No. 755,791. PATENTED MAR. 29, 1904.

W. B. POTTER.

MEANS FOR CLOSING FIELD CIRCUITS OF ROTARY CONVERTERS.

APPLICATION FILED SEPT. 17, 1903.

NO MODEL.

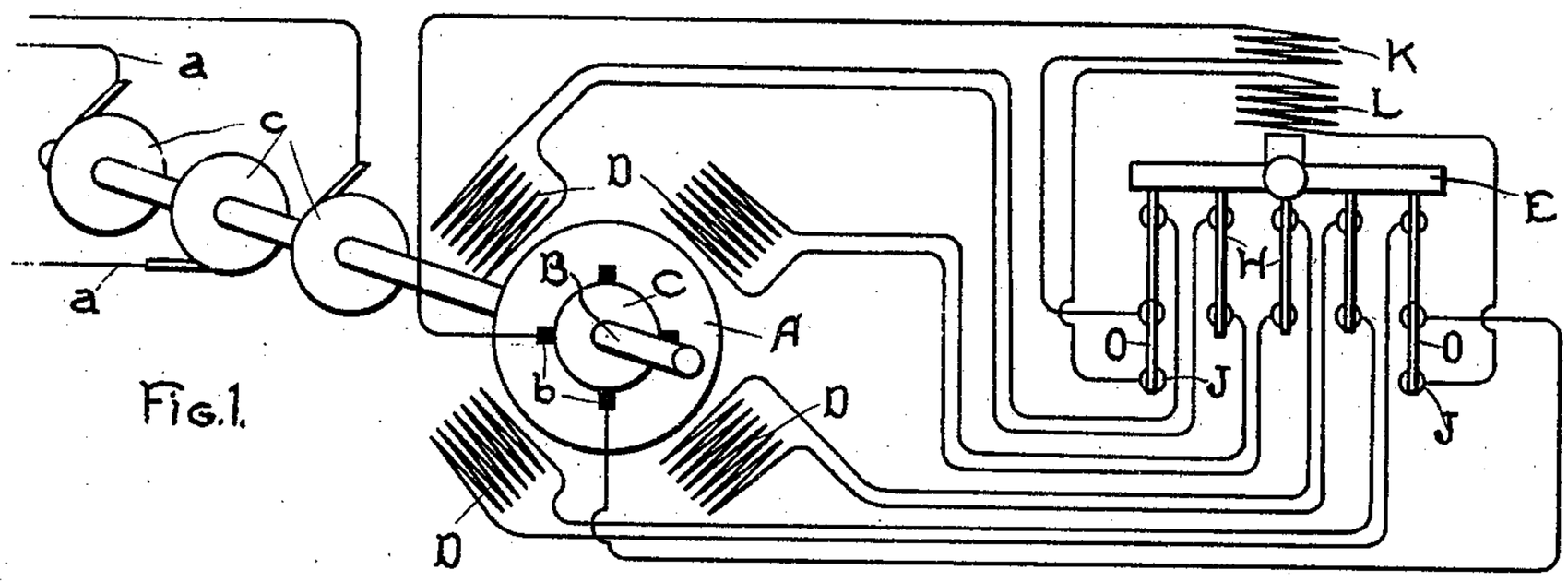

Fig. 1.

