

No. 646,485.

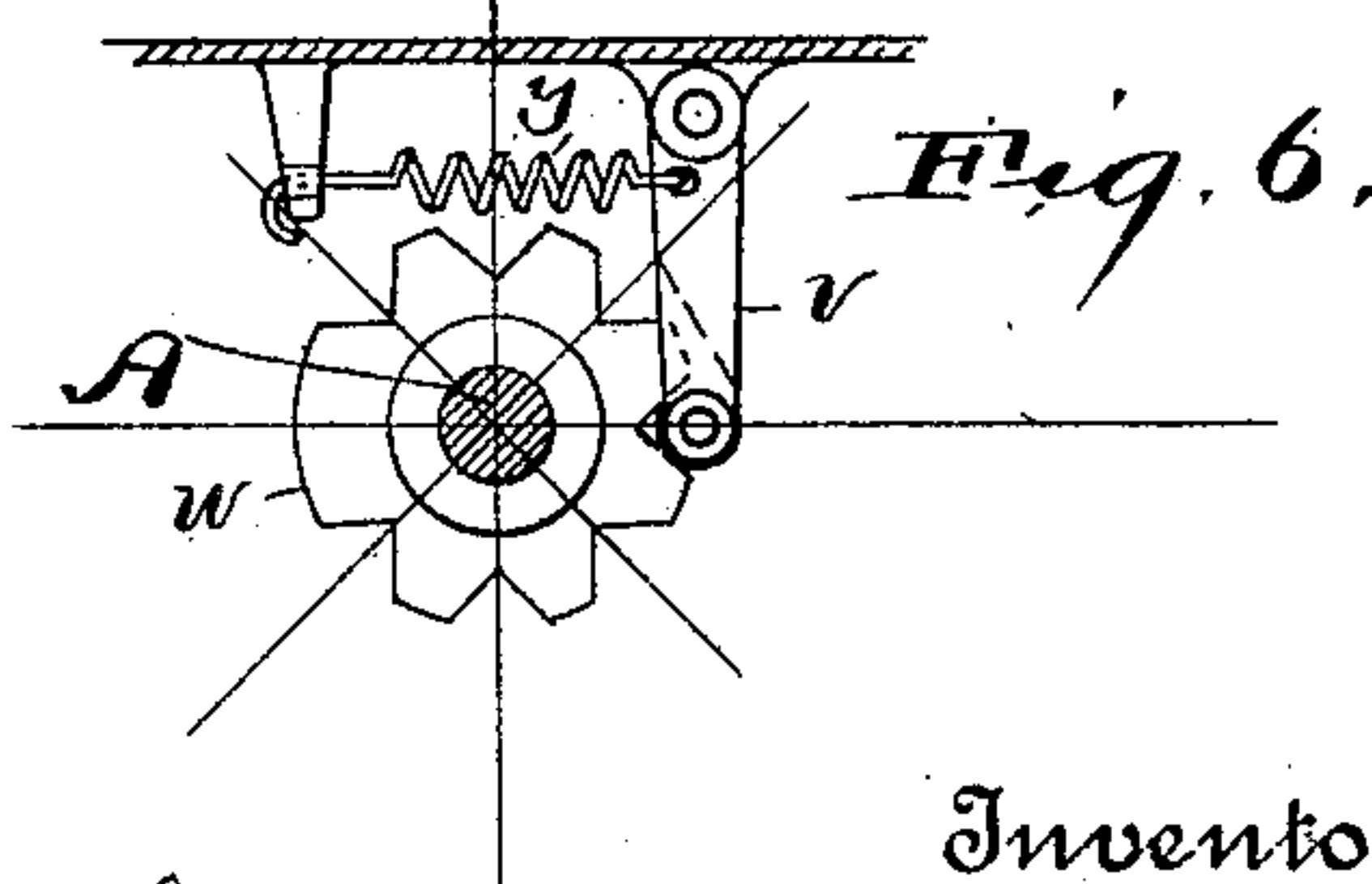
