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R. N. FALGE ET AL

2,282,956

DIRECTION SIGNAL SYSTEM

Filed Aug. 16, 1937

2 Sheets-Sheet 1

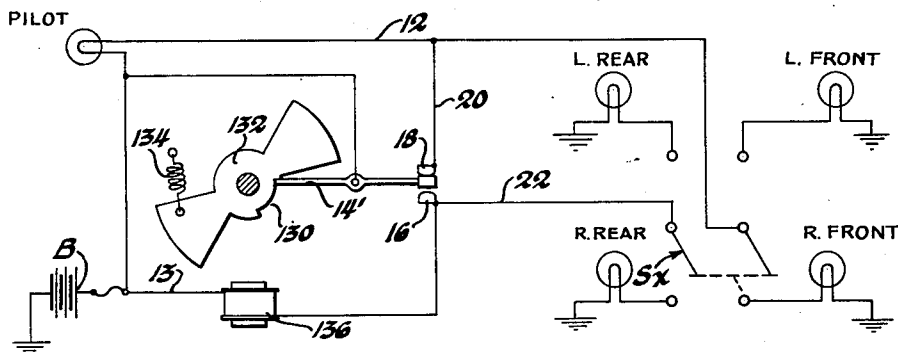


Fig. 6.

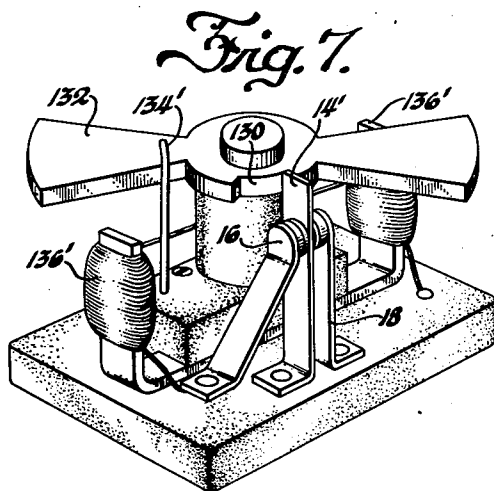


Fig. 7.

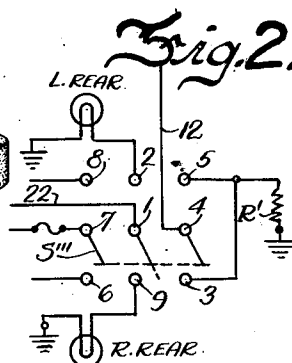


Fig. 2.

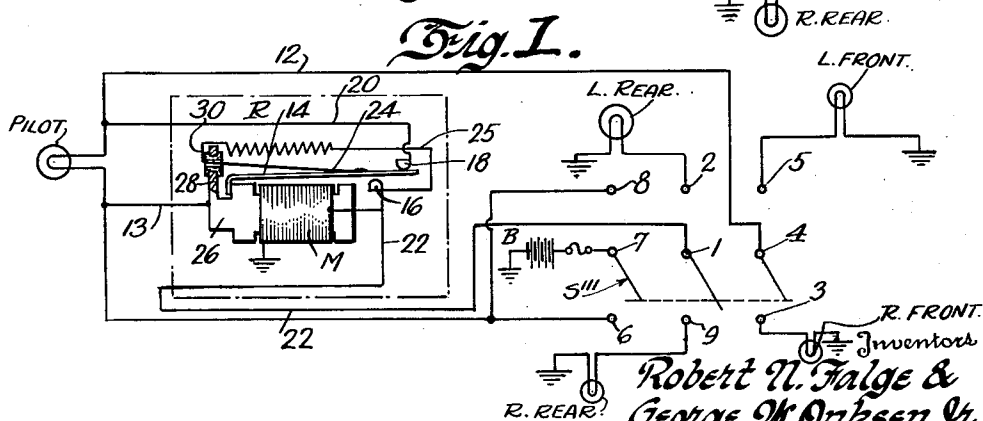


Fig. 1.

