

C. G. BURKE.
TELEGRAPHIC TRANSMITTING INSTRUMENT.

No. 460,109.

Patented Sept. 29, 1891.

Fig. 1

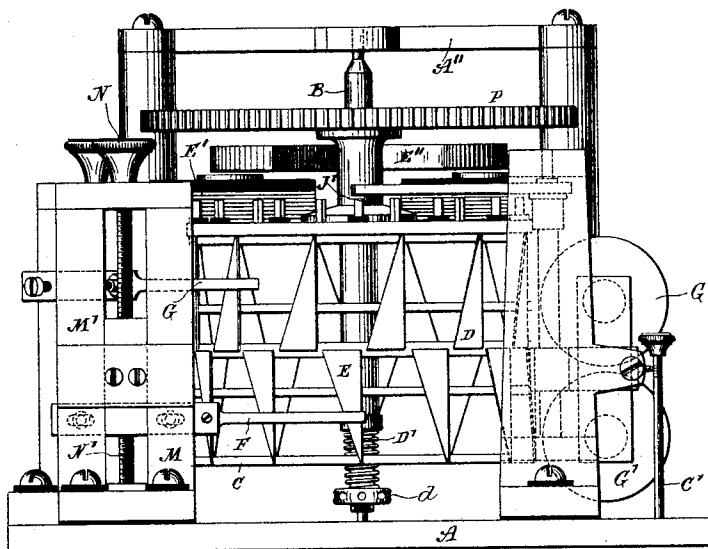
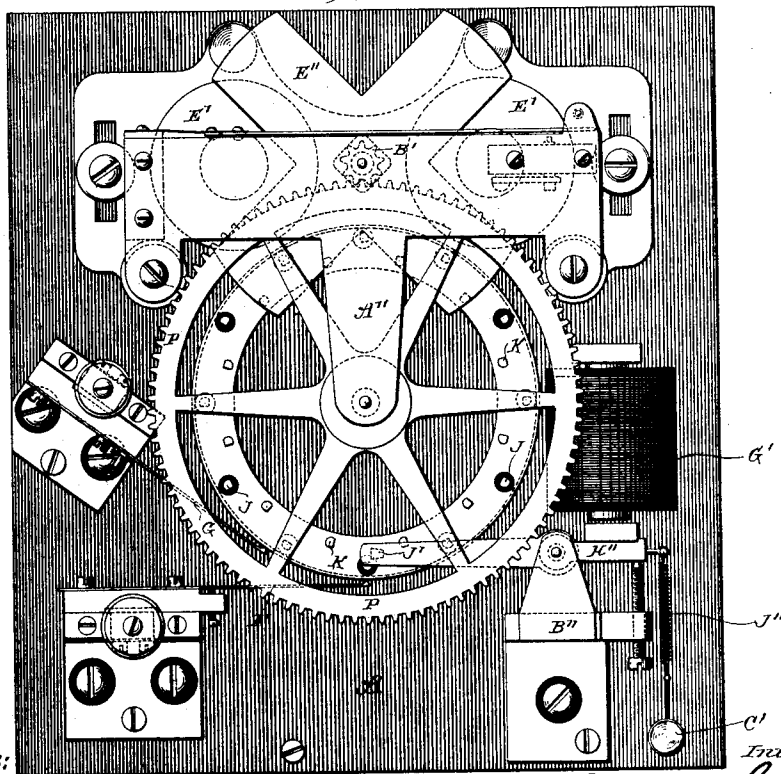


Fig. 2



Witnesses:

Raphael Netter
Ernest Hopkinson

Inventor

Charles G. Burke
by
Duncan & Page,
Attorneys.

