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G. E. MCGILL

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HEADLIGHT CIRCUIT

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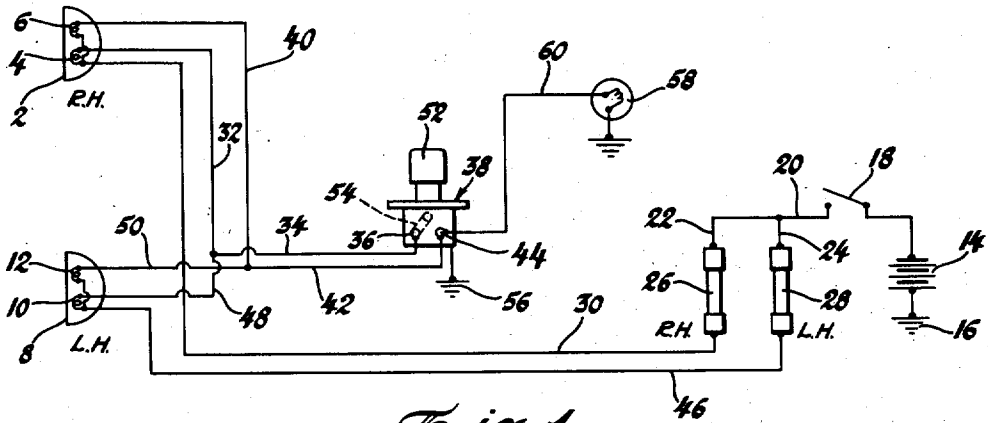


Fig. 1.

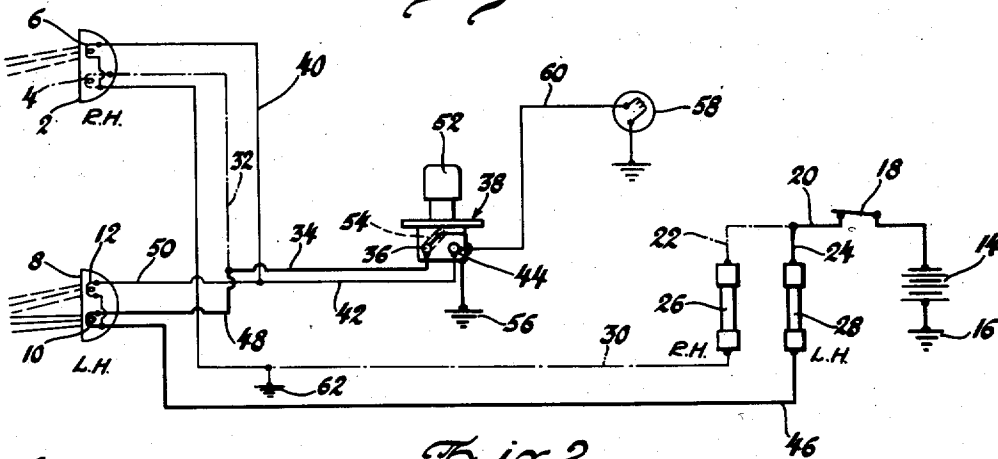


Fig. 2.

