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R. SCOTT.

AUTOMATIC MOTOR STARTING RESISTANCE.

APPLICATION FILED JUNE 15, 1904.

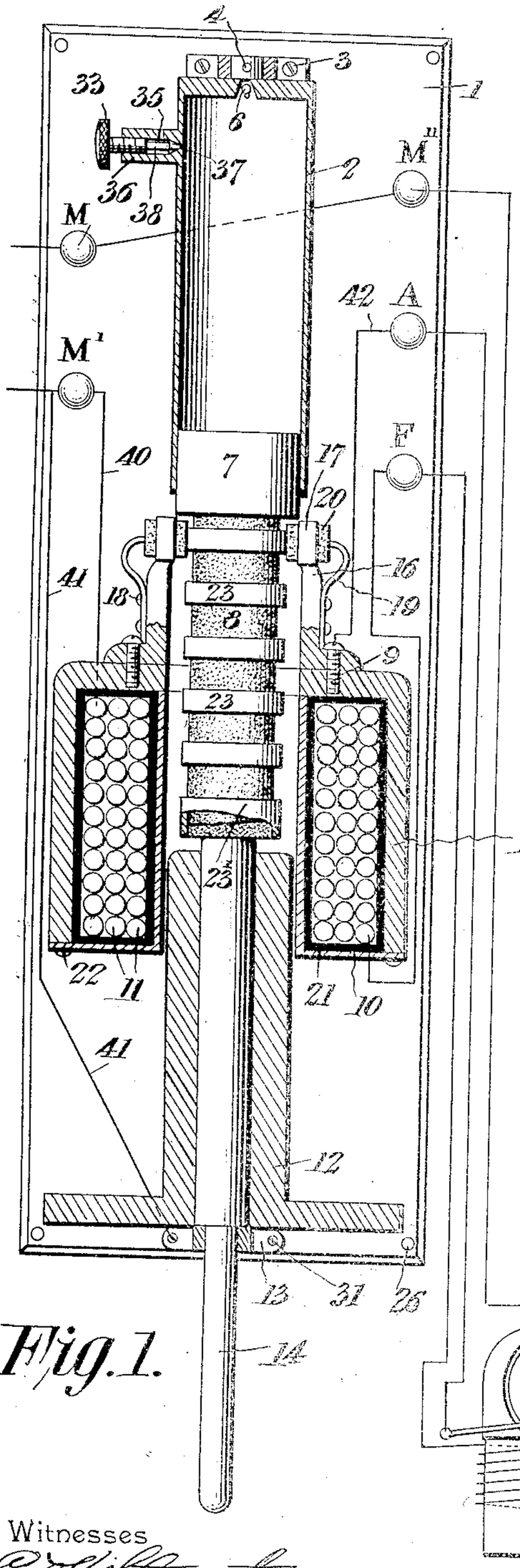

Fig. 1.

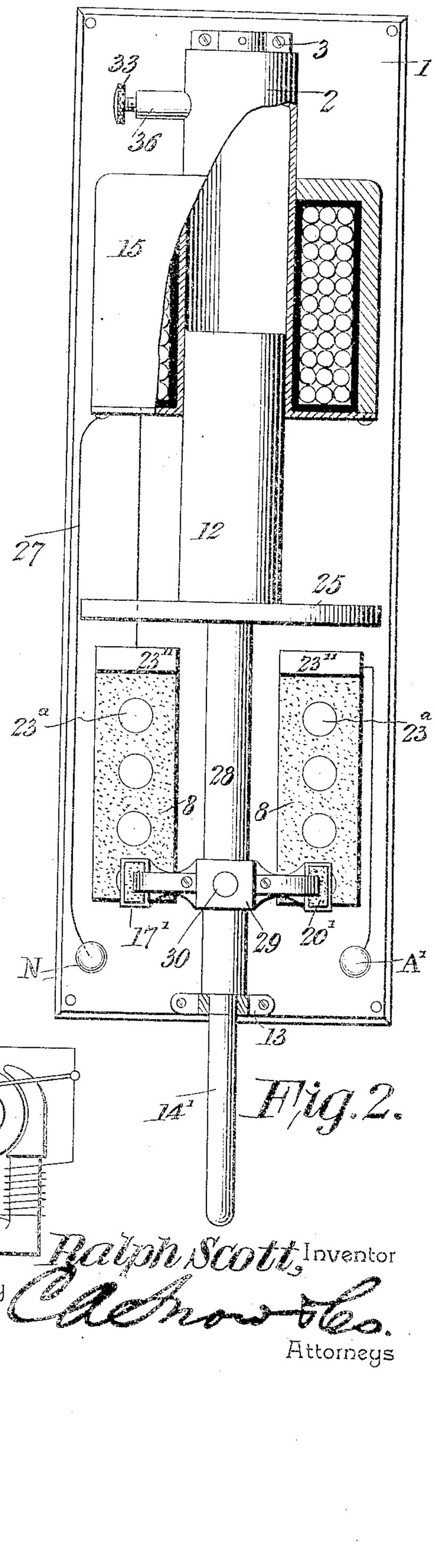

Fig. 2.