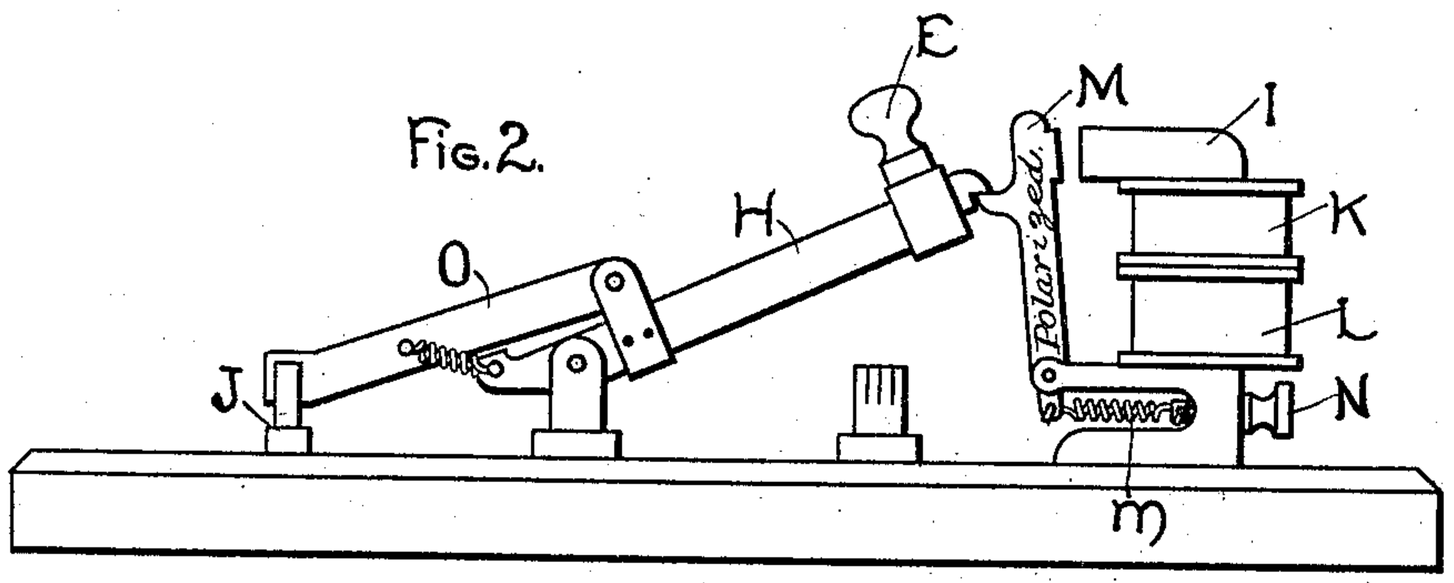

Fig. 2.

