

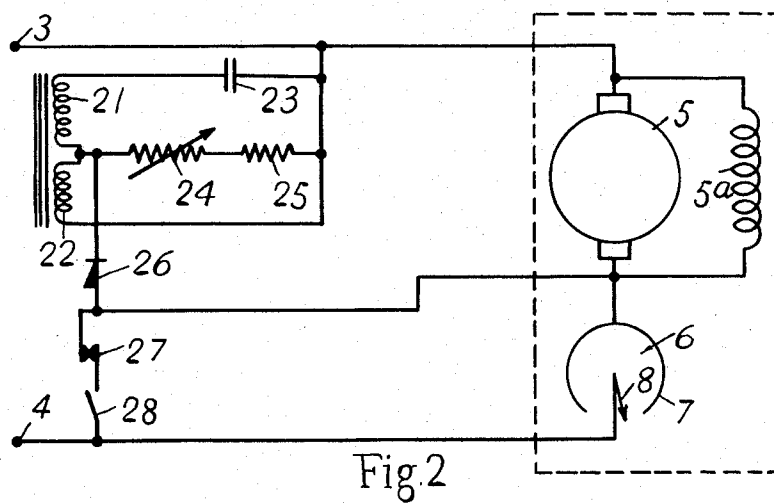
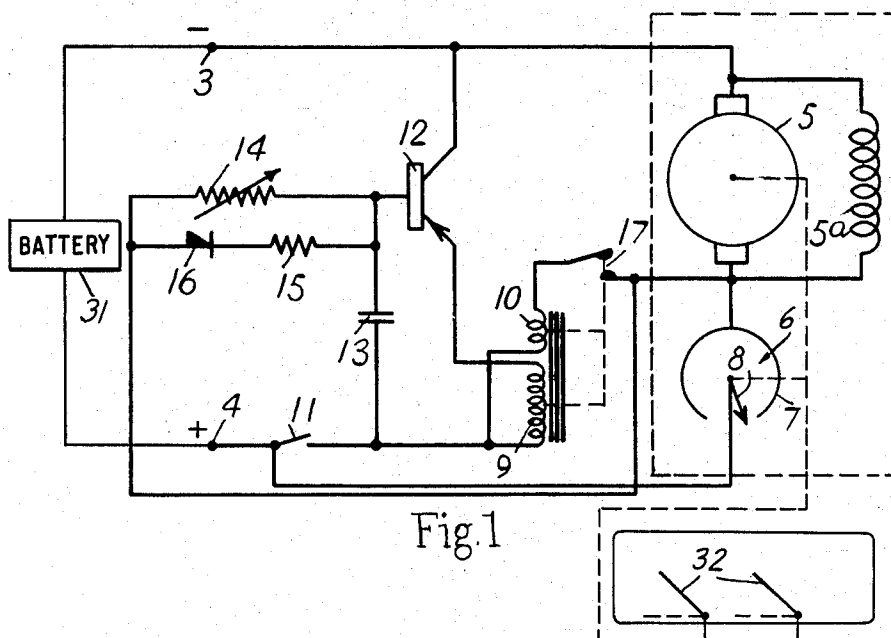
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ELECTRICAL OPERATING CIRCUITS FOR VEHICLE WINDSCREEN WIPERS

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ELECTRICAL OPERATING CIRCUITS FOR VEHICLE WINDSCREEN WIPERS

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This invention relates to electrical operating circuits for vehicle windscreen wipers, and has for its object to provide such a circuit in a convenient form particularly suitable for use in light rain or mist.

An operating circuit in accordance with the invention includes means for effecting a delay between the termination of one cycle of operation of the wipers and the commencement of the next cycle of operation.

In the accompanying drawings, FIGURES 1 and 2 respectively are circuit diagrams illustrating two examples of the invention.

Referring first to FIGURE 1, there are provided first and second terminals 3, 4 adapted for connection to the negative and positive terminals of a battery 31 respectively. The terminal 3 is connected to one end of the field coil 5a of a windscreen wiper motor 5, the coil 5a being connected across the motor armature. The other end of the coil 5a is connected to the fixed contact of a known form of rotary switch 6 comprising an arcuate fixed contact 7 and a rotary contact arm 8 operable by the motor 5, the switch operating in such a manner that when the motor is energized through the switch alone, the wipers 32 driven by the motor 5 will continue to operate until they are in their parking position which is indicated in dotted lines, at which point the arm 8 will be moved out of register with the arcuate fixed contact and the motor will stop. The rotary arm 8 is connected to the second terminal.

There is further provided a relay including first and second windings 9, 10. One end of the winding 9 is connected through a control switch 11 operable by the driver to the terminal 4, whilst its other end is connected to the emitter of a p-n-p transistor 12 the collector of which is connected to the terminal 3. The base of the transistor 12 is connected to the terminal 4 through a capacitor 13 and the switch 11 in series, and is also connected to said other end of the coil 4 through parallel circuits one of which contains a variable resistor 14 and the other of which contains a fixed resistor 15 and a diode 16 in series.

