

Nov. 4, 1958

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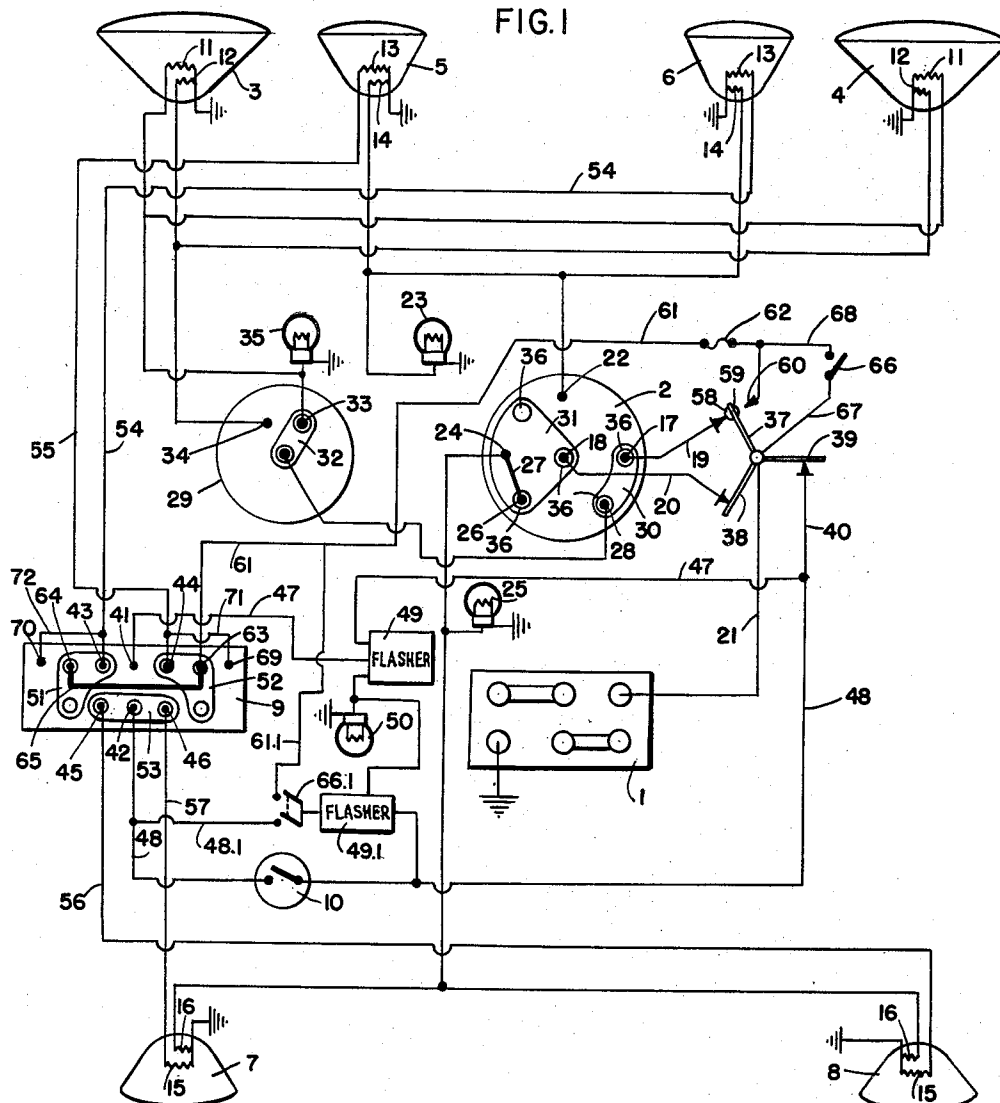
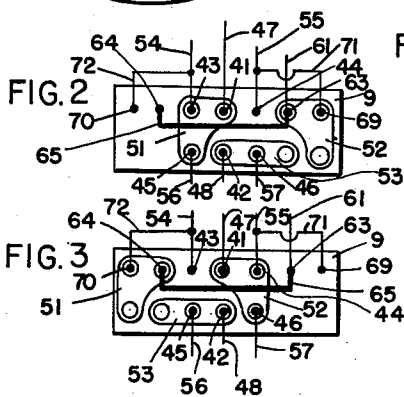
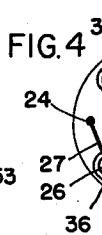
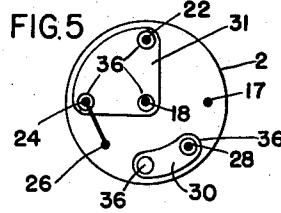
2,859,382

EMERGENCY LIGHTING SYSTEM

Filed March 9, 1954

4 Sheets-Sheet 1

FIG. 1



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FIG. 6

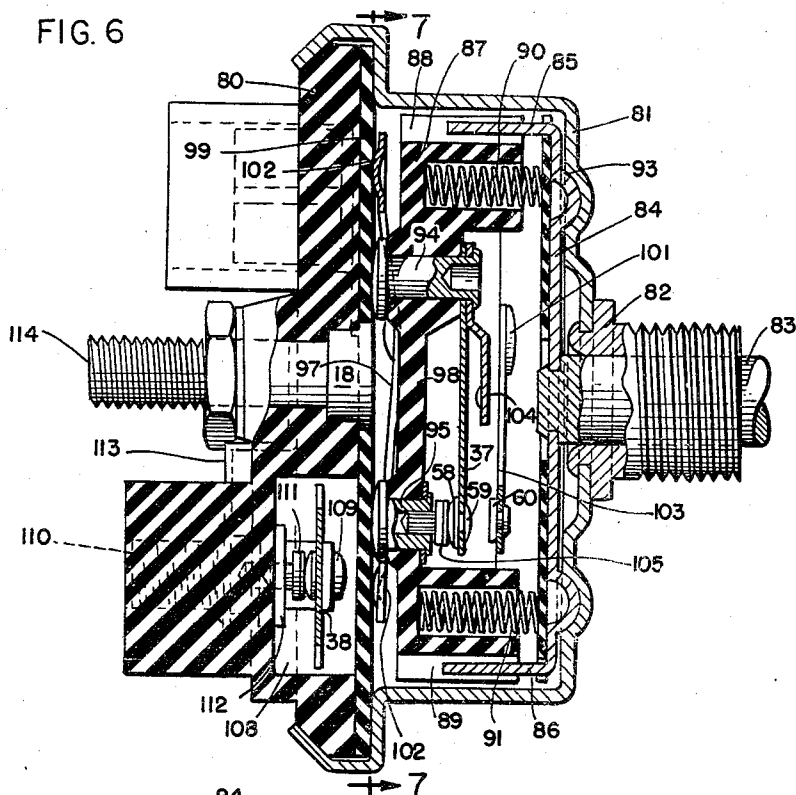
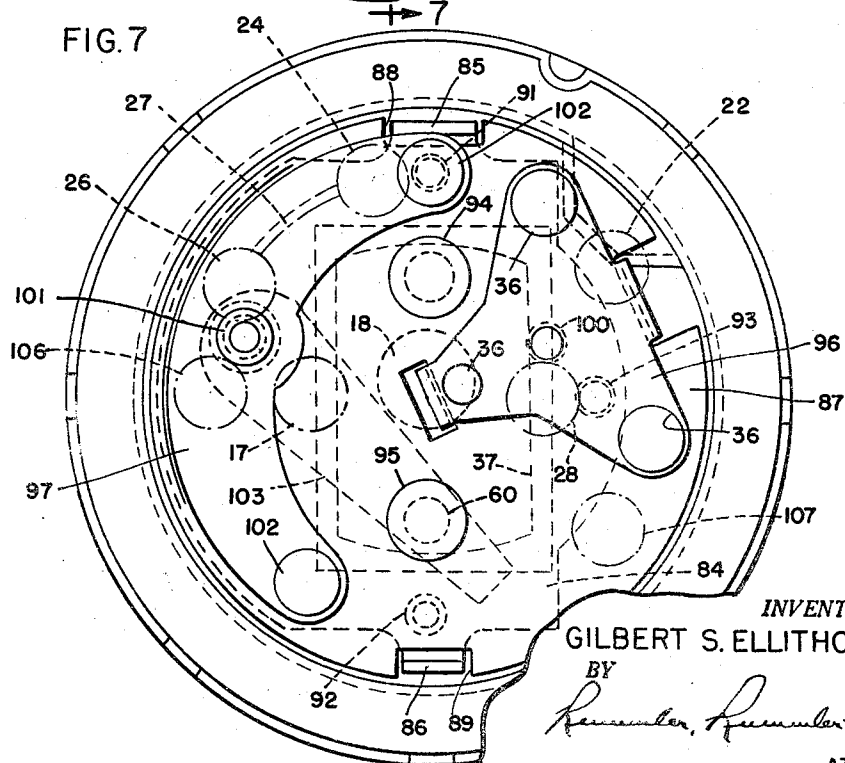