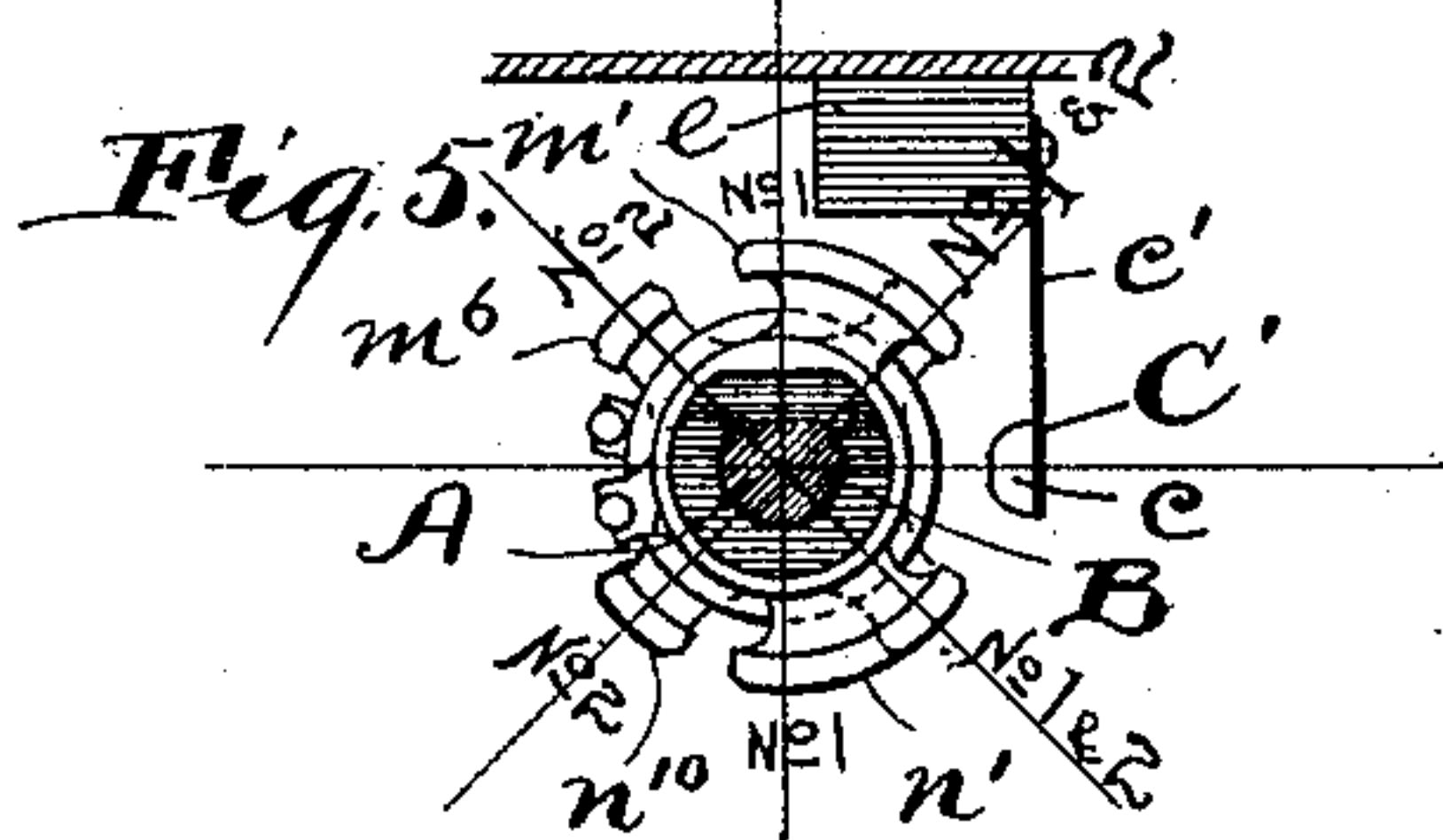
