(No Model.)

A. PIEDFORT.

RECEIVER FOR SUBMARINE TELEGRAPHS.

No. 573,286. Patented Dec. 15, 1896.

Fig. 2.

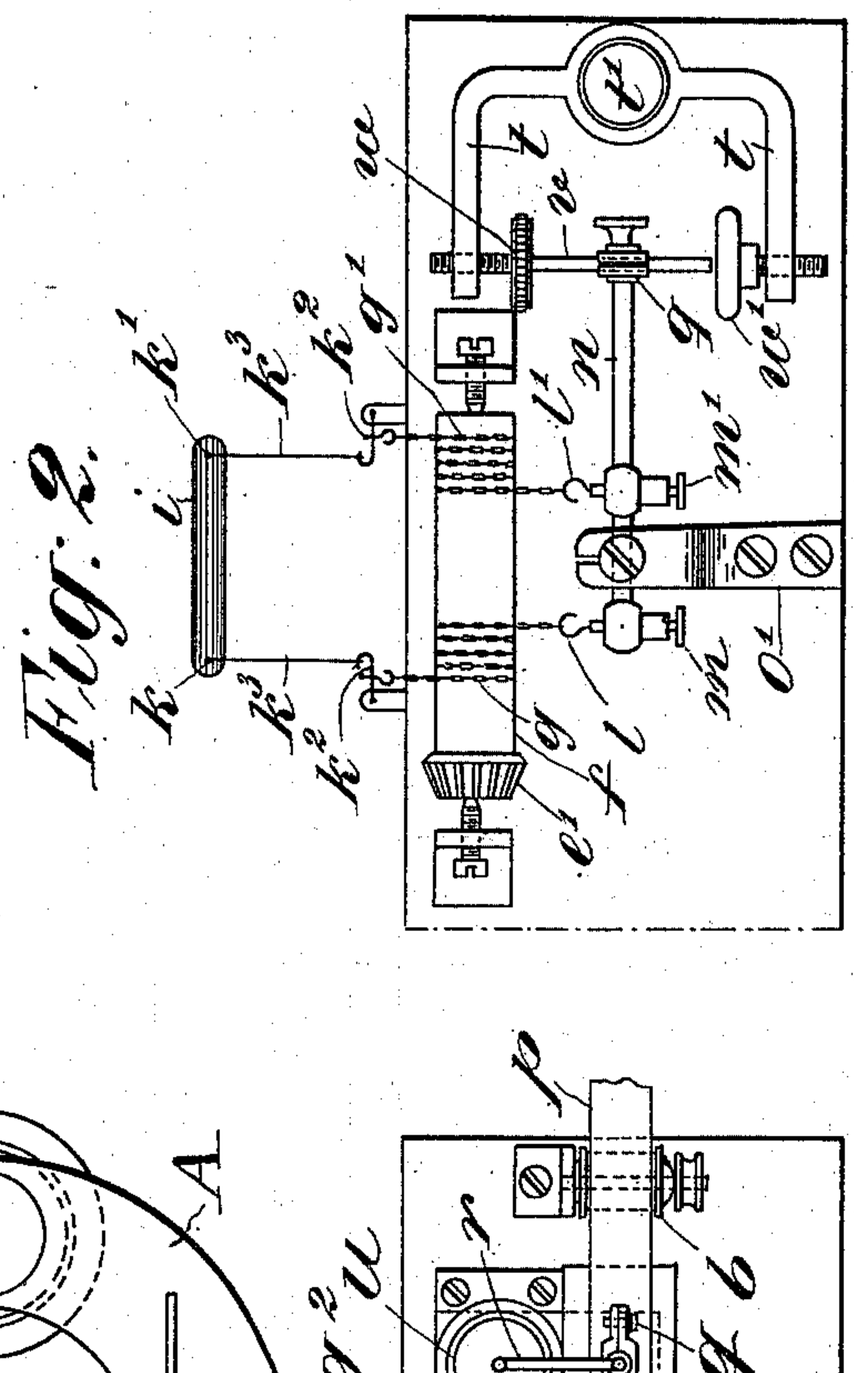
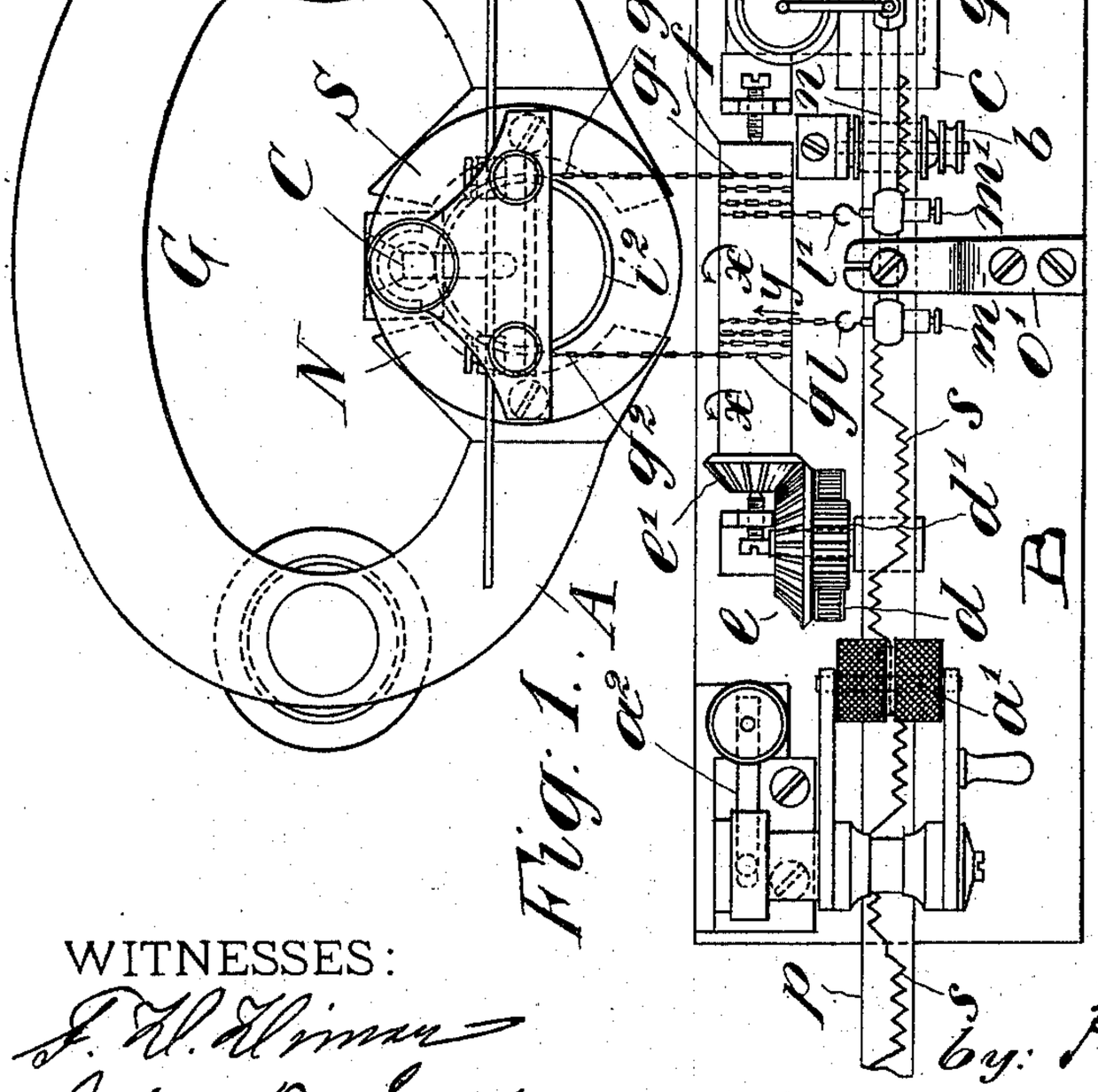