FIG. 7



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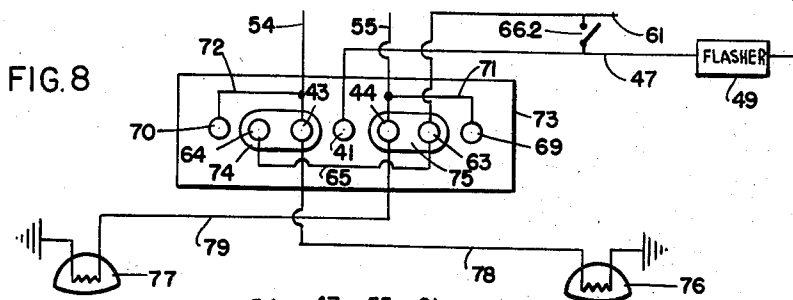
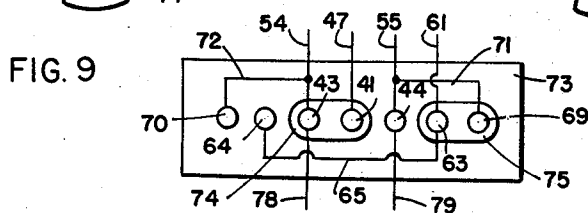
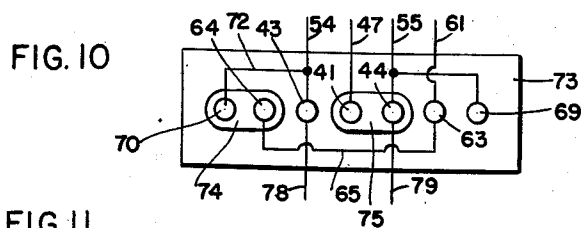


FIG. 11

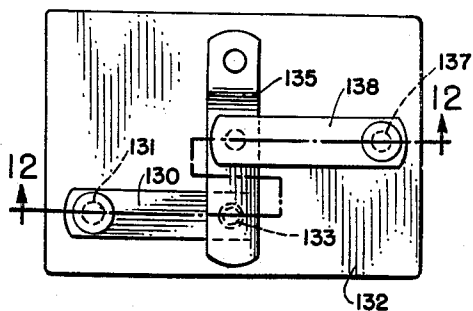


FIG. 12

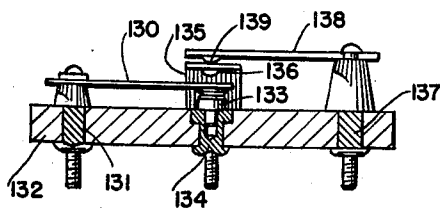
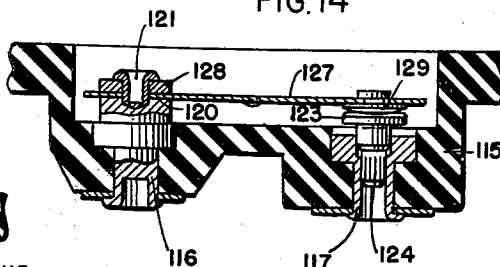
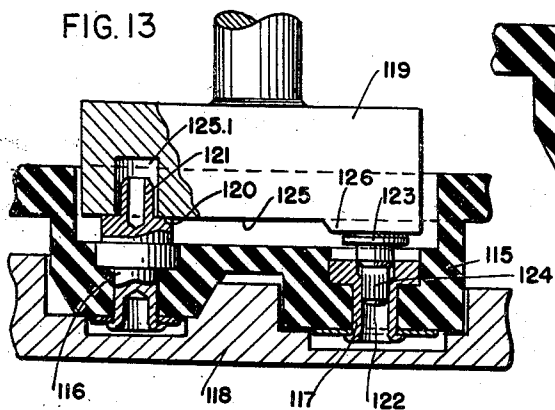


FIG. 14



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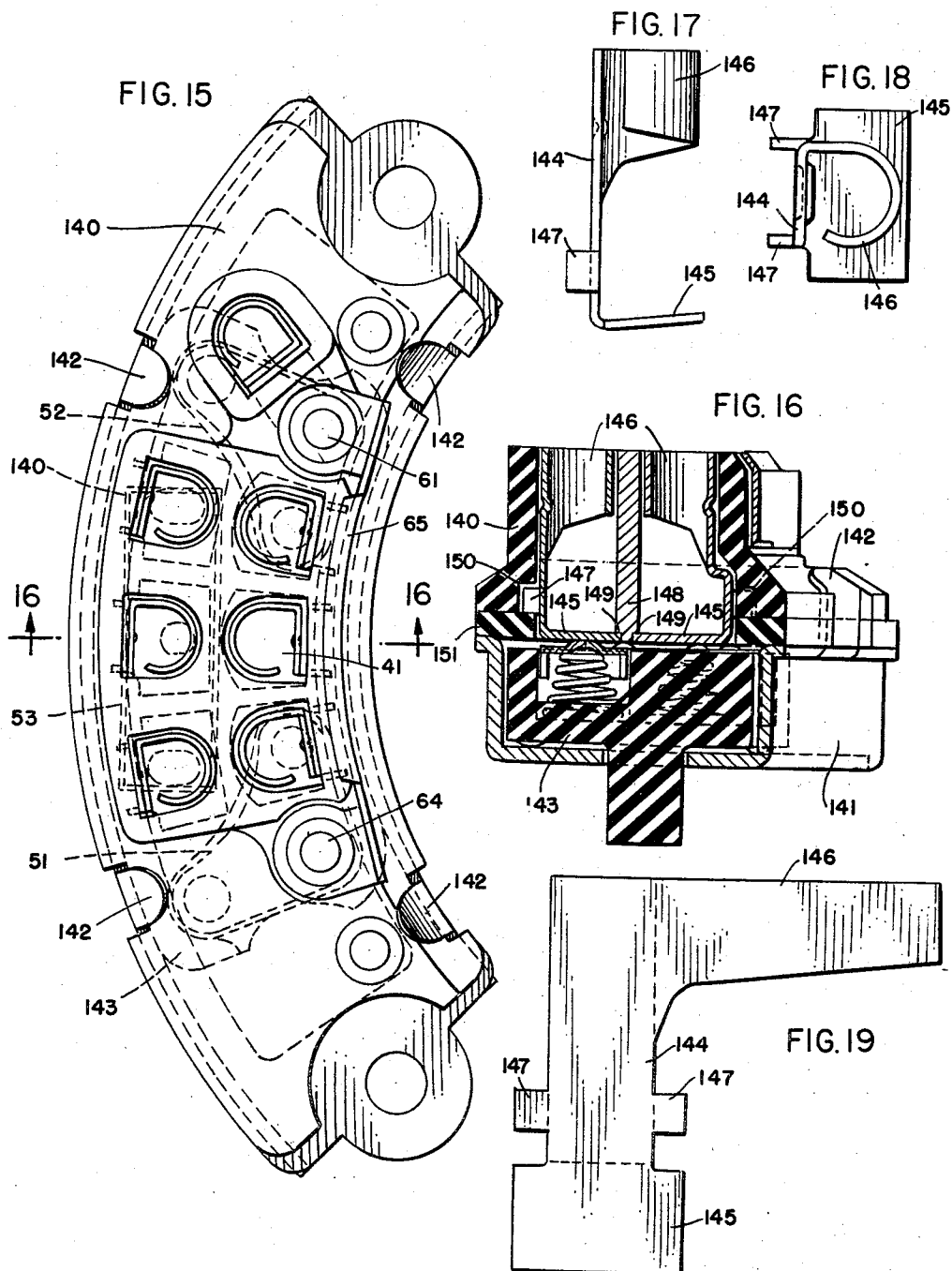
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EMERGENCY LIGHTING SYSTEM

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4 Sheets-Sheet 4



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2,859,382

EMERGENCY LIGHTING SYSTEM

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Application March 9, 1954, Serial No. 414,975

8 Claims. (Cl. 315—83)

This invention relates to improvements in motor vehicle lighting systems, and particularly to an improved circuit and operating means for automatically providing emergency driving light in cases of failure of the usual headlights due to overload conditions. In this last respect this application is a continuation-in-part of my co-pending application, Serial No. 109,788, filed August 11, 1949, for Combination Electric Switch and Circuit Breaker, for which Patent No. 2,692,309 was issued October 19, 1954.

The main objects of this invention are to provide an improved circuit arrangement for the headlight system of a motor vehicle; to provide an improved circuit arrangement for the lighting system of a motor vehicle whereby auxiliary lamps are automatically energized to provide driving light in the event of failure of the principal lighting means due to overload or short-circuit of the principal lighting circuit; to provide an improved circuit arrangement for motor vehicle lighting systems wherein the usual directional signal lamps may be utilized as emergency driving lights in the event of failure of the principal lighting means; to provide such a system in which the usual directional signal lamps are automatically energized upon failure of the principal headlights due to overload conditions; to provide such a system in which emergency use of the directional signal lights for driving light purpose will not interfere with the usual function of such lights for directional signaling use; and to provide an improved emergency lighting system wherein the directional signal lights may be utilized as warning lamps for a disabled vehicle standing in or alongside a roadway.