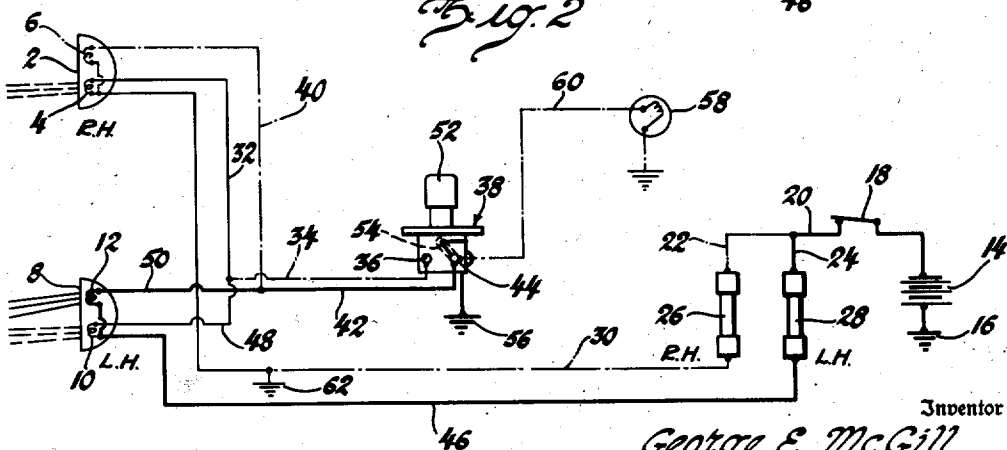


Fig. 3.

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HEADLIGHT CIRCUIT

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The present invention relates to an improved headlight circuit for vehicles incorporating certain safety features and advantages which are not present in prior lighting systems.

It has been the practice to protect headlight circuits by single overload circuit breakers with separate grounds for each headlamp so that an accidental grounding of the headlamp circuit will cause both headlamps to be extinguished. It has also been common practice to locate the dimmer or beam control switch in the positive circuit from the battery to the headlamps so that an accidental grounding of the dimmer switch will also operate the single overload circuit breaker to extinguish both headlamps.

It is an object of the present invention to provide separate circuit breakers for each headlamp and connect the ground wires from the headlamp filaments to the dimmer or beam control switch which is grounded instead of being in the positive circuit between the battery and the headlamps.

A further object is to provide a headlight circuit with separate circuit breakers for each headlamp in which the accidental permanent grounding of the circuit to either filament of one headlamp will not affect the continued operation of the corresponding filament of the other headlamp and will also cause the second filaments of both headlamps to be placed in series to operate at reduced voltage.

Further objects and advantages of the present invention will be apparent from the following description of the embodiment thereof which is illustrated in the accompanying drawing.

In the drawing, Figure 1 is a wiring diagram of the present circuit, and Figures 2 and 3 are similar views showing different conditions in the operation thereof.

In each of the figures, the headlamps are diagrammatically shown as comprising the right hand headlamp 2 with upper beam filament 4 and lower beam filament 6 and the left hand headlamp 8 with upper beam filament 10 and lower beam filament 12. The battery 14 which is grounded at 16 is connected on its positive side to a main lighting switch 18 which is shown herein as controlling only the supply of current to the headlight circuit. It will be understood, however, that in accordance with standard practice this switch would ordinarily also be so constructed as to control other circuits leading from the battery to auxiliary lamps such as parking and tail lamps which are not shown herein.

The switch 18 is movable from the open posi-

tion shown in Figure 1 to the closed position of Figures 2 and 3 to complete a circuit from the battery to a wire 20 connected by wires 22 and 24 to fuses or other types of overload protection devices 26 and 28, respectively. It will be apparent that, if desired, the wire 20 could be eliminated and wires 22 and 24 connected directly to contacts adapted to be engaged by switch 18 to thereby position the respective fuses closer to the switch 18. In addition to the reference numerals heretofore mentioned as applied thereto, the respective right and left hand headlamps and fuses associated therewith may be conveniently designated and referred to as R. H. and L. H.

From the R. H. fuse 26, a wire 30 extends to one end of both the upper beam filament 4 and lower beam filament 6 of the R. H. headlamp 2. The other end of the upper beam filament 4 is connected by wires 32 and 34 to a fixed contact terminal 36 of a beam control switch indicated generally at 38, and the other end of the lower beam filament 6 is connected by wires 40 and 42 to a fixed contact terminal 44 of this switch 38. From the L. H. fuse 28, a wire 46 extends to one end of both the upper beam filament 10 and lower beam filament 12 of the L. H. headlamp 8 and the other end of filament 10 is connected by wire 48 to wire 34, while the other end of filament 12 is connected by wire 50 to wire 42.

