

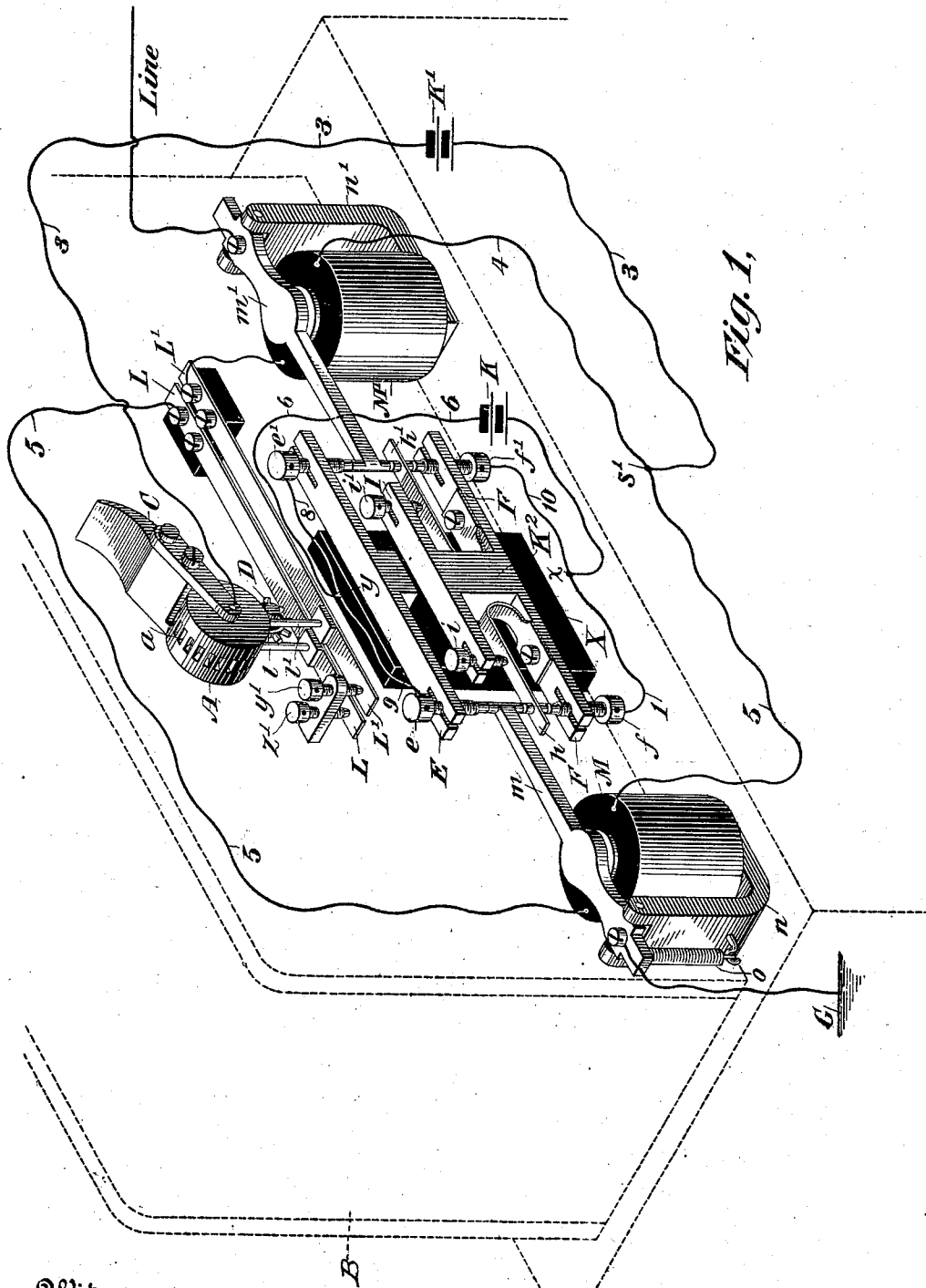
(No Model.)

3 Sheets—Sheet 1.

S. P. FREIR.
AUTOMATIC TELEGRAPH.

No. 561,547.

Patented June 2, 1896.



Witnesses
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(No Model.)