Other objects of this invention are to provide an improved overload protection means for the running light circuits of a motor vehicle lighting system; to provide such a means which will automatically energize a secondary or emergency lighting circuit upon actuation by overload conditions in the primary circuit; to provide an improved directional signal switch arrangement whereby the directional signal lamps may be utilized for emergency lighting purposes without interference with their usual function as directional signaling means; to provide an improved circuit combination of a headlight switch, circuit overload protecting means, and directional signal switch whereby the directional signal system of a motor vehicle lighting circuit may be utilized automatically to provide driving lights in the event of failure of the primary headlights due to overload of the headlight circuit; and to provide an improved overload protecting means for electrical circuits whereby calibration of the thermally actuated element will not be affected by manufacturing inaccuracies in the parts with which the element is assembled.

A specific embodiment of this invention is illustrated in the accompanying drawings in which:

Figure 1 is a diagrammatic view of a motor vehicle lighting system embodying my new circuit arrangement.

Fig. 2 is a diagrammatic view showing a typical direc-

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tional signal switch, as shown in Fig. 1, in right-turn indicating position and embodying an improved contact and circuit arrangement for emergency lighting purposes.

Fig. 3 is a similar view showing the directional signal switch in left-turn indicating position.

Fig. 4 is a diagrammatic view of a primary lighting circuit switch, as shown in Fig. 1, and showing the movable contactor elements in their "off" position relative to the stationary terminal board contacts with which the movable contactors coast.

Fig. 5 is a similar view showing the primary lighting switch with its movable contactor members in the intermediate or "parking" position relative to the stationary terminal board contacts.

Fig. 6 is a sectional view of an improved rotary switch for controlling the nighttime lighting circuits of a motor vehicle lighting system, and embodying means for operating my improved emergency lighting system.

Fig. 7 is a plan view of the same as taken on lines 7—7 of Fig. 6, to show the movable switching contactor members, and having the terminal board contact positions superimposed in dash outline to show their relation with each other and the contactor means.

Fig. 8 is a diagrammatic view showing an improved contact arrangement for directional signal switch according to my invention for operating a motor vehicle lighting system having rear directional lights that are independent of the usual tail and stop lights, the movable contactors being shown in neutral or intermediate position.

Fig. 9 is a similar view showing the switch of Fig. 8 with its movable contactors in position to operate the front and rear right-turn directional signal lights.

Fig. 10 is a similar view of the same switch showing the movable contact elements in position to operate the left-turn directional signal lights.

Fig. 11 is a top plan view of an improved circuit breaker for operating an emergency circuit upon overload actuation, and simultaneously providing overload protection for the emergency circuit.

Fig. 12 is a sectional view of the same taken on line 12—12 of Fig. 11.

Fig. 13 is a view diagrammatically illustrating the method of setting the fixed contact of a bimetal current-overload actuated switch, to establish the correct table height of the contact normally engaging the movable bimetal blade, without affecting the blade calibration.

Fig. 14 is a similar view showing a circuit breaker blade mounted according to the method illustrated in Fig. 13.

Fig. 15 is a plan of the back or terminal side of a signal switch embodying the contact arrangement of the switch 9 shown in Fig. 1, and showing an improved form for the terminal connectors.

Fig. 16 is a sectional view of the same as taken on line 16—16 of Fig. 15.

Fig. 17 is a view in elevation showing the form and construction for one of the improved terminals and connectors.

Fig. 18 is a plan view of the same, and

Fig. 19 is a plan view of a blank from which the improved terminal may be formed.

In the arrangement shown in Fig. 1 of the drawings, the improved emergency lighting system is applied to a conventional motor vehicle lighting circuit. This conventional system comprises a battery or other suitable source of power 1; a main switch 2, having appropriate contactors, contacts and leads therefrom for energizing a pair of primary lights or headlamps 3 and 4, a pair of front combination parking light and directional signal light lamps 5 and 6, a pair of combination taillight and directional signal light lamps 7 and 8, and the usual

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instrument light or lights; A directional signal switch 9, for selective operation of the directional signal lights; and the usual foot brake switch 10. As shown, each of the directional signal and foot brake switches is independently connected into the power source or battery on the battery side of the main switch 2.

As indicated in Fig. 1 the primary or main headlamps 3 and 4 are of the "sealed beam" type, having high and low candle power filaments 11 and 12 for the driving beam and passing beam, respectively. The parking lights 5 and 6 are also dual filament lamps, each of which has a high candle power filament 13, for directional signal use, and a low candle power filament 14 for the usual parking use; and the taillights 7 and 8 are dual purpose lamps having a high candle power filament 15, for stop light and directional signal light use, and a low candle power filament 16 for ordinary taillight use.

As shown in Figs. 1, 4 and 5, the main switch 2 is a manually operated three position device having a plurality of spaced stationary contacts, or terminal board contacts, and two movable contactor elements for selectively engaging certain groups of the stationary contacts. This switch is illustrated as of the rotary type, however, it will be understood that the switch may also be of push-pull type, in which movement of the contactor elements is linear rather than angular. As shown, the switch 2 has six terminal board or fixed contact positions, one of which is centrally located, and the others of which are arranged angularly about the center in equal radially spaced relation therewith for engagement by the movable contactor elements which are angularly shiftable about the center position. The terminal board contacts 17 and 18 are battery or power input terminal contacts, each of which has an independent lead 19 and 20, respectively, for connection with the main battery lead 21, as will be hereafter described.

Of the remaining terminal board positions, fixed contact 22 leads to the two parking light filaments 14, with a branch connection to the ignition switch lamp 23; contact 24 leads to the taillight filaments 16, of the rear lamps 7 and 8, with an appropriate branch connection to supply the usual instrument lights and accessories indicated by the lamp 25; terminal 26 is a second position for supplying the taillight circuit, and the instrument lights and accessories, and is connected with the contact 24 by means of a bus bar 27; and finally the contact 28 leads to the headlights 3 and 4 by way of the usual foot dimmer switch 29, which is a two-position switch for selectively energizing the driving beam and passing beam filaments of the headlights.

In Fig. 1 the main switch 2 is shown in its third position, for nighttime driving conditions, wherein the headlight and taillight portions of the system are connected with the battery 1, through the contacts 17 and 18, respectively, by means of movable contactors 30 and 31. Also the foot dimmer switch 29 is shown with its movable contactor element 32 engaged with a contact 33 which leads to the driving beam filaments 11 of the head lamps 3 and 4. The second foot dimmer switch contact 34, which is also engageable by the contactor element 32 upon actuation of the foot dimmer switch, leads to the low or passing beam filaments 12 of the head lamps 3 and 4. This is the usual arrangement for foot dimmer switch connections and, therefore, need not be further described except to mention that the usual dashboard driving-beam-signal lamp 35 is provided in a branch connection from the foot dimmer switch terminal 33.

The "off" position of the movable contactors 30 and 31 of the switch 2 is shown in Fig. 4, and it will be observed that in this position there is no connection of the power input terminals 17 and 18, with the remaining terminal board contacts. As shown, each of the movable contactors 30 and 31 is provided with a plurality of contacting portions or dimples 36 for engagement with the terminal board contacts, and therefore, a circuit

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connecting function is only performed when a pair of these dimples or contact portions of a contactor are in engagement with a power input terminal contact and one of the output terminal contacts. Thus in the "off" position shown in Fig. 4 there is no connection between the power input terminal contacts 17 and 18, and the remaining terminal positions.

The second or intermediate position of the main switch 2 is shown in Fig. 5 and in this position it will be seen that the contactor 31 simultaneously engages the power input contact 18 and the output contacts 22 and 24 for respectively energizing the filaments 14 of the parking lamps 5 and 6, and the filaments 16 of the taillights 7 and 8. In this position the contactor 30 engages the terminal 28 which supplies the headlights 3 and 4, but is out of engagement with the power input terminal 17, and hence the headlight circuit is not energized. This "parking" position of the switch is normally used only when parking and taillights together are desired.

The third or full "on" position of the main switch 2 is as shown in Fig. 1, and in this position the contactor 30 bridges the terminal board contacts 17 and 28 so that the headlight circuit is energized, while the contactor 31 bridges the contacts 18, and 26, to energize the taillight and instrument light circuits, by way of the bus bar 27 and the terminal board contact 24.