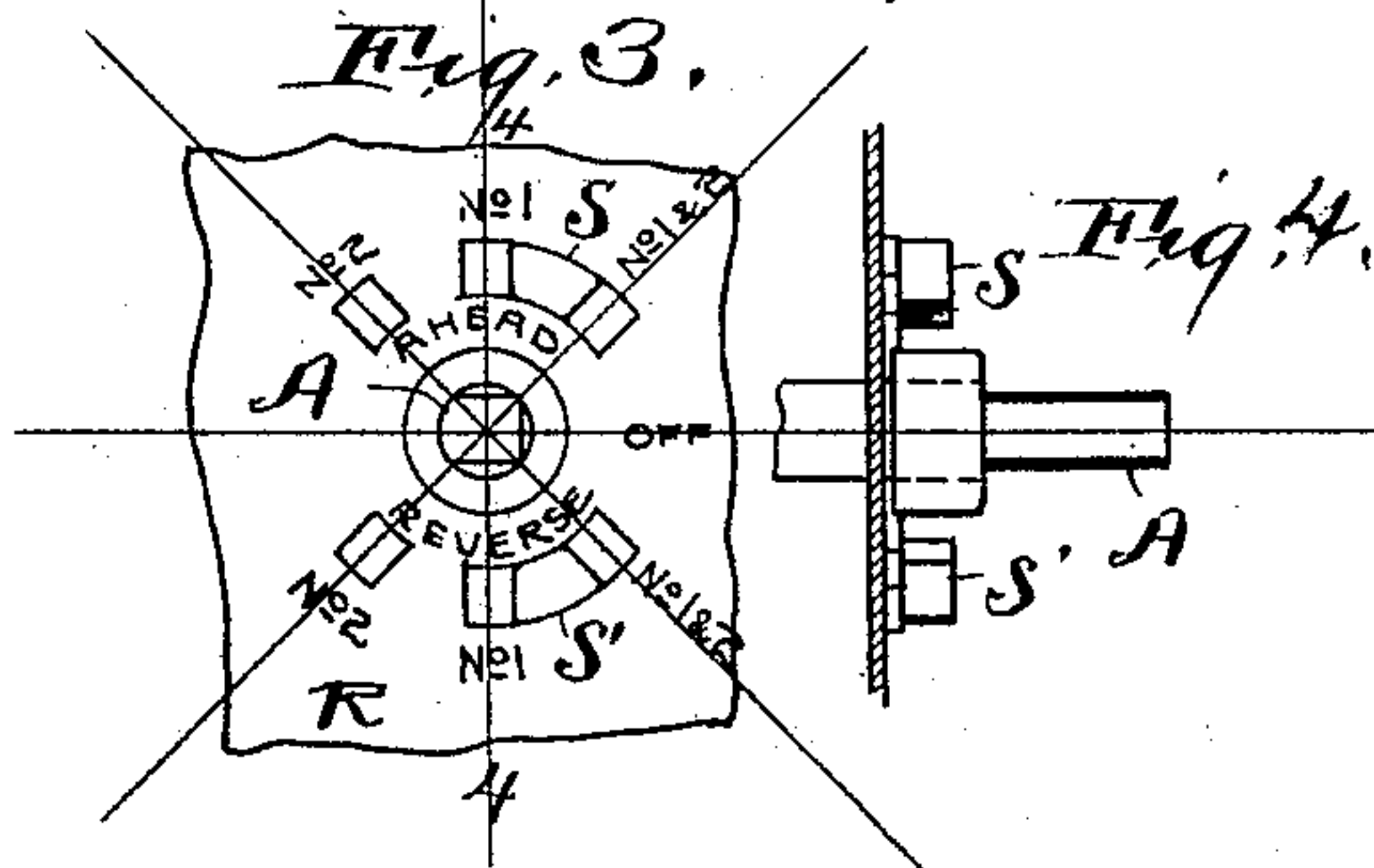