The winding 10 has one end connected through the switch 11 to the terminal 4, its other end being connected to said other end of the field coil 5a through a pair of normally open contacts 17 operable by the relay.

In operation, when the control switch 11 is closed, the capacitor 13 charges through the field coil and armature and the variable resistor 14. After a period of time determined by the variable resistor 14, the transistor 12 is rendered conductive to energize the winding 9 and close the relay contacts 17. Closing of the contacts 17 energises both the motor and the second relay winding 10, the latter assisting the action of the winding 9 to ensure rapid closing of the relay contacts 17.

As soon as the relay is energized, the capacitor 13 discharges through the resistor 15, the diode 16 and the rotary switch 6. The transistor 12 now reverts to its non-conductive state so that the relay is de-energized. However, by this time the rotary arm 8 has moved into contact with the arcuate contact 7, so that the motor remains energized through the rotary switch 6 until the wipers have completed one cycle. There will then be a delay

determined by the variable resistor 14, followed by a further single cycle, the operation continuing until the control switch 11 is opened.

In the example seen in FIGURE 2 the first terminal 3 is connected to one end of the field coil 5a the other end of which is connected to the arcuate fixed contact 7 of the rotary switch 6 as before. The arm 8 of the rotary switch is connected to the second terminal 4.

There is further provided a relay comprising first and second windings 21, 22 in series, the free end of the winding 21 being connected through a capacitor 23 to the terminal 3, and the free end of the winding 22 being connected directly to the terminal 3. A point intermediate the windings 21, 22 is connected to the first terminal through a variable resistor 24 and a fixed resistor 25 in series, and to the second terminal through a diode 26, a pair of normally closed relay contacts 27 and a control switch 28 in series. Finally said other end of the field coil 5a is connected to a point intermediate the diode 26 and the relay contacts 27.

In operation, when the control switch 28 is closed the motor is immediately energized, and current flows through the winding 21 to charge the capacitor 23, and through the winding 22 to the negative supply terminal. However, the windings 21, 22 are now in opposition, so that the relay is not energized. When the capacitor 23 is charged, the effect of the winding 21 becomes negligible, and the relay is energized to open the relay contacts 27. The motor is now energized solely through the rotary switch 6, and the relay is also maintained energized through the rotary switch.

As soon as one cycle is completed, the motor stops, but although the rotary switch 6 is open the relay is maintained energized by discharging of the capacitor 23 through the windings 21, 22 in series the windings 21, 22 now acting in conjunction. When the capacitor has fully discharged, the relay is de-energized and the cycle is repeated. The delay period is determined by the variable resistor 24.

Each of the circuits described is intended to be used optionally in place of the normal continuous operation of the wipers and further circuitry for effecting normal operation is provided. For this purpose the switches 11, 28 conveniently are movable from an inoperative position to a pair of operative positions in one of which the circuits described are brought into operation. In the other operative position a circuit is completed through the switch and the coil 5a and motor 5 to provide for normal operation of the wipers. The circuits described are intended for use in light rain or mist where the windscreen is too dry to permit a clean wipe if the wipers are operated normally. Preferably the resistors 14, 24 are readily variable by the driver of the vehicle to determine the delay.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. An electrical operating circuit for vehicle windscreen wipers which normally occupy a parking position when they are not operating, including an electric motor for driving the wipers, a rotary switch in series with and driven by the motor, said rotary switch occupying an open position when the wipers are in said parking position, but at other times occupying a closed position in which it completes a circuit to the motor, a relay having a normally closed relay contact in series with said motor, switch means for completing a circuit through said relay contact to the motor to energise the motor so that the wipers are operated and the rotary switch is moved from its open to its closed position, means for actuating said relay to open said relay contact while the rotary switch is closed so that the motor is energized solely through the

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rotary switch and will be stopped when the wipers reach said parking position, and capacitive timing means associated with said relay actuating means and maintaining said relay contact open for a predetermined period of time each time the wipers reach said parking position.

2. An electrical operating circuit as claimed in claim 1 in which said capacitive timing means is variable, so that said predetermined period of time can be varied.

3. An electrical operating circuit for vehicle windscreen wipers which normally occupy a parking position when they are not operating, including an electric motor for driving the wipers, a rotary switch in series with and driven by the motor, said rotary switch occupying an open position when the wipers are in said parking position but at other times occupying a closed position in which it completes a circuit to the motor, a relay having a relay coil and a normally open relay contact in series with said motor, a manually operable switch in series with said relay contact, closing of said manually operable switch completing a circuit to the motor through said relay contact, a capacitor, means for charging said capacitor when said manually operable switch is closed, means operable when said capacitor is charged for energising said relay coil to close said relay contact and complete a circuit to the motor through said manually operable switch so that the wipers are operated and the rotary switch is moved from its open to its closed position, means providing a discharge path for said capacitor when said motor is energised, means whereby said relay becomes de-energised when the capacitor has discharged so that said relay contact opens and the motor is energised solely through the rotary switch and will be stopped when the wipers reach said parking position, whereafter the motor remains de-energised for a period of time during which said capacitor is charged again.