As shown in Fig. 1, each of the principal circuits of the improved lighting systems is protected by a self-resetting, bimetal blade circuit breaker designed to open the respective circuit upon the occurrence of a predetermined current overload condition in the circuit in which the blade is series connected. These circuit breakers are preferably located on the battery, or power input, side of the main switch 2, and are connected in parallel to the main battery cable 21. Thus a circuit breaker 37 is disposed in series with the lead 19 to the power input terminal 17 of the switch 2 for protecting the headlight circuit; a circuit breaker 38 is disposed in series with the lead 20 to the main switch terminal 18 for protecting the parking, taillight, instrument light and accessories circuit of the system; and a circuit breaker 39 is disposed in series with a lead 40 which supplies the directional signal light and the stop light circuits of the system independently of the main switch 2. In Fig. 1 these circuit breakers are shown to be separate and independent of the main switch 2, however, it should be understood that they may be combined with, or built into, the main switch 2 in accordance with the principles disclosed in my beforementioned Patent No. 2,692,309 if such an arrangement is desired.

The power lead 40 which supplies the directional signal and taillight circuits of the system, leads to the directional signal switch 9, which in the form shown has two power input contacts 41 and 42, two front directional signal light output contacts 43 and 44, and two stop light output contacts 45 and 46, the supply lead 40 having two branch leads 47 and 48, which respectively lead to the directional signal switch input terminals 41 and 42. The lead 47 includes a conventional flasher unit 49 for causing rapid flashing of the directional signal lights, and the usual flasher pilot light 50 is connected into the output side of the flasher unit to provide dashboard indication that the directional signal lights are operating. The lead 48 includes the usual foot brake switch 10 in series with the input terminal 42, for operation of the stop lights 7 and 8 independently of the remainder of the lighting system.

The directional signal switch 9 shown in Fig. 1, is of the type illustrated in my Patent No. 2,666,101, issued January 12, 1954, in which the terminal contacts are arranged in two rows of three contacts each, and in which three contactors 51, 52 and 53, movable in unison and in predetermined relation with each other, are employed to bridge or engage predetermined groups of the several terminal contacts. This type of signal switch is

employed in those cases where the stop signal lights are also used as directional signal means, and wherein the high candle power filament of the rear lamps is employed for both purposes.

Thus the terminals 43 and 44 of the first row, are connected to the high powered filaments 13 of the lamps 6 and 5 respectively, by way of the respective leads 54 and 55, the lead 54 from the terminal 43 going to the right-hand signal lamp 6, and the lead 55 from the terminal 44 going to the left side signal lamp 5. Similarly, the terminal 45 of the second row is connected by a lead 56 with the high powered filament 15 of the right rear light 8 while the terminal 46 is connected by a lead 57 with the high powered filament 15 of the left rear light 7. As shown, the contactors 51 and 52 are triangularly shaped members adapted to engage two contacts of the first row and one contact of the second row, simultaneously, when shifted to the right or to the left as the case may be. The contactor 53 is a narrow rectangular element, preferably articulated, arranged to engage the contacts of the second row only.

In the neutral or intermediate position of the signal switch 9 the contactors 51 and 52 are in engagement with the lateral contacts 43 and 44 respectively, but are out of engagement with the power input contact 41, hence in this position the front signal lights 5 and 6 are not energized. Also in this position the contactor 53 bridges or engages all of the contacts of the second row, thus connecting the input contact 42 with the output contacts 45 and 46 whereby the high power filaments 15 of the rear lamps 7 and 8, are connected with the foot brake switch brake 10 and the power lead 48, for energization whenever the foot brake switch 10 is closed.

The operative positions of the signal switch 9 are shown in Figs. 2 and 3, of which Fig. 2 shows the position for signaling a right turn, and Fig. 3 shows the position for signaling a left turn. In the position shown in Fig. 2, the contactors 51, 52 and 53, have been shifted to the right so that the contactor 51 bridges the contacts 41, 43, and 45 thereby connecting the battery or power lead 47 with the leads 54 and 56 which run to the right-hand, front and rear, signal lights 6 and 8, respectively. Simultaneously, the contactor 53 bridges the contacts 42 and 46, so that the battery lead 48, running from the foot brake switch 10 is connected with the lead 57 for the high powered filament 15 of the rear light 7 thereby permitting operation of that lamp as a stop light signal, by the foot brake switch 10, even though the signal switch 9 has been operated to signal a right turn. Thus the lamp 7 will burn continuously whenever the foot brake switch 10 is closed, while the front and rear lamps 6 and 8, will be flashed rapidly under the action of the flasher 49 which is connected in series with the battery lead 47.

In the left turn position of the signal switch 9, shown in Fig. 3, the contactors 51, 52 and 53 have been shifted to the left, so that the contactor 52 bridges the contacts 41, 44 and 46, to connect the leads 55 and 57 with the battery lead 47 to flash the left-turn signal lamps 5 and 7 respectively. At the same time the contactor 53 is in position to bridge the contacts 42 and 45, whereby the battery lead 48 is connected with the lead 56 for stop light operation of the rear light 8. This operation of the switch 9 is fully described in my before-mentioned Patent No. 2,666,101 to which reference is made for any further details that may be desired.

The foregoing description concerns the circuits and operation of a conventional motor vehicle lighting system, such as is commonly used at the present day, and to which my present invention of improved emergency lighting system and means has been applied. As before-indicated, the object of my emergency lighting system invention is to provide adequate running light and roadway illumination whenever there may be failure of the principal lighting system other than through failure of

the power source. Another object is to employ the usual directional signal lights for such emergency use, and it is with this purpose that the present invention is particularly concerned.

As indicated in Fig. 1 the circuit breaker blade 37 is arranged to operate as a double-throw switch and carries oppositely disposed contacts 58 and 59, at its free or moving end, the contact 58 being normally engaged with the power input lead 19 of the switch 2, and the contact 59 being engageable with the terminal 60 of a lead 61, which serves as an auxiliary or emergency power input lead for the signal switch 9. The lead 61 may be provided with its own overload protection by any suitable means, such as a fuse 62.

As shown, and for emergency lighting purposes, the signal switch 9 is provided with four extra or auxiliary contacts in its first row of contacts, there being two auxiliary contacts on either side of the three primary contacts, and aligned therewith, so as to be engageable by the contactors 51 and 52. As shown the emergency lead 61 is connected with a first auxiliary contact 63, which in turn is connected with a second auxiliary contact 64, by means of the bus bar 65, the contacts 63 and 64 being on opposite sides of the three primary signal contacts. Thus when the signal switch 9 is in its intermediate or neutral position as shown in Fig. 1, the contactor 52 bridges the contacts 44 and 63, while the contactor 51 bridges the contacts 43 and 64, thereby providing connection for the front directional signal light leads 54 and 55 with the emergency power input lead 61, so that upon overload actuation of the circuit breaker 37 the front directional signal lights will be automatically energized.

Since the high powered filaments 13, of the directional signal lights 5 and 6, are ordinarily of at least twenty-one candle power each, the signal lights 5 and 6 will provide ample illumination for nighttime driving on the darkest of roads and thus permit continued operation of the motor vehicle, even though the principal headlights 3 and 4 have become disabled. This emergency illumination will be provided automatically and instantly upon overload actuation of the circuit breaker 37, which has the primary function of providing overload protection for the principal headlight system. In this regard it should also be understood that a manually operated emergency switch 66 may be connected in parallel with the circuit breaker 37, and between the battery cable 21 and the auxiliary or emergency circuit lead 61 for use in case operation of the circuit breaker 37, should for any reason be unsatisfactory, or, for example, in case the main headlights 3 and 4 should become disabled for reasons other than an electrical overload condition. As shown in Fig. 1, the emergency manually operated switch 66 is connected into the emergency circuit 61 by the leads 67 and 68.

In order to maintain emergency illumination from the lamps 5 and 6 when the switch 9 is operated for direction signaling purposes, it is necessary to provide means for keeping continuity of the circuit between the emergency power input line 61 and the lead to the particular lamp which is not being used to signal a turn. As shown in Figs. 1, 2 and 3, this is accomplished by providing the additional or auxiliary terminal contacts 69 and 70, at the opposite ends respectively of the first row of terminal contacts in the signal switch 9, which contacts are respectively bridged to the terminal leads 55 and 54, or the terminal contacts thereof, by suitable conductors 71 and 72. The terminal contacts in each row of the signal switch 9 are equally spaced from each other, and it will now be seen that when the contactors of the signal switch are shifted to the right-hand position for indicating a right turn, as shown in Fig. 2, the ordinarily non-functioning contactor 52 will engage or bridge the emergency power input terminal 63 and the auxiliary terminal 69, whereby through the conductor 71, a continuous

circuit will be maintained between the line 61 and the lead 55, which connects with the high powered filament 13 of the lamp 5. Thus under emergency conditions the lamp 5 will be energized for illumination purposes, while the lamp 6 is being operated to signal the operator's intention for a right turn. Similarly, when the movable contactors of the signal switch 9 are shifted to the left side, as shown in Fig. 3, to cause indication of a left turn intention, the contactor 51 will bridge the terminal contacts 64 and 70 whereby, through the conductors 65 and 72, the terminal lead 54 for the right-hand signal lamp 6 will be maintained in circuit with the emergency supply conductor 61. In this manner the lamp 6 will be operable to provide emergency illumination while the left-hand lamp 5 is signaling the operator's intention to make a left turn.