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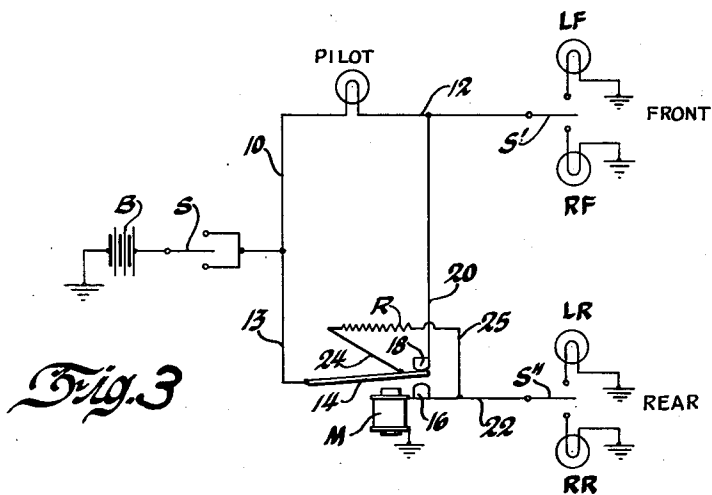
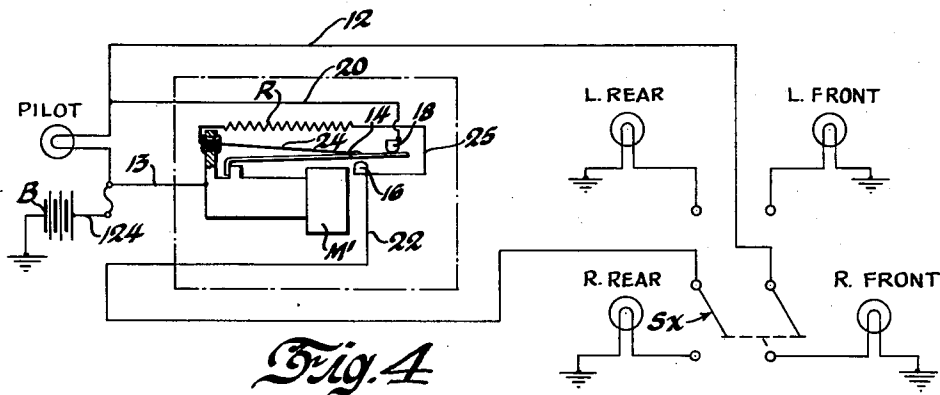
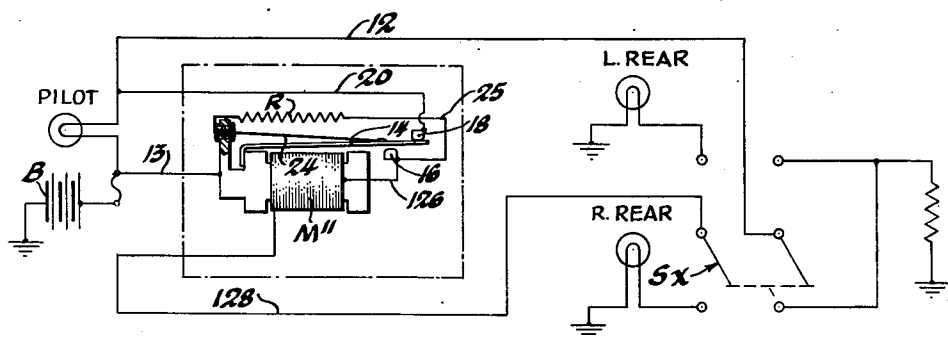
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DIRECTION SIGNAL SYSTEM

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2 Sheets-Sheet 2



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DIRECTION SIGNAL SYSTEM

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7 Claims. (Cl. 177—311)

This invention has to do with a direction signal system characterized by simplicity, economy of construction and reliability. The system comprises signals, preferably lamps, which may be energized by the operator to indicate a left or right turn as may be desired.

An important feature of the invention consists in the provision of a pilot light combined with a flasher arranged to flash the signals, the arrangement being such the pilot light indicates whether any of the direction signals, either front or rear, has ceased to function. By the simple arrangement hereinafter described a single pilot light thus serves to guard all important parts of the system to make sure that it is in operative condition.

The invention also includes certain details of construction enabling the circuit to operate satisfactorily in cases where signals are provided only at the rear of the car. This is done by substituting a suitable resistance for the front signals, thereby enabling the flasher and the rear indicator light to operate in the usual manner.

Figure 1 discloses the preferred form of circuit.

Figure 2 is a fragmentary view showing a modification of the righthand portion of the circuit of Figure 1.

Figure 3 is a simplified drawing of Figure 1.

