No. 661,464. Patented Nov. 6, 1900.

W. ALDRICH & H. E. BORGER.

ALTERNATING CURRENT MOTOR.

(Application filed Apr. 30, 1900.)

(No Model.) 2 Sheets—Sheet 1.

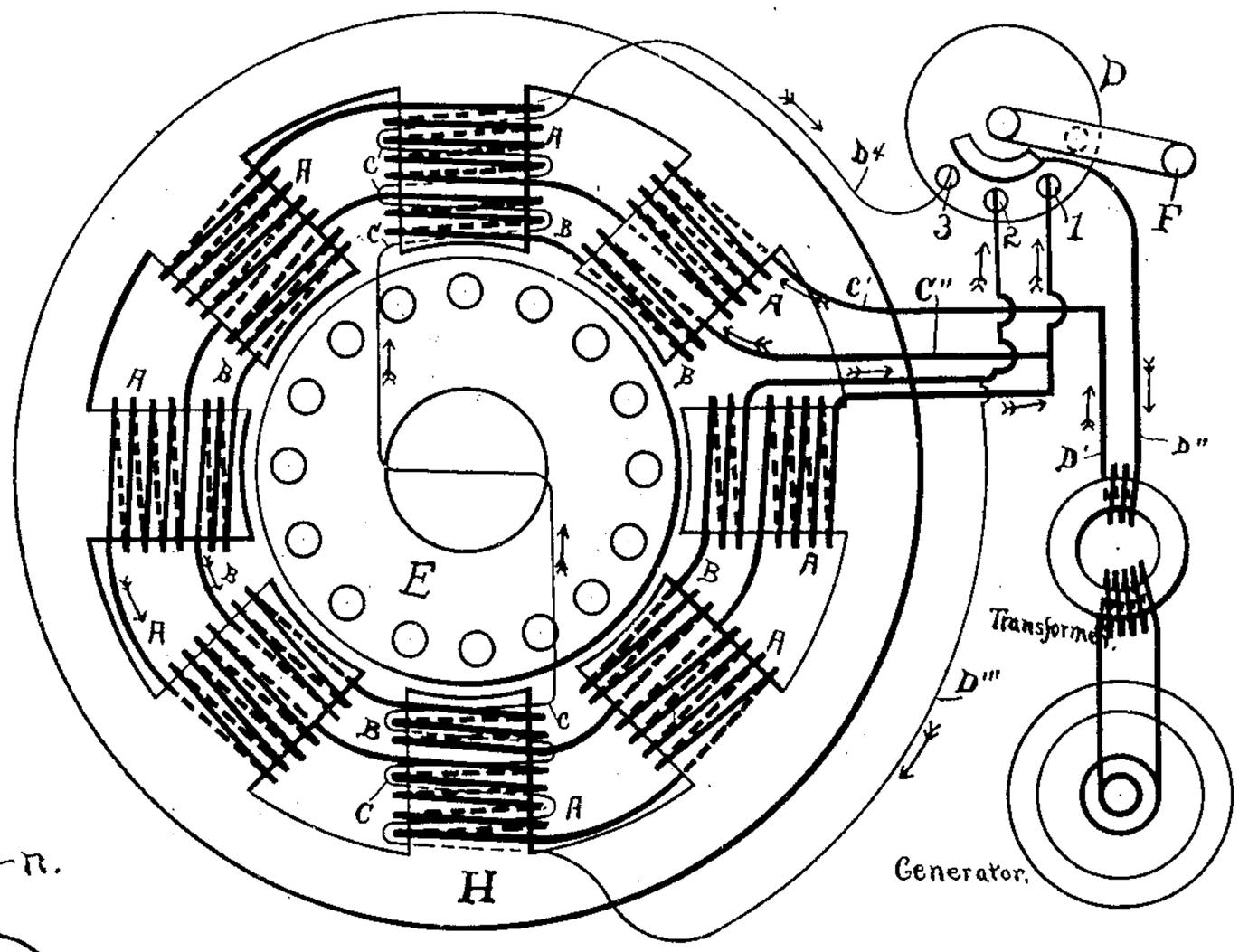

Fig. 1.