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Fig. 3

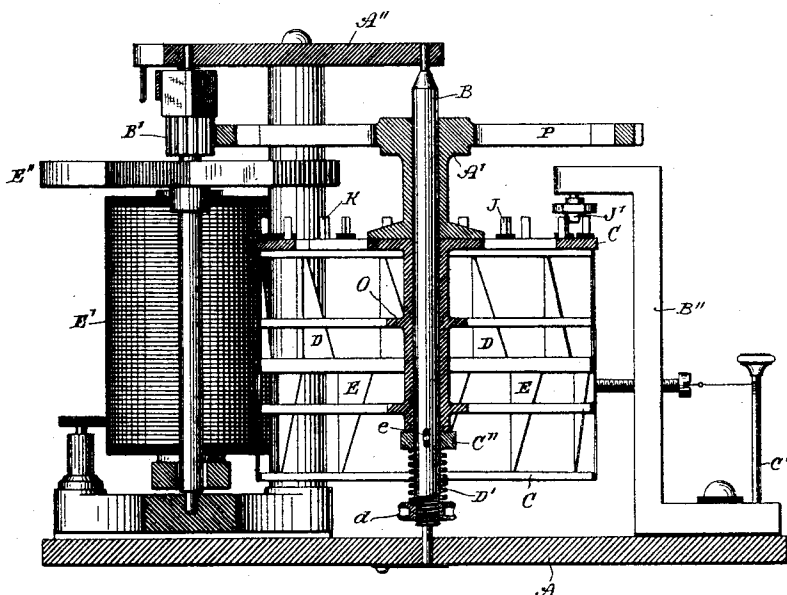
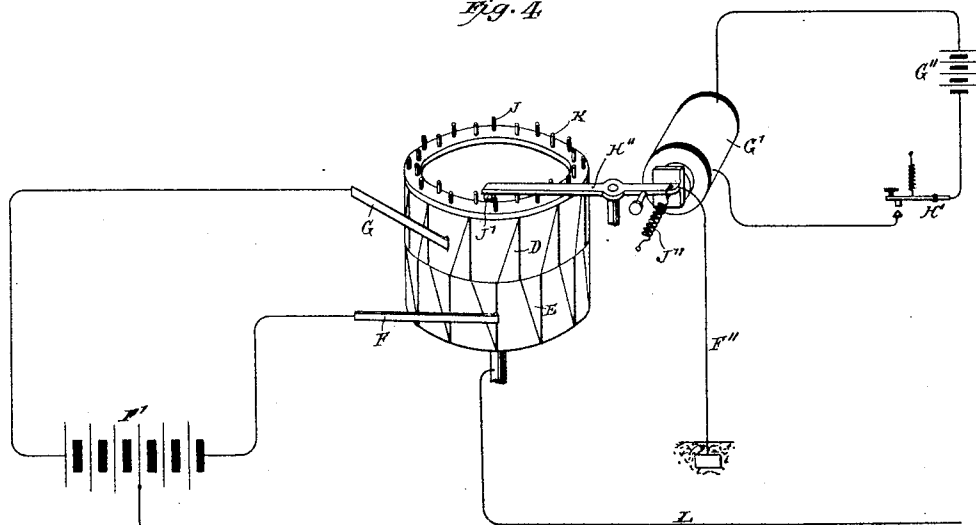


Fig. 4



Witnesses:
Raphael Netter
Ernest Hopkinson

Inventor
Charles H. Burke
by
Duncan & Page,
Attorneys.

UNITED STATES PATENT OFFICE.

CHARLES G. BURKE, OF RICHMOND HILL, NEW YORK.

TELEGRAPHIC TRANSMITTING-INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 460,109, dated September 29, 1891.

Application filed June 17, 1890. Serial No. 355,731. (No model.)