Figures 4, 5 and 6 show modifications of the circuit of Figure 1.

Figure 7 is an enlarged perspective view of the type of interrupter shown in Figure 6.

The principle of the circuit employed will be most easily understood by referring to Figure 3 which is a simplified drawing of the preferred circuit. Here B is the battery supplying current for the system through switch S. From switch S current flows through conductor 10, pilot light and conductor 12 to switch S', which when thrown in one direction closes the circuit through left front signal LF and when swung in the other direction closes the circuit through right front signal RF. From switch S current is likewise supplied through conductor 13 to a flasher comprising movable switch member 14 adapted to engage either of contacts 16 or 18. Contact 18 supplies current through conductor 20 and conductor 12 to switch S' to the front signals. Contact 16 supplies current through conductor 22 and switch S'' to either the left rear signal LR or the right rear signal RR. Switch member 14 is held in engagement with contact 18 by thermally expansible element 24 connected through suitable conductors, and preferably through resistance R, and conductor 25 to the conductor 22 going to the rear signals. M indicates an electromagnet arranged between contact 16 and ground.

The circuit operates as follows;

With switch S closed and switches S' and S'' engaged with their upper contacts and with movable switch element 14 in engagement with contact 18 as shown current flows from the battery through the switch S, conductor 13, switch element 14, contact 18, conductors 20 and 12, and switch S' to the left front signal thereby energizing it. The pilot light is not lighted for it is short-circuited by the conductor 13 switch element 14, contact 18 and conductor 20. Current also flows from the switch element 14 through the thermal element 24, resistance R, conductors 25 and 22, switch S'' and signal LR to ground. Some current also flows from conductor 25 through magnet M to ground.

In this condition of parts the left front signal is lighted. The left rear signal is not lighted because thermal element 24 and resistance R cut down the current and voltage applied to it to such an extent that its filament does not become incandescent. The pilot light is out because it is short-circuited as previously described.

The current flowing through thermal element 24 is sufficient to heat it enough after a time to cause it to expand sufficiently so that with the aid of the magnet M the movable contact 14 is moved out of engagement with contact 18 and into engagement with contact 16. In this position of parts, current is no longer supplied to the signal LF through conductor 20, but is only supplied through conductor 10, the pilot lamp and conductor 12. The flow of current is sufficient to energize the pilot, but the resistance is so great that the voltage applied to the signal lamp LF is insufficient to light it.

With movable switch element 14 in engagement with contact 16 current flows directly from switch element 16 through conductor 22 and switch S'' to signal LR and ground. Signal LR is consequently energized. Thermal element 24 is short-circuited in consequence of engagement of switch element 14 with contact 16 so that little or no current flows through it. This gives it an opportunity to cool and as it cools it contracts, pulling movable switch element 14 up into engagement with contact 18 whereupon the cycle is repeated. The magnet M makes the making and breaking of the circuits at the contacts 16 and 18 more rapid so as to avoid destructive sparking.

It is now clear that the sequence of operations with switches S' and S'' engaged with their upper contact, and starting with switch element 14 in the position shown in Figure 3, is that the pilot light is out and the left front signal is on, and this is followed by the pilot light being lighted along with the left rear signal, the cycle thereafter being repeated as long as the switches remain closed.

An important advantage of this circuit is that

the pilot will remain unlighted if either front or rear signal fails to come on. Obviously, if the front signal fails to come on, the pilot, which can only be energized when movable switch element 14 engages contact 16, cannot then go on because the failure of the left front signal light interrupts the circuit through it. If the left rear signal light does not come on the pilot is not lighted because the resistance of the remaining path through magnet M is so high that the current flowing through thermal element 24 is insufficient to cause it to expand. Consequently movable switch element 14 remains in engagement with contact 18, thus short-circuiting the pilot lamp.

Obviously, the circuit works the same way when the switches S' and S'' are moved into engagement with their lower contacts, the only difference being that the signals on the right side of the car are energized instead of those on the left.

Another advantage of this circuit is the fact that the failure of the front signal does not affect the rear signal which continues to flash. Failure of the rear signal causes the front signal to burn continuously so long as the direction signal switch is closed. The size of the filaments of the front signals may be varied without affecting the operation of the flasher. If desired, the front signals may be omitted and in that case it is only necessary to substitute for them an equivalent resistance indicated at R' in Figure 2 whereupon the rear signals function as before as will appear hereafter in connection with the description of modifications. The principle of our improved circuit may be used with various kinds of flashers. The thermal type of flasher has been selected because of economy and reliability, but various flashers, operated magnetically, mechanically, or in other ways, could be used.