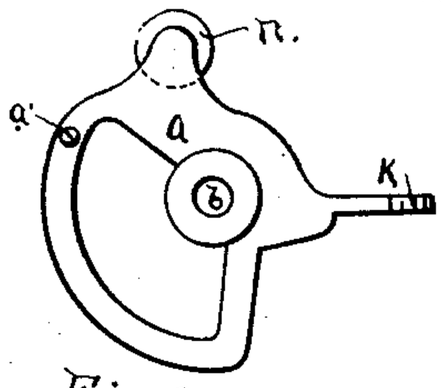

Fig. 3.

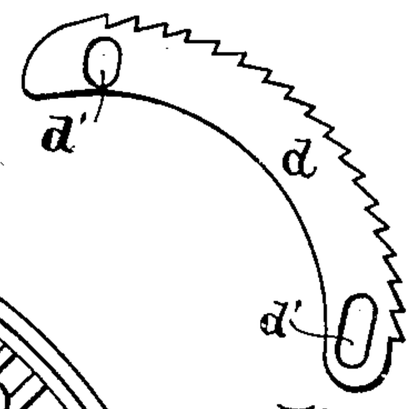

Fig. 4.

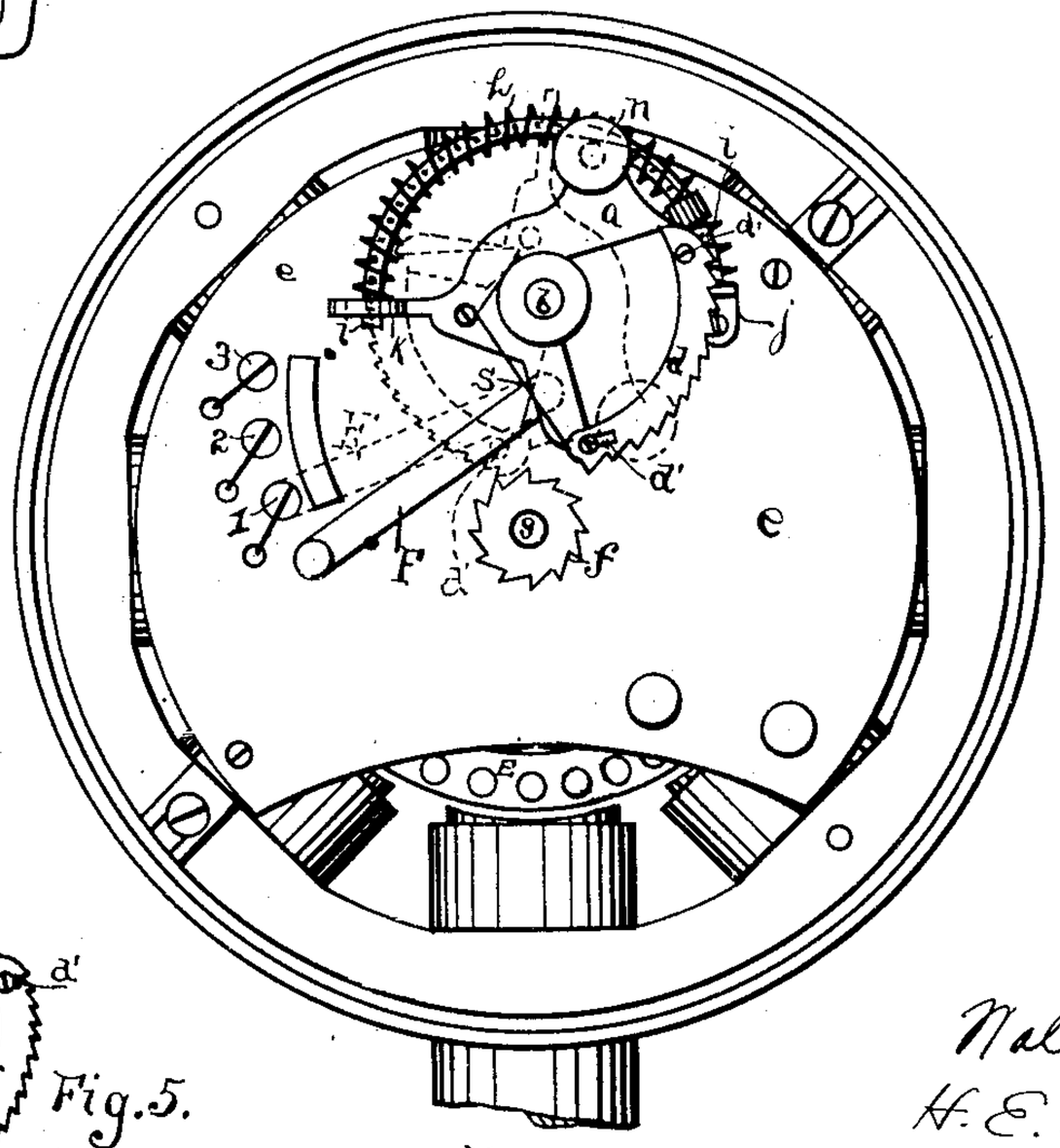

Fig. 2.

