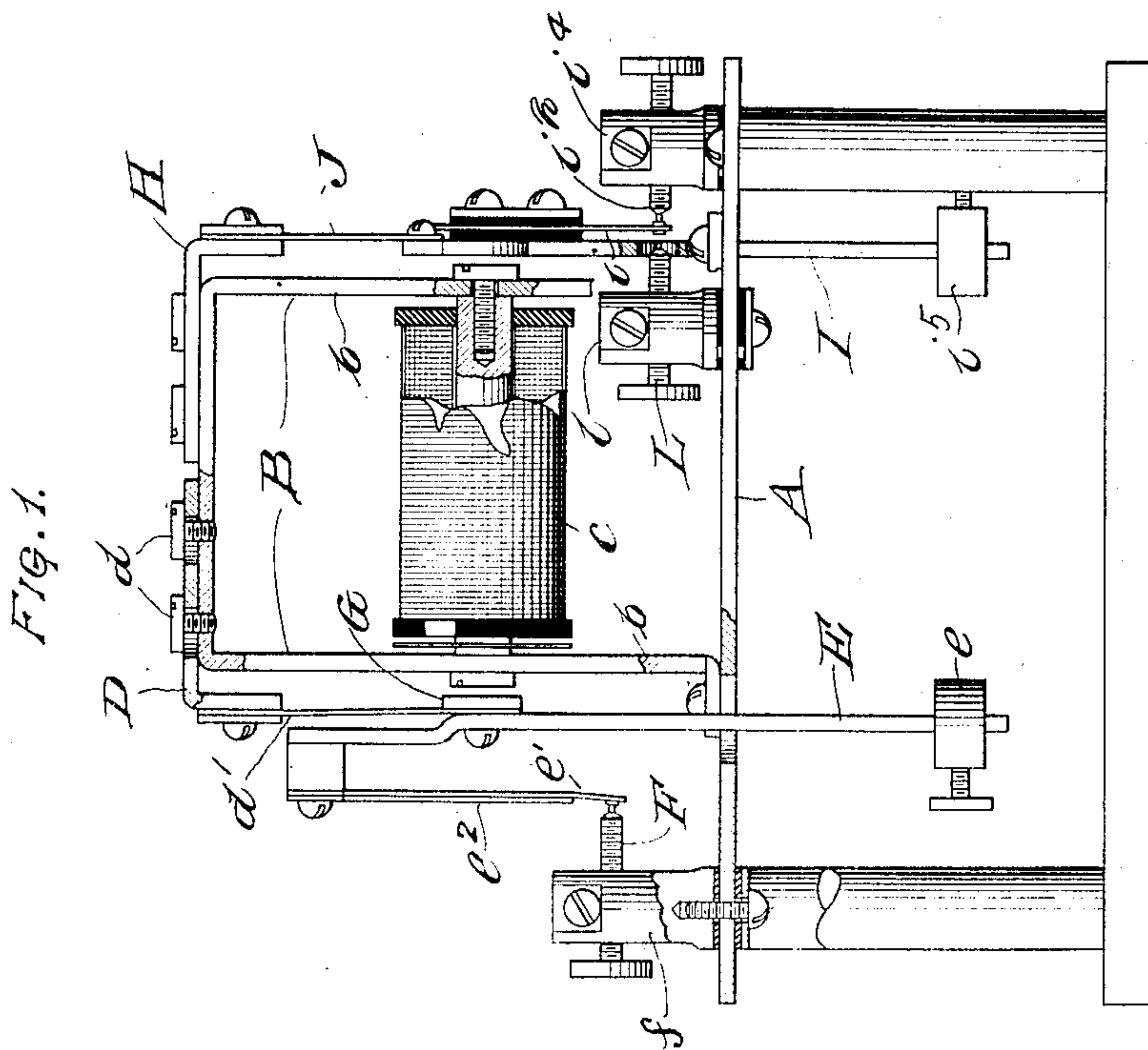
