88; its only effect, however, is to push the dog inwardly against the bias of spring 86. The relay is then in position for the cycle to start over.

Electrical terminals 94, 96 and 98 may be secured to insulating board 100 for connection to wires to complete the necessary circuits.

No attempt is made here to describe circuits for the relay and the drive motor other than to point out that the motor circuit will necessarily include contacts 80 and 82 is advantage is to be taken of the automatic power cut-off feature disclosed above. The circuit for electromagnet 76 is independent of the motor circuit.

With the above described relay it is only necessary to energize electromagnet 76 momentarily because contacts 80 and 82 are held in engagement by dog 88 riding on the periphery of drive plate 66; it takes only such a momentary energization of the magnet to raise the armature to the position where spring 88 can bias dog 88 outward into position to engage the periphery of drive plate 66 as described.

It will be appreciated by those skilled in the art that under certain circumstances it might be desirable to have only one recess in the periphery of drive plate 66, as where the lamp is to remain normally either covered or uncovered, and the mechanism is to be used for momentary uncovering or covering respectively of the light emitting surface of the lamp.

A brief résumé of the operation of a device built according to the invention is as follows: starting with the parts in the position shown in Figures 1, 2, 5, 6, 7 and 8, a switch is closed to momentarily energize electromagnet 76 and apply a voltage to contacts 80 and 82. This may

conveniently be one switch in which the operating lever momentarily completes a circuit through magnet 76 while traveling through a short distance to apply a voltage to contacts 80 and 82. The momentary energization of magnet 76 attracts armature 78, engaging contacts 80 and 82 and biasing dog 88 outward so that it rests on the periphery of drive plate 66. A power circuit to the electric motor 64 is thereby completed. Motor 64 revolves, rotating drive plate 66 through the reduction gears and moving cam plate 30 upward, as seen in Figures 2, 3 and 4, and to the right as seen in Figure 5. The first action of cam plate 30 is to retract shield 42, withdrawing it from opening 48 and guide slot 45' to the position shown in Figure 3. Further movement of cam plate 30 upward, as seen in Figure 3, pivots arm 44 about pin 55 as a fulcrum. Just before shield 42 has completed the end of its pivot stroke, the forwardly directed portion of cam slot 23 engages projection 26 on lamp mounting 24, moving lamp mounting 24 and its lighting unit 25 into operating position in opening 48. As cam plate 30 nears the upper end of its stroke, as seen in Figure 4, one of the recesses 90 in drive plate 66 rotates into position under dog 88. Dog 88 thereupon drops down into the recess, opening the motor circuit by separation of contacts 80 and 82. The inertia of the moving parts will cause drive plate 66 to rotate notch 90 past dog 88. The only effect of this coasting, however, on dog 88 and armature 78 will be for trailing edge 92 of recess 90 to engage dog 88, biasing it inwardly. Armature 78 is not otherwise affected. For the return stroke the operations are of course reversed. Magnet 76 is again momentarily energized, armature 78 is attracted to magnet 76, spring 86 biases dog 88 outward until it rests on the periphery of drive plate 66, a power circuit to motor 64 is thereupon established through contacts 80 and 82, lamp mounting 24 and lighting unit 24 are withdrawn to their retracted position, shield 42 is pivoted around to lamp covering position and is then reciprocated forwardly, guided by the engagement of lug 45 with slot 45', into opening 48 to seal the opening.

I claim:

1. A retractable lamp mounting for vehicles for enabling the lamp to be exposed when desired in an opening in a suitable support comprising in combination with said lamp and support, means for mounting said lamp on said support for longitudinal movement toward or from the opening in said support, a shield adapted to cover or uncover said opening, means for mounting said shield on said support for longitudinal movement toward or from said opening and for pivotal movement out of the path of movement of said lamp, and operator controlled means including a cam plate, means for mounting said cam plate on said support for transverse movement relative to said support, means for reciprocating said cam plate, and means operably connecting said cam plate to said lamp and shield for moving said lamp and shield to expose the lamp in said opening on movement of said cam plate in one direction and cover said opening with said shield on movement of said cam plate in the opposite direction.

2. The combination set forth in claim 1 in which said means for reciprocating said cam plate includes a rotatable member, means oper-

ably connecting said member to said cam plate to move said cam plate successively in opposite directions on rotation of said member in one direction, and means for rotating said member.

3. The combination set forth in claim 1 in which said means for reciprocating said cam plate includes a control means which provides for transverse movement of said cam plate in opposite directions on successive operations of said control means.

4. A retractable lamp mounting for vehicles for enabling the lamp to be exposed when desired within an opening in a suitable support including in combination with said lamp and support, means for mounting said lamp on said support for longitudinal movement toward or from the opening in said support, and operating means for said lamp including a plate, means for mounting said plate on said support for transverse movement relative thereto, means for reciprocating said plate, and means operably connecting said plate to said lamp to move said lamp within said opening on movement of said plate in one direction and retract said lamp from said opening on movement of said plate in the opposite direction.

5. The combination set forth in claim 4 in which said means for reciprocating said plate includes a rotatable member, drive means for rotating said member a predetermined amount in the same direction on successive operations thereof, and means operably connecting said member to said plate to move said plate in opposite directions on successive operations of said drive means.

6. A retractable lamp mounting for vehicles for enabling the lamp to be exposed when desired in an opening in a suitable support comprising in combination with said lamp and support, means for mounting said lamp on said support for horizontal longitudinal movement toward or from the opening in said support, a shield adapted to cover or uncover said opening, means for mounting said shield on said support for horizontal longitudinal movement toward or from said opening and for pivotal movement out of the path of movement of said lamp, and operator controlled means adapted to move said lamp and shield to successive positions in which the lamp and shield are respectively exposed and cover said opening including an arm on said shield, a cam plate, means for mounting said cam plate on said support for transverse movement relative to said support, means for reciprocating said cam plate, and means operably connecting said cam plate to said lamp and said shield including a projection on said lamp operating in a slot in said cam plate and a pair of longitudinally spaced projections on said shield arm operating in longitudinally spaced slots in said cam plate.

7. The combination set forth in claim 6 in which one of said projections on said shield arm is provided with an extension operating in a longitudinal slot on said support to permit the horizontal longitudinal movement of said shield and arm on transverse movement of said cam plate until said extension engages one end of said longitudinal slot and then provide a fulcrum for pivotal movement of said shield and arm on further transverse movement of said cam plate.

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