Witnesses

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AUTOMATIC MOTOR-STARTING RESISTANCE.

No. 806,009. Specification of Letters Patent. Patented Nov. 28, 1905.

Application filed June 15, 1904. Serial No. 212,744.

To all whom it may concern:

Be it known that I, RALPH SCOTT, a citizen of the United States, residing at Wilkesbarre, in the county of Luzerne and State of Pennsylvania, have invented a new and useful Automatic Motor-Starting Resistance, of which the following is a specification.

This invention relates to improvements in automatic motor-starting resistances, and has for its principal object to construct an automatic starting resistance of the most simple and efficient character and one which may be readily adjusted in order to cut out the resistance with any desired degree of rapidity, in accordance with the capacity and work of the motor and the strength of the current.

A further object of the invention is to provide an automatic resistance with improved contacts whereby all danger of sparking is prevented.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in the novel construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a sectional elevation of an automatic starting resistance constructed in accordance with the invention. Fig. 2 is an elevation, partly in section, illustrating a slight modification of the invention.

The device forming the subject of the present invention is one of that general class in which when the motor-circuit is completed a resistance is cut in in order to prevent sudden starting of the motor, and such resistance is gradually cut out until it is finally eliminated, at which time the motor will have attained full speed.

The various working parts of the apparatus are mounted on a suitable slab or base 1, formed of non-conducting material and provided with openings 26 for the passage of securing-screws or other fastening devices. At a point near the top of the base-plate is secured a bracket 5, held in position by screws or similar fastenings 3, and this bracket supports a dash-pot 2, formed of any suitable material, the dash-pot being secured to the bracket by a fastening means—such, for instance, as a pin 4. In the upper end of the dash-pot is an air-opening 6, preferably tapered to form a valve-seat for the reception of a valve 6′, which may be in the form of a sphere. Under pressure of air in the dash-pot the valve will be forced to its seat and close the opening 6; but when pressure is reduced the valve falls from its seat and allows air to flow into the dash-pot. Within the dash-pot is placed a plunger 7, which may be formed of graphite or other suitable material, and depending from the plunger is a resistance-bar 8, formed of any suitable material, such as carbon or carbon compounds, the lower end of the resistance-bar being formed by a metallic ring 23′. At intervals throughout the length of the resistance-bar are arranged rings 23, formed of metal and adapted to form contacts for successively cutting out portions of the resistance, these bars from top to bottom being successively brought into engagement with carbon or other contact-blocks 20, carried by a supporting-bracket 17, that normally comes into engagement with the contact-rings 23 by means of metallic springs 19. The lower ends of the brackets 17 are secured, as by screws 9, to an inverted-cup-shaped casing 15, formed of soft iron, said casing forming a housing or closure for a solenoid-coil 11, which is insulated from the housing by a ring or cylinder 21, that extends completely around the solenoid-coil. The solenoid and the insulating material are held in place by a spool 10, formed of brass or other non-magnetic material, the lower flange of which is projected beyond the edge of the coil and is secured to the casing or housing 15 by brass or other non-magnetic screws 22, and the solenoid and its casing as a whole are rigidly secured in any suitable manner to the slab or base 1. Fitting within the solenoid is an iron core 12, at the lower end of which is a collar or flange 25, extending outward and of a diameter equal at least to the diameter of the casing or housing 15 in order to render the magnetic field of the solenoid more effective and to retain the core in elevated position with a minimum expenditure of energy. Secured to the core and moving longitudinally with said core is a rod 14, formed of brass or other non-magnetic material and forming a support for the resistance-bar 8. The lower portion of the rod 4 is reduced in diameter and passes through an opening in a guiding-bracket 13, that is secured to the lower portion of the slab or

base 1, as by means of a screw 31, and the enlarged shoulder at the top of the reduced portion of the rod serves to limit the upward movement of the core by engaging against said bracket.

Returning now to the dash-pot, 36 designates a nipple in communication with the dash-pot and having a valve-seat 37 and a port 35 leading to the outer air. The nipple is threaded for the reception of a needle-valve 38, provided at its outer end with a milled or knurled knob 33, by which the valve may be adjusted in order to control the discharge of air from the dash-pot.

At one side of the slab are binding-posts M M', to which the main line-wires are connected. On the opposite side of the base are binding-posts M'', A, and F. One of the line-wires leads from binding-post M to binding-post M'' and from thence to the motor. From the binding-post M' leads a wire 40 to the solenoid-core, and from thence to binding-post F, and from thence to the motor-field. A second wire 41 leads from the binding-post M to the bracket 13, which is connected, through the rod 14, to the resistance-rod 8 and from thence to contacts 20, bracket 17, and springs 19 to the housing or casing 15 and by wire 42 to the binding-post A, from whence it passes to the motor-armature.

