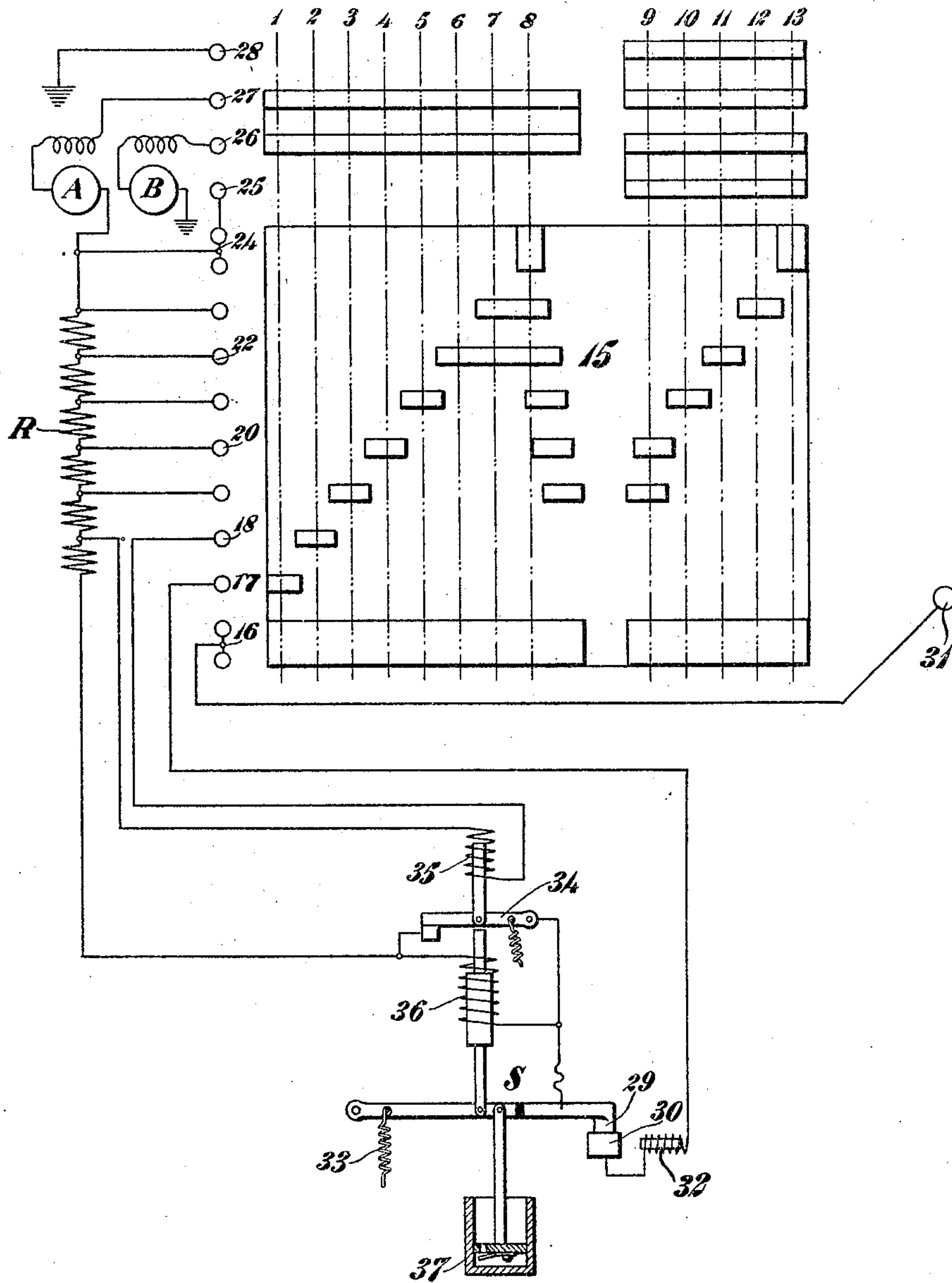


No. 897,031.

PATENTED AUG. 25, 1908.

E. W. STULL.
SYSTEM OF CONTROL.
APPLICATION FILED JAN. 20, 1908.



Witnesses

Olivier Shorman
Fred J. Rinsley

Inventor
Emmett W. Stull

By
Chas. E. Lord
Attorney

UNITED STATES PATENT OFFICE.

EMMETT W. STULL, OF NORWOOD, OHIO, ASSIGNOR TO ALLIS-CHALMERS COMPANY, A CORPORATION OF NEW JERSEY, AND THE BULLOCK ELECTRIC MANUFACTURING COMPANY, A CORPORATION OF OHIO.

SYSTEM OF CONTROL.

No. 897,031.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed January 20, 1908. Serial No. 411,616.

To all whom it may concern:

Be it known that I, EMMETT W. STULL, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Systems of Control, of which the following is a full, clear, and exact specification.

My invention relates to controllers for electric motors and especially to arrangements for preventing flashing at the contacts of railway controllers.

This present invention is an improvement on that shown in my co-pending application Serial No. 324,133, filed June 30, 1906.

It frequently happens, especially when a car is being "notched along", that dangerous arcing or flashing occurs at the controller contacts when the controller is moved to "off" position. Sometimes this arcing will burn out the controller and absolutely disable the car.

It is the object of my invention entirely to avoid flashing at the controller contacts and to break the motor circuit elsewhere. This is attained without requiring any change in or addition to the controller proper.

