No. 897,538. PATENTED SEPT. 1, 1908.

L. JANISCH & W. NAUMANN.

SYSTEM OF MOTOR CONTROL.

APPLICATION FILED MAR. 6, 1907.

Fig. 1

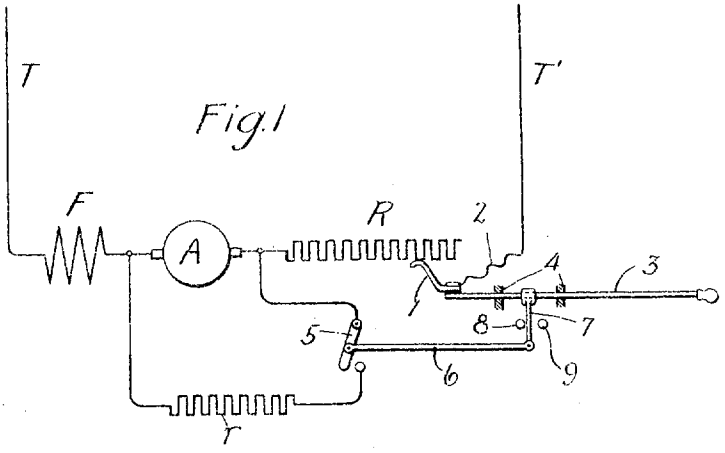
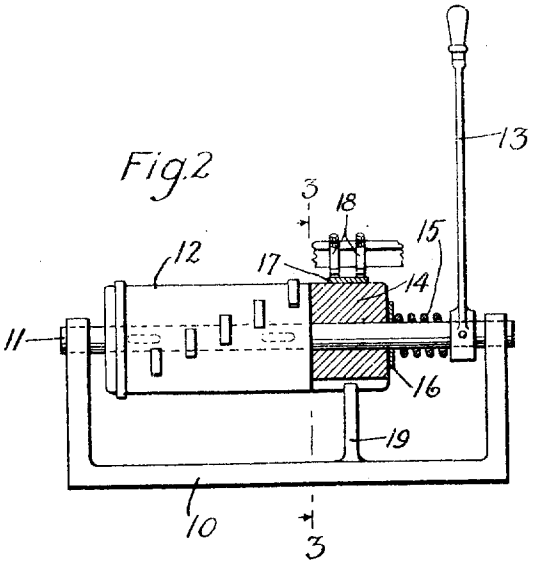


Fig. 2



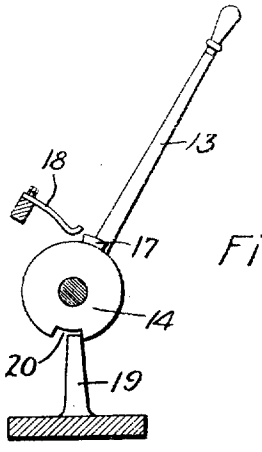


Fig. 3

Witnesses
J. Ellis Glen
M. Ray Taylor.

Inventors
Leopold Janisch
Wilhelm Naumann
by Albert G. Davis Atty.

UNITED STATES PATENT OFFICE.

LEOPOLD JANISCH AND WILHELM NAUMANN, OF BERLIN, GERMANY, ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

SYSTEM OF MOTOR CONTROL.

No. 897,538. Specification of Letters Patent. Patented Sept. 1, 1908.

Application filed March 6, 1907. Serial No. 360,915.

To all whom it may concern:

Be it known that we, LEOPOLD JANISCH and WILHELM NAUMANN, subjects of the Emperor of Germany, residing at Berlin, Germany, have invented certain new and useful Improvements in Systems of Motor Control, of which the following is a specification.

Our invention relates to motor controllers and is especially designed for use in connection with motors for elevators, hoists, and the like. In this service various difficulties are presented which arise from the necessity for high velocity, exact stop at certain points with widely varying loads, the descent of the elevator at a slow rate, stop without shock, and other requirements peculiar to this service. Under these conditions, a simple controller will not meet the requirements.

Our system gives the operator a positive control over the speed especially in stopping and lowering the load and consists in arranging a resistance for connection in parallel with the motor armature at any time. In order that this may be accomplished conveniently, we provide means, operated directly from the controller, for closing the circuit through this resistance. In the particular embodiment of our invention illustrated, a switch in the circuit of this resistance is closed when the controller, at any position of its travel, is moved even slightly toward its off position.

Our invention will be fully understood from the following description of one particular form thereof when taken in connection with the accompanying drawing, in which

Figure 1 is a diagrammatic view of a motor controlled according to our invention; Fig. 2 is a side elevation, partly in section, of a controller arranged for the purposes of our invention; and Fig. 3 is a sectional elevation on the line 3 3 of the controller shown in Fig. 2, looking in the direction of the arrow.

