

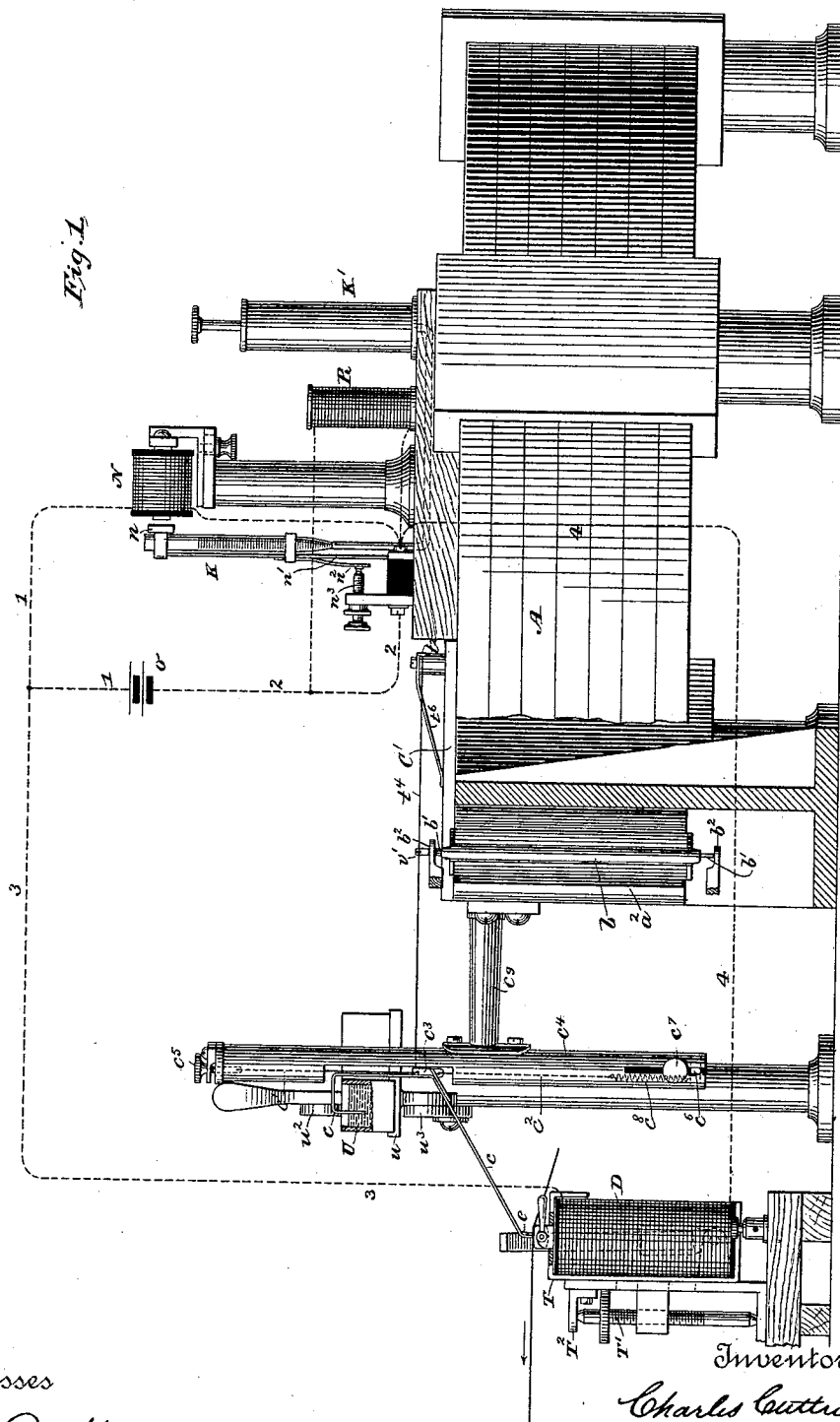
(No Model.)

3 Sheets—Sheet 1.

C. CUTTRISS.
TELEGRAPHIC RECORDING APPARATUS.

No. 386,059.

Patented July 10, 1888.



Witnesses
Geo. W. Breck.
Carrie C. Ashley

By his Attorney.

Inventor.
Charles Cuttriss.
Pope, Edgcomb & Perry.

