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PHOTOCELL MOTOR SPEED CONTROL SYSTEM

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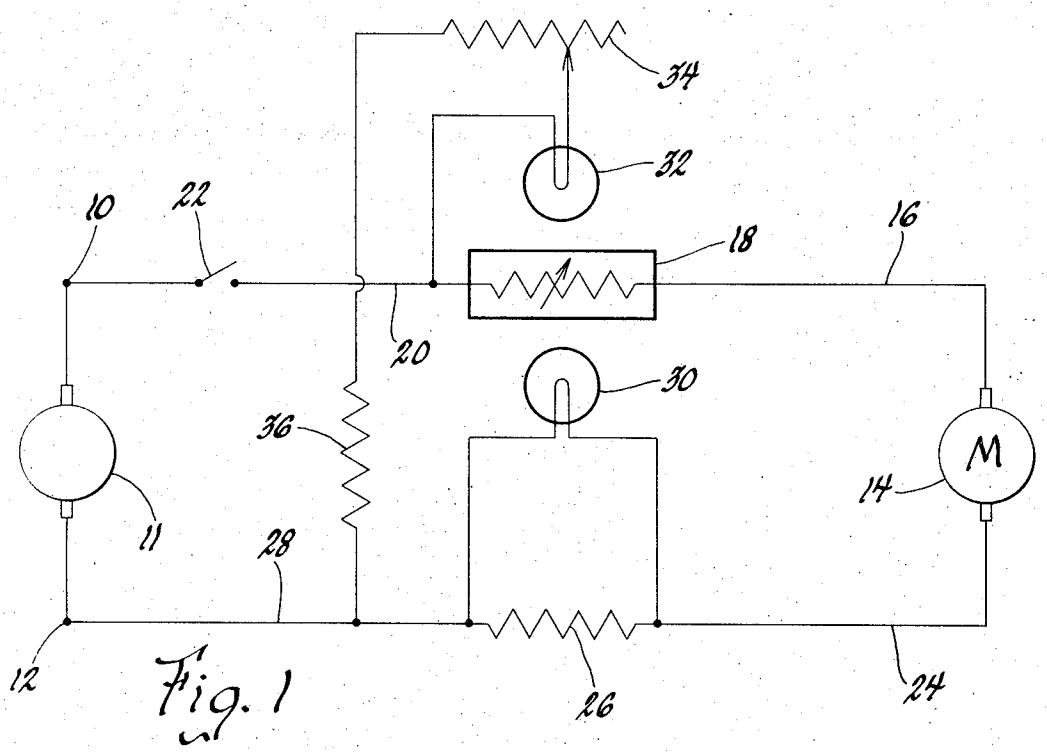


Fig. 1

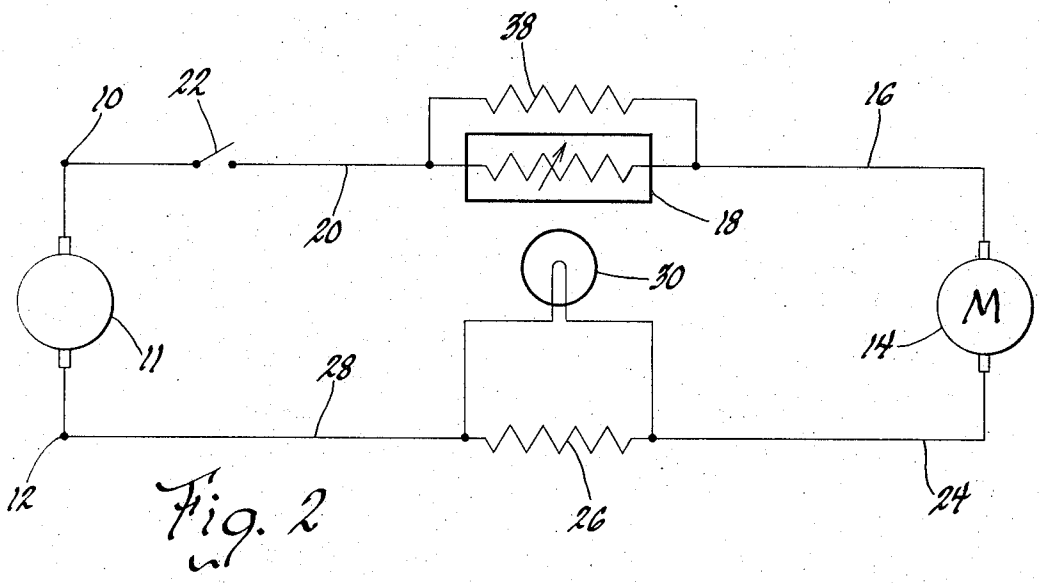


Fig. 2

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PHOTOCELL MOTOR SPEED CONTROL SYSTEM