The beam control switch 38 is preferably of the foot-operated type with an operating pedal or button 52 which is adapted on successive depressions to move a switch arm indicated in dotted lines at 54 back and forth between the contact terminals 36 and 44. In the present instance the switch arm 54 is grounded through the switch casing as indicated at 56. The usual beam indicator lamp 58 which may be located on the vehicle instrument panel is connected by a wire 60 to the switch contact terminal 44 to indicate the position of the beam control switch to the operator as this switch completes the respective circuits to the upper and lower beam filaments as will now be described.

Referring first to Figure 1 for the normal operation of the present headlight circuit and assuming that the main switch 18 has been moved to its closed position, it will be seen that in the indicated position of the beam control switch 38 the upper beam filaments of both headlamps will be energized as follows: battery 14, closed switch 18, wire 20, wire 22, R. H. fuse 26, wire 30, upper beam filament 4 of R. H. headlamp 2, wire 32, wire 34, terminal contact 36, switch arm 54 to ground 56 to energize the upper beam filament

of one headlamp with the upper beam filament of the other headlamp connected in parallel therewith between the switch 18 and switch 38 by wire 24, fuse 28, wire 40, upper beam filament 10 and wire 48 to wire 34. In this position of the beam control switch 38 it will also be seen that the beam indicator lamp 58 will be energized by leakage current passing through the lower beam filaments to the ground of the lamp 58, but it is not believed necessary to trace this circuit except to note that the same extends through the contact terminal 44 of switch 38 which is not engaged by the switch arm 54 in the position shown in Figure 1.

Assuming now with the main switch 18 still closed that the operator depresses the beam control switch pedal 52 to move the switch arm 54 from contact terminal 36 to contact terminal 44, the lower beam filaments 6 and 12 will be energized in parallel through obvious paths which are grounded at 56 through the beam control switch 38. In this position of switch arm 54 it will also be seen that the beam indicator lamp 58 will not be energized but is shunted out by the grounding of contact terminal 44.

Considering now the abnormal operation of the headlight circuit described hereabove and referring first to Figure 2, there has been shown a condition in which one of the headlamp supply wires has been short circuited or grounded to blow out one of the fuses with the beam control switch 38 in the position shown in Figure 1 which normally energizes the upper beam filaments of the headlamps. In Figure 2 this short circuit has been shown as a grounding of the wire 30 at 62 which has blown the R. H. fuse 28 and results in a deenergization of the portion of the circuit indicated in dot and dash lines which includes the upper beam filament 4 of the R. H. headlamp 2. The upper beam filament 10 of the L. H. headlamp 8 remains energized at full strength by the circuit indicated in heavy lines, and current also flows through those portions of the circuit indicated in light lines to energize the lower beam filaments of the headlamps in series and also continue to energize the beam indicator lamp 58.

The current path for energizing the lower beam filaments may be traced as follows in Figure 2: from the positive wire 46 extending from the L. H. fuse 28 through the lower beam filament 12 of the L. H. headlamp 8, wire 50, wire 40, lower beam filament 6 of the R. H. headlamp 2, and part of wire 30 to the short circuit ground 62. Current will also flow from wire 50 through wire 42, terminal contact 44 and wire 60 to the grounded beam indicator lamp 58. Since the lower beam filaments are now in series whereas they normally operate in parallel it will be apparent that such filaments receive only one-half of the rated voltage but this has been found to cause the filaments to glow sufficiently that they can be seen for several hundred feet. Although the lower beam filament of the L. H. headlamp might possibly not be visible to an approaching driver because of the brighter intensity of the upper beam filament of this headlamp, the lower beam filament of the R. H. headlamp would be visible and thereby function as a marker for the right side of the vehicle.