Broadly my invention comprises the combination with a motor controller of a switch biased toward closed position and in series with the controller when the latter is in a certain position, and a magnet for opening said switch and arranged to be energized only when the controller in its backward movement reaches such position.

Other features of my invention will appear from the description and drawings and will be particularly pointed out in the claims.

The single figure of the drawing shows diagrammatically one embodiment of my invention.

The controller shown in this figure may be of any desired type, but is here shown as a series-parallel controller for two electric motors A and B. The controller drum 15 has operative positions 1 to 13 inclusive and is provided with contact segments cooperating with stationary contact fingers 16 to 28 inclusive. As the controller is moved between positions 1 and 8 the resistance R in the motor circuit is varied with the motors connected in series. Between positions 8 and 9 the connections of the motors are changed from series to parallel. Between

positions 9 and 13 the resistance R is varied with the motors connected in parallel.

The contact finger 16 is connected to the trolley or other collecting device 31. The contact finger 17 is connected to the lower end of the resistance R through the magnetically operated switch S and its blow-out coil 32 and operating solenoid 36. The solenoid 36, however, is normally short-circuited by a second magnetically operated switch 34, which is biased toward closed position. The operating solenoid 35 of the switch 34 is connected in series between the contact finger 18 and a point on the resistance R. The solenoid 36 tends to open the switch S whenever it is energized, but it is only energized when the switch 34 is open. The switch S is biased toward closed position, and normally held in such closed position by a spring 33. A dash pot or other time limit device 37 retards the closing movement of such switch, but allows a free opening movement thereof.

The operation of my invention is as follows: When the controller is moved into its first operative position the motor circuit is completed from trolley 31 through contact finger 16, the proper contact segments on the controlling drum, contact finger 17, blow-out coil 32, switch S, switch 34 short-circuiting solenoid 36, the whole of resistance R, and the motors A and B to ground. In this position the solenoid 36 is deenergized. When the controller is moved into its second operative position, the lowest section of resistance R and the switch S with its appurtenances will be shunted by the engagement of contact finger 18 and its cooperating contact segment on the drum. This completes a circuit through magnet 35, which will open the switch 34. If the contact segments on the drum overlap, as they usually do, the solenoid 36 will be energized slightly by this opening of the switch 34, but by properly proportioning the relative resistances of the coils 32, 35, and 36 and the lowest section of resistance R most of the current may be made to flow through the coil 35, thus preventing the coil 36 from being energized sufficiently strongly to operate the switch S. The further forward movement of the controller deenergizes magnet 35 and varies the motor circuits in any desired manner, but this latter, having nothing to do with my present invention, will not be described in

detail. When the controller in its backward movement reaches position 2, magnet 35 is energized to open the switch 34. Upon further backward movement the switch S, solenoid 36, and lowest section of resistance R are first momentarily connected in shunt to the solenoid 35. But as stated above, the resistances of these parts are preferably so proportioned that with this connection the solenoid 36 is not energized sufficiently strongly to open the switch S. However, immediately after the shunt connection is made, the contact finger 18 and the cooperating contact segment on the drum are disengaged, thus throwing the whole current through the switch S and solenoid 36, the switch 34 now being open. The solenoid 36 immediately opens the switch S, the upward extension of its core holding the switch 34 open, and thus the motor circuit is broken at the contacts 29 and 30. Any arcing that takes place at these contacts is extinguished by the blow-out magnet 32. Upon further backward movement of the controller to "off" position no arcing takes place at the controller contacts because the motor circuit is wholly broken. In order to allow the motorman sufficient time to move the controller from first to "off" position, the closing movement of the switch S is retarded by the dash pot 37, the opening movement of this switch being unretarded. The switch at which the motor circuit is broken may be located at any desired place but is preferably so located as to be out of sight of the passengers.

In some controllers, as in the one shown, the motor circuit is broken as the controller moves between the last series and the first parallel positions. As the motors usually have considerable counter electromotive force at this time, thus greatly reducing sparking which would otherwise take place at the controller, it is generally unnecessary to provide for having the circuit broken elsewhere than at the controller contacts when this change is made. However, by a slight rearrangement of the parts this can be done if desired.

Many modifications in the particular ar-

rangement here shown and described may be made without departing from the spirit and scope of my invention, and all these obvious modifications I aim to cover in the following claims.

What I claim as new is:—

1. In combination, a motor controller, a switch, a magnet for opening said switch to break the motor circuit, and connections whereby said magnet is energized only when the controller is moved backward to its first operative position.

2. In combination, a motor controller, a normally closed switch, a magnet for opening said switch, and means for energizing said magnet only when the controller in its backward movement reaches a predetermined position.

3. In combination, a controller for electric motors, a normally closed switch through which the motor current is supplied when the controller is in a predetermined position, a magnet for opening said switch, and means for energizing said magnet only when the controller in its backward movement passes through such predetermined position.

4. In combination, a controller for electric motors, a normally closed switch through which the motor current is supplied when the controller is in a certain position, a normally short-circuited magnet which when energized tends to open said switch, and means for opening the short-circuit around said magnet when the switch in its backward movement reaches a predetermined position.

5. In combination, a motor controller, a switch biased to closed position and in series with said controller when the latter is in a certain position, a magnet which when energized tends to open said switch, a second switch short-circuiting said magnet, a second magnet tending to open said second switch, and means for connecting said magnets in circuit in different positions of the controller.

In testimony whereof I affix my signature, in the presence of two witnesses.

EMMETT W. STULL.

Witnesses:

GEO. B. SCHLEY,
FRED J. KINSEY.