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This invention relates to a motor control system and more particularly to a motor control system which uses a circuit element that varies its resistance in accordance with the amount of light sensed by the circuit element.

One of the objects of this invention is to provide a motor control system which is connected in series with the motor and which includes a circuit element that varies its electrical resistance in accordance with the amount of light applied to the circuit element.

Another object of this invention is to provide a motor control system wherein a power photocell is connected in series with the motor and wherein a lamp is provided which applies light energy to the photocell to control the resistance of the photocell in response to energization of the lamp.

A further object of this invention is to provide a motor control system wherein motor current is controlled by a power photocell whose resistance is controlled in accord ance with motor line current.

Still another object of this invention is to provide a motor control system wherein a photocell or similar device is connected in series with the motor and wherein a pair of lamps are provided for applying light energy to the photocell, one of the lamps being energized in accordance with motor current and the other lamp providing a light intensity which is adjustable. In this arrangement, the lamp that responds to motor current is used in starting the motor and where heavy loads are encountered during a running condition.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

FIGURE 1 is a schematic circuit diagram of a motor control system made in accordance with this invention.

FIGURE 2 is a schematic circuit diagram of a modified motor control system made in accordance with this invention.

Referring now to FIGURE 1, the reference numerals 10 and 12 designate power input terminals for supplying power to a motor 14. The input terminals 10 and 12 are energized from a suitable source of direct current or alternating current 11. The motor 14 can be a series or universal AC-DC motor of the type that is normally controlled by a series rheostat.

One side of the motor 14 is connected with the power input terminal 10 through conductor 16, a power photocell 18, conductor 20 and a manually operable control switch 22. The opposite side of the motor 14 is connected with power input terminal 12 via conductor 24, a resistor 26 and conductor 28.

The photocell 18 is a circuit element which changes its resistance in accordance with the amount of light applied to it and is of the cadmium sulphide photoconductive type. Thus as the amount of light which is applied to the element 18 increases, the resistance of this element decreases and vice versa.

The photocell 18 responds to light emitted by the lamps 30 and 32. The lamp 30 is connected across the resistor 26 while the lamp 32 is connected between conductor 20 and a variable resistance 34. The opposite side

of the variable resistance 34 is connected to conductor 28 through resistor 36. The lamp 32 is therefore connected in series with resistors 34 and 36 and across power input conductors 20 and 28.

By way of example and not by way of limitation, where the motor 14 has a one amp stall current and where the power source 11 is 115 volt alternating current, the circuit elements of the system may have the following values:

Resistor:
- 26 ---------- 6 ohms fixed.
- 36 ---------- 2000 ohms fixed.
- 34 ---------- 2500 ohms variable.

Lamp:
- 32 ---------- 28 volt lamp.
- 30 ---------- 6 volt lamp.

Photocell 18 ---------- Delco Radio LDR–25 photocell.

When the switch 22 of the motor control system is closed, the motor 14 will be energized from the power source 11 through the photocell 18 and through resistor 26. When the motor is started, the current flow through resistor 26 will be relatively high which will cause the lamp 30 to have an increased light intensity. This increased intensity of lamp 30 which is applied to the photocell 18 will cause the resistance of the photocell 18 to decrease with a corresponding increase in voltage applied to the motor 14.

As the speed of the motor increases after starting, the current flow through the resistor 26 will decrease with a corresponding decrease in the brightness of lamp 30. The effect of the lamp 30 on the photocell 18 will therefore be decreased so that the resistance of the photocell 18 will increase with regard to the light emitted by lamp 30.

The amount of light emitted by the lamp 32 depends upon the adjustment of the variable resistor 34. Thus when the resistance of the variable resistance is decreased, the amount of light emitted by lamp 32 is increased to thereby reduce the resistance of the photocell 18 with a consequent increase in motor speed. If the resistance of the variable resistor 34 is now increased, the amount of light emitted by lamp 32 is decreased causing an increase of the resistance of the photocell 18 and causing a decrease in motor speed.