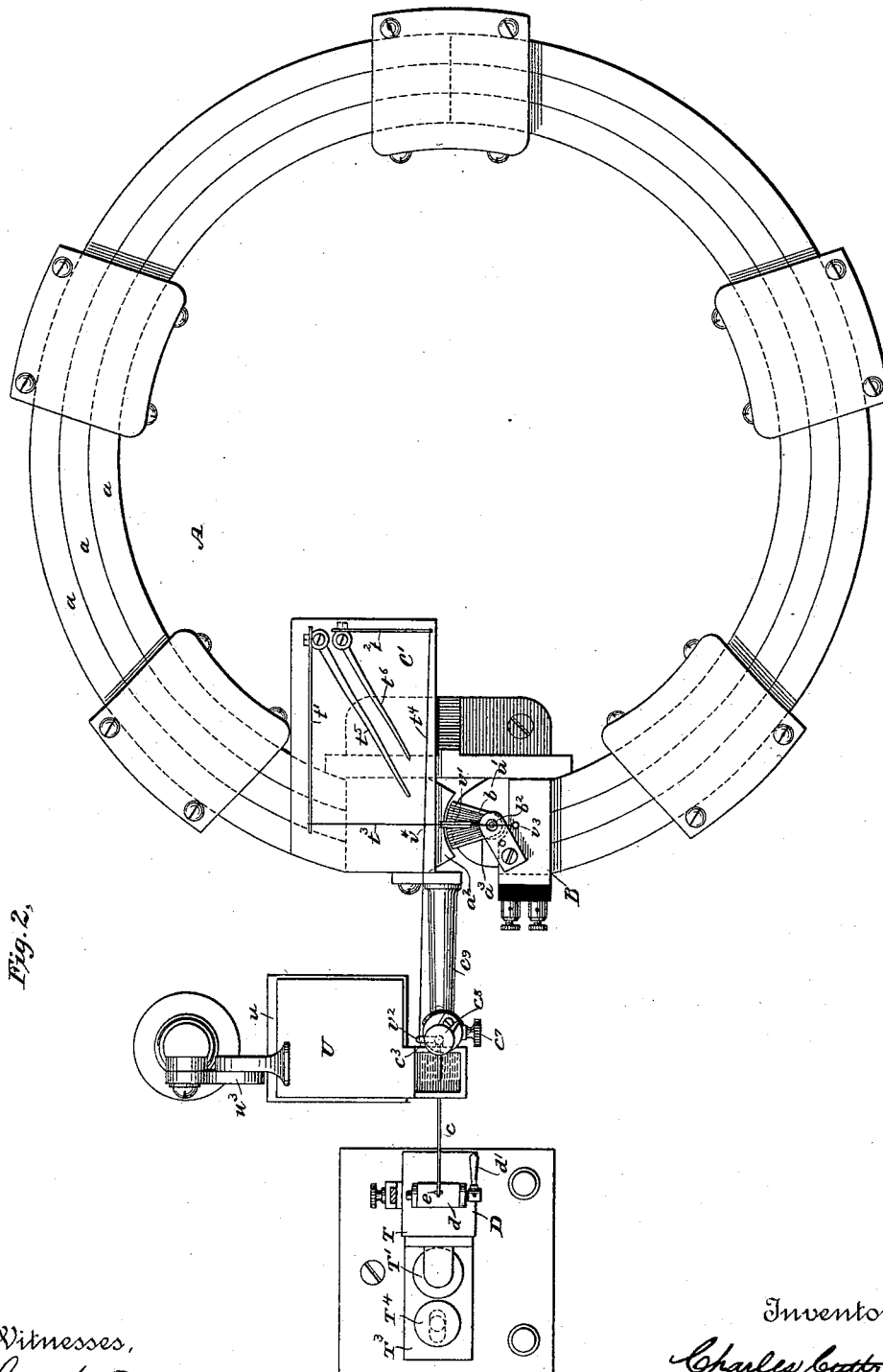
(No Model.)

3 Sheets—Sheet 2.

C. CUTTRISS.
TELEGRAPHIC RECORDING APPARATUS.

No. 386,059.

Patented July 10, 1888.



