No. 806,733. PATENTED DEC. 5, 1905.

C. E. CARPENTER.

MAGNETIC BLOW-OUT SWITCH.

APPLICATION FILED JAN. 9, 1904.

Fig. 1

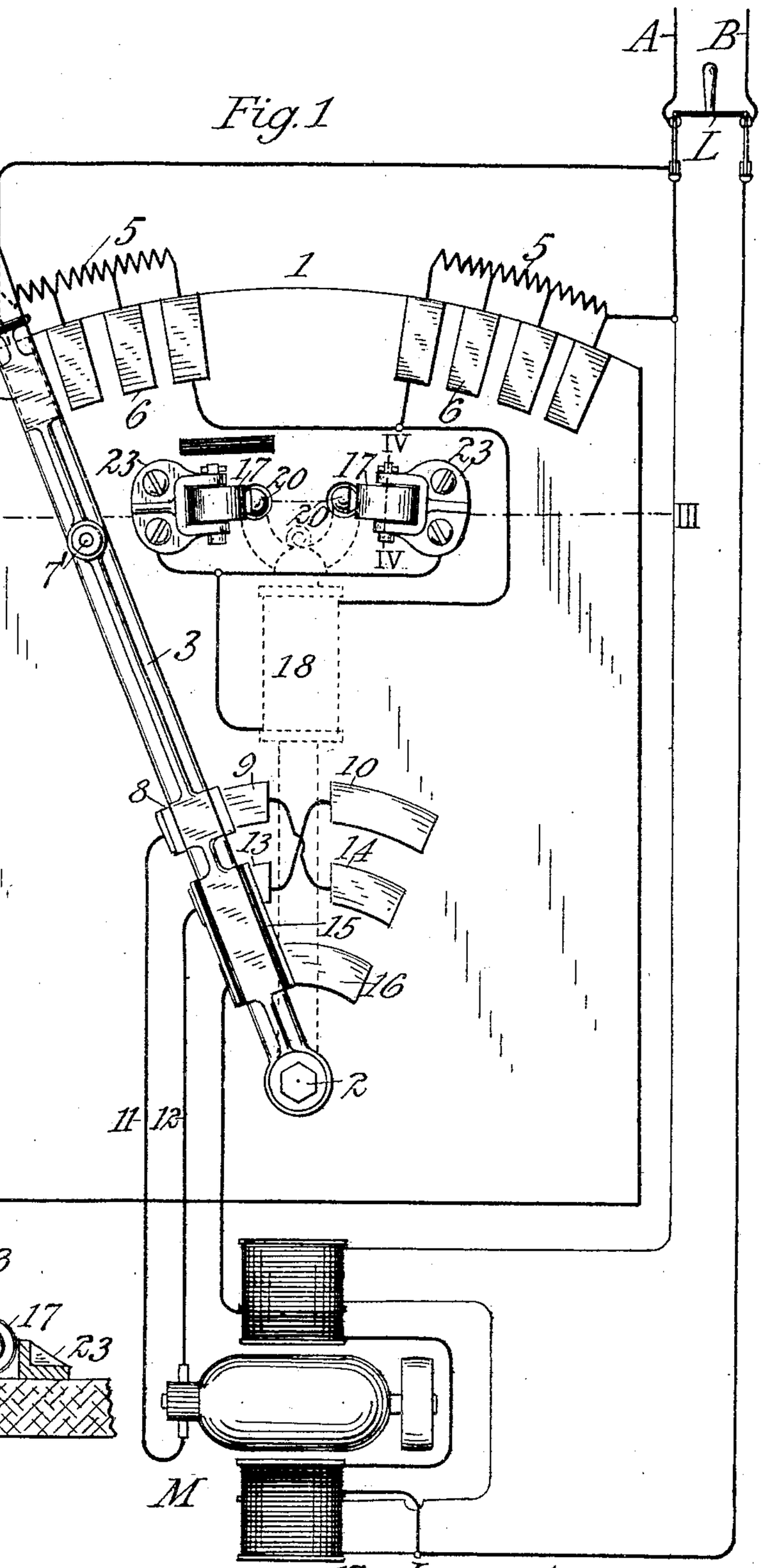


Fig. 2

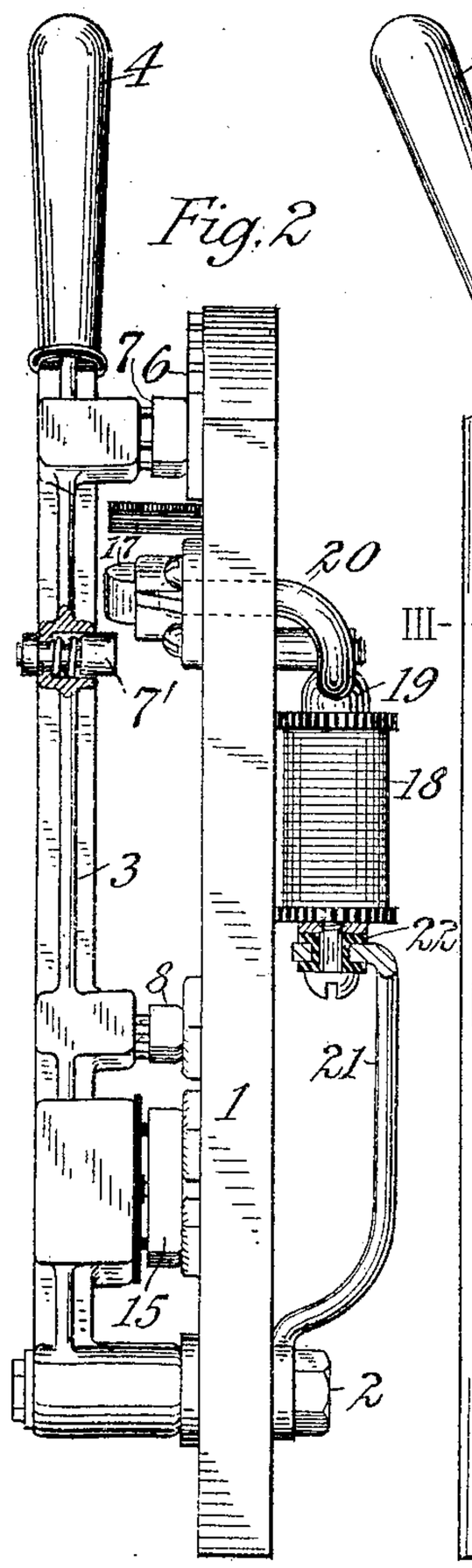


