

J. B. WIARD,  
CIRCUIT CONTROLLING DEVICE,  
APPLICATION FILED MAR. 26, 1907.

998,662.

Patented July 25, 1911

Fig. 1

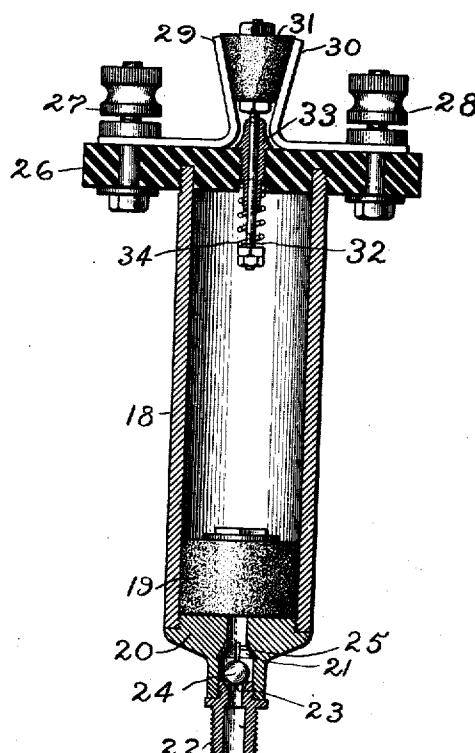
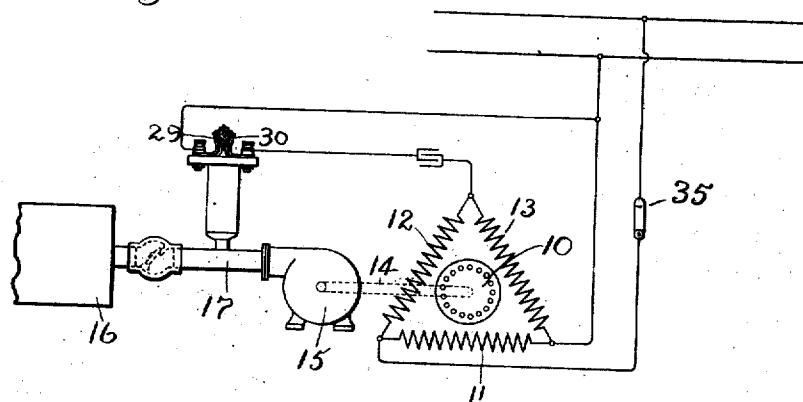


Fig. 2



WITNESSES:

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# UNITED STATES PATENT OFFICE.

JOHN B. WIARD, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## CIRCUIT-CONTROLLING DEVICE.

998,662.

Specification of Letters Patent. Patented July 25, 1911.

Application filed March 25, 1907. Serial No. 364,255.

To all whom it may concern:

Be it known that I, JOHN B. WIARD, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Circuit-Controlling Devices, of which the following is a specification.

This invention relates to devices for controlling electric motors and has for its object the provision of means whereby an electric motor may be started and brought to running speed in a reliable, safe and efficient manner.

15 The invention relates more particularly to the controlling of motors which operate fluid pressure generators, such as blowers, pumps and the like, one of the objects being to provide a circuit controlling switch which 20 is actuated by fluid pressure.

25 My invention finds a special application in the starting of single-phase motors which have different connections for starting and running. The pressure-operated switch is arranged so as to communicate with the generator so that as soon as the latter starts, the pressure therefrom will actuate the switch, the arrangement being such that only a small portion of the fluid delivered 30 from the generator acts upon the switch. When the motor reaches the required speed, the switch cuts out the starting windings leaving the motor directly connected to the line.

35 In the accompanying drawing, in which one embodiment of my invention is shown, Figure 1 is a sectional view of the switch used in connection with my invention and Fig. 2 is a diagram of the circuits.

40 Referring to the drawing, 10 is the rotor of an induction motor having a main stator winding 11 and auxiliary or starting windings 12 and 13. The rotor 10 drives, by means of a belt 14 or in any desired manner, a fluid pressure generator, such as a blower 15, discharging into a tank 16, there being preferably a check valve between the blower and the tank. The pressure-operated switch for controlling the starting of 45 the motor is tapped into the pipe 17 between the generator and the tank so as to make communication with the generator. The switch consists of a tube or cylinder 18 of any desired material, provided with a piston or plunger 19 moving freely therein.