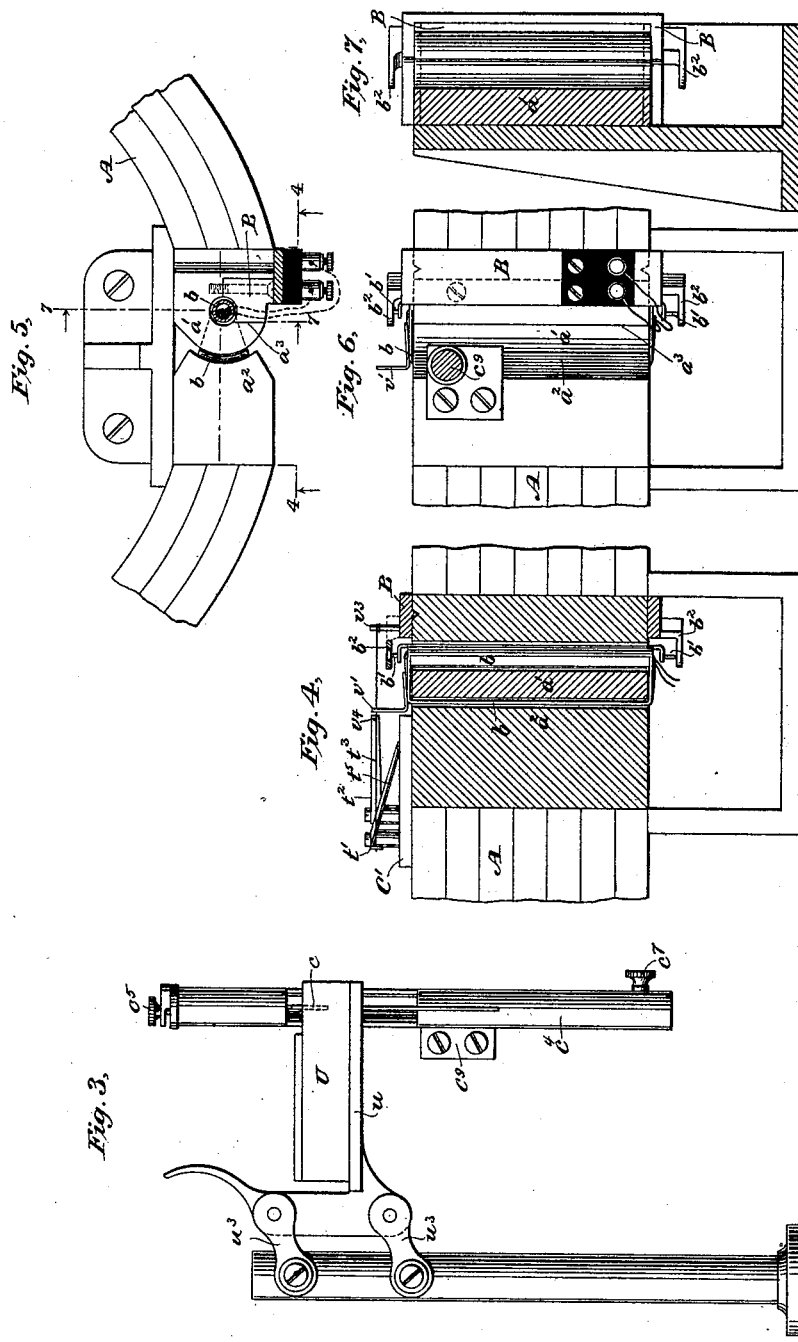
Witnesses,
Geo. W. Breech.
Garrie C. Ashley.

Inventor,
Charles Cuttriss.
By his Attorneys,
Pope, Elg, Seabolt & Perry.

C. CUTTRISS.
TELEGRAPHIC RECORDING APPARATUS.

No. 386,059.

Patented July 10, 1888.



Witnesses.
Geo. W. Breck.
Carrie C. Ashley.

Inventor.
Charles Cuttriss.
By his Attorneys
Pope, Edgcomb & Terry.

UNITED STATES PATENT OFFICE.

CHARLES CUTTRISS, OF NEW YORK, N. Y.

TELEGRAPHIC RECORDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 386,059, dated July 10, 1888.

Application filed October 17, 1887. Serial No. 252,584. (No model.)

To all whom it may concern:

Be it known that I, CHARLES CUTTRISS, a subject of the Queen of Great Britain, residing in New York, in the county and State of New York, have invented certain new and useful Improvements in Telegraphic Recording Apparatus, of which the following is a specification.

The invention relates to the class of apparatus employed for recording signals transmitted over telegraphic circuits of great length, especially ocean-cables, by means of electricity.

The object of the invention is to provide convenient means for producing a record of the movements of the receiving apparatus which is capable of ready adjustment, is free from the defects of many of the organizations heretofore employed, and is, in short, reliable and accurate in its operation. The invention involves certain details in construction and organization of various parts of the apparatus, especially relating to the general form of apparatus described in Patent No. 344,772, issued to me June 29, 1886. It will be described in detail in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of the apparatus, partly in section; and Fig. 2 is a plan. Figs. 3, 4, 5, 6, and 7 illustrate details.