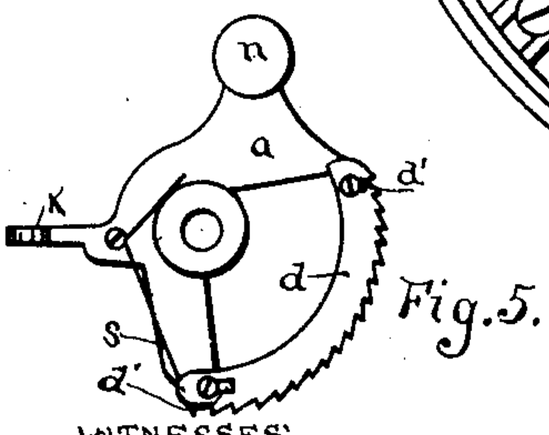

Fig. 5.

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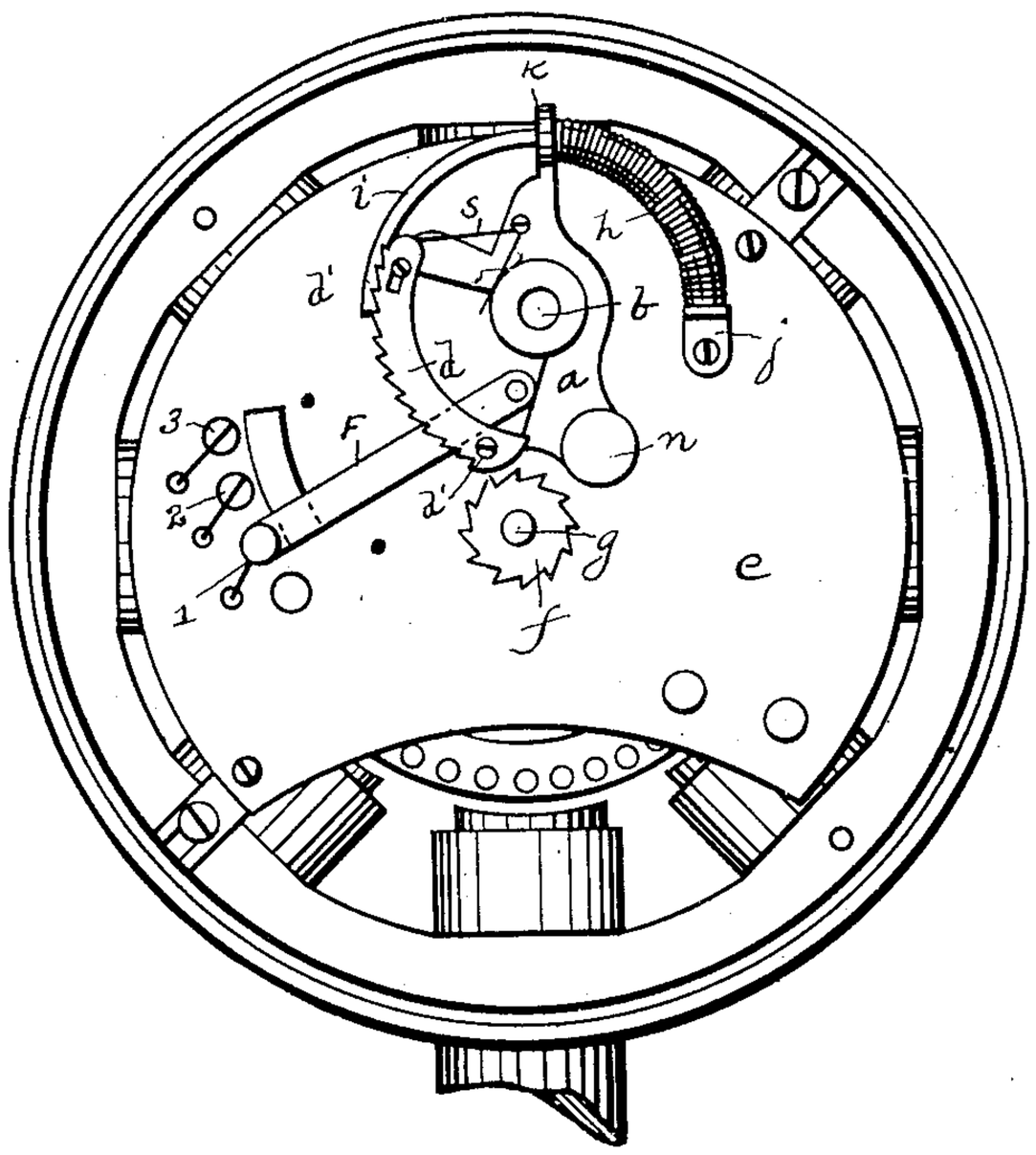