A similar abnormal condition to that of Figure 2 is represented in Figure 3 in which, however, the beam control switch 38 is in the position which normally energizes the lower beam filaments of the headlamps. In this event, it will

be seen that the normal circuit for energizing the lower beam filament 12 of the L. H. headlamp at full intensity will be retained while the short circuit ground 62 will cause the upper beam filaments of both headlamps to be placed in series whereby the upper beam filament 4 of the R. H. headlamp will serve as a marker for the right side of the vehicle. The diagram of Figure 3 also indicates how the beam indicator lamp 58 is shunted out by the beam control switch 38 when this switch is operated to energize the lower beam filaments.

From the foregoing it will be apparent that in the event of a short circuit and grounding of the current supply line to either filament of the R. H. headlamp, the L. H. fuse in the present circuit will not be affected and the current supply to the corresponding filament of the L. H. headlamp will be continued. At the same time the other filaments of both headlamps are placed in series to operate at reduced voltage whereby such other filament of the R. H. headlamp will serve as a marker for this side of the vehicle. With the present circuit it will also be apparent that this desirable feature of the operation thereof will be obtained with the above described conditions reversed as pertains to the right and left hand headlamps in the event of a short circuit and accidental grounding of the supply line to the L. H. headlamp.

With reference to the foregoing safety feature of the present circuit it will be noted that when the fuse for one headlamp is blown the other fuse supplies current to maintain this headlamp with a dim light and that separate shorts are required to blow each fuse such as would render both headlamps inoperative. It will also be noted that since the beam control switch is grounded in the present circuit, a defective beam control switch does not blow the fuses and if this switch fails to properly ground either the upper or lower beams during normal operation, one of the contact terminals of the switch can be externally connected to ground to energize the respective upper or lower beam filaments of the headlamps.

Whereas in the present disclosure the overload circuit breakers have been referred to as fuses it should be understood that these elements may assume any desired form such as conventional bi-metallic switches or other known types of overload circuit breakers, and although the headlamp filaments have been referred to herein as upper and lower beam filaments the same may be in the nature of bright and dim filaments.

While the embodiment disclosed herein constitutes a preferred form it will also be understood that many other changes are contemplated as coming within the scope of the present invention as defined by the following claims.

I claim:

1. In a grounded electrical system for head-lights, a current source, a pair of headlamps having upper beam filaments and lower beam filaments, means for connecting said current source to the filaments of said headlamps, and means to selectively energize the upper beam filaments or the lower beam filaments of both headlamps including a beam control switch interposed in connections from said respective filaments to ground.

2. A headlight circuit including a current source, a pair of headlamps having upper beam filaments and lower beam filaments, means for connecting said current source to the filaments of said headlamps including parallel connections

from the current source to the filaments of the respective headlamps, an overload circuit breaker in each of said parallel connections, and means to selectively energize the upper beam filaments or the lower beam filaments of both headlamps including a beam control switch interposed in connections from said respective filaments to ground.

3. A headlight circuit including a current source, a pair of headlamps having upper beam filaments and lower beam filaments, and means for connecting said current source to the filaments of said headlamps including a connection from said current source to one end of both filaments of one headlamp, an overload circuit breaker interposed in said connection adjacent said current source, a parallel connection from said current source to one end of both filaments of the other headlamp, an overload circuit breaker interposed in said parallel connection adjacent said current source, parallel connections from the opposite ends of the upper beam filaments of both headlamps and from the opposite ends of the lower beam filaments of both headlamps and means to selectively connect said last named parallel connections to ground.

4. A headlight circuit including a current source, a pair of headlamps having upper beam filaments and lower beam filaments, and means for connecting said current source to the filaments of said headlamps including a connection from said current source to one end of both filaments of one headlamp, an overload circuit breaker interposed in said connection adjacent said current source, a parallel connection from said current source to one end of both filaments of the other headlamp, an overload circuit breaker interposed in said parallel connection adjacent said current source, a beam control switch having a grounded switch arm and two

contact terminals adapted to be selectively engaged by said switch arm, means connecting the upper beam filaments of both headlamps to one of said contact terminals, and means connecting the lower beam filaments of both headlamps to the other contact terminal.