Fig. 1.



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RECEIVER FOR SUBMARINE TELEGRAPHS.

SPECIFICATION forming part of Letters Patent No. 573,286, dated December 15, 1896.

Application filed December 19, 1895. Serial No. 572,623. (No model.) Patented in France November 13, 1895, No. 238,957.

To all whom it may concern:

Be it known that I, ALFRED PIEDFORT, a citizen of the French Republic, residing in Paris, France, have invented certain new and useful Improvements in Receivers for Submarine Telegraphs, (for which a patent has been granted in France, No. 238,957, dated November 13, 1895,) of which the following is a specification.

My invention relates to receivers for submarine telegraphs; and the object is to provide an apparatus which will automatically and with certainty and exactness trace on ordinary telegraphic paper the conventional signs corresponding to the direction of the current sent through the cable, and this without the need of a local electric current; also, or which will displace a sliding pin, determining with absolute exactness and certainty and whatever may be the intensity of the current which provokes its displacement, a contact which may close a relay on a Morse apparatus, or on a Hughes apparatus, or which will permit of sending the message farther on. These results are effected by the combination of the fine-wire coil of a galvanometer (a Thomson, D'Arsonval, or other galvanometer) with a mechanical multiplier acting on a lever-bearing, either an ordinary siphon in the case of the automatic recording of the message without the need of a local circuit or a sliding pin having a limited displacement, which by its contact forms a relay-contact. The multiplier consists of wires or chains wound several times about a barrel having a uniform rotary motion. Each of these wires or chains is attached at one end either directly to the coil of the galvanometer, or to it through the intermediary of a lever, and at the other end to the lever bearing the siphon or the sliding pin. The rotating barrel on which the chains are wound is set in motion by a clock mechanism, which may be actuated by a spring, by weights, or by electricity. The direction of rotation of the barrel is such that it tends constantly to move the chains toward the coil of the galvanometer.

The invention will now be fully described with reference to the accompanying drawings, wherein—

Figure 1 is a plan view of the apparatus, and Fig. 2 is a plan of a part of the mechanical multiplier in a construction adapted to displace a sliding pin.

The receiver is formed in the usual way of a very sensitive galvanometer G, placed in the vicinity of a box B, in which is a clock mechanism furnished with a good regulator. This clock mechanism drives a feed-roller, which feeds along the paper p, which comes from an ordinary reel and is gripped between the said roller and an upper roller a', which is pressed elastically to the feed-roller by a spring a^2. The paper on its way to the feeding-point passes over a guide-roller b and then over a small plate or table c. The clock mechanism drives a barrel f (arranged at right angles to the course of the paper p) through the intermediary of toothed wheels d, d', e, and e'. About this barrel f are wound the chains $g\ g'$ of the mechanical multiplier. One end of each chain is attached directly to the respective suspension-wires k and k', Fig. 2, of the fine-wire coil of the galvanometer G or indirectly, that is to say, through the medium of levers k^2, as seen in Fig. 2, connected with the galvanometer-coil or with its suspension-wires $k\ k'$, through the medium of wires k^3. The other ends of the chains $g\ g'$ are secured, respectively, to hooks $l\ l'$, fixed to regulating-screws $m\ m'$, mounted on an oscillating or rocking lever n. These screws $m\ m'$ are placed symmetrically with reference to the fulcrum or pivot of the lever n. This pivot is borne by a bracket o', fixed on the box B, in line with and facing the vertical axis of the galvanometer-coil.

The longer arm of the lever n is furnished with a clamp q, which serves to embrace and hold the longer vertical branch of a siphon r, of which the shorter end dips into an inkstand u, mounted on the box. The longer branch of the siphon, drawn to a point at its end, rests in contact with the paper p, which is drawn under it at the table c. When the galvanometer-coil is stationary, the lever n holds the tip of the siphon r at the median line of the moving strip of paper p.

The longer arm of the lever n may be furnished with a clamp q', (see Fig. 2,) which serves as a support and guide for a sliding contact-pin v, which may slide freely therein and through the oscillations of the lever be

brought into contact with one or the other of two contact-pieces or contact-screws *w* and *w'*, mounted in the arms *t* on a bracket *t'*. These arms *t* limit the longitudinal displacement of the pin *v*. When this pin is displaced through the rocking of the lever *n* a distance greater than that which separates its end from a contact *w* or *w'*, it slides in its bearing in the clamp *q'* and projects so much the farther in the opposite direction in such a fashion that it will be found constantly at the proper point for establishing contact with that contact-screw which is in connection with a relay which permits of working a Hughes or Morse apparatus (in this case one of the contacts *w* or *w'* will be of insulating material) for sending the message farther on.