To all whom it may concern:

Be it known that I, CHARLES G. BURKE, a citizen of the United States, residing at Richmond Hill, in the county of Queens and State of New York, have invented certain new and useful Improvements in Telegraphic Transmitting-Instruments, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

In the practical operation of submarine-telegraph cables of large static capacity it is found that the clearness of the signals and speed of signaling are very materially affected by certain conditions of the current employed, its potential, the duration of the contact between battery and line in transmission, and the mutual relations of reverse polarities, both as to the frequency of succession and relative strength. In the above respects every cable involves different requirements and presents conditions that must be fully and perfectly met in order to receive the best results. In the present methods of transmission and in those heretofore followed in operating such cables, impulses of the same polarity following in immediate succession with simply the "earthing" of the cable at the end of each impulse, produce signals having no definition of the beats or impulses, so that the number of such impulses is only recognized by the wave or rise of potential; and whether there be used as a receiving-instrument a mirror galvanometer or a siphon-recorder the receiving-operator must possess and exercise no little skill to determine the record with accuracy.

The object of the present invention is to give to the transmitting operator perfect control over the length of actual contact for each impulse, so that the character of the impulses may be varied to best meet the static conditions of a given cable, and, furthermore, to enable him to vary the potential and relative periods of contact between reverse polarities, whereby the elements of the signals may be more clearly defined, whether they consist of the same polarity or are made up of impulses of direct and reverse currents. With this object I have invented an instrument for the purposes of controlling automatically in an electric circuit the electric energy employed by regulating and limiting through its contacts and adjustment the actual contact dura-

tion of successive impulses irrespective of the speed of which such impulses are made, and independently of each other when such impulses are of alternating polarity. This may be effected in a variety of ways; but I have devised especially for this purpose an apparatus comprising a wheel or wheels or any equivalent circular frame having on its periphery contacts varying in extent as to the surface presented by them in the manner herein set forth. This wheel or wheels is rotated by a motor at the required speed, and conducting-strips adjustable in the direction of the axis of the wheel are designed to bear upon the contact. Suitable provision is made for establishing and maintaining the proper electrical connections. The contact points or plates, as well as the metal frame-work of the wheel or wheels, are connected with the line or cable, and when at rest and in their normal position they are not in contact with either pole of the battery, but in direct connection with earth, grounding the cable. Provision is also made by the disposition of the contacts and the electrical connections that in the movement of the wheel or wheels the contacts are brought alternately into engagement with the strips which form the battery-terminals, so as to produce alternations of polarity on the line or cable; but it is not material that such alternate contacts shall be equidistant, for it is designed that the wheel or wheels may be stopped at a point between any two of such reversals, so that at the will of the operator the reverse contact may be withheld from the line for any desired period of time. By this arrangement the static capacity of the cable itself, in lieu of the battery-contact, may be utilized for prolonging any signals or part of signals in which it may be desired to manifest a difference of duration from some other; but every complete operation or action of the wheel carrying the contacts insures the transmission of one impulse of a given polarity and one impulse of a polarity the reverse of the one which preceded it. In practice I drive the wheel or frame that carries the contacts by a frictional connection with the driving-motor, whereby the said wheel may be readily stopped or carried around when released, for the purpose of making a signal. The wheel is preferably held in its normal position by an escapement and a locking and releasing lever,

which latter may be operated by hand or by an electro-magnet, a battery, and key. One set or series of the detents of the escapement are preferably insulated from the contact-carrying frame and alternate with the others, which are in metallic contact with said frame and serve to connect the line to earth through the locking and releasing lever whenever the wheel or frame is in its normal position of rest.

This apparatus and the manner of using or operating the same are illustrated in the accompanying drawings.

Figure 1 is a side elevation of the apparatus which embodies my invention. Fig. 2 is a top plan view of the same. Fig. 3 is a vertical section of the device. Fig. 4 is a diagram illustrating the electrical connections and circuits used in operating the invention.