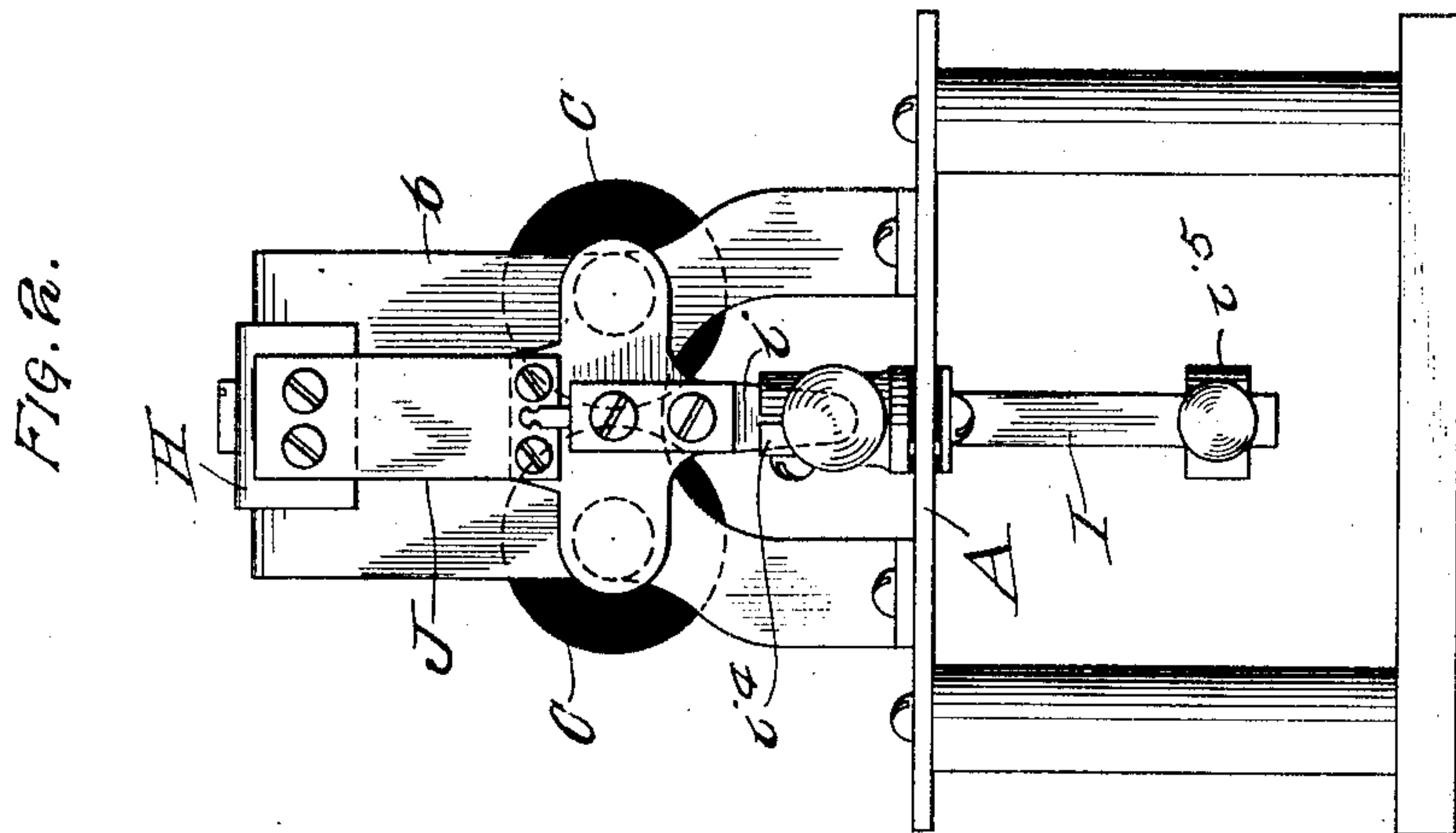