At this point it should be understood that the circuit breaker 37 is preferably constructed and calibrated for a relatively long "cooling" or automatic reset interval. That is, when the breaker 37 is actuated by an overload condition the time required for it to cool and return to its normal position closing the overloaded circuit, is in the order of ten to twenty seconds or about six to three operations per minute. On the other hand the flasher 49 is calibrated and constructed for about sixty circuit opening and closing operations per minute. Thus while the lamps 5 and 6 will be energized for ten to twenty second intervals, or six to three intermittent operations per minute, when under emergency operation, either one of the lamps when operated to signal a turn will flash rapidly at a rate of about one time per second for sixty flashes per minute. Thus when seen from an oncoming vehicle the rapid flashing of one of the lamps will clearly indicate to the oncoming driver that that lamp is being operated to signal a turn in the respective direction.

It will be understood, of course, that when the manually operated emergency switch 66 is used to close the emergency circuit through the lead 61 the lamp or lamps energized for emergency illumination will burn with a steady light, in which case only the lamp being used to indicate a turn intention will operate with a flashing light.

For those cases in which independent rear directional lights are employed, instead of using the highpowered stop light filament as shown in Fig. 1, a modified signal switch arrangement may be used since the stop light function will be wholly independent of the directional signal circuits. In such cases the main stop light power lead 48 will run from the brake switch 10 directly to the stop light lamps, and the second row of contacts in the signal switch of Fig. 1, may be eliminated.

A modified signal switch arrangement for use with independent rear direction signal lights, is diagrammatically illustrated in Figs. 8, 9 and 10, in which the signal switch 73 is shown with a single row of seven terminal contacts, and two longitudinally spaced and aligned bar-like contactor 74 and 75 are used for switching purposes. As shown, the bar contactors 74 and 75 are spaced apart endwise to leave one open contact between them and are movable in unison lengthwise of the row of contacts. The terminal contacts are equally spaced from each other, and each of the contactors is of a length to bridge one pair of adjacent contacts.

In this modified switch arrangement the connections of the terminal contacts with the power input leads 47 and 61, and with the leads 54 and 55 to the front signal lamps 5 and 6, are identical with the connections shown in Figs. 1, 2 and 3, as are the intercontact bus bars or conductors 65, 71 and 72. For this reason the same identifying numbers have been applied to the terminal contacts and leads of the modified signal switch 73, as are used in Fig. 1. In Fig. 8 the independent rear direction lights are indicated at 76 and 77, the light 76 being connected by a lead 78 to the terminal 43, and the light 77 being connected by a lead 79 to the terminal 44.

Thus whenever the leads 54 and 55 for the front directional signal lights are energized by connection with the power source, the leads 78 and 79 for the rear direction lights are simultaneously energized. In this manner ordinary direction signaling operation of the modified switch 73, as well as the emergency operation of the signal lights, both front and rear, upon the closing of the power circuit to the leads 61, will be identical with the operation of the circuit shown in Fig. 1.

Fig. 8 shows the modified switch 73 in its neutral position; Fig. 9 shows the switch 73 with its contactors in position for indicating a right turn; and Fig. 10 shows the switch 73 with its contactors in position for indicating a left turn. These figures are, therefore, comparable with Figs. 1, 2 and 3 insofar as the emergency lighting circuits are concerned.

In the circuit arrangements herein shown, the directional signal circuits may be arranged to permit a fast pulsating energization of all of the directional signal lights both front and rear at the same time, while the directional signal switch is in neutral position, and when there is no overload condition in the principal lighting circuit that might cause operation of the overload protection means 37 to energize the steady light emergency circuit 61. Such simultaneous fast blinking operation of all of the directional signal lights would be of considerable advantage as a warning means when standing at the roadside, or in the roadway, at nighttime because of mechanical breakdown or for any other reason, and shown in Fig. 1, such fast blinking or flashing operation of the direction signal lights may be had by providing a second flasher unit 49.1 into the battery lead 48 and then running leads 48.1 and 61.1 from the second flasher to the signal light circuits 48 and 61, respectively. A double pole, single-throw switch 66.1 is connected between the flasher 49.1 and the leads 48.1 and 61.1 to control this signal light operation and it will be seen from the circuit diagram of Fig. 1, that this operation will be continuous, as long as the switch 66.1 is closed, regardless of the position of the signal switch 9.

In the circuit shown in Fig. 8, where independent rear signal lights are used, such fast blinking flashing operation of the directional signal lights may be had by connecting a manually operated switch 66.2 between the flasher unit 49 and the emergency line 61, at any convenient point on the output side flasher unit. Thus since the emergency line 61 has direct connection with all of the signal lights both front and rear when the signal switch 73 is in neutral position, closing of the manually operated switch 66.2 will cause all of the signal lights to be energized through the flasher 49 and operated with the flash frequency normally provided by the flasher unit.

It should also be understood that in the construction of the signal switches, the internal terminal connections may be made by either jumper wires, bus bars, or stamped or printed circuit means.

An arrangement of a main lighting system switch in which the overload protection circuit breakers are built into the switch construction is illustrated in Figs. 6 and 7. This improved switch construction comprises a molded terminal board 80 on the contact surface side of which is mounted a hollow cup-like housing 81, serving as an enclosure for the movable switch parts. A tubular externally threaded mounting bushing 82, is centrally secured in the front end of the housing 81, and a rotary operating shaft 83 extends through this bushing to the interior of the housing 81, where the shaft is secured fast to a drive plate 84, which has laterally extending arms terminating in drive lugs 85 and 86 which project axially inward toward the terminal board. An annular rotor or carrier member 87, made of a suitable dielectric material, is mounted on the lugs 85 and 86, the carrier member having marginal slots 88 and 89 to receive the lugs, and this carrier member supports the movable con-

tacts and contactors of the switch mechanism. In the form shown the carrier member is a hollow cup-shaped body with its open end facing the drive plate 84, and compression springs 90, 91 and 92, seated in angularly spaced sockets formed in the margin of the carrier member, bear between the carrier member and an insulating plate 93 mounted on the inner face of the driving plate 84, to constantly urge the carrier member toward the contact face of the terminal board 80.

In the form shown the carrier 87 has two fixed contacts 94 and 95 arranged on opposite sides of the carrier axis and on a common diametric centerline, and two contactors 96 and 97 disposed on opposite sides of the said centerline, the contacts 94 and 95 being equally spaced from the carrier axis a distance of about one-half the radius of the carrier and the contactors having contacting portions disposed adjacent the outer margin of the carrier. The contacts 94 and 95 and the two contactors 96 and 97 are mounted on the front face of the carrier member end wall 98 so as to be engageable with stationary terminal contacts mounted on the terminal board and which are flush with the surface of a dielectric contact spacer plate 99, as indicated in Fig. 6. Thus since the carrier is continuously urged towards the terminal board 80, the fixed contacts and contactors of the carrier will always be in engagement with and ride upon the face of the spacer 99 or the spaced contact surfaces of the terminals, and the various switching operations will be accomplished by rotation of the carrier member by way of the shaft 83 and the drive plate 84.

In order to assure uniformity of contacting pressure between the contacts and contactors of the carrier 87, and the bearing surfaces of the spacer plate 99 and the terminal contacts flush therewith, the compression springs 90 and 91 are located on the same diametric centerline as the fixed contacts 94 and 95, and the compression spring 93 is located angularly midway between the springs 91 and 92, on the side of the carrier directly beneath the contactor 96, as shown in Fig. 7. Also the contactor 96, which has three triangularly spaced contacting portions or dimples 36, is provided with an oppositely projecting balancing dimple 100, which engages the face of the carrier 87, the balancing dimple 100 being substantially centrally located with respect to the three contacting dimples 36. As shown, the contactor 96 is mounted to the carrier 87 by means of inwardly projecting lugs which extend loosely into suitable apertures formed in the carrier member end wall 98, and contactor 96 is, therefore, free to rock in substantially any direction about the balancing dimple 100.

The contactor 97 is a resilient member mounted to the carrier 87 by means of a rivet 101, and comprises a pair of arcuately shaped spring arms which extend in opposite directions from the rivet 101 around the margin of the carrier 87. Each of these spring arms carries a contacting dimple 102 at its free end and the arms are lightly tensioned to normally bear against the terminal spacer plate 99.