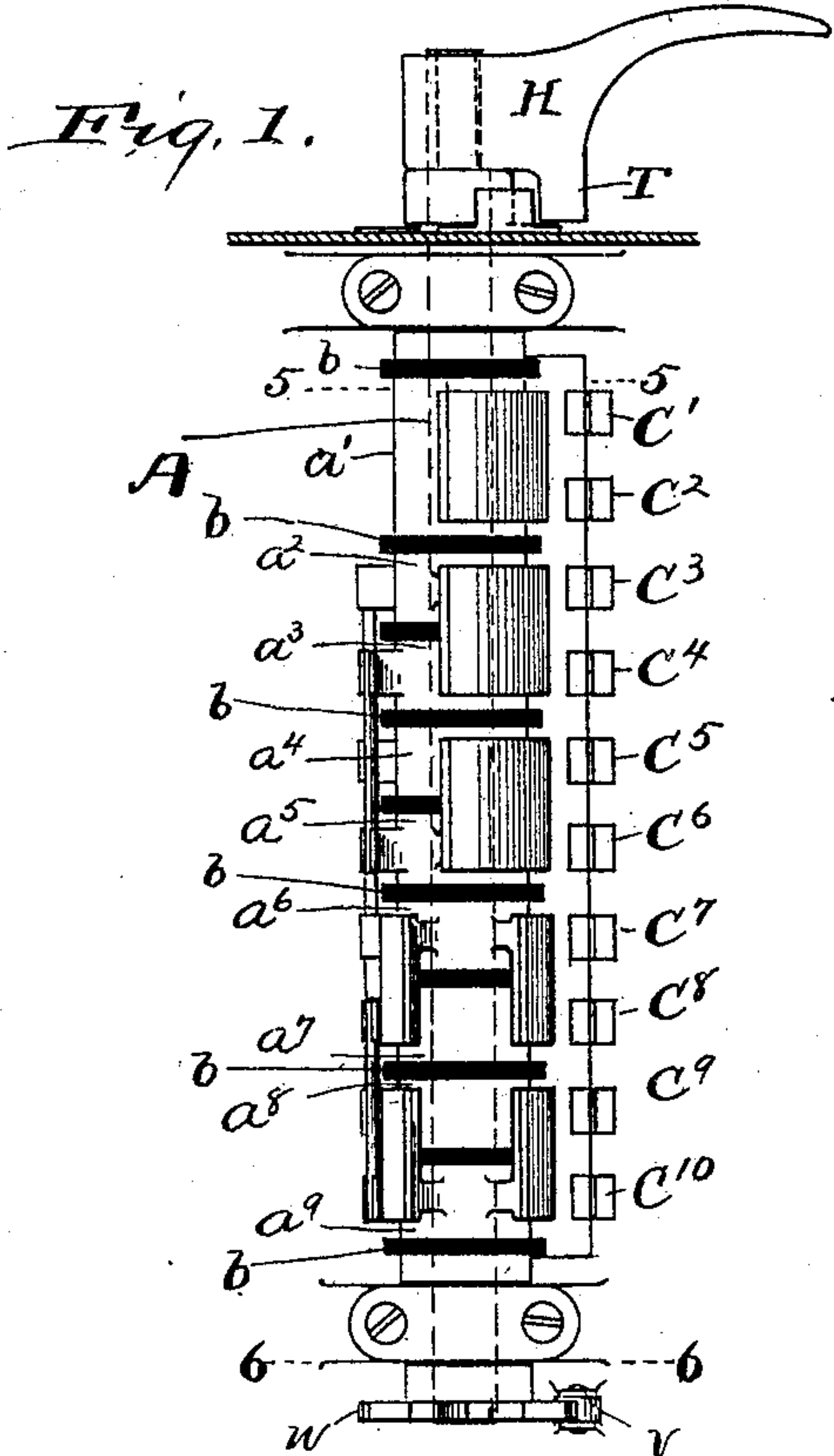