C. J. ERICKSON.
POLE CHANGER.
APPLICATION FILED JAN. 18, 1910.

1,218,067.

Patented Mar. 6, 1917.
2 SHEETS—SHEET 1.



WITNESSES
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2 SHEETS—SHEET 2.

FIG. 4.

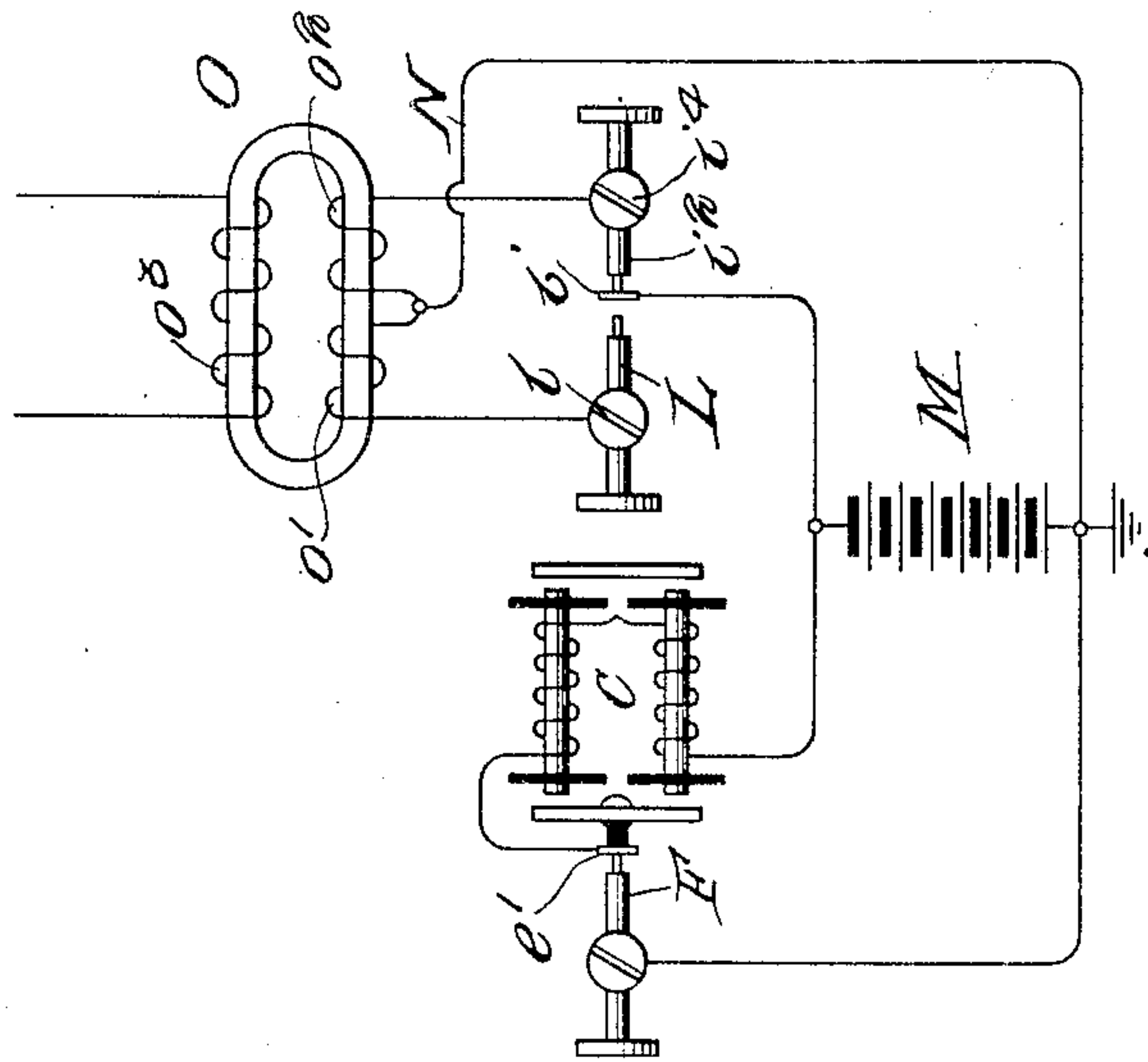
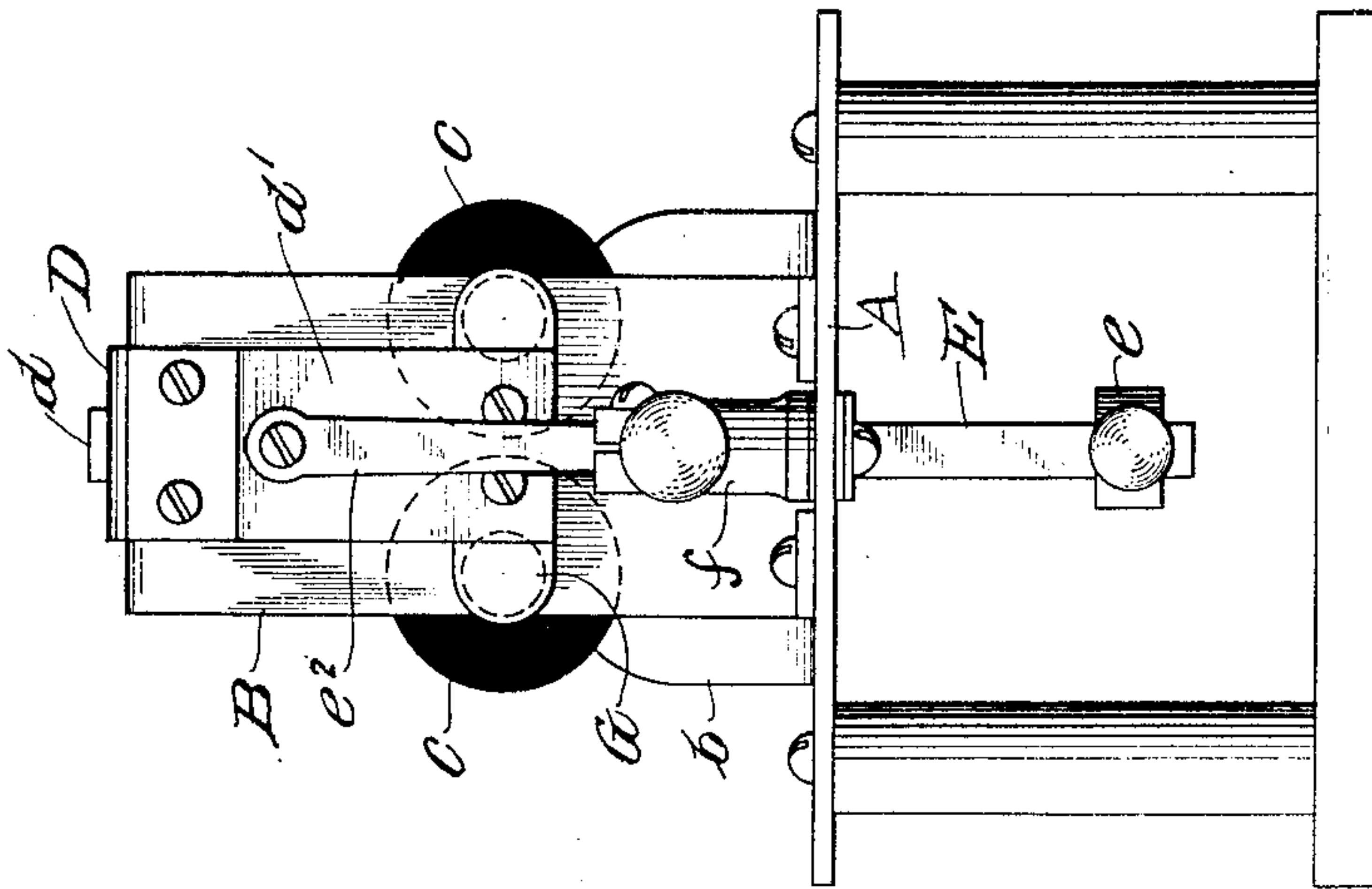


FIG. 3.



WITNESSES

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POLE-CHANGER.

