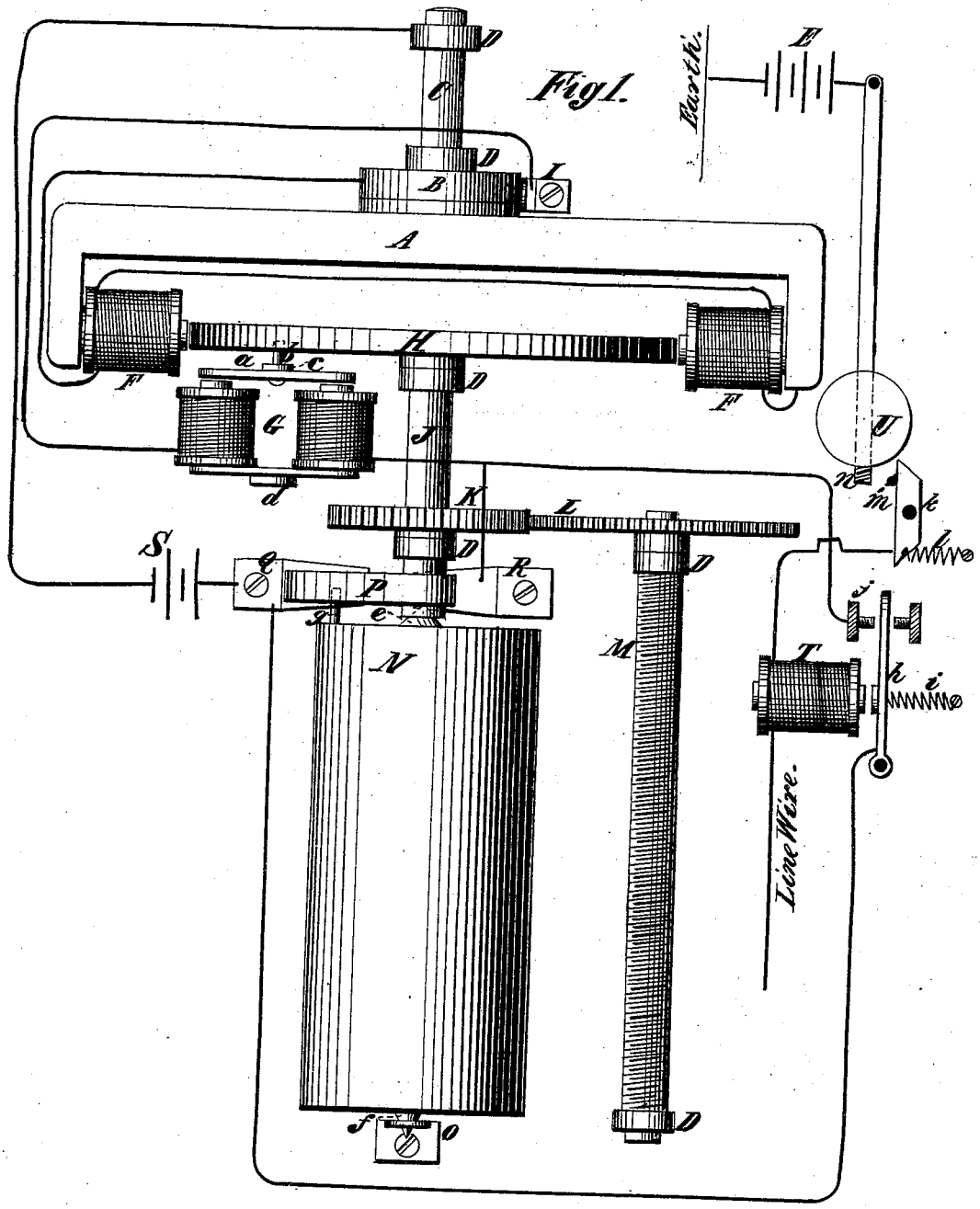
3 Sheets—Sheet 1.

W. E. SAWYER.

Autographic Telegraph Instruments.

No. 196,832. Patented Nov. 6, 1877.



