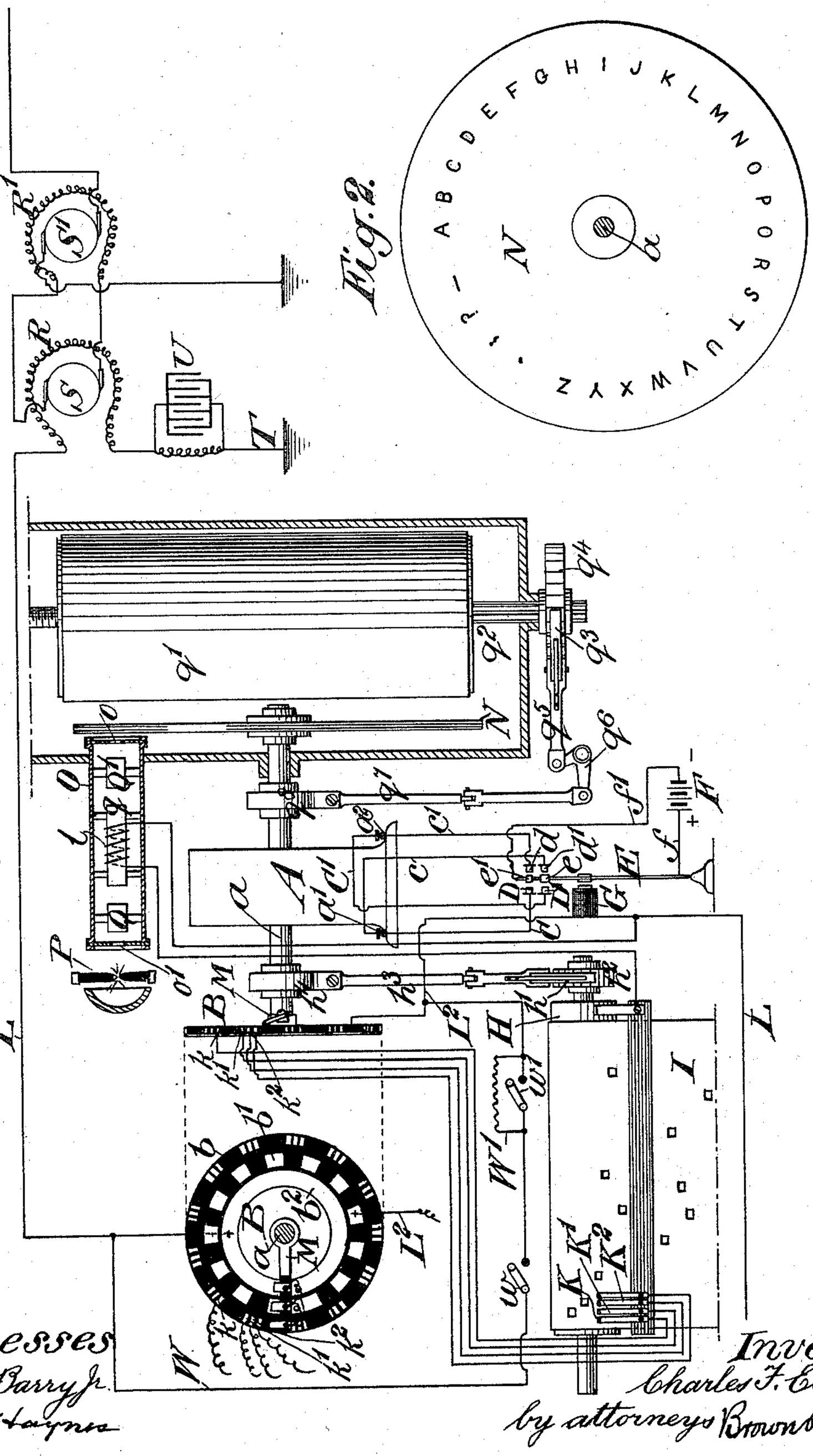
(No Model.)