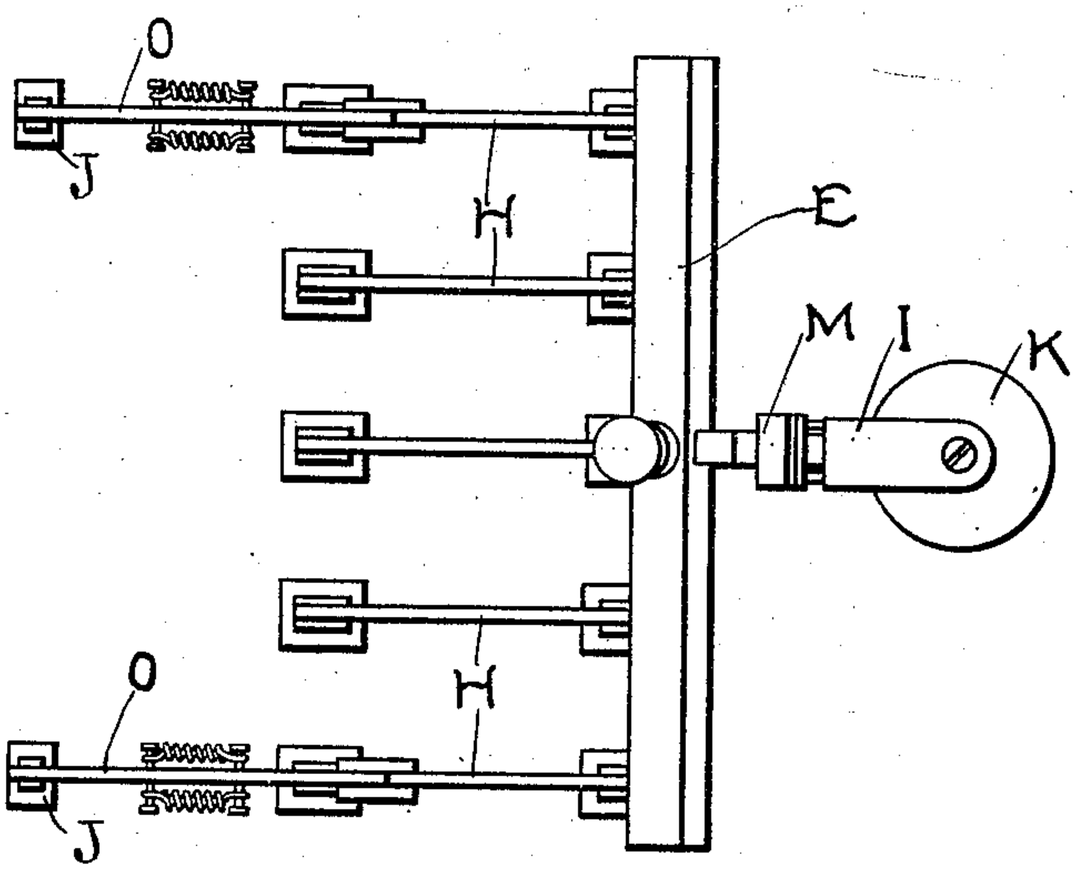

Fig. 3.

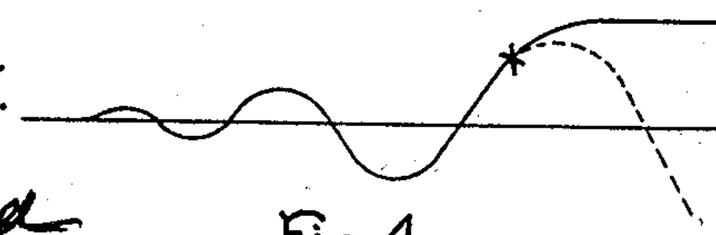

Fig. 4.

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No. 755,791. Patented March 29, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM B. POTTER, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

MEANS FOR CLOSING FIELD-CIRCUITS OF ROTARY CONVERTERS.

SPECIFICATION forming part of Letters Patent No. 755,791, dated March 29, 1904.

Application filed September 17, 1903. Serial No. 173,512. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. POTTER, a citizen of the United States, residing at Schenectady, in the county of Schenectady and State of New York, have invented certain new and useful Improvements in Means for Closing Field-Circuits of Rotary Converters, of which the following is a specification.

My invention relates to the operation of rotary converters, and has especial reference to starting such machines with alternating current.

In practice rotary converters are frequently started as induction-motors, the armature being closed directly on the line through impedance-coils or regulating-transformers, while the field is open-circuited at several points in order to prevent damage to the insulation due to electromotive forces induced by transformer action. When the machine is near synchronism, the field-circuit is closed across the armature and the machine runs as a synchronous motor. In making this connection of the field to the armature-terminals it is important that the machine should be running at a speed nearly synchronous and also that the armature-brushes should be at the proper polarity at the instant the field is connected to them; and the object of my invention is to provide automatic means insuring that the speed and polarity of the brushes shall be right when the field connection is made.

In the accompanying drawings, Figure 1 shows an arrangement embodying my invention. Fig. 2 shows my automatic switch in side elevation. Fig. 3 shows a plan view of the same, and Fig. 4 is an explanatory diagram.

In Fig. 1, A represents diagrammatically the armature of a rotary converter mounted on shaft B and having the commutator C, on which bear the brushes *b b*. Also mounted on shaft B are alternating-current-collector rings *c c*, which are connected through their brushes to the source of alternating current *a a*. D D represent diagrammatically the field-coils of the machine, which at starting should be open-circuited at several points and in operation should be connected in series to the armature-terminals. E represents a switch adapted to make these connections. When the switch is opened, field-coils D D are disconnected from the armature and their circuit is opened at the several points. When the switch is closed, the field-coils are connected to the armature-brushes *b b*.