In Fig. 1, A indicates the armature, F the field of a series motor connected to the lines T and T^1 through the controlling resistance R. As shown, this resistance R has in contact with it a finger 1, said finger being connected to the line T^1 by a flexible conductor 2 and supported on the rod 3 which is adapted to slide in the supports 4. By sliding the rod longitudinally the finger 1 is moved and the amount of resistance in the circuit varies. In parallel with the armature is a resistance r in the circuit of which is located a switch 5 adapted to be operated from the moving element 3 of the controller. To effect this, the movable arm of the switch 5 is connected by the rod 6 with an arm 7 having a sleeve through which the rod 3 slides with moderate frictional engagement. It is at once obvious that a movement to the left of the rod 3 carrying the contact finger 1 results in holding arm 7 at the left-hand limit of its travel as determined by the stop 8. In this position the switch 5 is open. If, however, the rod 3 is moved even slightly toward the right the arm 7 will be carried with it in that direction until it strikes the stop 9, a movement which will result in closing the switch 5. From this it is seen that at any position of the movable element of the controller the resistance arm may be connected in parallel to the armature by slight movement of the controller toward its off position. This movement may be so slight that the amount of controlling resistance R in the circuit is not changed.

The result of connecting the resistance r in parallel with the armature will be a reduction in the speed of rotation in the motor. That this will take place is apparent when it is considered that if the controller is at a certain position and the motor is operating at the speed corresponding to that position for that load that the connecting in of the resistance r in shunt to the armature will result in increasing the voltage drop through the portion of the resistance R then in circuit and will bring about a reduction in voltage drop across the terminals of the armature, thereby reducing the speed of the motor.

In Fig. 2 is shown a simple practical form of controller for serving the same purpose as the means shown in Fig. 1. In the frame 10 is supported a shaft 11 to which is secured a drum 12 carrying the usual contact segments adapted to engage with contact fingers (not shown) in the well-known manner. The rotation of this drum serves to regulate the amount of resistance R in the circuit. A handle 13 is secured to the shaft 11 and acts as means for rotating it. Rotatably mounted on the shaft 11 is the collar or drum 14 which is held in frictional engagement with the drum 12 by means of the spring 15 located on the shaft 11 between the handle 13 and the drum 14. A washer 16 may be placed between the spring and the drum 14.

The drum 14 carries a strip of conducting material 17 which is arranged to bridge the brush contacts 18 which are supported so as to engage the contact 17 when the drum 14 is rotated. Being held in frictional engagement therewith, the drum 14 will tend to rotate with the drum 12 when the latter is rotated by means of the handle 13. The movement of the drum 14 is, however, limited by a stop 19 which projects into and engages with the ends of a notch 20 in the circumference of the drum 14. It is therefore seen that when the handle 13 is moved in one direction the conductor 17 will bridge the contacts 18 and that when the handle is moved in the opposite direction the conductor 17 will be moved from engagement with the contacts 18 and the circuit thus broken at this point.

The manner in which the controller, shown in Figs. 2 and 3, is connected into the circuits shown in Fig. 1 is obvious. The drum 12 with its segmental contacts and the fixed contacts which engage with these, serve to control the amount of the resistance R which is in the circuit, while the brush contacts 18 are connected in the circuit in parallel to the armature through the resistance *r* and with the bridging conductor 17 take the place of the switch 5 in Fig. 1. A movement of the handle 13 (as illustrated in Fig. 3) in a clockwise direction results in decreasing the resistance R in the circuit, while rotation in a counter-clockwise direction even slightly will connect the resistance *r* in shunt to the armature of the motor.

Although we have shown our invention in a very simple form and applied to a series motor, we wish it distinctly understood that we realize that it may be used in connection with a shunt or with a compound-wound motor and varied in many ways without departing from the spirit thereof. For example, the parallel resistance may be made so that it can be regulated. Also the controlling resistance R might be arranged to be increased by an auxiliary resistance when the controller is moved towards its off position which would, of course, result in increasing the braking effect. All such variations we intend to cover in the following claims.

What we claim as new and desire to secure by Letters Patent of the United States, is,—

1. In combination, a motor, a controller therefor, a resistance, and means operated by said controller for connecting said resistance in parallel with the armature of the motor when the controller is moved even slightly toward its "off" position.

2. In combination, a motor, a controller therefor, a resistance arranged in parallel to the armature of the motor, and means for opening the circuit through said resistance when the controller is moved even slightly toward the "on" position and for closing said circuit when the controller is moved even slightly toward the "off" position.

3. In combination, a motor, a controller therefor, a resistance arranged in parallel to the armature of the motor, and means yieldingly connected to the moving element of the controller for maintaining the circuit through the resistance open or closed according as the most recent movement of the controller has been toward the "on" or the "off" position.

4. In combination, a series motor, a controller therefor, a resistance, and means operated by said controller for connecting said resistance in parallel with the armature of the motor when the controller is moved even slightly toward its "off" position.

5. In combination, a series motor, a controller therefor, a resistance arranged in parallel to the armature of the motor, and means for opening the circuit through said resistance when the controller is moved even slightly toward the "on" position and for closing said circuit when the controller is moved even slightly toward the "off" position.

6. In combination, a series motor, a controller therefor, a resistance arranged in parallel to the armature of the motor, and means yieldingly connected to the moving element of the controller for maintaining the circuit through the resistance open or closed according as the most recent movement of the controller has been toward the "on" or the "off" position.

In witness whereof, we have hereunto set our hands this 14th day of February, 1907.

LEOPOLD JANISCH.
WILHELM NAUMANN.

Witnesses:
MAX HAMBURGER,
JULIUS RUMLAND.