With this arrangement of the carrier 87 the compression springs 91 and 92 are made with sufficient strength to overcome any oppositely directed force exerted by the spring arms of the contactor 97 and to assure positive engagement of the fixed contacts 94 and 95 against the face of the terminal spacer plate 99. Also the carrier spring 93 is made with an even greater tension so as to normally cause the carrier to rock about the centerline through the fixed contacts 94 and 95, and thereby assure positive engagement of the contactor 96 with the surface of the spacer plate 99. Thus the contactor 96 will be urged constantly toward the spacer plate 99 and, because of the balancing action of the dimple 100, the contacting dimples 36 will be engaged with equal pressure in every position of the carrier 87 relative to the terminal board.

In the form of switch shown in Fig. 6, the circuit breaker 37 which, as shown in the circuit diagram of Fig.

1, provides overload protection for the principal lighting circuit and operates the emergency lighting circuit under overload conditions in the principal system, is combined with the carrier member 87 of the main switch in a manner similar to that disclosed in my before-mentioned Patent No. 2,692,309. In this arrangement the fixed contacts 94 and 95 are the heads of rivets which extend through the end wall 98 of the carrier 87 and the bimetal circuit breaker blade 37 is mounted directly onto the inner end of the contact rivet 94, in the interior of the carrier, with its free end overhanging and normally engaged with the inner end of the fixed rivet 95. Thus the circuit breaker 37, is normally electrically in series with the fixed contacts 94 and 95 whereby current entering through the contact 94 must pass through the circuit breaker 37 before reaching the contact 95 for distribution through the terminal board to the principal headlight circuit.

As shown the emergency contact 60, which is engaged by the circuit breaker contact 59 upon overload actuation of the blade 37, is mounted on the free end of a bimetal conductor arm 103, which in turn is secured on an inner end margin of the carrier 87 by means of the rivet 101 which extends through the carrier to the forward face thereof to hold the arcuate contactor 97. Thus, upon overload actuation of the circuit breaker 37, the contact 59 will engage the contact 60 and close a circuit between the fixed contact 94 and the conductor arm 103 which leads through the rivet 101 to the spring contactor 97. The bimetal arm 103 is preferably calibrated to open, away from contact 59, under a predetermined overload condition, less than that for blade 37, as a protective means for the emergency or auxiliary circuit.

As shown in Fig. 6, a limit stop 104 is mounted on the inner end of fixed contact rivet 94, to limit the movement of the breaker blade 37 upon its being actuated by an overload condition in the principal lighting circuit. Also the inner contact head 105 of the fixed contact 95, is of a special arrangement to be hereafter described, which permits accurate preassembly calibration of the circuit blade 37.

The several terminal board contact positions for the operation of the switch shown in Figs. 6 and 7, are shown in dot-dash outline in Fig. 7, and since they are directly comparable with the terminal contact positions shown in Figs. 1, 4 and 5, they have been given the same identifying numbers as used in Fig. 1, and as used for the description of the circuit of Fig. 1. Also, the movable contacts and contactors, shown in solid outline in Fig. 7, are shown in the first or "off" position of the switch, like that illustrated in Fig. 4 and wherein the contactor 31 is like the contactor 96 in its form and operation. In the device of Figs. 6 and 7, however, it should be noted that the movable contactor 30 of Figs. 1, 4 and 5 has been omitted, and that instead the fixed contacts 94 and 95, together with the built-in circuit breaker 37, perform the switching functions for the principal headlight circuit.

Thus as shown in Fig. 7 the power input terminal contact for the headlight circuit is indicated at 17 and the output terminal contact, which leads to the headlight circuit, is indicated at 28. Also, both of these terminal contacts are located on the terminal board at positions 90° angularly removed from the "off" position of the fixed contacts 94 and 95. Likewise the power input terminal contact 18 for supplying the parking, taillight, instrument light and accessory circuits, is substantially at the center of the terminal contact circles for continuous engagement by the contactor 96, while the terminal contacts 22, 24 and 26, which lead to these circuits, are angularly spaced from each other for engagement by the contactor 96 when it is moved to its second and third positions, as shown in Figs. 5 and 1 respectively. The contacts 22 and 24, for the parking light circuit and the taillight and instrument light circuits respectively, are spaced angularly from each other, so as to be simultaneously engaged by the contactor 96 when it is in its second

position, that is substantially 45° from its "off" position, and the contacts 26 and 24 are angularly spaced 45° so that only the contact 26 will be engaged by the contactor 96 when the contactor is in its third or "full-on" position. Also, as shown in Fig. 7, the contacts 24 and 26 are connected by a conductor 27, as in the case of the diagram of Fig. 1, since the contact 24 is the terminal for the lead, or leads, running to the taillights and instrument lights. Thus as far as the principal lighting circuits are concerned the movable contact and contactor positions, as well as the terminal board contacts and the circuit connections leading therefrom, are the same as shown for the main switch 2 in the diagram of Fig. 1.

However, since in the switch construction shown in Figs. 6 and 7 the overload protection means for the principal lighting circuits is built into the main switch unit, two additional contact positions 106 and 107 are shown in Fig. 7. The terminal contact 106 connects directly with the emergency circuit line 61 of Fig. 1, and the terminal contact 107 is a separate terminal available for connection with emergency red lights at the rear of the vehicle if such may be desired. As shown in Fig. 7, the terminal contacts 106 and 107 are located in the outer contact circle so as to be engaged by the contacts 102 of the spring arm contactor 97, when the switch rotor or carrier 87 has been turned to its "full-on" position 90° counterclockwise from the "off" position shown. Thus, since the contactor 97 is energized through its mounting rivet 101, and the conductor arm 103, only upon actuation of the circuit breaker 37 when the switch is in its "full-on" position, there is no possibility of short-circuit between the contactor 97 and any of the other terminal board contacts when the switch is in its "off" or intermediate position.

An additional feature of the switch construction illustrated in Figs. 6 and 7, is that of combining the circuit breaker 38, which provides overload protection for the parking light circuit and the taillight, instrument light and accessory circuits, with the main switch construction. As shown in Fig. 6 this is done by mounting the circuit breaker 38 in a recess 108 formed in the terminal board on the side against which the dielectric terminal spacing plate 99 is disposed. As shown, the circuit breaker 38 is mounted on the inner end 109 of the battery or main power input stud 110, which projects into the space 108, and the opposite or free end of the circuit breaker 38 is arranged to be normally in contact with the head 111 of a terminal rivet 112. The terminal rivet 112 is then connected by a bus bar, not shown, with the central power input terminal contact stud 18. Also the battery stud 110 is connected by a bus bar 113 with the power input terminal 17. The stud 114, shown in Fig. 6, extending from the terminal contact 18, is for the connection of accessories which are to have a battery connection that is continuous and wholly independent of any of the switching operations of the switch unit.

As before-mentioned, the contacting head 105 of the contact stud 95 is of a special arrangement which will permit preassembly calibration of the bimetal circuit breaker blade 37. The contacting head 111 of the terminal rivet 112 is also of the same arrangement, and in either case the contacting heads are set in their respective terminal rivets after the rivets have been secured in the body which is to support them. As shown in Fig. 6, each of the terminal rivets or studs 95 and 112, is a hollow member, opening at one end and into which the shank of the contact head is mechanically pressed to a predetermined depth so that the contact surface of the head will project a predetermined distance from the terminal stud so as to have a precise "table height" or elevation with respect to an adjoining surface on which the circuit breaker blade is mounted.

The purpose of this is to permit the mounting of the circuit breaker blade on its own support, so that it will normally engage the contact head with an exactly

predetermined amount of pressure for which the circuit breaker blade can be calibrated during its manufacture and prior to its being assembled with its mounting means. Such an arrangement is necessary because the ordinary manufacturing inaccuracies, which occur in the manufacture of the supporting body and in the assembly therewith of the contact studs or rivets, are such that resulting variations in the contact pressure between the circuit breaker blade and the contact head produce wide variations in the temperature required for actuation of the circuit breaker blade. This often results in rejection of the assembled device upon inspection because the circuit breaker blade will not function within an allowable range from the point for which it is calibrated. Therefore, if the contact heads are assembled to the rivets or studs after the latter have been mounted on their supporting body, the contact heads can be set in place in such a manner as to compensate for any inaccuracies that might occur with respect to location of the parts relative to the table or surface on which the circuit breaker blade is mounted, and rejections for failure of the blade to operate at the point for which it is calibrated will be substantially obviated.

An improved method for mounting the terminal or contact heads in their supporting studs or rivets, is illustrated in Figs. 13 and 14 of the drawings, wherein a molded terminal board 115, having terminal studs or rivets 116 and 117 already mounted, is shown positioned in a jig or support plate 118, disposed in alignment with the head 119 of a fluid pressure operated ram. As shown, the stud 116 is molded or otherwise secured in the terminal board body, and has an enlarged head on the inner side of the body which terminates in a flat shoulder 120. A tubular shank portion 121 of reduced diameter projects axially beyond the shoulder 120. The stud 116 is designed to serve as the mounting means and support for a precalibrated circuit breaker blade seated on the shoulder 120 and secured by staking the shank 121, as in the case of a hollow rivet, and as will be hereafter described.