The cylinder is closed at one end by a plug 20 screwed therein and provided with a longitudinal passage having a valve seat 21. A nipple 22, which screws into this plug, is also provided at one end with a valve seat 23, while at its opposite end are screw threads for tapping into the pipe 17. A ball valve 24 is arranged to play between the two valve seats 21 and 23, so that when there is a pressure in the pipe 17, the ball 25 will go up to the seat 21, while when the pressure is reduced it will return by gravity to the seat 23. When the ball is on the seat 21 the passage to the cylinder is not entirely closed, there being small leak-holes or vents 25 in the valve seat which permit the air to leak into the cylinder. A similar arrangement may be made in the valve seat 23. The upper end of the cylinder is closed by an insulating block 26 carrying binding posts 27 and 28 forming the terminals of contacts 29 and 30 respectively. These contacts are normally bridged by a plunger contact 31 preferably conical in shape and provided with a stem 32, which slides in the sleeve 33 screwed into the insulating block 26. A spring 34, engaging nuts on the end of the stem, forces the plunger into the position shown in Fig. 1, in which the contacts 29 and 30 are bridged. When the piston 19 reaches the upper end of the cylinder, it engages the end of stem 33 and pushes the plunger contact upward so as to break the contact.

The operation of my device is as follows:—When the motor circuit is closed at switch 35, the motor will be operated with the starting windings 12 and 13 in circuit so as to make a three-phase winding for starting. The motor drives the generator 50 thereby delivering fluid to the tank 16. The pressure from the generator immediately lifts the ball valve 24 against the seat 21, closing the passage to the cylinder with the exception of the leak vent 25. The fluid will therefore leak into the cylinder and gradually raise the piston. When the latter reaches the stem 33, it will move it upward and open the circuit of the starting windings. The plunger having reached the 55 upward limit of its travel and opened the switch, the pressure in the cylinder quickly rises and becomes substantially equal to the pressure in the main. There being then practically no difference in pressure between 60

- the cylinder and the main, the ball will drop by its own weight and the apparatus will be in condition for the plunger to drop immediately when the pressure in the main falls. When the blower 15 stops the piston 19 will drop immediately and the spring 32 will cause the contacts 29 and 30 to be bridged by the contact 31 thereby throwing in the starting windings.
- 10 It will be seen that I have provided a very simple and efficient means for changing the motor connections from starting to running, which will operate automatically and positively.
- 15 It is clear, of course, that my invention is not limited to the particular type of motor herein shown and described, nor to the other details of construction or arrangement of parts herein set forth, since many modifications of my device will suggest themselves to those skilled in the art without departing from the spirit of my invention, the scope of which is set forth in the annexed claims.
- 25 What I claim as new and desire to secure by Letters Patent of the United States is,—
1. The combination with an electric motor having different connections for starting and for running, of a fluid pressure generator operated by said motor, a switch for establishing running connections of the motor, a cylinder communicating with the generator, and a piston movable independently of said switch and arranged to engage the same.
  - 30 2. The combination with an electric motor, of a fluid pressure generator operated thereby, a tank for the fluid, a switch for establishing running conditions for the motor, and means for operating said switch comprising a cylinder connected between the generator and the tank, and a piston therein movable independently of said switch and arranged to engage the same at a predetermined point in its travel.
  - 35 3. The combination with an electric motor of a fluid pressure generator operated thereby, a tank for the fluid, a switch for establishing running conditions of the motor, means for operating said switch comprising
  - 40 a cylinder connected between the generator and the tank, a piston therein arranged to engage said switch and movable independ-

ently thereof, and means for varying the area of the passage to the cylinder.

4. The combination with an electric motor 55 of a fluid pressure generator operated thereby, a tank for the fluid, a switch operating mechanism therefor comprising a cylinder connected between the generator and the tank, a piston therein arranged to operate 60 the switch, and a valve controlled by the generator pressure for reducing the area of the passage to the cylinder.

5. The combination with an electric motor 65 of a fluid pressure generator operated thereby, a tank connected with said generator, a switch for establishing running conditions of the motor, means for controlling said switch comprising a cylinder connected between the generator and the tank, a piston 70 therein arranged to engage the switch, and a valve controlled by the pressure from the generator for varying the area of the passage to the cylinder.

6. The combination with an electric motor 75 of a fluid pressure generator operated thereby, a tank for the fluid, a switch, operating mechanism therefor comprising a cylinder connected between the generator and the tank, a piston 80 in said cylinder movable independently of said switch and arranged to operate the same at a predetermined point in its travel and means whereby less than the entire discharge of fluid from the generator is admitted to the 85 cylinder.

7. The combination with an electric motor having different connections for starting and running, of a fluid-pressure generator operated thereby, a tank for the fluid, a 90 switch for establishing running connections of the motor, means for operating said switch comprising a cylinder connected between the generator and the tank, a piston 95 therein arranged to engage said switch, and means controlled by the generator for varying the area of the passage to the cylinder.

In witness whereof, I have hereunto set my hand this twenty-first day of March, 1907.

JOHN B. WIARD.

Witnesses:

JOHN A. McMANUS, Jr.,  
HENRY O. WESTENDARP,