A is a metal base from which rise standards supporting a metal plate A'. A vertical spindle B is mounted between the plate A' and base A. A disk or sleeve C' surrounds the spindle B near its lower end and is secured thereto by a pin working in a vertical slot *e* in said spindle so that the sleeve turns with the spindle, but has a limited movement thereon in the direction of its length. Beneath the sleeve C' is a spiral spring D', surrounding the spindle and adjustable by means of a nut *d*. Mounted loosely on the spindle, with its hub resting on the sleeve C', is the wheel or circular frame O, that carries the contact-plates, hereinafter described. Above this is a sleeve A', forming the hub of a gear-wheel P, that meshes with a pinion B' on the shaft of an armature E' of some suitable form of motor, of which the magnets are designated by E'.

The hub or sleeve A' is fixed to the spindle B, and the motor therefore rotates said spindle. The frame or wheel O, being held in frictional connection with the spindle between the two sleeves A' and C', turns with said spindle when not locked.

On the periphery of the wheel or frame O are secured two series of contact-plates D and E. These plates are straight along one edge, which is parallel to the axis of the wheel, but inclined from their bases, which are at the middle line of the peripheral surface, to points at their ends, and are placed alternately—that is, the plates of one series opposite the spaces between those of the other series. A contact-strip F bears upon the lower series of contacts E. This strip is carried by a metal block sliding between vertical guides M M' and adjustable vertically by means of a screw N', turned by a head N. A contact-strip G is similarly mounted with capability of vertical adjustment and bears upon the upper series of contacts D. The duration of contact then between the strips F G and the plates E D, respectively, when the wheel O is turned, will depend upon the relative adjustment of the strips F G.

In the upper head C of the wheel or frame

O are set as many pins J K as there are contact-plates D E. The pins J are set nearer the edge of the head than the pins K and are insulated from the wheel, while the others are not. The two series of pins alternate also in position.

To a bracket or arm B'' is pivoted an armature-lever, H'' acted upon by an electro-magnet G', and a spring J'', secured to an adjusting-screw C' and having a determined movement or play. Its end is formed or provided with a lug or projection J', that by the movement of the lever H'' from one extreme position to the other is brought alternately into engagement with the teeth or detents J and K.

The magnet G' is in a circuit including a battery G'' and a key H', and it is normally inactive. The spring J'' therefore draws over the lever H'' and keeps it in engagement with one of the teeth of the series marked K. When a signal is not being sent, it will thus be seen the wheel or frame O remains stationary, though the motor and spindle B may be revolving.

Referring now to Fig. 4 for an explanation of the working of this device, one pole of a divided battery F' is connected to one of the contact-strips, as G. The other is connected to strip F, and the center is grounded at H. To the metal frame of the apparatus, which is in electrical connection with the plates D E, the line L is permanently connected. A ground connection through the lever H'' and conductor F'' from the line is maintained by the engagement of the lever H'' with one of the pins K. At this time the strips G F are out of contact with their respective series of plates. If the key H' is depressed, however, to send an impulse, the lever H'' is carried from engagement with one of the pins K over into engagement with the next pin J; but in the movement of the wheel O, which occurs in the interval, one of the plates D has been carried by the strip G and a positive impulse sent to line. The reverse movement of the key H' and of the lever H'' then permits the wheel O to move another step until it is arrested by the engagement of the stop J' with the next succeeding pin, which is one of the series K. Thus by depressing and raising the key H' a direct or marking impulse and a reverse or clearing current are sent to line and the line is then grounded; but the duration of contact which sends the direct impulse and that which sends the reverse or clearing one is determined entirely independently of the key H' by the adjustment of the contact-strips E F. For more ready comprehension a double series of contacts, alternating in their relative positions, has been shown; but it will be obvious that since both series of contacts have a common function—that of connecting the battery to line—only one series is necessary, for by placing the connecting strips or springs one before and the other behind the widest part of the contacts a sequence of alternations of polarity will be produced by the revolution

of the contacts. These features constitute a valuable and important improvement in the art of controlling impulses in an electric circuit, and particularly so in cable signaling.