Fig. 3

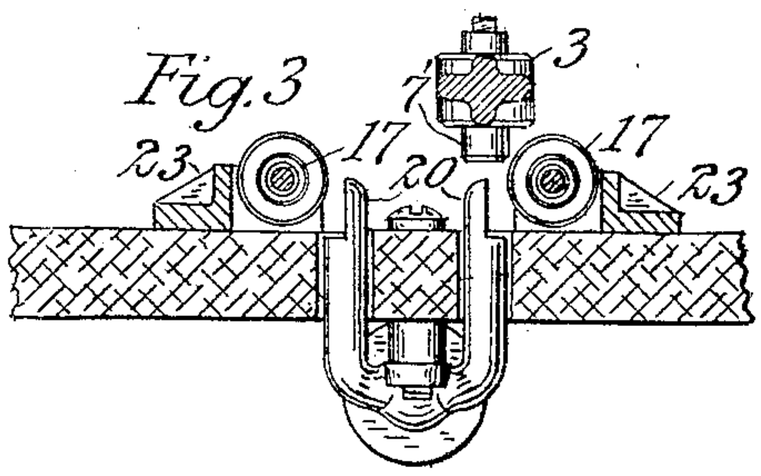
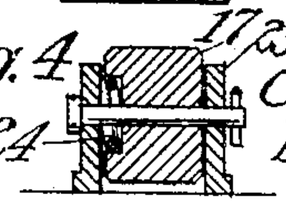


Fig. 4



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UNITED STATES PATENT OFFICE.