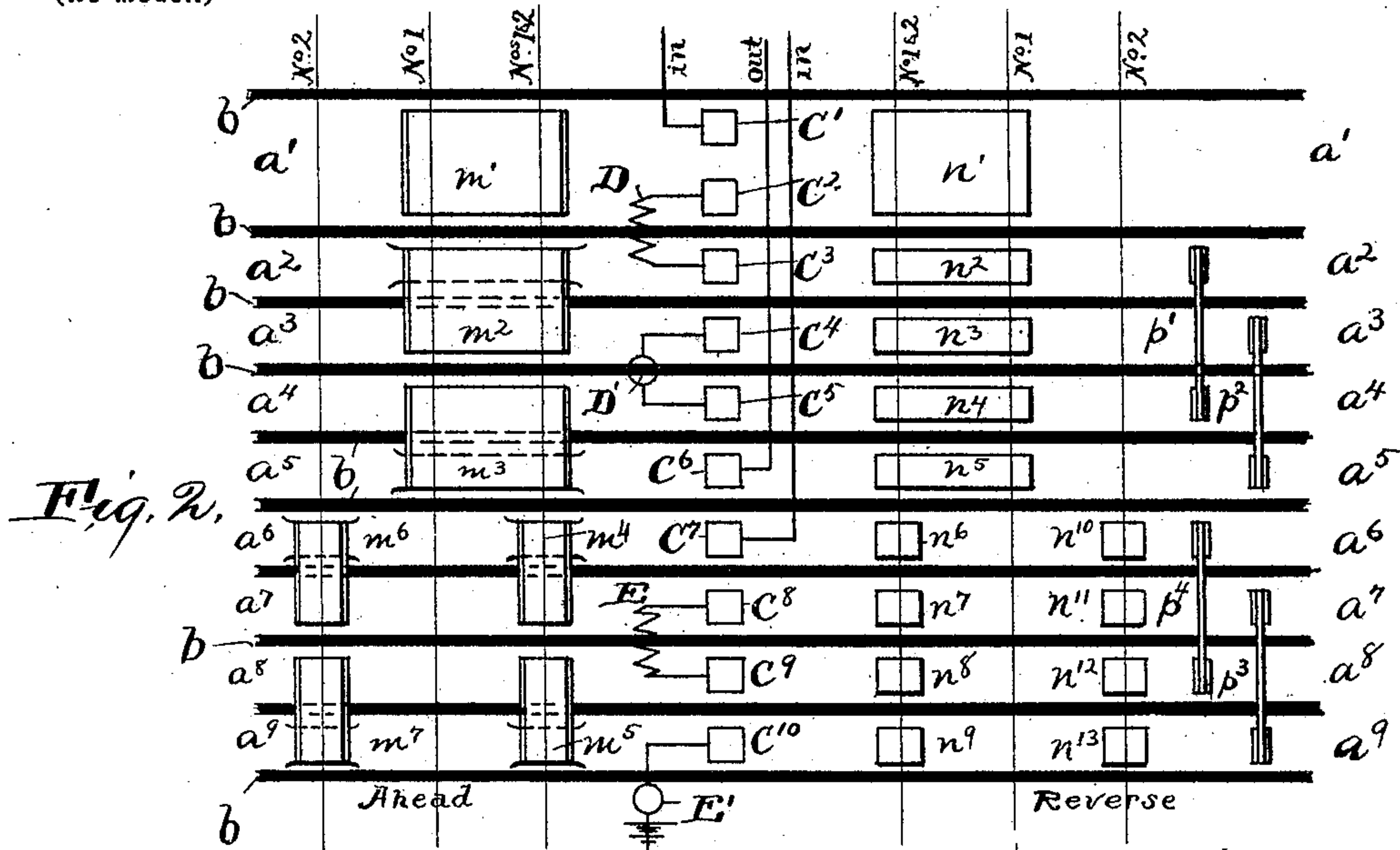
Patented Apr. 3, 1900.