The production circuit shown in Figure 1 is the same in principle as that shown in Figure 3. The chief difference is the fact that switches S, S' and S'' have been combined into a single switch S''' of the three pole double throw type.

Another distinction between the production circuit of Figure 1 and the diagrammatic circuit of Figure 3 is that the former shows some of the details of a particular kind of flasher which may be employed. This flasher includes the contacts 16 and 18, as before, resistance R, thermal element 24, and magnet M but the magnet is shown wound about an iron core 26 which also serves as a support for the movable switch element 14 as well as to conduct current thereto. The core 26 likewise has an extension 28 carrying an insulator 30 through which the thermal element 24 extends and in which one end of it is anchored in order that it may exert the desired pull on the switch element 14.

In Figure 4 there is shown a slight modification of the circuit of Figure 1. Here the magnet M is replaced by a permanent magnet M', and this makes it possible to use a two-point double throw switch Sx instead of a three-point double throw switch S''' of Figure 1, since current from the battery may now be supplied directly to the flasher and pilot as by lead indicated at 124 without having current continuously flowing through the electromagnet M as would be the case with the circuit of Figure 1 with the battery connected as shown in Figure 4. This obviously simplifies the circuit.

In Figure 5 there is shown a further slight modification in that the magnet M'' is arranged

in series with the rear set of direction signals by means of conductors 126 and 128. Here, too, it is possible to use the simpler two-point double throw switch since the circuit through the electromagnet is broken by breaking the circuit through the rear signals. While this likewise is a simpler circuit, the flasher is a little more sensitive to adjustment, voltage changes, and variations in the current drawn by the rear bulbs than is the case with the circuit first described.

In the modified circuit shown in Figures 6 and 7 a different type of flasher is disclosed but the circuit is otherwise the same. Here the movable switch element 14' is adapted to engage contacts 16 or 18 as before. It is operated by engagement of its opposite end with segmental notch 130 in oscillating armature 132 yieldingly urged in one direction by a spring shown in Figure 6 as a coil spring 134 and in Figure 7 as a wire or leaf spring 134'. 136 indicates an electromagnet supplied with current from battery B, the connection of this circuit with the battery being the same as in Figs. 4 and 5. In the embodiment shown in Figure 7 the two electromagnets indicated at 136' are employed instead of one. In either case upon closing the switch to energize either of the sets of direction signals the magnet or magnets are energized causing the armature 132 to swing toward them with the result that switch member 14' is moved to break contact with contact 18 and engage contact 16, thereby effecting flashing of the pilot and of the front and rear signals in the same manner as in the case of the circuits previously described. In this circuit the coil of the magnet 136, like the thermal element 24 and resistance R of the preferred form of flasher, has sufficient resistance to prevent the rear signals from being lighted when the parts are in the position shown in Figure 6 but with the switch closed.

Obviously various forms of interrupters could be used in place of the flashers described, for example, a simple doorbell type of interrupter having armature alternately engaging a pair of contacts. It is equally apparent that electrically operated mechanical signals could be used instead of signal lights.

It will be understood that in the case of each circuit embodying our invention of which Figures 1 to 6 show examples, the front signals may be dispensed with where desired and an equivalent resistance substituted as shown in dotted lines at R' in Fig. 2. It will be appreciated that the filaments of the signal lamps function as resistances as well as emit light. In certain of the claims which follow the term "resistance" is used to include either a simple resistance or a resistance in the form of filaments in the signal lamps.

We claim:

1. In a direction signal circuit the combination of a source of current, an interrupter including an armature in series with the source, a pair of contacts alternately engaged by the armature, means normally biasing the armature into engagement with one of said contacts, a shunt circuit including a pilot connecting the armature and said last-named contact, and means for actuating the armature including current-responsive means arranged in a circuit connecting the armature and the other of said contacts, two pairs of right and left direction signals, a circuit including a switch adapted to selectively connect either the right or left signal of one pair to one of said contacts or to disconnect both signals

therefrom, a circuit including a switch adapted to connect either the right or left signal of the other pair to the other of said contacts or to disconnect both signals therefrom, and means for simultaneously actuating said switches to connect both of said right signals or both of said left signals in circuit with the interrupter and source or to disconnect them all therefrom, whereby said pilot is energized when either the right or the left signals are connected in circuit and the armature is in engagement with the contact with which it is normally out of engagement, and is deenergized when either the right or the left signals are connected in circuit but either or both fail to operate.