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MAGNETIC BLOW-OUT SWITCH.

No. 806,733. Specification of Letters Patent. Patented Dec. 5, 1905.

Application filed January 9, 1904. Serial No. 188,358.

To all whom it may concern:

Be it known that I, CHARLES E. CARPENTER, a citizen of the United States of America, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Magnetic Blow-Out Switches, of which the following is a specification.

In the operation of machines, and particularly printing-presses, by individual motor-drive it is necessary at times, especially in setting up work, to run the machine or press very slowly and for short distances and to be able to bring or adjust the machine to and to stop at definite positions. Where operation at slow speed is occasional and for brief intervals, as is usually the case, the employment of resistance in series with the armature-circuit for reducing the current or voltage and slowing the motor has proved the most acceptable and commercial instrumentality on account of the simplicity of the apparatus; but the speed assumed by a motor when there is considerable armature resistance in the circuit is a very variable quantity, depending on the torque required to move the machinery and being greater as the torque is less. Machinery in general requires a much greater torque to start than is usually necessary to keep it in motion at any speed, particularly when it is not doing work and frictional resistances mainly are to be overcome, as in starting printing-presses and in setting up work. In consequence, any adjustment of armature resistance which will permit sufficient current-flow to start the motor and connect in machinery will, if continued, drive the machinery at too great a speed for the purposes mentioned.

One object of the invention is to provide inexpensive and durable apparatus for effecting the operation of motors under such condition, which apparatus may or may not be combined with armature resistance. This apparatus comprises a switch for the armature-current which is so organized that it can be readily opened and closed by a slight movement of the hand, and such opening and closing can be repeated in rapid succession and an interrupted current thereby supplied to the armature. Too rapid an accumulation of heat attendant upon the closure and separation of the contacts is prevented, and ease of manual operation is secured by using a roller for at least one of the coöperating contacts, so that each separation and closure will be at a different point of the roller and is easily effected by small movements of the operating-handle. A magnetic blow-out is also combined with the switch, so that a small movement of the operating-handle will be sufficient to open the circuit, and it has been found that by this means the arc will be blown out instantly even when the separation is not more than a thirty-second part of an inch.

The various parts of the switch are arranged with a view to making the apparatus as compact as possible, particularly in thickness, so that when mounted at the side of a machine to be operated by the switch it will project in the passage-way alongside of the machine as little as possible.

In further explanation reference will be made to the accompanying sheet of drawings, which will be made a part of this application, in which—

Figure 1 is a plan view showing my magnetic blow-out in connection with a rheostat reversing-switch, together with a motor and connections. Fig. 2 is a side view of the switch. Fig. 3 is a section on the line III III of Fig. 1. Fig. 4 is a detail of the roller on the line IV IV of Fig. 1.

The figures illustrate a compound-wound motor M, the current to which is supplied through a line-switch L from two leads A and B. The armature and series field of the motor is supplied from the leads through a switch embodying my invention, which will hereinafter be described in detail. The shunt-field of the motor may be, as shown in the drawings, independent of the contacts of this switch and connected directly across the leads inside the line-switch and open only when the line-switch is opened.

A slate slab 1 carries a stud 2, on which an iron lever 3 is fulcrumed. The lever is provided with an operating-handle 4 and is operated in a plane parallel with the face of the slate. Operation of the lever either to the right or to the left of the open position, which is the middle position in the form of switch illustrated, closes a circuit from one of the leads A through resistance-sections 5, contacts 6 carried by the slate, a coöperating copper contact 7 carried by the iron lever through the lever to a contact 8, to reversing