1,218,067.

Specification of Letters Patent.

Patented Mar. 6, 1917.

Application filed January 18, 1910. Serial No. 538,596.

To all whom it may concern:

Be it known that I, CHARLES J. ERICKSON, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Pole-Changers, of which the following is a specification.

My invention relates to pole changers of the kind that are used, for example, in selective signaling on party-lines in telephone systems. It relates to that particular kind of pole changer in which an electromagnet is provided with two armatures, one of which acts as a buzzer or interrupter for the energizing circuit of the magnet, and the other of which controls the flow of current in the primary of a transformer.

An object of my invention is to synchronize the vibrations of the two armatures, whereby the armature that controls the flow of current in the primary of the transformer operates in exact synchronism with the armature which controls the energizing circuit of the magnet, thus insuring a harmonic action for the entire mechanism of the pole changer, and whereby much more satisfactory results are obtained than were possible with the old arrangement in which the rate of vibration of the two armatures was the same, but in which one armature did not vibrate synchronously with the other armature.

Another object is to provide an improved arrangement of the circuits, as well as an improved construction of the contacts controlling the same, whereby the mechanism is simplified and its operation materially improved.

To these and other useful ends my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings Figure 1 is a side elevation of a pole changer embodying the principles of my invention, certain portions being shown in section to more clearly illustrate the construction.

Fig. 2 is an end elevation of the same.

Fig. 3 shows the outer end of the said pole changer.

Fig. 4 is a diagram of the circuits of the said pole changer.

As thus illustrated, the pole changer comprises a suitable support or body-frame A upon which is mounted a U-shaped support or frame B. The electromagnets C, C are

arranged horizontally in the same plane, and have their end portions suitably secured to the vertical portions *b* of the said frame. Upon the top of said frame the mounting D is adjustably secured in place by the screws *d* and is provided with a downwardly-extending spring *d'*. The pendulum E has its upper end secured to the said spring, and its lower end is provided with an adjustable weight *e*. The said pendulum is provided with a circuit-controlling or interrupter spring *e'* which is provided with a stiff backing spring *e²* and which bears against the stationary contact F, which latter is mounted in a suitable binding post *f*. The pendulum E carries the armature G, which latter is arranged in operative relation to the cores or pole-pieces of the electromagnets. At the other end of the structure a bracket piece H is secured to the top of the frame B.

Attached to the bracket H there is a downwardly projecting spring J to the lower end of which is secured the swinging armature I in the same manner in which the pendulum E is secured to the spring *d'*. This armature, it will be seen, carries the terminal spring *i* which is held normally against the stationary contact *i²*, this contact being mounted in a suitable binding post *i⁴*. The normally disengaged stationary contact L is mounted in a binding post *l*, and is adapted to be engaged by the spring *i* when the armature I is attracted by the electromagnets.

Referring to Fig. 4, it will be seen that the battery M is connected in series with the windings of the two electromagnets, as well as with the contacts *e'* and F. With this arrangement the electromagnets attract the armature G, and in so doing open the energizing circuit in which their coils or windings are included. The pendulum E then swings back and causes the contacts *e'* and F to close together, thus restoring the energizing circuit. This more or less rapid interruption in the flow of energizing current through the electromagnets is thus controlled by the armature G, the whole constituting what is ordinarily known as an interrupter. This intermittent energizing of the electromagnets causes a corresponding energizing of the armature I. It will also be seen by referring to Fig. 4 that this operating circuit is independent of and to

tally distinct from the generating circuit N, which generating circuit includes the primary windings of a transformer or induction coil O. The primary of the transformer O comprises two windings o' and o^2 . One end of the winding o^2 is connected to the binding post i^4 and one end of the winding o' is connected to the binding post l . The remaining end of each winding is connected to the positive or grounded side of the battery M. The opposite end of the battery is connected to the movable contact i mounted upon the armature I. When the movable contact i engages the stationary contact i^2 a circuit is closed through the primary winding o^2 , and when the contact i engages the contact l a circuit is closed through the winding o' . Thus, as the armature I swings back and forth current will flow first through one of the secondary windings and then through the other. The two windings o' and o^2 are so connected that the currents flowing through them produce equal but opposite magnetic effects in the core of the transformer. The alternating magnetism thus produced by the alternate energizing of the primary windings induces an alternating electromotive force in the secondary winding o^3 . This alternating electromotive force has the same frequency as the vibration of the armatures G and I of the pole changer, and may be used to produce alternating current for operating electric bells or other signal-receiving devices which may be connected to the secondary winding of the transformer O.