Referring now to Fig. 2, M represents a hard-steel polarized armature which is normally held in engagement with switch E by spring *m* and which holds switch E open. I represents an electromagnet adapted when properly energized to retract armature M and release switch E. Electromagnet I carries two coils L and K. Coil L is a high-resistance coil which is connected across the armature-terminals by means of the auxiliary switch-contacts J and switch-blades O. K is a low-resistance coil which when the switch is opened is connected in series with coil L and when switch E is closed is in series with field-coils D D. Its purpose is to maintain the proper polarization of armature M.

Referring now to Fig. 4, the curve indicates the potential across the armature-brushes as the machine speeds up. It will be seen that the voltage decreases in frequency and increases in amplitude as the machine approaches synchronism. Armature M is so adjusted that when the voltage across the armature-brushes, which is impressed upon coil L, corresponds to the amplitude of the brush potential near synchronism and when the polarity is right to attract the polarized armature M the armature will be retracted by the electromagnet, permitting switch E to fall and close the field-circuit across the armature-brushes. This point is indicated by the cross on the curve of Fig. 4. The curve then rises to the normal voltage and is there maintained, the machine operating in synchronism.

Auxiliary switch-blades O are arranged to be opened by the closing of switch E, thus cutting coil L out of circuit. Coil K, as has been mentioned before, remains in series with field-coils D D.

N represents a set-screw whereby the tension of spring *m* may be adjusted in order to adjust the closing-point of switch E.

It is evident that by means of the polarized armature I am able to insure the proper polarity of the armature-brushes at the instant the field is connected to them and by a proper adjustment of the retractile spring I can adjust the voltage at which the field-circuit will be closed. Thus the danger arising from closing the field-circuit at the wrong instant is avoided.

I do not desire to limit myself to the particular construction and arrangement of parts here shown, since changes therein which do not depart from the spirit of my invention and which are within the scope of the appended claims will be obvious to those skilled in the art.

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

1. In combination, a rotary converter, a switch adapted to connect the field of said converter to its armature, and a polarized electromagnetic device adapted to operate said switch.

2. In combination, a rotary converter, a switch adapted to connect the field of said converter to its armature, a polarized electromagnetic device adapted to operate said switch, and means for impressing on said device a voltage proportional to the potential across the commutator-brushes of said converter.

3. In combination, a rotary converter, a switch adapted to connect the field of said converter to its armature, and means responsive to the polarity and potential of the commutator-brushes adapted to operate said switch.

4. In combination, a rotary converter, a switch adapted to connect the field of said converter to its armature, a polarized magnet-armature adapted to trip said switch, and an electromagnet adapted to retract said magnet-armature.

5. In combination, a rotary converter, a switch adapted to connect the field of said converter to its armature, a polarized magnet-armature adapted to operate said switch, and an electromagnet energized by a current proportional to the potential of the commutator-brushes and adapted to retract said polarized armature.

6. In combination, a rotary converter, a switch adapted to connect the field of said converter to its armature, a magnet-winding connected to the commutator-brushes of said converter, and a polarized armature adapted to be retracted by said magnet-winding and to trip said switch.

7. In combination, a rotary converter, a switch adapted to connect the field of said converter to its armature, a polarized magnet-armature held in engagement with said switch by a spring, means for adjusting the tension of said spring, and an electromagnet energized by current proportional to the potential of the commutator-brushes and adapted to retract said polarized armature against the tension of said spring.

8. In combination, a rotary converter, a switch adapted to connect the field of said converter to its armature, a polarized magnet-armature adapted to trip said switch, an electromagnet adapted to retract said polarized armature, a high-resistence winding on said electromagnet in shunt to the commutator-brushes when said switch is open and open-circuited when said switch is closed, and a low-resistance winding on said electromagnet in series with said high-resistance winding and with the field when said switch is open and closed respectively.

In witness whereof I have hereunto set my hand this 15th day of September, 1903.

WILLIAM B. POTTER.

Witnesses:

BENJAMIN B. HULL,

HELEN ORFORD.