The terminal 117 is in the form of a hollow rivet having a central passage extending axially therethrough, the rivet having an enlarged head on the inner side of the terminal board 115, and being disposed with its inner end considerably below the level of the shoulder 120 of the mounting stud 116. As shown, the contact 123 mounted on the hollow rivet 117 is in the form of a solid rivet having a knurled shank 124 adapted to be press fitted into the passage 122.

Since the shoulder 120 of the mounting stud 116 is a fixed table or principal plane of reference on which the circuit breaker blade is to be mounted, it is the object of the process to press the contact rivet or stud 123 into the terminal rivet 117 so that its upper or contact surface will be at an exactly predetermined distance from the plane of reference defined by the shoulder 120. This is accomplished by driving or pressing the contact rivet 123 by means of the ram 119, which has a face surface 125 normal to the ram axis adapted to engage the shoulder 120 of the mounting stud 116, an inlet or socket 125.1 to receive the shank 121, and a boss or raised portion 126, which projects a predetermined distance beyond the face 125, located on the ram head 119 in a position to engage the head of the contact rivet 123.

Since the contact rivet 123 is a press fit into the hollow terminal 117, only a relatively small amount of pressure is necessary to correctly position the rivet head 123, and the shoulder 120 of the mounting stud serves as a limit stop for the downward movement of the ram 119 without damage to the mounting stud or to the terminal board body 115. Thus with the surface of the boss 126 parallel with the ram face 125, and with the plane of the shoulder 120 perpendicular to the axis of the movement of the ram 119, the contact head 123 will be exactly and precisely located with reference to the plane

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of the shoulder 120 and every contact rivet so seated will have precisely the same relation with the supporting surface on which a coacting circuit breaker blade is to be mounted.

The completed structure made in accordance with this method, and with the circuit breaker blade mounted on the mounting stud 116, is shown in Fig. 14 in which it will be seen that the fixed end of the circuit breaker blade 127 is clamped against the shoulder 120 by means of a washer 128, which is held in place by the staked end of the hollow rivet portion 121 of the mounting stud. Thus, since the contact head 123 is accurately spaced with reference to the shoulder 120, the contact 129 on the free or movable end of the circuit breaker blade 127 will bear against the contact head 123 with the same contact pressure for which the blade 127 was calibrated. It will be understood, of course, that the space between the contact surface of the contact head 123 and the plane of the shoulder 120, will be determined by the specifications of the circuit breaker blade and the apparatus by which the blade 127 is calibrated.

An improved form of circuit breaker construction for overload protection of circuits such as that illustrated in Fig. 1, is shown in Figs. 11 and 12. In this construction the primary circuit breaker blade 130 is mounted on a terminal and mounting stud 131, which in turn is mounted on a terminal board 132, and the free end of the circuit breaker blade 130 is disposed to engage the contact head 133 of a terminal 134. A bracket arm 135 is mounted on the terminal board 132 in position to overhang the free end of the circuit breaker blade 130 at a predetermined distance above the same when the circuit breaker blade is normally engaged with the contact head 133. The bracket arm 135 has a contact 136 disposed immediately above the free end of the circuit breaker blade 130 for engagement by the same when the circuit breaker is actuated by a current overload in the circuit in which the blade is series connected by means of the terminals 131 and 134. The bracket arm 135, thus serves as a limit stop for the movement of the blade 130 upon overload actuation, and also serves as a conducting means for closing a second circuit between the blade 130 and an auxiliary or emergency circuit having connection with the bracket arm 135 by way of a third terminal stud 137 and a second circuit breaker blade 138, which is mounted on the stud 137 in such a position as to overhang and normally engage the bracket 135.

Thus with the improved construction of this current overload protection means, not only is the primary circuit between the terminals 131 and 134 protected by the circuit breaker blade 130, but also the emergency or secondary circuit connected to the terminal 137, is provided with overload protection by means of the second circuit breaker blade 138.

Figs. 15 to 19 inclusive are intended to show an improved terminal board and terminal arrangement for a directional signal switch construction, which permits an increase in the number of terminal contacts, such as would be required for the signal switches 9 and 73, shown in Figs. 1 and 8, respectively, without any material increase in the over-all size of the signal switch assembly. This improved terminal board and terminal arrangement, also permits the use of plug-in type of lead connectors, and thereby obviates the need for soldering the lead connections to the terminal board, which is one of the principal items entering into the total cost of manufacture of the ordinary signal switch.

As shown in Figs. 15 and 16, the signal switch comprises a molded terminal board 140 which contains the fixed terminals and terminal contacts; a sheet metal housing 141 secured to the terminal board by means of clamping lugs 142; and a movable carrier 143 which is slidable in the housing 141 and which carries the movable contactors for selectively closing the several circuits

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to which the terminal board contacts lead. As far as the carrier 143 and the housing 141 are concerned, these members may be constructed as described in my before-mentioned Patent No. 2,666,101 and therefore need not be further discussed. The terminal board 140, however, is of a modified and improved arrangement in that the terminals and the terminal contacts are unitary elements, separable from the terminal board, which are clamped in place in the terminal board upon assembly of the housing 141 with the terminal board body. In the former arrangements the terminals were molded or riveted in place, as in the case of the construction shown in my before-mentioned Patent 2,666,101.

As shown in Figs. 17 to 19, the improved terminals are made as simple, one piece, sheet metal stampings. Each terminal has a substantially flat back or shank 144, which extends in the axial direction, and at one end the back or shank is bent forwardly through slightly more than 90° to provide a contact plate portion 145. At the opposite end of the shank 144 an integral laterally projecting portion of the shank is rolled forwardly and upon itself to form a substantially tubular body 146, open at each end, which is substantially aligned endwise with the contact portion 145. As shown the free end of the turned lateral portion forming the body 146, is slightly spaced from the shank 144 so that the entire body 146 can flex resiliently to receive and grip the shank of a plug inserted into the outer end of the body 146. Also, as shown, an integral wing-like lug member 147 is formed on each side of the shank 144, adjacent the contact plate portion 145, the lug members 147 projecting rearwardly and substantially at right angles of the plane of the shank 144.

As shown in Fig. 16 the molded terminal board 140 is formed with a plurality of pockets or sockets, extending from face to face of the terminal board, and in which the sheet metal terminals are disposed longitudinally. In the form of switch shown, wherein there are two rows of terminals and sockets, the center wall 148, which separates the two rows of sockets, projects beyond the face of the terminal board on the contact side of the same and the margins of the outer edge of the wall 148 are rabbetted, as at 149, to provide shoulders below the outer edge surface of the wall 148. Also, on the opposite side of each socket, the socket wall is provided with a pair of laterally spaced notches 150 which open outwardly and extend axially along the socket.

Thus when a terminal is inserted into a socket, from the face of the terminal board, the body portion 146 first, the free end of the contact portion 145 will rest on the shoulder 149 and the lugs 147 will be received in the notches 150. Because of the less than 90° included angle between the contact portion 145 and the shank 144 of the terminal, however, the contact portion will be held above the plane of the terminal board face and the terminal will be only loosely seated, with the lugs 147 partially projecting from the notches 150 beyond the terminal board face.

When all of the terminals are placed in their respective sockets they are then clamped firmly in place by means of a washer 151 which engages the ends of the lugs 147 and presses them into the notches 150 against the spring action of the contact portions 145. The washer 151 is in turn held in place by means of the housing 141 when it is clamped to the terminal board by means of the clamping lugs 142. It will be understood, of course, that the thickness of the washer 151 is such that when the terminals are clamped in position, the terminal contact portions 145 will be flush with the outer face of the washer. This relationship is clearly shown in Fig. 16.

The main advantages of my invention reside in the arrangement whereby the directional signal light means may be used as driving lights whenever the main lighting system is inoperative for reasons other than failure of the current supply; in the arrangement whereby the direc-

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tional signal lights are automatically operated for emergency lighting purposes; and in the circuit arrangements whereby the operation of the directional signal lights for lighting purposes, does not interfere with the normal functioning of the signal lights for directional signaling purposes.

Other advantages of my invention resides in the relatively simple circuit and switching arrangements whereby the directional signal light system may be used for emergency lighting purposes; in the improved circuit arrangement for directional signal switches whereby normal operation of the switches for directional signaling purposes is not disturbed or interrupted by emergency use of the signaling circuit for driving light purposes; and in the improvement of the several switching device constructions whereby manufacturing cost and the cost of assembling the devices into the lighting system circuits may be greatly reduced.

Still further advantages of my invention reside in the adaptability of the improved lighting circuits to arrangements wherein the usual directional signal lamps may be utilized as distinctive warning lights whenever the vehicle is standing in the roadway, or at the roadside, on open and unlighted highways.