T. VON ZWEIGBERGK.

REVERSING AND CUT-OUT SWITCH.

(Application filed Jan. 26, 1897.)

(No Model.)



Witnesses.
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UNITED STATES PATENT OFFICE.

THORSTEN VON ZWEIGBERGK, OF CLEVELAND, OHIO.

REVERSING AND CUT-OUT SWITCH.

SPECIFICATION forming part of Letters Patent No. 646,485, dated April 3, 1900.

Application filed January 26, 1897. Serial No. 620,821. (No model.)

To all whom it may concern:

Be it known that I, THORSTEN VON ZWEIGBERGK, a subject of the King of Sweden and Norway, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Reversing and Cutting-Out Switches; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a switch for reversing one or more electric motors and for cutting out a motor when desired. It is especially adapted for use on street-railway cars having a pair of motors; and its object is to supply convenient means for directing at will the current through both motors in either direction, whether the motors are connected in series or parallel, and for cutting out either motor and properly directing the current through the remaining one.

The invention consists in the construction and combination of parts hereinafter specified, and definitely pointed out in the claim.

The drawings show my invention in an improved form.

Figure 1 is an elevation of the switch with the cover removed. Fig. 2 is a development of the surface thereof, showing diagrammatically the contact-fingers, the fields and armatures of a pair of motors, and the connecting-circuits. Fig. 3 is a top view of the switch-case, indicating the different positions of the switch. Fig. 4 is a vertical central section taken on the line 4 4 of Fig. 3. Fig. 5 is a horizontal section on the line 5 5 of Fig. 1; and Fig. 6 is a horizontal section on the line 6 6 of Fig. 1, showing the detent mechanism for retaining the switch in the desired position.

Similar letters of reference designate similar parts in each figure.

Secured to an insulating-sleeve B, which surrounds and is secured to a vertical shaft A, are a series of metallic bands a' to a^9 , inclusive, separated from each other by insulating-flanges b , these parts constituting an efficient movable switch. Secured to these bands are two series of segmental contact-plates m' to m^6 and n' to n^{13} , against which bear contact-fingers, to which the circuit-wires are con-

nected. The purpose of the contact-plates is to connect together desired contact-fingers. One of the contact-fingers is shown at C' in Fig. 5, and the series are indicated by C' to C^{10} , inclusive, in Figs. 1 and 2. The finger is composed of the contact-button c and its spring-arm, secured to an insulating-block e , by which it is given the required pressure against the contact-plate and which forms the conductor from the contact-button.

In the arrangement of the parts illustrated in the drawings the circuit may lead from the controller-switch (not shown) to the contact-finger C' and from the contact-finger C^2 through the field of one of the motors, which I will designate as "motor No. 1." This field is shown diagrammatically at D. From the field D the circuit leads back to contact-finger C^4 . The circuit leads through the armature D' of motor No. 1 and back to contact-finger C^5 and from contact-finger C^6 to the controller. From the controller the circuit leads into contact-finger C^7 , from contact-finger C^8 through the field of motor No. 2 to contact-finger C^9 , and from contact-finger C^{10} it leads through the armature of motor No. 2 to the ground.

In the position of the switch which is indicated as "off" in Fig. 3 the contact-fingers do not bear upon any of the plates, and hence no connection is established. This position is also shown in Fig. 5 and is indicated at the center of the development in Fig. 2.

Inasmuch as contact-fingers C' and C^2 are always to be connected together when they are connected at all, I make the band a' of twice the width of the other bands, and the contact-plates $m' n'$, secured to this band, are wide enough to receive the contact of both fingers C' and C^2 . If desired, instead of this one wide band there might be two bands of the same width as the others and properly connected together. The circuits of the contact-fingers are so arranged that in the position of the switch to go ahead proximate pairs of fingers are to be connected together. To accomplish this, I provide contact-plates m^2 to m^7 of great enough width to receive two contact-fingers and secure each of these plates to one of the bands and let it project over the proximate band, the result being that when the contact-fingers rest upon these plates each pair is connected together through

them. The development illustrated in Fig. 2 shows the different positions of these contact-plates. In the position indicated as Nos. 1 and 2, which corresponds to the similarly-numbered position in Figs. 3 and 5, contact-fingers C^1 and C^2 are connected together by the plate m^1 , C^3 and C^4 to the plate m^2 , and so on. Thus the current coming in through the contact-finger C^1 passes through the field and armature of motor No. 1 out to the controller and back through the field and armature of motor No. 2 and to the ground or return wire, or if the controller connects the two motors in parallel the current divides and comes in through the two contact-fingers C^1 and C^7 and, passing through the armature and field of each motor, goes to the ground or return wire. If the shaft A is turned through a portion of a revolution until its handle-lever H is in the position corresponding to No. 1 ahead in Fig. 3, the contact-fingers C^1 to C^6 , inclusive, are in contact with the left-hand half of the plates m^1 , m^2 , and m^3 , but the contact-fingers C^7 to C^{10} , inclusive, are out of contact with any contact-plates. This position is indicated at No. 1 ahead in the development. In this case the current flows through the field and armature of motor No. 1 and out to the controller, motor No. 2 being cut out. On the other hand, if the switch is in the position corresponding to No. 2 ahead, motor No. 1 is entirely cut out and the current coming in from the controller passes through the field and armature of motor No. 2 only.