The coil of the galvanometer G and parallel with the axis of the barrel *f* by the two wires *k k'*, attached, respectively, to regulating-screws k^4, mounted in a cross-piece on an upright or bracket C. S is one of the pole-pieces of the magnet A, and i^2 is a block of soft iron fixed to the bracket C in the center of the galvanometer-coil.

The operation is as follows: The clock mechanism being set in motion, the feed-rollers draw the strip of paper *p* over the table *c*. The gear-wheels *d d' e e'* rotate the barrel *f* uniformly in the direction of the arrow *x* in such manner that the chains *g g'* are urged in the direction of the arrows *y*. As soon as a current is sent through the cable, and consequently through the coil of the galvanometer, the said coil will be slightly displaced in the vertical plane of its support with very little force and in a direction corresponding to the direction of the current traversing the cable. It exercises a very feeble pull on one or the other of the floating chains g^2, Fig. 1, or k^3, Fig. 2, of the chains *g g'*. This very slight effort is multiplied through the winding of the chains *g g'* about the barrel *f* in such a manner that it becomes capable of displacing the lever *n* and siphon *r* or the pin *v*, which is attached to the end of the longer arm of the lever. The siphon *r* being primed, it traces at one side or the other of the median line of the strip of paper *p* a sinuous or zigzag line *s*, corresponding to the conventional signs of the telegraphic alphabet. The positive or negative character of the current determines which side of the median line the tracings will occupy.

The pin *v*, Fig. 2, being displaced by the lever *n*, strikes against one or the other of the screw-contacts *w w'*, connected with the binding-posts of a relay after having shifted more or less (if need be) in its bearings *q'* when the amplitude of oscillation transmitted by the lever *n* has been too great. The variations of amplitude which are produced in the displacement of the galvanometer-coil are thus corrected by the longitudinal play of the pin *v* in its bearings.

In the drawings the flexible connectors are represented as chains, but they may as well be wires.

Having thus described my invention, I claim—

1. In a receiver for submarine telegraphs, the combination with a galvanometer, of a mechanical multiplier comprising a rotating barrel *f*, chains *g*, *g'*, wound about said barrel, said chains being connected at one end to the galvanometer-coil directly or indirectly, and at the other end to the operating-lever *n*, at opposite sides of its pivot or fulcrum and at equal distances therefrom, and the said operating-lever *n*, whereby the connectors wrapped about the barrel *f* will be constantly drawn toward the coil of the galvanometer in such a manner that the part of each connector which is attached to said coil may be always floating so as not to produce displacement of the coil about the vertical plane of its support.

2. In a receiver for submarine telegraphs, the combination with means for feeding a strip of record-paper, a galvanometer, and a constantly-rotating barrel, *f*, of a lever *n*, fulcrumed near said barrel, chains *g*, *g'*, wound about said barrel and at one end connected with said lever *n* at opposite sides of its fulcrum and at equal distances therefrom, and at their other end to the coil of the galvanometer, and a recording-siphon, carried by the long arm of the lever *n* and adapted to mark characters on the strip of paper passing under it, substantially as set forth.

3. In a receiver for submarine telegraphs, the combination with a galvanometer having a suspended coil adapted to be oscillated by the current flowing in the cable, in a well-known way, a rotating barrel *f*, arranged adjacent to said galvanometer, and an operating-lever *n*, having a relatively long arm, of connectors *g*, *g'*, wrapped about the said barrel *f*, one end of said connectors being coupled to said lever *n* at opposite sides of its fulcrum and at equal distances therefrom, and the other ends of said connectors being in connection with the said suspended coil whereby the oscillations of the coil are communicated to the long arm of the lever *n*, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ALFRED PIEDFORT.

Witnesses:
ALBERT MAULVAULT,
PAUL MAULVAULT.