Referring to the figures, A represents a permanent or an electro magnet designed to maintain a strong magnetic field between the poles a' a'' . The magnet may with advantage be made up of separate permanent magnets a a . The compound magnet thus formed is preferably circular in form, so that the poles confront each other exactly. The pole a' is curved outward upon its end, and the pole a'' is cut away or hollowed out to correspond. A narrow space is thus left between the two poles. An opening or slot, a^1 , is cut into the pole-piece a' slightly beyond the central line, as shown. It is designed that a coil, b , of fine insulated wire shall be suspended by means of an arbor, b' , carried in jeweled bearings b^2 b^2 , which are supported upon a block, B, which is preferably of magnetizable material, and which slides into the slot a^1 . A portion of the pole a' extends thus through the coil b , and a portion of the coil passes between the

confronting poles. The coil b is preferably so wound that the portion between the poles is in the form of the arc of a circle coinciding with the space between the poles whose center is coincident with the axis b' . The inner portion of the coil which is carried in the slot is gathered closely about the axis or trunnion. By removing the block B the coil b may be easily removed or replaced, as required.

The siphon or recording tube c is suspended by means of a fine wire, c' c^2 , to which is attached a delicate holder, c^3 . This thread extends through a tube, c^4 . One end, c' , of the wire is fastened at the upper end to a head, c^5 , which may be turned for the purpose of giving the right torsion to the siphon-holder. The other end of the wire is connected with a slide, c^6 , at the lower end of the tube, and the position of this may be adjusted by means of a set-screw, c^7 , extending through a slot in the tubular pillar. A spring, c^8 , preferably connects the end c^2 of the wire with the slide. This serves to give it the required tension. The tube c may be conveniently supported upon an arm, c^9 , extending from a plate secured to the pole a'' of the magnet A, or in any other convenient manner.

Upon a plate, C', carried upon the magnet there are supported two delicate springs, t' and t'' , to which, respectively, there are attached threads or filaments t^1 and t^2 . Tension-fingers t^3 and t^4 , applied to these springs, respectively, press against the face of the plate C', so that they may be independently adjusted and caused to exert whatever stress is required upon their respective threads.

One of the filaments, t^1 , passes through a slot or fork in an arm, v' , upon the coil b to a post, v^2 , and the other is connected with an arm, v^3 , upon the holder of the siphon. The two filaments are attached to each other at v^4 , where they cross each other at nearly right angles. The movements of the coil b upon its axis will thus be communicated to the filaments t^1 and t^2 , and thereby to the siphon.

The recording end of the siphon carries a small piece of magnetic material—such as soft iron—as shown at e . This is acted upon by an electro-magnet, D, and the successive vitalizations and demagnetizations of the matter cause the siphon to vibrate rapidly toward

and from its pole. The manner of making and breaking the circuit through the magnet D will presently be described. The magnet D is constructed with a movable polar face, d , so that it will constitute a table or pillar for the paper to rest upon as it is passed over beneath the recording-point. As it is sometimes difficult to grind the recording end of the siphon so that its end will be exactly parallel with the face of the magnet-pole, the adjustable pole-piece is useful, for by means of it the angle at which it is presented to the siphon may be modified until the proper position is obtained. Unless the end of the siphon is parallel with the table the ink is liable to gather upon its end in globulous form, which either blurs its record or else causes it to cease from recording. The pole-piece is preferably cylindrical in form throughout the portion in contact with the core of the magnet, so that slight changes in its position will not affect its magnetic value. A handle, d' , may be attached to the pole-piece for adjusting it.

The entire magnet is preferably supported upon a bracket, T, which may be raised or lowered by means of an adjustable screw, T', carried in a frame, T². This entire frame may itself be adjusted upon a base, T³, by means of a screw, T⁴.

The upper end of the siphon dips into the ink-reservoir U, carried upon a shelf, u . This shelf is adjustable, being supported from a pillar, u' , by parallel links $u'' u'''$, so that when it is desired to remove the reservoir from the shelf the latter may be easily moved down, and thus the reservoir taken out from beneath the siphon. The reservoir is preferably covered, except the portion into which the siphon dips.