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Fig. 2,

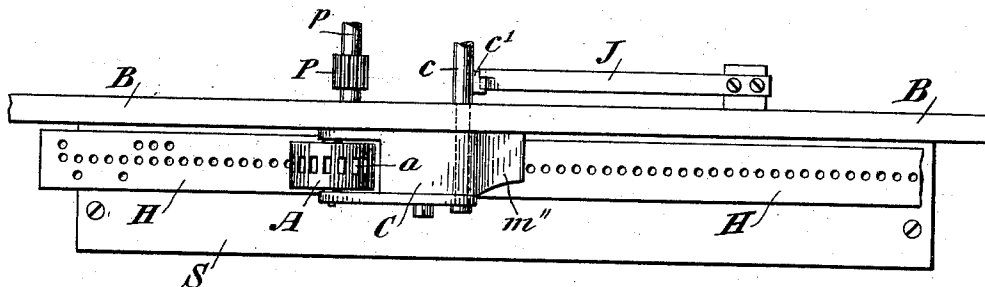


Fig. 3,

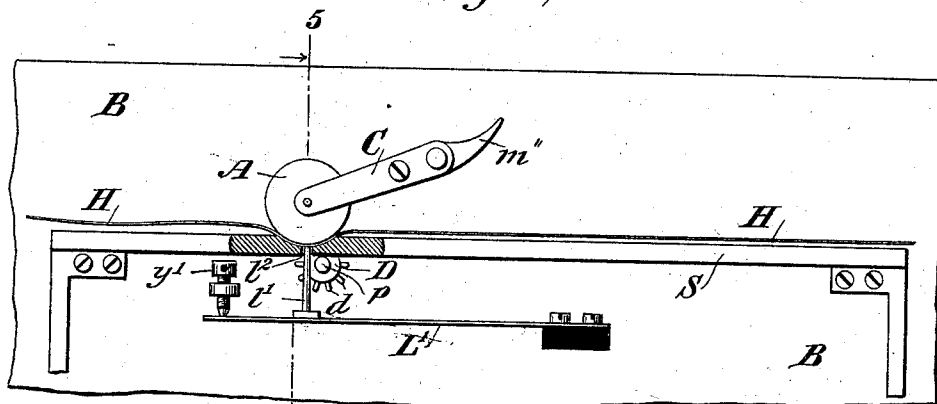


Fig. 4,

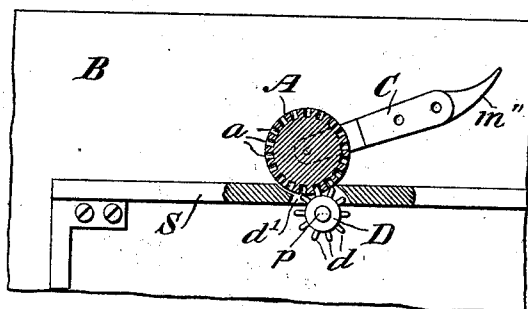
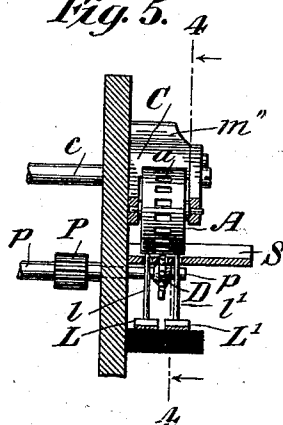


Fig. 5.