Witnesses.
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Fig 2

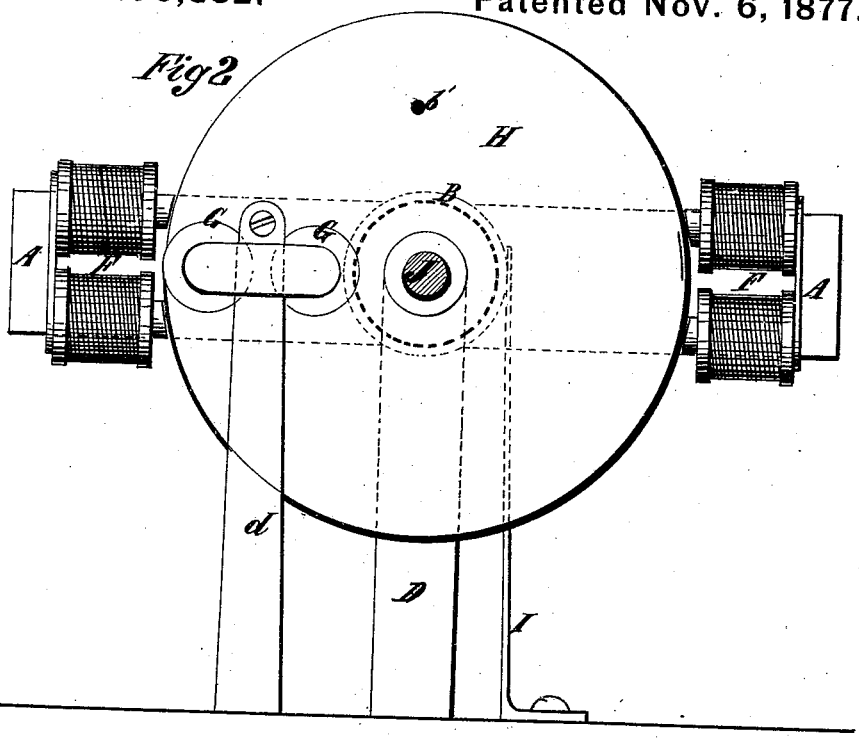
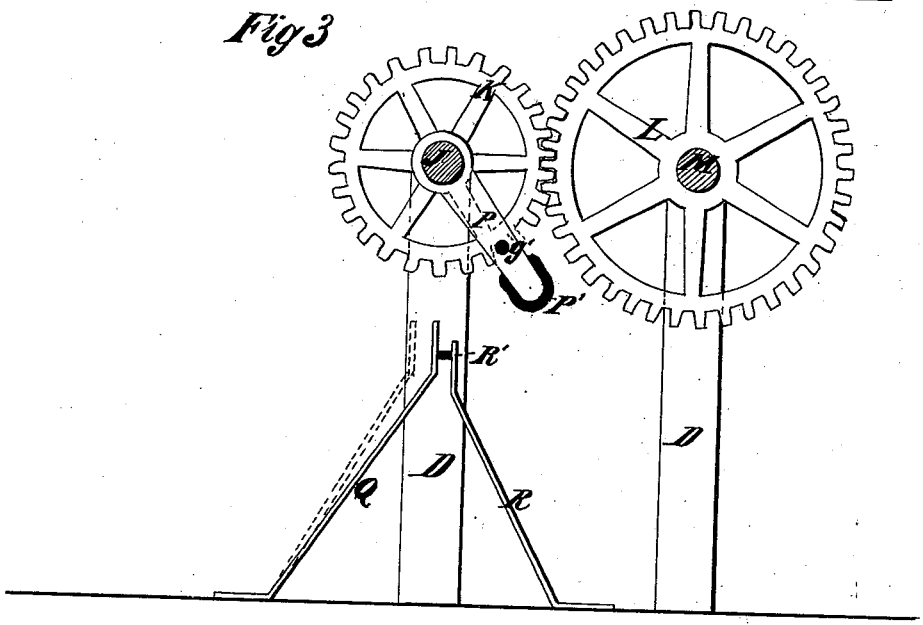


Fig 3



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3 Sheets—Sheet 3.