Fig. 6.

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UNITED STATES PATENT OFFICE.

WALES ALDRICH AND HENRY E. BORGER, OF DAYTON, OHIO, ASSIGNORS TO D. L. BATES & BROTHER, OF SAME PLACE.

ALTERNATING-CURRENT MOTOR.

SPECIFICATION forming part of Letters Patent No. 661,464, dated November 6, 1900.

Application filed April 30, 1900. Serial No. 14,856. (No model.)

To all whom it may concern:

Be it known that we, WALES ALDRICH and HENRY E. BORGER, citizens of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Alternating-Current Motors; and we do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in mechanical starters for alternating-current motors for driving fans or other uses.

The object of the invention is to provide a motor of the above type in which a mechanical starter is employed. The motor has no difference in phase. Therefore it will run in either direction, depending, however, upon the direction given the rotating part through the mechanical starter. One circuit—to wit, circuit A—is used for starting. Other circuits may be used after the motor has been raised to its maximum speed by the above-named circuit, all as will be hereinafter more fully described.

In a detail description of our invention reference is made to the accompanying drawings, in which—

Figure 1 is a diagram of the field-magnet windings and switch connections. Fig. 2 is a view of the rear side of the motor, showing the mechanical starter. Figs. 3 and 4 are detailed views of parts of the mechanical starter; Fig. 5, a view of the mechanical starter detached from the motor; Fig. 6, a rear view of the mechanical starter and motor. The starter is in the position in which it is shown in Fig. 2.

As shown in the drawings, the motor has eight polar projections, each of which has two separate windings A and B. Upon two of said polar projections which are opposite each other there are additional windings or a third coil C for the purpose of obtaining a slower-running speed after the motor is up to maximum speed.

It is immaterial how many of the coils C are used. The switch D has contact-points 1 2 3. When current passes through contact-point 1, the motor runs at a high speed which is very near synchronism. For this speed a circuit is made through the winding A. When the motor is running at this high speed, the current passes from the main conductor or line D′ through conductor C′ and into coils A, returning to contact-point 1, and thence through the switch back to line D″. The windings B and C are additional connections which may be switched in manually to obtain slower speeds after the motor has been started at its maximum speed by the mechanical starter.

The field-magnet ring H and the polar projections are made in the usual manner of laminated iron. The polar projections, however, are not slotted, as is customary in motors which have a starting or phase coil. The armature E is of the closed-circuit type. Connection of the switch-lever F with contact-point 1 is made by a mechanical starter which is operated by hand.