The manner in which the electro-magnet D is vitalized and demagnetized is as follows: A rheotome is employed, consisting of a glass tube, K, carrying an armature, n , applied to an electro-magnet, N. The tube and its armature are supported on a flexible spring, n' . A reservoir, K', contains a supply of mercury and communicates through a flexible tube, k' , with a glass tube, K. A plunger is placed in the reservoir, and the height to which the mercury is raised in the tube K is determined by this plunger. In this manner it is possible to vary the rate of vibration of the tube. When a new siphon is adjusted to the apparatus, it is frequently necessary to modify the rate of its vibration, by reason of the fact that each tube has its own natural rate of vibration.

The electro-magnet N is vitalized by currents from an electric battery, o , one pole of which is connected by a conductor, 1, through the coils of the electro-magnet with a resilient contact-point, n^2 , supported upon the spring n' . An adjustable contact, n^3 , is connected by a conductor, 2, with the other pole of the battery o . When the electro-magnet is vitalized, the tube, together with the point n^2 , is drawn away from the point n^3 , separating the two points and interrupting the circuit. The mag-

net being thus demagnetized, the point n^2 returns again to the point n^3 , completing the circuit. In this manner the tube K is kept in vibration at a rate dependent upon the height at which the mercury is maintained.

The conductor 1 is connected by a conductor, 3, with the coils of the electro-magnet D, and thence through a conductor, 4, to the spring n' . Therefore the electro-magnet D will have its circuit made and interrupted at the same rate that the circuit of the electro-magnet N is made and broken.

An artificial resistance, R, is connected around the points $n^2 n^3$ for preventing electric discharges upon the interruption of the circuit.

I claim as my invention—

1. In a siphon-recorder, a circular magnet having confronting poles, between which there is left a curved opening, one of said poles having a lateral opening, leaving a partially-detached portion, a coil of insulated wire supported upon an axis and turning in bearings, a block of magnetizable material carrying the same and fitting within said lateral opening, and a recording-stylus actuated by the movements of the coil.

2. In a telegraph-recorder, the combination of a movable coil or armature, an axis about which it turns, a recording arm, a filament strained at an angle to the axis of support of the coil and tending to hold it in a given position, and a second filament secured to the recording-arm, through which movements of the coil are communicated to the recording-arm.

3. In a telegraphic recorder, the combination of a movable coil or armature, an axis about which it turns, a recording-arm, a filament strained at an angle to the axis of support of the coil, but supported independently thereof, a connection between the coil and the filament, and connections between the coil and the recording-arm, substantially as described.

4. In a telegraphic recorder, the combination of a movable coil or armature, an axis about which it turns, a recording-arm, a filament strained at an angle to the axis of support of the coil and tending to hold it in a given position, said filament being supported independently of the coil, and a second filament secured to the recording-arm, through which movements of the coil are communicated to the recording-arm, substantially as described.

5. In a siphon-recorder, the combination, with the movable coil and the holder for the siphon, of the supporting-wire for the holder, a filament strained at an angle to the axis of support of the coil and tending to hold it in a given position, and a second filament secured to the holder, through which movements of the coil are communicated thereto.

6. In a siphon-recorder, the reservoir, the adjustable shelf for carrying the same, and the parallel links upon which the shelf is supported.

7. In a siphon-recorder, the combination, with the siphon and the actuating-coil, of a

flexible filament or thread having a yielding support at one end and connected at the other with the siphon, and a second filament crossing the former at an angle and attached thereto, and fixed at one end and having a yielding support for the other, and connected with the coil at or near the other end.

8. In a siphon-recorder, the combination, with the marking-point of the recorder and the armature attached thereto or carried thereby, of an electro-magnet having its pole beneath the marking-point and an adjustable polar face for the magnet, substantially as described.

9. In a siphon-recorder, the combination, with the siphon and its armature, of an electro-magnet and means for rapidly changing the magnetization of the same, and an adjustable polar face for the magnet, whereby its plane may be changed with reference to the end of the marking-point, substantially as described.

10. In a siphon-recorder, an armature fixed

to the siphon or its holder, in combination with an electro-magnet, said magnet having an adjustable polar face, an electric circuit including the magnet, a circuit-controller applied to said circuit for changing the magnetization of the magnet, and an adjusting device for the controller for adjusting the rate of change of magnetization to the natural rate of vibration of the siphon, substantially as described.

11. A rheotome consisting of a reservoir for holding mercury, a tube connected therewith, means for varying the height of the mercury in the tube, a circuit whose connections are controlled by the movement of the tube, and an electro-magnet connected in said circuit.

In testimony whereof I have hereunto subscribed my name this 15th day of October, A. D. 1887.

CHARLES CUTTRISS.

Witnesses:

DANL. W. EDGECOMB,
CHARLES A. TERRY.