contact 9 or 10, carried by the slate, and armature-lead 11 or 12, accordingly as the lever is moved toward the left or the right of the open position, through the armature and other armature-lead 12 or 11, and the other reversing contact 13 or 14, through a contact 15, carried by the lever but insulated therefrom, a contact 16 carried by the slate, through the series field of the motor, if there is one, to the other lead B. When moved from the open position, the roller 17 first contacts with a cooperating spring-pressed contact 7′, carried by the iron lever, and the circuit is as above traced, except that after traversing the resistance-section 5 the current traverses a blow-out coil 18, the roller, and the coöperating contact 7′ and thence through the lever and other connection as above traced. The blow-out coil with the connections as illustrated serves as the first section of resistance of the rheostat to be cut out when the switch is closed. Further movement of the lever short-circuits and then cuts out in succession this coil and the other sections of resistance, and at the extreme position, which is the normal running position in the switch illustrated, all the resistance is cut out of the circuit. On the return of the lever to open position the sections of resistance are successively cut into the circuit, and, lastly, the blow-out magnet-coil is cut into the circuit.

The blow-out magnet is located on the back of the slate and parallel therewith, and it is placed as close thereto as possible, so as not to unduly increase the thickness of the apparatus. The core 19 of the magnet has at its upper end two prongs 20 20, which pass through openings in the slate and project one close to each roller and between the roller and the open position. The other end of the magnet is magnetically connected to an iron pole-piece extension 21, which is screwed to the magnet-core and bolted to the stud which forms the fulcrum of the lever. Washers 22, of insulating material, intervene between the pole-piece extension and the screw, thereby separating the parts electrically without interfering with the transmission of the magnetism from the core to the pole-piece extension and thence through the stud to the lever, so that the iron of the lever adjoining the copper contact 7′ will be an opposing pole to the adjoining prong and the lines of force in the field between the two poles will intersect the spark-gap formed by the separation of the contact carried by the lever from the roller upon the movement of the lever to the open position. The two magnet-poles between which the magnetic field is formed are electrically insulated one from the other by reason of the insulating-washers above mentioned, and at least one of the poles, and conveniently the magnetic pole, which projects through the slate, should preferably not be in electrical connection with any part of the electric circuit, so that the arc when blown from the separated contacts cannot reëstablish the circuit between any accessible points outside the magnetic field by the aid of the conducting parts for the magnetism or any other metal parts of the apparatus. The rollers are journaled in brackets 23, to which branch wires from one end of the blow-out magnet-coil are connected, and a spring 24 is set in a recess in the side of each roller to insure sufficient electrical contact between the bracket and the roller. Any roughening of either the roller or its coöperating contact does not interfere with the free manipulation of the switch, since the separation and closure here is by rolling and not by sliding action, and any slight welding effect in closing is overcome without noticeable effort by reason of the mechanical advantage of the roller separation at the point of closure, as the contact carried by the lever rides over the roller. It is not essential to the invention herein claimed that contacts be provided for reversal and operation of the motor in both directions.

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

1. In an electric switch, the combination with a source of current-supply of a pair of coöperating contacts, one of which is movable to and from the other contact under the control of the operator, and one which is a roller moved by the other contact, and a blow-out magnet energized from the source of current-supply, the poles of which are so placed as to produce lines of force which intercept the spark-gap formed by the separation of the contacts, substantially as described.

2. In an electric switch, the combination of a pair of coöperating contacts, one of which is movable to and from the other contact, and one of which is a roller, and a blow-out magnet, the poles of which are so placed as to produce lines of force which intercept the spark-gap formed by the separation of the contacts, one of the poles being electrically insulated from both contacts and the other magnetic pole, substantially as described.

3. In an electric switch, the combination of a hand-lever, a support therefor, a pair of cooperating contacts, one of which is movable to and from the other contact, and is carried by the lever, and a blow-out magnet with the axis of its coil parallel to the plane of movement of the lever, and one of its poles so placed as to produce lines of force intercepting the spark-gap formed by the separation of the contacts, substantially as described.

Signed by me at New York city, New York, the 5th day of January, 1904.

CHARLES E. CARPENTER.

Witnesses:
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THOMAS EWING, Jr.