The mechanical starter consists of a frame *a*, which is pivoted at *b* to a supporting-plate *c*, the latter being attached to the rear of the motor.

d is a ratchet-segment which is mounted on the frame *a*. This ratchet *d* has a loose or yielding connection with said frame by means of oblong slots *d′* in the ends thereof. This connection allows said ratchet to return to its normal position, which is that shown in full lines in Fig. 2.

f is a ratchet-wheel fixed to the shaft *g* of the rotating part of the motor. When the frame *a* is moved in the direction of the dotted position, the ratchet *d*, engaging with the pinion *f*, rotates the moving part of the motor mechanically. The pivotal frame *a* is held in position shown in full lines by means of a spring *h*, which incloses a curved supporting-bar *i*, the latter being supported on a bracket *j*, which is secured to plate *o*. An extension or arm *k*, projecting from the frame *a*, has an opening in it which receives the free end of

the bar *i* when said frame *a* is moved to cause a rotation of the armature-shaft *g*. During such movement of frame *a* the spring *h* is compressed by the arm *k*, and when said frame *a* is released the spring *h* returns the frame *a* and ratchet *d* to their normal positions. In the movement of the frame *a* to start the motor, near the completion of said movement, a pin or lug *a'* on the inner side of said frame comes in contact with said switch-lever F and moves said lever to the contact-point 1. When this connection is made, current passes through winding A, and the motor is given a high speed, as hereinbefore specified. In place of the spring *h* the plate or frame *a* may be provided with an excess of weight on one side of the pivot *b*—for example, on the left side of said pivot, as it is shown in Fig. 2. This greater weight will perform the same function as the spring by returning the frame and ratchet to their normal positions as soon as the hand releases the device.

The starter or frame *a* is operated by the hand through means of a finger-piece *n*, which may be placed at any suitable point on said frame. A spring *s* bears upon the ratchet-segment *d* and keeps it in position to engage the pinion when the segment is being moved to rotate the armature.

It will be observed that there are three separate windings, A, B, and C, the connections between them being made through the switch-lever F. The first speed occurs when the switch-lever is on contact-point 1, winding A alone forming the circuit. The lever F may be moved by hand from one point to the other contact-points. The second speed occurs when the switch-lever F is moved to contact-point 2, which connects windings A and B in series, and the last speed, which is the slowest speed, is obtained by moving the switch-lever F to contact-point 3, connecting windings A, B, and C in series.

Having described our invention, we claim—

1. The combination with an alternating-current electric motor, of a mechanical starting device, consisting of a ratchet-wheel geared to the armature-shaft, a pivotal frame mounted adjacent to the armature-shaft, a segmental ratchet yieldingly mounted on said pivotal frame and adapted to gear with the ratchet-wheel on the armature-shaft, as herein shown and described.

2. In an alternating-current motor, the combination with a rotor of the squirrel-cage type, of a pivotal frame having a projection thereon, a switch-lever engaged by said projection in one movement of said frame, a segmental ratchet-bar yieldingly connected to said frame, and a ratchet-wheel on the rotor-shaft with which the said segmental bar engages, substantially as shown and for the purposes specified.

3. In an electric alternating-current motor, the combination with an armature, of a mechanical starter for simultaneously giving said armature its initial movement and switching in an electrical circuit for running said motor at its maximum speed, the said mechanical starter comprising a pivotal frame normally held out of an operative position, a segmental ratchet-bar yieldingly supported on said frame, a pinion on the armature-shaft with which said segmental ratchet engages, and means on said pivotal frame engaging with the switch-lever during the movement of said frame in giving the armature its initial movement.

4. In an alternating-current motor, the combination of a field-magnet having two or more circuits, and a rotor of a squirrel-cage type, of a mechanical starter for imparting to the rotor its initial movement and switching in the first or starting circuit through which the motor attains its maximum speed, said mechanical starter consisting of a pivotal frame, a segmental ratchet yieldingly connected to said pivotal frame, a projection on said frame engaging with the switch-lever, and a pinion on the rotor-shaft with which the segmental ratchet engages to impart to said rotor its initial movement, substantially as shown and described.

5. In an electrical motor, the combination with the rotating part of the motor, of a pivotal frame, a ratchet-bar loosely connected to said frame, a pinion on the shaft of the rotating part of the motor and with which said ratchet-bar engages, a switch-lever engaged by said pivotal frame during the movement of the latter, and whereby said switch-lever throws in circuit the winding on the field-magnet producing the maximum speed, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

WALES ALDRICH.
HENRY E. BORGER.

Witnesses:
R. J. McCARTY,
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