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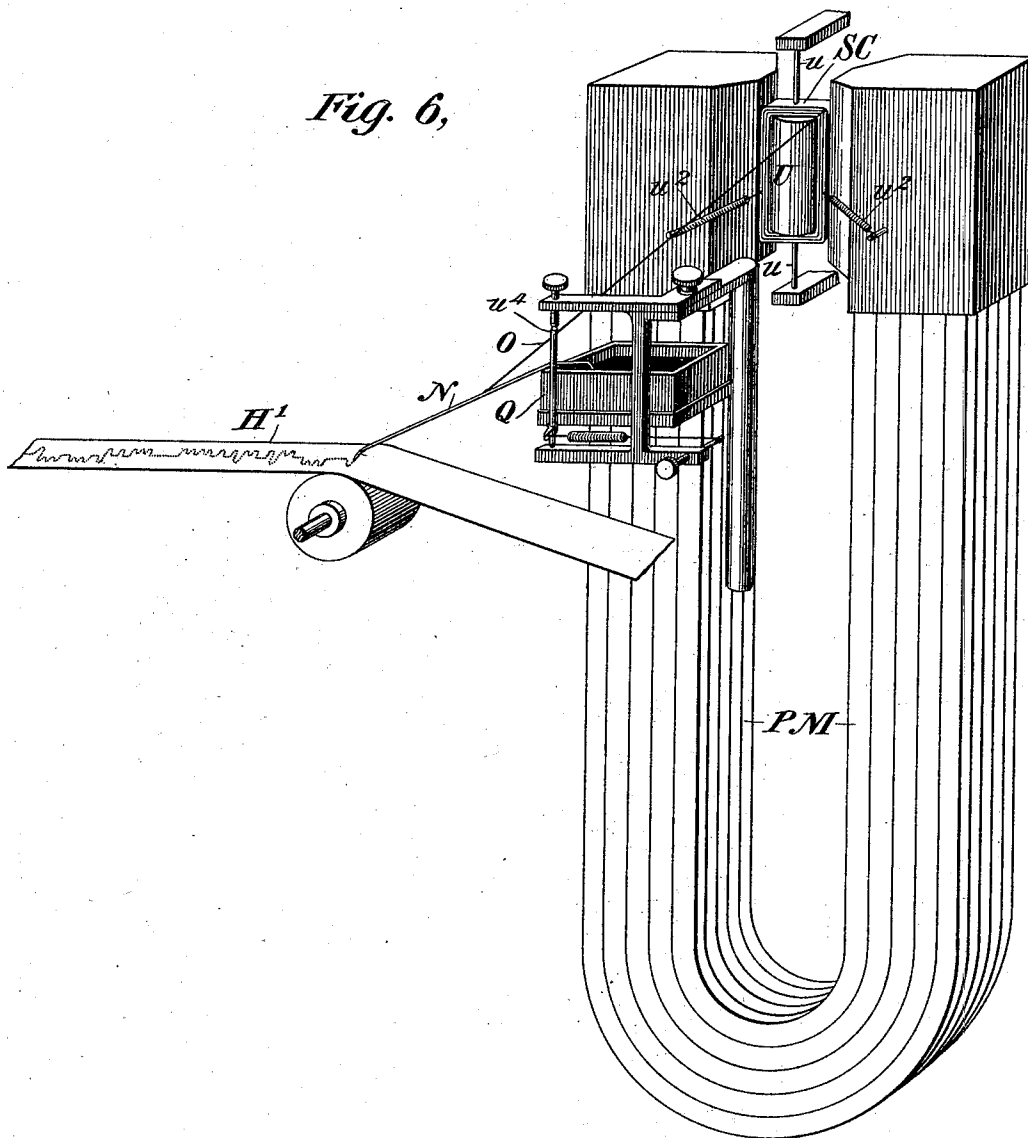
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3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 561,547, dated June 2, 1896.

Application filed August 9, 1893. Serial No. 482,717. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL P. FREIR, a citizen of the United States, residing at Hasbrouck, Bergen county, State of New Jersey, have made a new and useful Improvement in Automatic Telegraphs, of which the following is a specification.

In long-line submarine telegraphy only the feeblest currents are used, and to make a telegraphic record a beam of light is thrown upon a screen in a dark room or a fragile pen is moved backward and forward across the middle line of a moving band of paper, thereby forming a wavy line, substantially as shown in Fig. 6. The signals for effecting such record have heretofore been manually transmitted by the manipulation of hand-keys.

My invention is particularly directed to an apparatus for automatically transmitting such signals; and to this end I have devised an arrangement in which a band of paper is employed with three longitudinal lines of perforations, the central line consisting of apertures of uniform frequency along the length of the paper, and it is by means of this range of perforations in combination with a feeding mechanism that the speed of the paper is controlled, while on either side of the central line of perforations is a row of holes intermittently arranged, those on one side corresponding with blank spaces on the opposite margin.

The perforations on one side of the strip of paper control a circuit-closer for sending positive currents to line, while the opposite row control negative transmissions. The undulations are not only irregular in form, but they are characterized by peculiarities due to the variable force applied to the transmitting-keys by the fingers of the operator; and it is the object of my invention to not only automatically send positive and negative pulses to actuate siphon-recorders, but also to give the automatic transmissions the appearance, as produced by the receiving-instrument, that they would have if they were sent manually. The peculiarities of hand transmission may possibly be regarded as defects rather than advantages; but it is desirable that they be reproduced in my automatic method, as it is largely through them

that the signals are made intelligible to cable-operators.