C. F. EATON, Jr.

TELEGRAPHIC APPARATUS.

No. 582,157. Patented May 4, 1897.



UNITED STATES PATENT OFFICE.

CHARLES F. EATON, JR., OF NEW YORK, N. Y.

TELEGRAPHIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 582,157, dated May 4, 1897.

Application filed December 18, 1896. Serial No. 616,106. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. EATON, Jr., of New York, in the county and State of New York, have invented a new and useful Improvement in Telegraphic Apparatus, of which the following is a specification.

My invention relates to an improvement in telegraphic apparatus in which provision is made for transmitting a character or series of characters by means of a moving mechanical pattern of the character or series of characters which coacts with an electric circuit, and certain devices under the control of the electric circuit to designate at a distance the character or series of characters which correspond to the pattern. For efficient work it is desirable that the force of the electric current be maintained through the line, which may include one or more intermediate stations; and to this end I have provided a system of reinforcing-relays, which may be located at suitable intervals along the line at one or more of the intermediate stations, and while I have chosen to illustrate these current-reinforcing relays in connection with the instruments for transmitting characters from mechanical patterns I do not wish to limit myself to such special use.

My present invention further provides for utilizing one set of pulsations of an alternating electric current for disclosing the characters at a distant station and the opposite set of pulsations for controlling the pulsations of a local alternating-current motor for actuating the several operating parts of the apparatus.

In the accompanying drawings, Figure 1 represents the several parts of the apparatus at an intermediate station on a telegraph-line, it being assumed that the main-line wire leading to the right as the sheet is held in reading would connect with a successive instrument similar to the one shown either with or without the current-reinforcing relay and in the same manner as the main-line wire at the left of the sheet connects with the instrument shown. Fig. 2 represents the character-disk in side elevation.

The instrument or apparatus which I have chosen to illustrate my present invention is similar in many respects to that shown, described, and claimed in my pending application, Serial No. 599,624, filed July 18, 1896, and contemplates a mechanical pattern of the character or characters to be transmitted, which pattern may be formed by punching holes in a strip of paper, the relative positions of the holes determining the nature and successions of the characters employed—as, for example, the letters composing the words of a message, an alternating-current electric motor for imparting motion to the perforated strip of paper, a commutator for selecting the character at the receiving end of the line corresponding to any given perforation which may be temporarily brought into active operation, a disk containing the characters to be transmitted by the machine and arranged to present the several characters in position to be selected, the commutator at the sending-station, a source of light, and a shutter under the control of an electric circuit to admit light to the particular character which may from time to time be determined by the mechanical pattern at the sending end of the line and selected by the commutator.

To make the drawings less confused, the supporting frames or pedestals for the several operative parts have been omitted, it being understood that the parts may be mounted in any well-known or approved manner.

A represents an alternating-current motor, *a* its armature-shaft, in axial alinement with a commutator B, and C C′ and *c c′* two sets of conducting-wires which lead from its poles, (denoted by a' a^2,) the former to a pair of contact-pieces D D′ and the latter to a pair of contact-pieces *d d′*, spaced a short distance from the contact-pieces D D′. Between the two pairs of contact-pieces D D′ *d d′* a vibrating polarized arm E is located and provided with contact-pieces *e e′*, connected with the poles of a battery F by wires *f f′*. The arm E serves as a pole-changer by making contact alternately with the two sets of contact-pieces D D′ and *d d′* under the influence of an electromagnet G, toward and away from the core of which the positive pole of the arm E is drawn and driven as the magnet G receives the alternating pulsations from the line-wire with which it has a shunt connection, as will be hereinafter more particularly described.

Near the motor-shaft *a* is a counter-shaft *h*, carrying a metallic roller H and driven by

means of a pawl and ratchet h' h^2 and connecting-rod h^3, leading to a cam or eccentric h^4 on the shaft a one step for each complete revolution of the shaft a. The roller H is adapted to receive the perforated pattern-strip I and cause it to pass step by step in engagement with a series of electric conducting-brushes K K' K², &c., one for each character within the scope of the instrument.