When the circuit is closed, the solenoid is energized and gradually raises the core 12, the speed at which the core is elevated being dependent on the extent to which the valve 38 is opened, and by altering the size of the passage from the dash-pot the speed may be increased or diminished in accordance with circumstances. As the core is elevated the successive contact-rings 23 are brought into engagement with the contact-blocks 20, and as these are disposed at diametrically opposite points good contact of one or both is at all times assured. On the completion of the upward movement, which may occupy any predetermined length of time, the flange 25 of the spool comes into engagement with the non-magnetic screws 22 and is held slightly away from the soft-iron casing or housing 15, so that when the circuit is broken the core may fall and will not be held by residual magnetism, as will be the case if the flange comes into direct contact with the casing or housing.

In Fig. 2 is illustrated a slight modification of the invention, the resistance-bar 8' in this instance being in the form of flat plates or slabs provided with a plurality of contact-buttons 23^a, and at the top of each of the plates is a metallic contact-strip 23''. The resistance-plates in this instance are stationary, and the contact-blocks 20' are carried by posts 17', projecting from a central block 29, that is secured to the rod 14' by means of a set-screw 30. The operation here is substantially the same as that before described in that the energizing of the solenoid gradually raises the rod 14'. The contact-blocks 20' engage the successive contact-buttons 23^a, and the resistance is gradually cut out until the plates 23'' are reached, at which time the resistance is wholly eliminated. The circuit in this instance may be traced from binding-post N through the solenoid to one of the end plates 23', thence through the resistance to block 20' and across to the opposite block 20', thence through resistance to plate 23'', and finally to binding-post A'. The resistance in this case is intended to be in series with the armature of a motor. In both cases the period of time required for cutting out the resistance may be adjusted in accordance with requirements, and when the circuit is broken the weight of the core 12 and the associated parts will cause the contact-buttons to again engage with the last contact of the resistance-bar, so that all resistance is held in the circuit in readiness for another operation.

Having thus described the invention, what is claimed is—

1. In a device of the class specified, a resistance-bar, a plurality of contact members on said resistance-bar, a contact member for engaging the contacts of the resistance-bar, said contact member and resistance-bar constituting two members of a circuit-controlling device, one of which is movable with respect to the other, a solenoid having an iron casing, a movable core connected to the movable member and having an enlarged flange that is attracted by the casing when the solenoid is energized, a non-magnetic spacing means preventing contact between the flange and the casing, and a dash-pot for controlling the speed of movement of said core.

2. In a device of the class specified, a solenoid, a movable core, a resistance-bar carried by the core, a plurality of contact members on said resistance-bar, contact members carried by the solenoid for engagement with the contacts of the resistance-bar, a plunger secured to the resistance-bar, and a dash-pot into which said plunger extends.

3. In a device of the class specified, a solenoid, a solenoid-core, a resistance-bar supported by the core, a plurality of contact-rings on said resistance-bar, a pair of diametrically-opposed contacts carried by the solenoid for engagement with the contacts of the resistance-bar, a plunger secured to the resistance-bar, and a dash-pot into which said plunger extends.

4. In a device of the class specified, a solenoid, a solenoid-core, a resistance-bar secured to the core, a plurality of spaced contact-rings carried by the resistance-bar, a pair of spring-held contact-blocks supported by the solenoid and adapted to engage the contact-rings of the resistance-bar, a plunger secured to the resistance-bar, and a dash-pot into which said plunger extends.

5. In a device of the class specified, a solen-

oid having a soft-iron casing or housing, a core having an enlarged flange that is attracted by the casing or housing when the solenoid is energized, a non-magnetic spacing means preventing contact between the flange and the casing, a resistance-bar supported by the core and having a plurality of spaced contacts, a contact carried by the casing and adapted to engage the contacts of the resistance-bar, and means for retarding movement of the solenoid-core.

6. In a device of the class specified, a solenoid, an inverted-cup-like casing or housing for said solenoid, a non-magnetic spool for the solenoid-winding, said spool having an enlarged flange, a non-magnetic means for securing said flange to the casing, insulating material surrounding the solenoid-winding, a core having an enlarged flange adapted to engage the securing means and prevent direct contact between the core-flange and the casing, a metallic rod secured to the core, a guiding-bracket for the rod, said bracket serving also to limit movement of the core, a resistance-bar supported by the rod and core, a plurality of contacts on said bar, a pair of spaced spring-pressed contact-blocks carried by the casing and adapted to engage the contacts of the resistance-bar, a plunger secured to said resistance-bar, a cylindrical dash-pot into which said plunger enters, a valved air-inlet for the dash-pot, a nipple projecting from the dash-pot and provided with an air-outlet port, and a needle-valve carried by the nipple and serving to adjust the effective area of said outlet-port.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

RALPH SCOTT.

Witnesses:
FRANK SCOTT,
THOS. M. HERBERT.