Although several embodiments of this invention have been herein shown and described, it will be understood that details of the several constructions and circuit arrangements shown may be altered or omitted without departing from the spirit of the invention as defined by the following claims:

I claim:

1. An electric lighting system comprising a primary circuit including a power source, primary lights, a manually operated switch for controlling said circuit, and a circuit breaker, all connected in series, said circuit breaker comprising means responsive to a predetermined current overload condition for operation between two positions to interrupt said primary circuit and to connect an auxiliary circuit with said power source; an auxiliary circuit; a second circuit including a flasher device, a second switch, and a pair of signal lights, all connected in series with said power source independently of said primary circuit, and shiftable contactor means in said second switch having a neutral position and two selectively settable positions for connecting said signal lights individually with said power source through said flasher device; and means in said second switch normally connecting each of said signal lights with said auxiliary circuit at the neutral position of said contactor means, said contactor means being shiftable to interrupt the connection between said auxiliary circuit and the respective signal light when said contactor means is in either settable position while maintaining connection between said auxiliary circuit and the other signal light.

2. An electric lighting system comprising a primary lighting circuit and an independent signal circuit, each having connection with a common power source, an auxiliary circuit; a circuit interrupter in said primary circuit having a movable member responsive to a predetermined current condition in said primary circuit for operation to interrupt said primary circuit and simultaneously connect said auxiliary circuit with said power source, said signal circuit including a flasher device and a signal switch connected in series with said power source, a pair of signal lights each connected independently with said signal switch, shiftable contactor means in said signal switch having a neutral position and two selectively settable positions for connecting said signal lights individually with said power source, means for connecting said auxiliary circuit with said signal switch, and means in said signal switch for connecting each of said signal lights with said auxiliary circuit when said contactor means is in neutral position, said contactor means being shiftable to interrupt the connection between said auxiliary circuit and the respective signal light when said con-

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tactor means is in either settable position while maintaining connection between said auxiliary circuit and the other signal light.

3. An electric lighting system comprising a primary circuit, a signal circuit, and an auxiliary circuit, said primary circuit and said signal circuit each having independent connection with a power source, a circuit interrupter normally in series with said power source and said primary circuit and having means responsive to a predetermined current condition in said primary circuit for operation to open said circuit and simultaneously close a connection between said auxiliary circuit and said power source, said signal circuit including a flasher device and a signal switch in series with said power source and a pair of signal lights having independent connection with said signal switch, shiftable contactor means in said signal switch having a neutral position and two selectively settable positions for connecting said signal lights individually with said power source through said flasher device, means for connecting said auxiliary circuit with said signal switch, means in said signal switch for normally connecting both of said signal lights with said auxiliary circuit when said contactor means is in neutral position, said contactor means being shiftable to interrupt the connection between said auxiliary circuit and the respective signal light when said contactor means is in either settable position, and further means in said signal switch for engagement by said contactor means to maintain connection between the other signal light and said auxiliary circuit while the contactor means is in a settable position.

4. An electric lighting system comprising a primary circuit, signal circuit, and an auxiliary circuit said primary circuit and said signal circuit being independently connected to a common power source, a circuit interrupter normally in series with said power source and primary circuit and comprising a movable member responsive to a predetermined current condition in said primary circuit for operation to open said circuit and simultaneously connect said auxiliary circuit with said power source, said signal circuit including a flasher device and a signal switch connected in series with said power source, said signal switch having a neutral position and two selectively settable positions, a pair of signal lights independently connected to said signal switch, means for connecting said auxiliary circuit with said signal switch, means including a pair of shiftable contactors in said signal switch for connecting said auxiliary circuit to both of said signal lights when said signal switch is in neutral position, and said contactor shifting in response to the setting of said signal switch to either settable position to energize a respective one of said lights through said flasher device, said contactors simultaneously interrupting the connection between the said auxiliary circuit and the said respective signal light when said signal switch is in either settable position while maintaining the connection of the other signal light with said auxiliary circuit.

5. An electric lighting system comprising a primary circuit, a signal circuit, and an auxiliary circuit, said primary circuit and said signal circuit each having independent connection with a power source, a circuit interrupter normally in series with said power source and said primary circuit and having means responsive to a predetermined current condition in said primary circuit for operation to open said circuit and simultaneously close a connection between said auxiliary circuit and said power source, said signal circuit including a flasher device and a signal switch in series with said power source and a pair of signal lights having independent connection with said signal switch, shiftable contactor means in said signal switch having a neutral position and two selectively settable positions for connecting said signal lights individually with said power source through said flasher device, means for connecting said auxiliary circuit with said signal switch, means in said signal switch for normally connecting each of said signal lights with said

auxiliary circuit through said contactor means when said signal switch is in neutral position, said contactor means shifting to interrupt the connection between said auxiliary circuit and the respective signal light when said contactor means is in either settable position while maintaining the connection of the other signal switch with said auxiliary circuit, and manually operable means for connecting said power source and said auxiliary circuit independently of said circuit interrupter.

6. An electric lighting system for motor vehicles comprising a signal circuit, a power source having connection with said signal circuit, an auxiliary circuit, means operable for connecting said power source with said auxiliary circuit, a stop light circuit having connection with said power source through a normally open brake switch, and a pair of independent stop lights; said signal circuit including a flasher device and a signal switch connected in series with said power source, and a pair of signal lights having independent connection with said signal switch, movable contactor means in said signal switch having a neutral position and two selectively settable positions for energizing said signal lights individually, other contactor means in said signal switch for connecting each of said stop lights with said stop light circuit when said signal switch is in neutral position, said other contactor means being shiftable for interrupting the connection to a respective one of said stop lights upon operation of said movable contactor means to either selectively settable position, and said movable contactor means acting to energize said one stop light from the signal circuit simultaneously with the energizing of a respective signal light; means for connecting said auxiliary circuit with said signal switch, and means in said signal switch for connecting each of said signal lights with said auxiliary circuit when said movable contactor means is in neutral position, the movable contactor means being shiftable to interrupt the connection between said auxiliary circuit and the respective signal light when set to either settable position and to simultaneously connect the respective signal light with said signal circuit while maintaining connection between said auxiliary circuit and the other signal light.

7. A motor vehicle electric lighting system comprising a signal circuit, a power source having connection with said signal circuit, an auxiliary circuit, a stop light circuit having connection with said power source through a normally open brake switch, a pair of independent stop lights connected to said stop light circuit, and manually operable means having connection with said power source through a flasher device for connecting said auxiliary circuit with said power source and for connecting said stop light circuit with said power source independently of said brake switch; said signal circuit including a flasher device and a signal switch connected in series with said power source, and a pair of signal lights having independent connection with said signal switch, shiftable contactor means in said signal switch having a neutral position and two selectively settable positions for energizing said signal lights individually; other contactor means in said signal switch for connecting each of said stop lights with said stop light circuit when said signal switch is in neutral position, said other contactor means being movable for interrupting connection to a respective one of said stop lights upon operation of said shiftable

contactor means to either selectively settable position, and said shiftable contactor means acting to energize said one stop light from the signal circuit simultaneously with the energizing of a respective signal light; means for connecting said auxiliary circuit with said signal switch, and means in said signal switch for normally connecting each of said signal lights with said auxiliary circuit when said shiftable contactor means is in neutral position, the shiftable contactor means acting to interrupt the connection between said auxiliary circuit and the respective signal light when set to either settable position and to simultaneously energize the respective signal light from said signal circuit while maintaining connection between said auxiliary circuit and the other signal light.

8. An electric lighting system for motor vehicles comprising a signal circuit, a power source having connection with said signal circuit, an auxiliary circuit, switch means operable for connecting said power source with said auxiliary circuit, a stop light circuit having connection with said power source through a normally open brake switch, a pair of independent stop lights, and manually operable means having connection with said power source through a flasher device for connecting said auxiliary circuit with said power source independently of said switch means and for connecting said stop light circuit with said power source independently of said brake switch; said signal circuit including a flasher device and a signal switch connected in series with said power source, and a pair of signal lights having independent connection with said signal switch, movable contactor means in said signal switch having a neutral position and two selectively settable positions for energizing said signal lights individually; other contactor means in said signal switch for connecting each of said stop lights with said stop light circuit when said signal switch is in a neutral position, said other contactor means being shiftable to interrupt the connection to a respective one of said stop lights when said movable contactor means is set to either selectively settable position, and said movable contactor means acting to energize said one stop light from the signal circuit simultaneously with the energizing of a respective signal light; means for connecting said auxiliary circuit with said signal switch, and means in said signal switch for normally connecting said signal lights with said auxiliary circuit when said movable contactor means is in neutral position, the movable contactor means also acting to interrupt the connection between said auxiliary circuit and the respective signal light upon being set to either settable position and to simultaneously energize the respective signal light from said signal circuit while maintaining connection between said auxiliary circuit and the other signal light.

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