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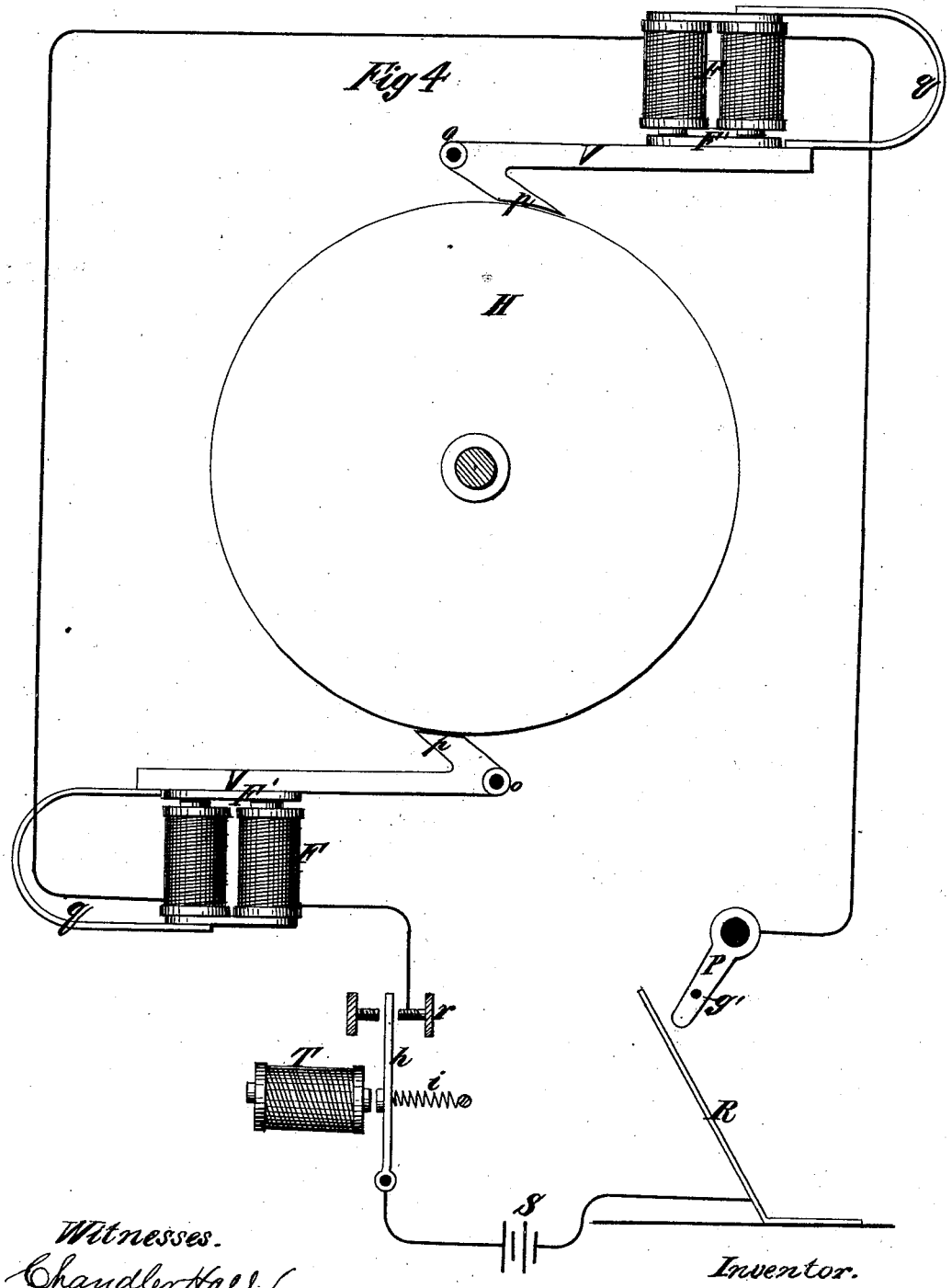

Witnesses.
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UNITED STATES PATENT OFFICE.

WILLIAM E. SAWYER, OF NEW YORK, N. Y.

IMPROVEMENT IN AUTOGRAPHIC-TELEGRAPH INSTRUMENTS.

Specification forming part of Letters Patent No. **196,832**, dated November 6, 1877; application filed July 9, 1877.

To all whom it may concern:

Be it known that I, WILLIAM EDWARD SAWYER, of the city, county, and State of New York, have invented certain new and useful Improvements in Autographic-Telegraph Instruments, of which the following is a full, clear, and exact description:

My invention consists in a simple and effective method of securing the isochronous action of instruments for transmitting by telegraph autographic copies of messages, and in devices for facilitating the labors of the operator, so that he may with ease attend to two or more instruments upon two or more different lines, thereby greatly lessening the cost of telegraphing both to telegraph companies and to the public.

To attain my purpose, I start with instruments to which regularity of motion is imparted by any suitable device or power. I then cause the transmission over the line, at regular intervals, of impulses of electricity, by which the instruments in circuit are periodically regulated. In order that this regulation may be exact, I contrive that the rate of motion in all the instruments in circuit shall be as nearly a unit as possible.