4. An electrical operating circuit for vehicle windscreen wipers which normally occupy a parking position when they are not operating, including an electric motor for driving the wipers, a rotary switch in series with and driven by the motor, said rotary switch occupying an open position when the wipers are in said parking position but at other times occupying a closed position in which it completes a circuit to the motor, a relay having first and second relay coils and a normally open relay contact in series with said motor, a manually operable switch connected in series with said second relay coil and said relay contact, closing of said manually operable switch completing a circuit to the motor through said relay contact, a capacitor, means whereby said capacitor is charged when said manually operable switch is closed, means operable when said capacitor is charged for energising said first relay coil and closing said relay contact, closing of said relay contact energising said second relay coil which assists said first relay coil to maintain the relay contact closed, and closing of said relay contact also energising the motor so that the wipers are operated and said rotary switch is moved from its open position to its closed position, means operable upon energisation of said motor for discharging said capacitor, means operable when said capacitor has discharged for de-energising said relay so that said relay contact opens and the motor is energised solely through said rotary switch and is stopped when the wipers reach said parking position, the motor being re-energised when the wipers are in their parking position after a predetermined delay during which said capacitor is charged.

5. An electrical operating circuit for vehicle windscreen wipers which normally occupy a parking position when they are not operating, including an electric motor for driving the wipers, a rotary switch in series with and driven by the motor, said rotary switch occupying an open position when the wipers are in said parking position but at other times occupying a closed position in which it completes its circuit to the motor, a relay having a first coil, a second coil and a normally open relay contact,

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said relay contact being connected in series with said motor, a manually operable switch connected in series with said second coil and said relay contact, closing of said manually operable switch completing a circuit to the motor through said relay contact, a transistor having said first coil in its collector-emitter circuit, a capacitor controlling the base potential of said transistor, means whereby said capacitor charges when said manually operable switch is closed, said transistor becoming conductive when the capacitor is charged and energising said relay so that current flows to the motor to energise the motor through said relay contact, said second coil assisting the first coil to close said contact, and the motor serving when energised to operate the wipers and to move said rotary switch from its open position to its closed position, a discharge path for said capacitor when the motor is energised, means whereby when the capacitor is discharged the transistor becomes non-conductive and the relay contact opens so that the motor is energised solely through said rotary switch and is stopped when the wipers reach said parking position, the motor being re-energised when the wipers reach their parking position after a predetermined time during which said capacitor re-charges.

6. An electrical operating circuit for vehicle windscreen wipers which normally occupy a parking position when they are not operating, including an electric motor for driving the wipers, a rotary switch in series with and driven by the motor, said rotary switch occupying an open position when the wipers are in said parking position but at other times occupying a closed position in which it completes a circuit to the motor, a relay having a coil and a normally open contact in series with said motor, a manually operable switch in series with said normally open contact, closing of said manually operable switch completing a circuit to the motor through said relay contact, a capacitor, a charging circuit for said capacitor, said charging circuit including the manually operable switch and a variable resistor, means for energising said relay coil when the capacitor is charged, energisation of said relay coil closing said relay contact so that the motor is energised through said rotary contact, and energisation of said motor operating the wipers and moving said rotary switch from its open position to its closed position, a discharge path for said capacitor when the motor is energised, means whereby when the capacitor has discharged the relay is de-energised and said relay contact opens so that the motor is energised solely through the rotary switch and is stopped when the wipers reach parking position, the motor being re-energised when said wipers are in their parking position after a delay which is dependent on the time taken for said capacitor to charge, and which can be varied by said variable resistor.

7. An electrical operating circuit for vehicle windscreen wipers which normally occupy a parking position when they are not operating, including an electric motor for driving the wipers, a rotary switch in series with and driven by the motor, said rotary switch occupying an open position when the wipers are in said parking position but at other times occupying a closed position in which it completes a circuit to the motor, a relay having a relay coil and a normally closed relay contact in series with said motor, switch means for completing a circuit through said relay contact to the motor to energise the motor so that the wipers are operated and the rotary switch is moved from its open to its closed position, a capacitor, means operable when said motor is energised for energising said relay coil and simultaneously charging said capacitor, energisation of said relay coil opening said relay contact so that the motor is energised solely through said rotary switch and stops when said rotary switch reaches its open position as a result of said wipers reaching said parking position, and means providing a discharge path for said capacitor when the motor is stopped, discharge of said capacitor maintaining said relay coil energised for a predetermined period of time, after which said relay contact closes and said motor is energised again.

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8. An electrical operating circuit as claimed in claim 7, including means for varying the time taken for said capacitor to discharge.

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