From the foregoing, it can be seen that under normal running conditions, the lamp 32 controls motor speed in accordance with the adjustment of the variable resistor 34. The resistance of the photocell 18 is, however, at all times effected by the amount of current being supplied to the motor due to the provision of the lamp 30 which responds to motor line current. For the most part, the lamp 30 is effective during starting of the motor and during sudden increases in motor load.

Referring now to FIGURE 2, a motor control system is illustrated which is intended to maintain a substantially constant motor speed regardless of the load imposed upon the motor. The elements of FIGURE 2 which are identical with those of FIGURE 1 have been identified by the same reference numeral. In FIGURE 2, the lamp 32 and resistors 34 and 36 have been eliminated and a resistor 38 has been added which is connected across or in shunt with the photocell 18. In the system of FIGURE 2, the resistor 38 can have a fixed value of approximately 100 ohms where the source 11 is 115 volt alternating current and where the lamp 30 is a six volt lamp and the resistor 26 a six ohm fixed resistor.

When the switch 22 is closed in the system of FIGURE 2, the motor will be energized through resistor 38. The amount of light energy applied to the photocell 18 in the system of FIGURE 2 will be determined by the amount of current flowing through resistor 26 and this

current is the line current of the motor 14. As motor line current increases, the amount of light energy developed by lamp 30 will increase to reduce the resistance of photocell 18; and as line current decreases, the amount of light energy developed by lamp 30 will decrease to cause an increase of the resistance of photocell 18. The system of FIGURE 2 will maintain the speed of the motor 14 substantially constant regardless of the load imposed on the motor since the resistance of element 18 will change in accordance with motor line current.

While the embodiments of the present invention as herein disclosed constitute a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. A motor control system comprising, a pair of input terminals adapted to be connected with a source of power, an electric motor, a circuit element having a resistance which varies in accordance with the amount of light applied to it, means connecting said circuit element in series between one of said input terminals and one side of said electric motor, a lamp positioned to apply light to said circuit element, and means for energizing said lamp as a function of motor line current.

2. A motor control system comprising, a source of electrical power, an electric motor, a circuit element having a resistance which varies in accordance with the amount of light applied to it, means connecting said circuit element between said source of power and said electric motor, a first lamp positioned to apply light to said circuit element, a second lamp positioned to apply light to said circuit element, means connecting said first lamp across said source of power, and means for energizing said second lamp as a function of motor line current.

3. The motor control system according to claim 2 where the means for energizing the second lamp in accordance with motor current is a resistor connected in series between the source of power and the motor.

4. A motor control system comprising, a source of electrical power, an electric motor, a circuit element having a resistance which varies in accordance with the amount of light applied to it, means connecting said circuit element in series between one side of said source of electrical power and one side of said electric motor, means connecting the opposite side of said electric motor with the opposite side of said source of power, first and second lamps positioned to apply light to said circuit element, a resistor connected in series between one side of said source of power and one side of said electric motor, means connecting one of said lamps across said resistor, and a circuit connecting the other of said lamps across said source of power, said circuit including a fixed resistor and a variable resistor.

5. A motor control system comprising, a source of voltage, a motor, a circuit element having a resistance which varies in accordance with the amount of light applied to it, means connecting said circuit element between said source of voltage and said motor, a first resistor connected between said source of voltage and said motor, a lamp connected across said resistor and positioned to apply light to said circuit element, and a second resistor connected in shunt with said circuit element.

6. A motor control system comprising, a pair of input terminals adapted to be connected with a source of power, an electric motor, a circuit element having a resistance which varies in accordance with the amount of light applied to it, said resistance of said circuit element decreasing when the amount of light applied to it increases and said resistance increasing when the amount of light applied to it decreases, means connecting said circuit element in series between one of said input terminals and one terminal of said electric motor whereby the current supplied to said motor is varied in accordance with the resistance of said circuit element, a lamp positioned to apply light to said circuit element, and means for controlling the amount of light applied to said circuit element as a function of motor line current, said last named means being so arranged that the amount of light applied to said circuit element increases as line current increases.

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