The brushes K K' K², &c., when opposite a perforation in the strip I, make electric contact with the roller H and through it with the line-wire L, coming, as shown, from the left to the instrument, and including at the station here illustrated a helix l for operating a shutter, as will be hereinafter more particularly described.

The commutator B, which I prefer to employ, consists of three concentric rings b b' b^2, fixed relatively to and insulated from one another and the whole fixed relatively to the motor-shaft a, with which the commutator is in alinement. The outer ring b has alternate spaces of contact and insulation of equal length, the middle ring b' similar alternating spaces of contact and insulation, but arranged to alternate radially with the spaces on the outer ring—viz., to bring an insulation-space on the middle ring radially opposite a contact-space on the outer ring—and the inner ring b^2 has a continuous annular contact-surface.

The contact-spaces on the outer ring b are provided with groups of contact-points k k' k^2, &c., one for each character within the scope of the instrument and each electrically connected with its corresponding brush K K' K², &c. A trailer M, carried by the motor-shaft a, is so located as to sweep the faces of the three rings b b' b^2 with each revolution of the shaft a, and in so doing make electric contact between each of the points k k' k^2, &c., and the contact-face of the inner ring, which is in permanent connection with the outgoing main-line wire L' at the right, as shown. As the trailer passes over the alternate insulation-spaces on the outer ring it will make electric connection between the contact-spaces on the middle ring b' and the inner ring, and hence will electrically connect the outgoing wire L' with the shunt-wire L², which connects the middle ring b' with the incoming main-line wire and includes the magnet G. The alternate contact and insulation spaces on the commutator are made to correspond to the pulsations of the alternating current, the positive pulsations being received through the outer ring, inner ring, and main line L' to operate the shutter at a receiving-station, and the negative pulsations being returned through the line-wire L', inner ring b^2, middle ring b', magnet G, and line-wire L to the origin of the main-line current.

As the positive pulsation passes along the main-line wire it will render the magnet G neutral with respect to the positive pole of the arm E, and it will swing into contact with the pieces d d', causing the current from the battery F to pass through the magnet of the motor A, and when the negative pulsation passes along the main-line wire it will cause the magnet G to attract the arm E, and hence draw it into contact with the pieces D D', and hence cause the current from the battery F to pass in the opposite direction through the magnet of the motor A.

The roller H, with its mechanical pattern, the commutator B, and the motor A constitute the important elements of the sending division of the instrument or apparatus.

The receiving division of the instrument or apparatus includes also the motor A, and in addition thereto a disk N, having formed thereon in an annular series the several characters included within the scope of the instrument and mounted to rotate with the shaft a of the motor to present the several characters during each revolution of the shaft in alinement with an opening in the end o of the opaque tubular casing O. An opening in the opposite end o' of the tubular casing admits light from a suitable source—such, for example, as the electric light P. The interior of the casing is provided with a polariscope consisting of a pair of Nicol's prisms Q Q', set at right angles to each other and separated by a body of liquid q—such, for example, as bisulfid of carbon—possessing magnetic optical rotary power. Ordinarily no light can pass through the prisms from the source P to the disk N. The helix l, hereinbefore referred to, surrounds the body of liquid q, and when a current of electricity is passed through the helix it creates a magnetic field which includes the liquid q, causing it to rotate the beam of light, and sends it through the analyzer-prism Q' to that portion of the disk N which may be at that particular moment opposite the opening in the end o of the casing O.

The casing O, with its polariscope and helix l, constitutes an electrically-operated shutter for disclosing the particular character at the receiving-station which may be selected by the commutator at the sending-station, the movement of the disk N being made to harmonize with the movement of the commutator at the sending-station to present that particular character opposite the shutter which corresponds to the contact-point k k' k^2, &c., on the commutator which is at that moment connected by the trailer with the inner ring b^2, and hence with the main-line wire L'.