5 It is to be observed that the particular configuration of the contact-plates D and E, which is distinguished by a straight edge on one side parallel with the axis of rotation of the wheel and an inclined edge on the other side, is a necessary and essential feature of the apparatus. This will appear upon consideration of the character of the signaling currents required. These currents are alternately positive and negative, and while their actual or relative durations may vary very considerably it is essential that a fixed relation between the periods of initial contact be preserved. An inclination of both sides of the contact-plates might result with a difference in the vertical adjustment of the bearing-strips in an overlapping of the signals and short-circuiting of the strips.

I do not limit myself to the special devices or apparatus which I have herein shown for carrying out my invention, as the same may be greatly varied.

What I claim is—

1. In a cable-transmitter, the combination, with a key, of an automatically-actuated contact-maker locked and released by the said key and provided with contact-surfaces adjustable relatively to one another, whereby the duration of contact for a given movement may be varied, as set forth.

2. In a cable-transmitter, the combination, with a locking and releasing key, of a wheel or carrier carrying contact-plates of varying width, a motor for revolving said carrier when released by the key, and contact-strips adapted to bear on the said plates and adjustable with respect thereto, whereby the duration of contact for a given movement of the carrier may be varied, as described.

3. In a cable-transmitter, the combination, with a locking and releasing key, of a frame or carrier provided with two series of contact-plates of varying width, a motor for revolving said carrier when released by the key, and positive and negative contact terminals adapted to bear on the two series of plates, respectively, and independently adjustable with respect thereto, whereby the duration of contact for a given movement of the said carrier may be varied, as described.

4. In a cable-transmitter, the combination of a revoluble frame or carrier provided with two lines or series of contact-plates of varying width, a source of power acting constantly on said carrier, a series of pins or stops constituting an escapement on said carrier, contact-strips adapted to bear on the series of contacts, respectively, and adjustable with respect thereto, whereby the width of contact-surface presented to said strips may be varied, and a lever or key acting in conjunction with the escapement to lock or release the carrier, as set forth.

5. The combination, with a cable or line of high static capacity and a transmitting-battery, of a revoluble frame or carrier provided with two series or rows of contacts of varying width connected to line and alternately disposed, two contact-terminals from the positive and negative poles of the battery adapted to bear on the rows of contacts, respectively, and adjustable with respect thereto, whereby the width of contact-surface presented to said strips may be varied, a motor for rotating the carrier, and a key for locking and releasing it, as herein set forth.

6. The combination, with a submarine cable and a transmitting-battery, of stationary and moving contacts adapted to connect the opposite poles of the battery alternately to line, means for adjusting the relative width or extent of the surfaces in contact and consequently the duration of contact for a given movement of the contacts, and a key or controlling device for locking and releasing the moving contacts according to the character of the signals to be transmitted.

7. The combination of the revoluble carrier or wheel, the contact-plates of varying width, the adjustable terminals bearing on the contacts, the two rows or series of escapement pins or stops, one row being insulated from the wheel and the contacts, and the locking and releasing lever adapted to be connected to earth and engaging with the teeth of each row alternately.

8. In a circuit-controlling device, a contact-maker revolved by a source of power and having angular contacts, one of the sides of such angles being parallel to the axis of revolution, in combination with connecting contacts adjustable along the line of said angular contacts, as set forth.

9. In a circuit-controlling device, the combination of a movable circuit-maker having contacts varying in superficial area, one side of such contacts being a right line, and two connecting contacts forming terminals of opposite poles of separate sources of electrical energy, said connecting contacts being independently adjustable along the line of the movable contacts, as described.

10. The combination of a contact-maker revolving at a uniform speed and carrying angular contact-plates, forming one part of an electric circuit, of two connecting strips constituting the terminals of independent sources of electrical energy of opposite polarity and forming alternately the other part of said circuit and adapted to produce successive alternations of polarity occupying equal intervals of time and independently adjustable with respect to said revolving contacts, whereby the duration of their respective engagement may be varied.

CHARLES G. BURKE.

Witnesses:

ROBT. F. GAYLORD,
PARKER W. PAGE.