The working of autographic telegraphs is so fully set forth in Letters Patent heretofore granted to me that I have not deemed it necessary to describe the same herein in detail. In the instrument of my present invention, I employ a metallic cylinder, revolving under a stylus, to which is imparted a movement longitudinal with the cylinder. The shaft from which motion is imparted to the cylinder and stylus is provided with a large iron disk or wheel, made as light as possible, or a disk provided with a paramagnetic rim, turned perfectly true, around the periphery of which, fixed to heavy rotating arms driven by the motive power, are electro-magnets, which, when not excited, move freely without touching the rim of the disk, but, when excited, both powerfully attract the same and, by their magnetic elongation, impinge, or tend to impinge, upon it, thereby imparting their rotation to the disk and, through it, to the cylinder. When the period of a revolution of the arms is shorter than the period of time between the regulating line-impulses before mentioned, the electro-magnets are demagnetized and the cylinder comes to a stand-still until the arrival of the line-impulse, when the magnets again act, and the cylinder instantaneously starts. When the apparatus transmitting the periodic regulating-impulses is at one of the terminal points of the line, the instrument at that terminal is apt to start an instant in advance of the more distant instrument, but as the difference in time between the starting of both the instruments in circuit is uniform, this result is of no consequence.

In the drawings accompanying and forming a part of this specification, Figure 1 is a top view of the transmitting or receiving instrument, with electrical circuits therefor. Figs. 2 and 3 are detailed views, and Fig. 4 a view illustrative of a modification that may be made of my invention.

A is the rotating arm or arms carrying the electro-magnets F F around the disk H. The magnets run with extreme closeness to the rim of the disk, and are carried round by any evenly-acting mechanism or power applied to shaft C of arm A in standards D D. Connection with the magnets is obtained through the insulated rim B, which rotates with the arm A, and the spring I. The disk H is fixed to an independent shaft, J, in its standards D D, and from it motion is imparted both to the transmitting or receiving cylinder N and, through gear-wheels K and L, to screw-shaft M, in its standards D D, which carries the stylus (not shown) along the length of the cylinder. The shaft running through and forming a part of cylinder N is tapered at its ends *e f* to enter the end of the shaft J and the standard O, which is a spring-piece, to be drawn back when the cylinder is inserted or removed.

To keep the cylinder firmly in place a pin, *g*, fixed to the same, enters a hole, *g'*, in cam P, fixed to shaft J. The end of the cam P is protected by insulation P^1. Once in each revolution of the cylinder the spring Q is struck by the insulated end of the cam, thus breaking the connection between the spring Q and the contact-point R′ of spring or standard R, whereby the rotating magnets F F are actuated. G is a third magnet mounted on standard *d*, and having an armature, *a*, fixed

to spring-lever *c*, provided with a pin, *b*, which pin, at the instant the cam P breaks the connection between Q and R, (the armature being by that action released from the magnet G,) drops into a hole, *b'*, in disk H, thus stopping the rotation of the disk, while the arm A continues to rotate. T is a relay whose armature-lever *h* is retracted by spiral spring *i*. U is a pendulum vibrated by any suitable means, the lower point of which, *n*, once in every complete vibration, makes connection with the button *k*, which is held in place against stop-pin *m* by spiral spring *l*. S is a local battery operating the magnets F F and G, while E is a main-line battery operating through the pendulum upon relay T.

In the drawings, to avoid confusion, I have omitted the transmitting and recording circuits, which form no part of my present invention, confining myself to illustration of the isochronous mechanism, whose operation is as follows: The relay T (at the moment of regulation in the circuit of the line) is, by the vibration of the pendulum, connected to battery E, and thence to earth. The relay-armature lever is connected both to spring Q and to one pole of local battery S, the other pole of which is connected to the frame, and thereby to one side of one of the rotating electro-magnets F F, the other side of which is connected to one side of the other rotating electro-magnet, the other side of which is in turn connected to the insulated rim B, and thence, by way of of spring I, to one side of the detent-magnet, the other side of which is connected both to the front contact-point of the relay *j* and to contact-point R'. The contact of the relay-armature lever with its front contact-point is broken so long as there is no current in the line to excite the relay-coils, but during the time of this absence of excitation the circuit of the local battery through the rotating and detent magnets is formed by contact of the spring Q with its point R'. During this latter connection the detent-magnet holds its armature-lever point *b* clear of the rotating disk upon which the rotating magnets are acting, and the disk and cylinder describe their revolution until the commutator-cam P strikes the spring Q, thus breaking the connection between that spring and the point R', when the rotating magnets relinquish their hold, and, the detent-magnet releasing its armature, the armature-lever drops the detent-pin *b* into the disk, and that and the cylinder are instantly stopped. At this moment, or about this moment, the pendulum completes connection with battery E, and the impulse thereby transmitted over the line excites the relay, whose armature closes the circuit of local battery S, through its lever and contact-point *j*, when, the detent and rotating magnets being again excited, the former withdraws the detent-pin, and the latter magnetically grasps the disk, the relay-armature remaining closed until the cam P has passed the spring Q, and connection between that spring and its contact-point R' is restored. The same operation takes place in all the instruments in circuit.