In order to insure a steady and regular vibration for the armature I it is provided with an adjustable weight i^5 similar to the weight e on the pendulum E. The weight i^5 may be so adjusted that the natural period of vibration of the armature I is the same as that of the pendulum E, thus insuring a true harmonic vibration of said armature, and, consequently, the alternation of the current delivered by the transformer O is more regular than if the weight i^5 were not provided.

With the arrangement shown and described it will be seen that the two armatures of the magnet operate in synchronism—that is to say, they not only have the same rate of vibration, but they also have the same amplitude and speed of vibration, the vibrations of one armature being an exact duplicate of those of the other armature. In this way better results are obtained, especially in connection with selective signaling systems, as, for example, those of party-lines in telephone systems. In such cases it is often necessary to adjust the pole changer to obtain a certain frequency of signaling current, and with my improved arrangement, whereby both armatures are adapted to be regulated for this purpose, the

results in this direction are much more satisfactory than heretofore. Furthermore, it will be seen that the current is not reversed in the primary of the transformer, as the primary is divided into two parts, its middle point being permanently connected with the grounded pole of the battery. In this way current first flows through one part of the transformer, and then in the opposite direction through the other part, thus reversing the magnetic polarity of the transformer. This method necessitates but a single movable contact for controlling the flow of current in the primary of the transformer, and thus the mechanism is not only simplified, but also materially improved in its operation.

What I claim as my invention is:—

1. In a pole changer, an electromagnet, two independently operating armatures for said magnet, an interrupter operated by one of said armatures, contacts operated by the other armature, a pendulum carried by the armature which operates the interrupter, and a transformer comprising a primary circuit having a plurality of windings terminating in said other armature and its contact, means for controlling said other armature by means of a pendulum to maintain the induced currents in the secondary in synchronism with said first armature, and a secondary responsive to the operations of said armature to produce an alternating signaling current.

2. In a pole changer, a circuit, a transformer secondary in said circuit, a battery, an electromagnet, contacts operated by said magnet for interrupting the current-flow in the winding thereof, and means including two transformer primaries controlled alternately by said magnet for reversing the polarity or magnetic effect of the said transformer, whereby an alternating signaling current is induced in the said secondary, a pair of armatures for said magnet, one of said armatures controlled by a pendulum for the purpose of maintaining the induced currents in the secondary in synchronism with said other armature.

3. In a circuit controller, a magnet, an armature for said magnet, an interrupter for said magnet, a battery, an energizing circuit for said magnet, said interrupter in said circuit, another armature for said magnet, a primary circuit, an interrupter for said primary circuit under the control of said other armature, a second circuit inductively related to said primary circuit, adjustable means for controlling said other armature to maintain the induced currents in the second circuit in synchronism with said first armature.

4. In a circuit controller, a magnet, an armature for said magnet, an adjustable pendulum for said armature to regulate the

action of the armature, an interrupter for
said magnet, a battery, an energizing cir-
cuit for said magnet, said interrupter in said
circuit, another armature for said magnet, a
5 primary circuit, an interrupter for said pri-
mary circuit under the control of said other
armature, a second circuit inductively re-
lated to said primary circuit, an adjustable
pendulum for controlling said other arma-

ture to maintain the induced currents in the 10
second circuit in synchronism with said first
armature.

Signed by me at Chicago, Cook county,
Illinois, this 30 day of December, 1909.

CHARLES J. ERICKSON.

Witnesses:

EDWARD D. FALES,
ARTHUR J. RAY.