When it is desired to reverse the motors, the operating-handle is turned to bring the shaft into some of the positions indicated in the lower half of Fig. 2, which corresponds to the right half of the development shown in Fig. 2. The contact-plates corresponding to the reverse position are not of double width, with the stated exception of the first one, and thus each contacts with one finger only. Contact-plates which connect the fingers, so as to reverse either or both motors, are shown at n^1 to n^{13} , inclusive. Those corresponding to the reverse position of motor No. 1 are the plates n^1 to n^5 , and those corresponding to the reverse position of motor No. 2 are the plates n^6 to n^{13} , inclusive. It will be remembered that the overlapping contact-plates m^2 to m^7 , inclusive, do not contact with certain of the bands, as a^3 and a^4 and a^7 and a^8 . Each of these bands is connected with alternate bands by the metallic bars p^1 , p^2 , p^3 , and p^4 . Thus a^2 and a^4 , a^3 and a^5 , a^6 and a^8 , and a^7 and a^9 are connected by these bars. As one of each of these pairs of bands is out of operation when the switch is in position to go ahead, the connection through the bars p^1 to p^4 is immaterial at that time. When, however, the switch stands, for example, in position with the contact-fingers engaging the plates n^1 to n^9 , inclusive, the current passes in through the contact-finger C^1 , through the field D in the usual order, and then from the contact-

finger C^3 to the plate n^2 and via the band a^2 through the connecting-bar p^1 to the band a^4 and plate n^4 , and thence around through the armature E in the reverse direction to contact-finger C^4 , and from thence through the contact-plate n^3 and the band a^3 to the bar p^2 , which forms the circuit to the plate n^5 , from which it passes out to the controller. The current coming in from the controller passes from finger C^7 to the plate n^6 and from thence around through either the field or armature of the motor in reverse direction and out to the ground. Both motors will therefore be reversed.

The drawings show the reversal as taking place in the armature of motor No. 1 and in the field of motor No. 2. It may, however, be reversed at either place, as desired, and therefore the drawings illustrate either form.

From what has been said it will be understood that when the switch is in the position for motor No. 1 alone or for motor No. 2 alone the other motor will be cut out and the current will pass through but one. Under ordinary circumstances the operating-lever will be swung between the positions of Nos. 1 and 2 ahead and Nos. 1 and 2 reverse, as shown in Fig. 3, passing through the "off" position. To prevent accidental swinging of the lever farther than either of these positions, I provide on the top plate R of the case the lugs S and S', against which a depending lug T on the handle H impinges. Should, however, one motor become disabled, so that it is desirable to cut it out and use but one, the handle-lever is lifted up, so that its lug T can pass over the lug S or S', and it is carried over into a position corresponding to the left half of Fig. 3. If it is motor No. 2 that is disabled, the lever stands at the position indicated as "No. 1 ahead" to go forward and is swung through one hundred and eighty degrees to the position indicated as "No. 1 reverse" to go backward. At any intermediate position the current will be thrown off, since motor No. 2 is out of use. Should motor No. 1 be disabled, the lever swings from the forward position of No. 2 to the rearward position and will be "off" at an intermediate position or at either No. 1 position.

In order that the switch may properly stop at its desired position and not be accidentally displaced therefrom, I provide the indicator-wheel w , (shown in Fig. 6,) having notches corresponding to the different positions of the switch, and the detent-arm v , which has a depending roller engaging with these notches. This roller is held in contact with the wheel by the spring y , which gives sufficiently to allow movement of the shaft. This detent mechanism may be placed in any desired position within the case. The case may be of any well-known construction, and for that reason is not shown.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

5 In a reversing-switch, a movable switch carrying a plurality of insulated metallic bands, two series of plates carried by said bands, the plates of one series being wide enough to extend over two consecutive bands but each being connected with but one band whereby some of the bands are out of connection with the series, the plates of the other series being connected one to each band and not overlapping, and electrical connection between each of those bands to which the first series of plates are not connected, and bands to which

those plates are connected, in combination with contact-fingers adapted to contact with either series of plates whereby the current may be reversed, substantially as and for the purpose specified.

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

THORSTEN VON ZWEIGBERGK:

Witnesses:

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ALBERT H. BATES.