2. In a direction signal circuit the combination of a source of current, a switch having an off position and two on positions, an interrupter including an armature in series with the source and switch, a pair of contacts alternately engaged by the armature, means biasing the armature into engagement with one of said contacts, a shunt circuit including a pilot connecting the armature and said last-named contact, and means for actuating the armature including current-responsive means arranged in a circuit connecting the armature and the other of said contacts, a circuit containing an electro-magnet connecting said last-named contact and the other side of the source, said electro-magnet being adapted to yieldingly hold the armature in engagement with said last-named contact, two pairs of right and left direction signals, a circuit including a switch adapted to selectively connect either the right or left signal of one pair to one of said contacts or to disconnect both signals therefrom, a circuit including a switch adapted to connect either the right or left signal of the other pair to the other of said contacts or to disconnect both signals therefrom, and means for simultaneously actuating all of said switches to connect both of said right signals or both of said left signals in circuit with the interrupter and source or to disconnect them all therefrom, whereby said pilot is energized when either the right or the left signals are connected in circuit and the armature is in engagement with the contact which is it is normally biased away from, and is deenergized when either the right or the left signals are connected in circuit but either or both fail to operate.

3. In a signal circuit the combination of a source of current, an interrupter including a conducting member in series with the source, a pair of contacts alternately engaged by the conducting member, means normally biasing the conducting member into engagement with one of said contacts, a shunt circuit including a pilot connecting the conducting member and said last-named contact, means for actuating the conducting member including current-responsive means arranged in a circuit connecting the conducting member and the other of said contacts, and a signal connected to each of said contacts adapted to be alternately energized by operation of said interrupter.

4. In a signal circuit the combination of a source of current, an interrupter including an armature in series with the source, a pair of contacts alternately engaged by the armature, means biasing the armature into engagement with one of said contacts, a shunt circuit including a pilot connecting the armature and said

last-named contact, means for actuating the armature including current-responsive means arranged in a circuit connecting the armature and the other of said contacts, a circuit containing an electro-magnet connecting said last-named contact and the other side of said source, said electromagnet being adapted to yieldingly hold the armature in engagement with said last-named contact, and signals connected to said contacts and adapted to be alternately energized by operation of said interrupter.

5. In a signal circuit the combination of a source of current, an interrupter including a conducting member in series with the source, a pair of contacts alternately engaged by the conducting member, means normally biasing the conducting member into engagement with one of said contacts, a shunt circuit including a pilot connecting the conducting member and said last-named contact, means for actuating the conducting member including current-responsive means arranged in a circuit including the conducting member and the other of said contacts, a signal connected to said last-named contact, and a resistance connected to the first-named contact, whereby said signal is intermittently actuated by said interrupter.

6. In a direction signal circuit the combination of a source of current, an interrupter including an armature in series with the source, a first contact on one side of the armature, a second contact on the other side of the armature, a signal in series with each contact, a tension element biasing the armature into engagement with the first contact arranged in a circuit in parallel with the normally open gap constituted by the armature and the second contact, said element being adapted to expand and lose its tension with flow of current, said tension element being short-circuited when the armature engages said second contact, means for actuating the armature including current-responsive means connected to said second contact, the resistance of said signals being such that when the armature engages the first contact the flow of current through said tension element is sufficient to cause said tension element to extend and permit said current-responsive means to draw the armature into engagement with the second contact and a pilot arranged across the normally closed gap constituted by the armature and said first contact.

7. In a signal system the combination of a source of current, an interrupter in series with the source having two output terminals and including means to alternately close low resistance paths through said interrupter to said terminals, said means comprising interrupter operating means embodying high resistance connected in series with the source and one of said terminals, the low resistance path through said terminal being normally open while the low resistance path through the other terminal is normally closed, an electrical indicator embodying high resistance connected to said source and the other of said terminals, a signal for each of said terminals, whereby said signals are alternately energized through said low resistance paths and said indicator is energized when the signal in series therewith is deenergized.

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