The disclosed character at the receiving-station may either be observed directly by the eye of the person receiving or the character may be photographed upon a sensitized film q' in a dark chamber q^2, the said film being conveniently made to move step by step by means of a pawl and ratchet q^3 q^4, connected by a rod q^5, angle-lever q^6, and rod q^7 with a cam or eccentric q^8 on the shaft a of the motor A.

The operation is briefly as follows: The

characters to be transmitted are determined by the perforations in the paper on the roller H, and as the brushes K K K^2, &c., make electric contact with the roller the corresponding point *k k' k²*, &c., on the commutator selects the character determined by the perforations through which the brush makes contact with the roller H and causes that character to be disclosed at the receiving-station by permitting the light to pass the shutter. To provide for creating a secondary current of any given ratio in strength to the primary controlling-current, and hence to maintain the force or strength of the main-line current throughout the extent of the line, I introduce the following device at such intervals as may be found desirable: The main-line wire L' is developed into a field R, surrounding the rotary armature S of a local dynamo, (either of a constant type, or alternating, or polyphase, as desired,) and from the field R the said wire extends to earth, as at T. The current induced in the armature S may be either continued as the main-line current or its conducting-wire may be again developed into a field R', surrounding the rotary armature S' of a second local dynamo, and the same arrangement may be still further repeated in the same manner until the force or strength of the current in the armature of the local dynamo has reached a degree satisfactory for efficient work. One or more condensers U of ordinary form may be employed, as found expedient. A current passing through the primary circuit L' R creates a magnetic field part of which lies in the space occupied by the armature S. Consequently a current is induced in the armature S which is proportional to the strength of the magnetic field multiplied by the rate of cutting. The rate of cutting being constant, the strength of the current is proportional to the strength of the field, but the strength of the field is proportional to the primary current inducing it, and hence the strength of the secondary current along R' is a multiple of the strength of the previous current along L' R. This enables me to control a strong current by a weak one and is of special advantage in use on a line where it is necessary to employ weak or short impulses of current, or both.

To enable an operator at any station to attune his own instrument without interrupting his work, a shunt W may connect the line-wire L' with the shunt-wire L^2 and be provided with switches *w w'*, one of which *w'* is located between the terminals of a by-pass wire W' of greater resistance than the wire W to admit to the local instrument sufficient current to enable it to be set in tune, while the greater proportion of the current is allowed to pass it.

The particular embodiment of my invention which I have above described is that which I at present prefer; but I do not wish to limit myself to the particular form of shutter described, nor to the particular form of mechanical pattern, as slight changes in these and other respects may be resorted to without departing from the spirit and scope of my invention.

What I claim is—

1. Telegraphic apparatus comprising a line-circuit, means for sending an alternating current along the line, means for mechanically determining the characters to be transmitted, means for disclosing the characters at the receiving end of the line, a commutator at the sending end of the line arranged to select the characters to be disclosed, a motor for operating the commutator, a pole-changer connected with the motor and means under the control of the commutator for operating the said pole-changer by pulsations of one nature and for disclosing the characters by pulsations of an opposite nature, substantially as set forth.

2. Telegraphic apparatus comprising a line-circuit means for sending an alternating current along the line, means for determining the characters to be sent, means for disclosing the characters at the receiving-station, a motor at the sending-station, a pole-changer connected with the motor, a magnet for operating the pole-changer, a commutator composed of electrically-insulated sections and means in connection with the commutator for alternately completing the line-circuit leading to the disclosing mechanism at a distant station and through the pole-changer-operating magnet at the sending-station, substantially as set forth.

3. Telegraphic apparatus comprising a line-circuit, means at a sending-station for mechanically determining the characters to be sent, means for disclosing the characters at the receiving-station, a commutator at the sending-station for selecting the characters to be disclosed at the receiving-station, a motor for actuating the commutator and a shunt connecting the incoming and outgoing wires at a station, said shunt including a switch and a greater resistance connection around the switch, substantially as set forth.

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Witnesses:
FREDK. HAYNES,
EDWARD VIESER.