5. The headlight circuit set forth in claim 4 with the addition thereto of a grounded beam indicator lamp, and means connecting said lamp to one of the contact terminals of said beam control switch.

6. A headlight circuit including a current source, a pair of headlamps having upper beam filaments and lower beam filaments, means for connecting said current source to the filaments of said headlamps, a beam control switch having a grounded switch arm and two contact terminals adapted to be selectively engaged by said switch arm, means connecting the upper beam filaments of both headlamps to one of said contact terminals, and means connecting the lower beam filaments of both headlamps to the other contact terminal.

7. A headlight circuit including a current source, a pair of headlamps having upper beam filaments and lower beam filaments, means for connecting said current source to said filaments including parallel connections from the current source to the filaments of respective headlamps and an overload circuit breaker in each of said connections, means to selectively energize the upper beam filaments of both headlamps or the lower beam filaments of both headlamps in parallel, and means to automatically energize the unselected filaments of both headlamps in series upon a short circuit ground and opening of the circuit breaker in either of said parallel connections causing deenergization of the selected filament of one of said headlamps.

GEORGE E. MCGILL.

CERTIFICATE OF CORRECTION.

Patent No. 2,377,706.

June 5, 1945.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 71, claim 2, strike out "A headlight circuit including" and insert instead the words and comma --In a grounded electrical system for headlights,--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of October, A. D. 1945.

Leslie Frazer

(Seal)

First Assistant Commissioner of Patents.

from the current source to the filaments of the respective headlamps, an overload circuit breaker in each of said parallel connections, and means to selectively energize the upper beam filaments or the lower beam filaments of both headlamps including a beam control switch interposed in connections from said respective filaments to ground.

3. A headlight circuit including a current source, a pair of headlamps having upper beam filaments and lower beam filaments, and means for connecting said current source to the filaments of said headlamps including a connection from said current source to one end of both filaments of one headlamp, an overload circuit breaker interposed in said connection adjacent said current source, a parallel connection from said current source to one end of both filaments of the other headlamp, an overload circuit breaker interposed in said parallel connection adjacent said current source, parallel connections from the opposite ends of the upper beam filaments of both headlamps and from the opposite ends of the lower beam filaments of both headlamps and means to selectively connect said last named parallel connections to ground.

4. A headlight circuit including a current source, a pair of headlamps having upper beam filaments and lower beam filaments, and means for connecting said current source to the filaments of said headlamps including a connection from said current source to one end of both filaments of one headlamp, an overload circuit breaker interposed in said connection adjacent said current source, a parallel connection from said current source to one end of both filaments of the other headlamp, an overload circuit breaker interposed in said parallel connection adjacent said current source, a beam control switch having a grounded switch arm and two

contact terminals adapted to be selectively engaged by said switch arm, means connecting the upper beam filaments of both headlamps to one of said contact terminals, and means connecting the lower beam filaments of both headlamps to the other contact terminal.

5. The headlight circuit set forth in claim 4 with the addition thereto of a grounded beam indicator lamp, and means connecting said lamp to one of the contact terminals of said beam control switch.

6. A headlight circuit including a current source, a pair of headlamps having upper beam filaments and lower beam filaments, means for connecting said current source to the filaments of said headlamps, a beam control switch having a grounded switch arm and two contact terminals adapted to be selectively engaged by said switch arm, means connecting the upper beam filaments of both headlamps to one of said contact terminals, and means connecting the lower beam filaments of both headlamps to the other contact terminal.

7. A headlight circuit including a current source, a pair of headlamps having upper beam filaments and lower beam filaments, means for connecting said current source to said filaments including parallel connections from the current source to the filaments of respective headlamps and an overload circuit breaker in each of said connections, means to selectively energize the upper beam filaments of both headlamps or the lower beam filaments of both headlamps in parallel, and means to automatically energize the unselected filaments of both headlamps in series upon a short circuit ground and opening of the circuit breaker in either of said parallel connections causing deenergization of the selected filament of one of said headlamps.

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