In the accompanying drawings, Figure 1 is a perspective view representing the circuit connections and sending apparatus of my transmitter. Fig. 2 is a top view of a part of the transmitter, showing a fillet of paper and a part of the mechanism for controlling its feed movement. Fig. 3 is a side view of substantially the same parts, while Fig. 4 is a partial side view represented by the sectional lines 4 4 of Fig. 5, showing the paper-controlling mechanism. Fig. 5 is a sectional view through section 5 5 of Fig. 3, the paper-feeding device, however, being only in end view. Fig. 6 represents the ordinary siphon-recorder used on ocean-cables, in which I have shown a fillet of paper with a partially-recorded message sent by my automatic transmitter.

Referring to the drawings, B is a frame, within which is placed a clockwork or other suitable motor (not shown) for actuating my transmitting mechanism. Power is communicated from the motor to a shaft *p* by a pinion P, and upon the former is placed a small spur-wheel D, which is so arranged that its upwardly-projecting teeth come within the openings of the central row of apertures of the tape as the latter is passed between the contact-roller A and the concave space formed in the upper part of the shelf S. In this manner the paper fillet is fed along with a uniform speed by the driving action of the spur-wheel D, the teeth of which project through a space *d'* cut in the shelf S, thence through the paper and upwardly into the radial apertures *a* of contact-roller A, while the latter is pressed downward upon the paper under the force of a spring J. The free end of spring J presses upward against the toe *c'* of the shaft *c*, upon which is pivoted the bar C, upon whose free end is journaled roller A. The lever C on the opposite side of its pivot *c* is also provided with a thumb-piece *m''*, by means of which roller A may be raised at the pleasure of the transmitting-operator, and this device is necessary to enable the operator in case of error to return the strip of paper toward its initial position to rerun the message. The spur-wheel D and contact-roller A are com-

bined with two pins l' or equivalent devices
 respectively mounted near the free ends of
 spring-bars L L' . These pins project up-
 wardly through apertures l , Figs. 3 and 5,
 and upon the arrival of an aperture on one
 side or the other of the tape said pins alter-
 nately form metallic contact with wheel A under
 pressure from L or L' . Moreover, L L' also
 form contact, respectively, with set-screws z' y'
 at the left of said wheel. By this means electrical
 connection is closed not only through
 l l' , but as well through set-screws z' y' and
 springs L L' , as said set-screws and roller A
 are both electrically connected to the metallic
 frame of the instrument. By means of a
 paper strip perforated, as shown in Fig. 2, it
 will thus be seen that electrical connection
 will first be made by way of pin l , spring L ,
 and set-screw z' , and then by l' , spring L' ,
 and screw y' , while at times connection will
 be made through neither, as it often occurs
 in the formation of a message or signal that
 apertures are omitted on both margins of
 the tape. Electrical contacts could be made
 through pins l l' alone, but paper fiber is liable
 to be caught upon the ends and the electrical
 flow thereby impeded. I could also rely
 wholly upon screws z' y' for the electrical
 connection.

Referring particularly to Fig. 1, it will be
 seen that when an aperture comes within pin
 l and roller A a local electric circuit is closed
 from battery K' through wire 3, spring L , pin
 l , stop z' , wire 5, and electromagnet M . In
 this case the main-line circuit is closed from
 the distant station to armature m' , contact e' ,
 wire 8, wire 6, battery K , point x , wire 7, anvil
 f , armature-lever m , to ground G , thus
 placing the zinc pole of the battery to line.
 On the other hand, if an aperture of the tape
 were to permit pin l' to come in contact with
 roller A a local circuit would be established,
 as follows: from pin l' , stop y' , spring L' ,
 electromagnet M , wires 4 3, battery K' , roller
 A , and the bracket-supporting stops z' y' , and
 in this instance the main line from the distant
 station would be connected by armature-lever
 m' , anvil f , wire 10, battery K , wire 6,
 point y , wire 9, anvil e , armature-lever m , and
 earth G . In this case the copper pole of the
 battery is directed to the distant station. By
 this arrangement of batteries and apertures
 in the transmitting-tape it is seen that positive
 and negative pulses may be transmitted
 to the distant station, and it is by this means
 that the wavy line is recorded by the siphon-
 receiver on either side of the central line of
 the receiving-paper.