Instead of the rotating magnets magnetically grasping the disk, they may be made to operate upon it in the manner shown in Fig. 4, where the magnets have armatures F' on levers V pivoted at *o*, and provided with cam-offsets *p*, which, by means of springs *q*, are caused to impinge upon the disk when the magnets are unexcited. In this case the action of the detent (not shown) is reversed, the pin entering the disk when the magnet is excited, and leaving it when the magnet is depolarized. The contact-point R' of spring Q is then dispensed with, the commutator-cam P making connection with the spring R direct. In this case, to close the circuit of local battery S through the rotating magnets, both the commutator and the relay-armature lever contacts are necessary, the latter working by its back contact *r* instead of its front contact, the normal condition of the relay being with the back contact closed. The disk having completed its revolution, the cam P closes the circuit of local battery S, and the rotating magnets, attracting their armatures, release the disk. The regulating line-current then excites the relay, which causes its armature-lever to leave the back contact, and thus open the local circuit of battery S, when the rotating magnet's armatures fly off, and their cams again grasp the disk.

It will be understood from the foregoing that, by means of suitable switches, the disk may at any time be held at a stand-still, thus leaving the relay in circuit, and by shunting the pendulum the line is put into condition for signaling or transmission of messages by the Morse system. When an autographic message has been transmitted, the operator stops his cylinder, and, drawing back the standard O, removes the cylinder from the instrument. He may then replace it with another cylinder, upon which a message or a chemically-prepared receiving-blank has been fixed, and, without loss of time, again set the disk in rotation until the transmission of another message shall be effected. Hence, as the operation of transmission is purely automatic, a single operator may manage as many instruments as he can supply with messages or blanks.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an autographic-telegraph instrument, the combination, with transmitting or recording apparatus, of an electro-magnetic connection situated between the same and the motive-power mechanism.

2. In an autographic-telegraph instrument, the combination, with transmitting or recording apparatus to which motion is imparted by an electro-magnetic connection situated between the same and the motive-power mechanism, of an electro-magnetic detent operating to arrest the motion of such apparatus

when such electro-magnetic connection is destroyed.

3. In an autographic-telegraph instrument, the combination, with transmitting or recording apparatus to which motion is imparted by an electro-magnetic connection situated between the same and the motive-power mechanism, of an electro-magnetic detent operating to release such apparatus when such electro-magnetic connection is made.

4. In an autographic-telegraph instrument, the combination, with transmitting or recording apparatus to which motion is imparted by an electro-magnetic connection situated between the same and the motive-power mechanism, of an electro-magnetic detent operating to arrest the motion of such apparatus when such electro-magnetic connection is destroyed, and to release such apparatus when such electro-magnetic connection is made.

5. In an autographic telegraph, the combination, with a line-wire relay, of an electro magnet or magnets actuated by the same, which connect the motive mechanism with the transmitting or recording apparatus.

6. In an autographic telegraph, the combination, with a line-wire relay, of an electro magnet or magnets which connect the motive mechanism with the transmitting or recording apparatus, and an electro-magnetic detent.

7. In an autographic telegraph, the combination, with an electro-magnetic connection situated between the transmitting or recording apparatus and the motive-power mechanism, of an apparatus for periodically transmitting electrical impulses over the line to actuate such electro-magnetic connection.

8. In an autographic telegraph, the combination of a relay, T, local battery S, and electro-magnetic controlling apparatus with an apparatus independent of the transmitting or recording instrument for periodically transmitting an electrical impulse over the line.

9. In an autographic telegraph, the combination of a commutator, P, and its spring Q, local battery S, and a relay, T, with electro-magnetic controlling apparatus.

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