The arrangement of anvils and contacts on
 either side of the armature-levers m m' are
 necessarily given a peculiar construction from
 the fact that it is desirable, as far as possible,
 to effect a variable-contact pressure corresponding
 with that produced by the fingers in manipulating
 transmitting-keys. For instance, as shown in
 Fig. 1, the insulating-piece X has mounted thereon a contact-bar

E , within the ends of which are placed back
 contacts e e' , and beneath the bar is located
 a bracket device K^2 , and upon the upper portion
 I are fixed contact-screws i i' , while upon
 the lower shelf F are mounted near its ends
 contact-screws f f' , and also springs h h' .
 Normally the armatures m m' are in an upper
 position in contact, respectively, with screws
 e e' . When, however, either of the
 armature-levers is depressed, it comes in contact
 with a spring before establishing rigid
 connection, and in the case of m , almost immediately
 upon leaving contact e in its downward stroke,
 it comes in contact with the anvil placed upon
 the end of the spring h , which in turn is forced
 against screw f . It is thus seen that after
 electrical contact is broken between m and e
 a circuit is first established between m and f
 through the length of the spring h ; but finally
 a short circuit is formed through its upper and
 lower contacts. The same is also true respecting
 the operation of armature m' between its contacts.

In Fig. 6 is shown a siphon-recorder of the
 usual form, in which SC is a movable rectangular
 coil of fine insulated wire, mounted upon
 radial supports u u and surrounding a stationary
 soft-iron core U , the coil being free to
 oscillate in the annular space between the
 poles of a powerful permanent magnet PM
 and said core. The siphon-pen N is pivoted
 upon a vertical axis u^1 and is actuated by coil
 SC through fiber o . One end of the siphon
 is immersed in an ink-reservoir Q , while its
 opposite end is suspended in close proximity
 to a moving band of paper H' , upon which a
 flow of ink is delivered, whereby the message
 is recorded during the backward and forward
 movement of the pen. The retractile springs
 u^2 u^2 are also attached to the rectangular coil
 and serve to return the latter to its central
 position after the passage of either a positive
 or negative current through said coil.

It is obvious that many variations of the
 apparatus above outlined may be employed
 without departing from the principle of my
 invention, and I therefore wish to broadly
 claim such apparatus in manner and form as

1. In an automatic telegraph apparatus for
 transmitting messages to siphon or equivalent
 recorders, the combination of main-line transmitting
 apparatus by which the positive or negative pole
 of a battery or batteries may be directed to line,
 and variable-pressure main-line contact devices
 whereby the touch of the fingers in the manual
 transmission of messages of such character may
 be reproduced.

2. In an automatic telegraph apparatus for
 transmitting messages to siphon or equivalent
 recorders, the combination of local transmitting
 devices consisting of a paper tape provided with
 three rows of apertures and local relays, as set
 forth, and main-line transmitting devices having
 variable-pressure contacts which are brought into
 action respectively by the two marginal rows of per-

forations upon the transmitting-tape and by the local relays to transmit positive and negative pulses.

3. In an automatic telegraph apparatus for transmitting messages to siphon or equivalent recorders, the combination of local transmitting devices consisting of a paper tape provided with three rows of apertures and local relays, as set forth, and main-line transmitting devices which are brought into action respectively by the two marginal rows of perforations in the transmitting-tape and by the two relays, and variable-pressure main-line contacts controlled by said automatic transmissions for the substantial reproduction of manual transmission, substantially as described.

4. In an automatic telegraph for transmitting messages to siphon or equivalent recorders, the combination of a roller A, driving-wheel D, a perforated strip of paper having three rows of apertures, pins l, l' , screws z, y' , a local battery or batteries K', electromagnets M, M', armature-levers m, m' , and contacts for connecting either pole of battery

or batteries K' to the main line, as and for the purpose set forth.

5. In an automatic telegraph-transmitter for transmitting messages to be received upon siphon-recorders or equivalent devices, the combination of local magnets M, M', and a fillet of paper having perforations on the marginal sides of the transmitting-tape, armature-levers m, m' , contacts e', f' , and springs h, h' for effecting variation of contact-pressure as the main battery is connected to line.

6. In an automatic telegraph-transmitter for transmitting messages to siphon-recorders or equivalent receiving devices, a feed-roller A, having apertures a , a driving-wheel D, having teeth d , a fillet of paper provided with three rows of apertures, contact-pieces l, l' , screws or stops z', y' , connections L, L', and magnets M, M', for alternately directing the two polarities of current to line.

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