

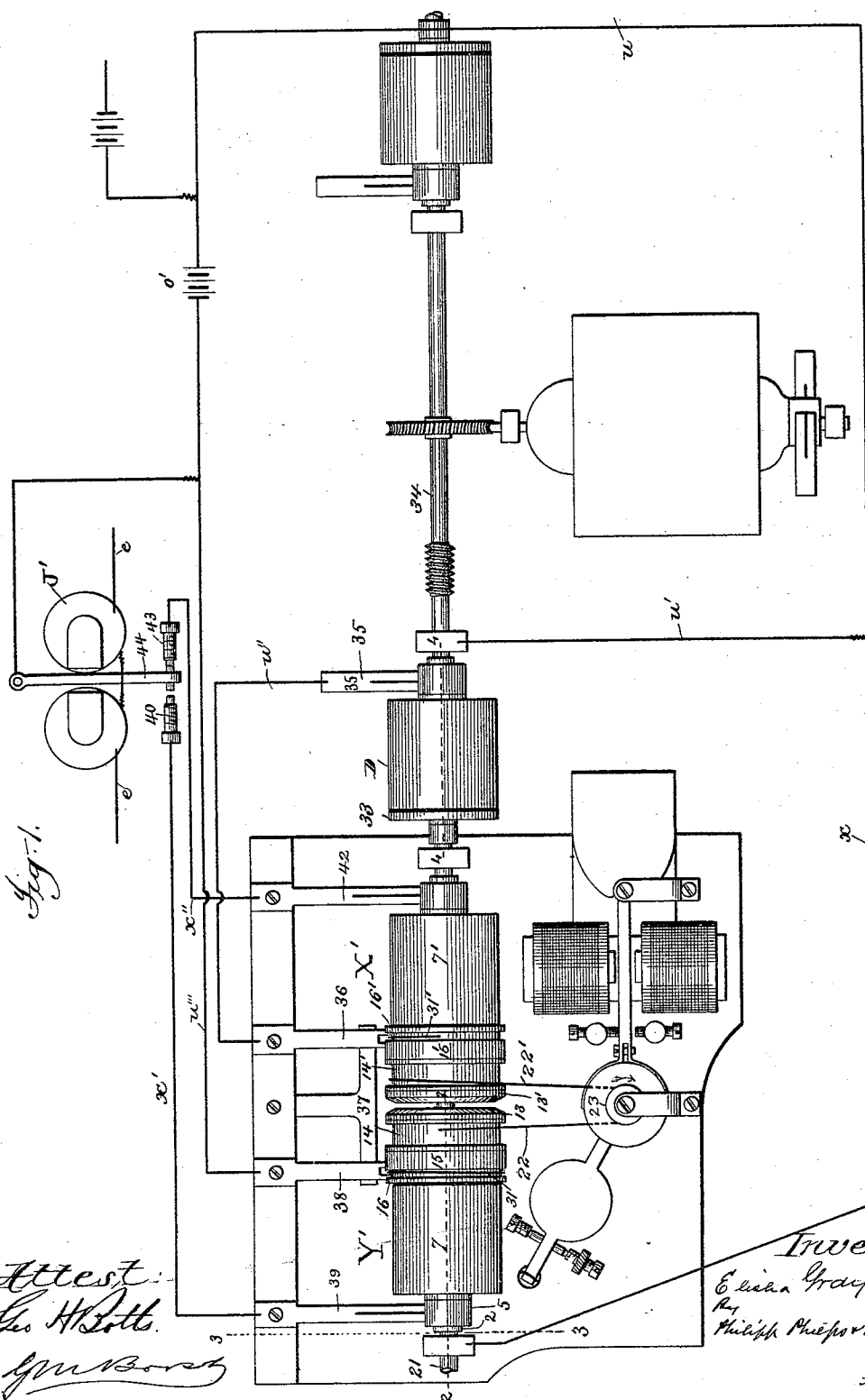
(No Model.)

2 Sheets—Sheet 1.

E. GRAY.
TELAUTOGRAPH.

No. 461,473.

Patented Oct. 20, 1891.



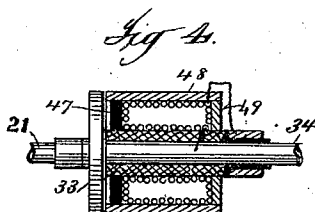
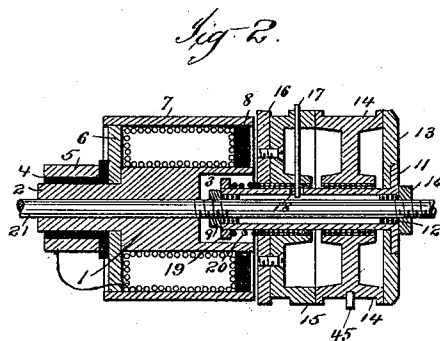
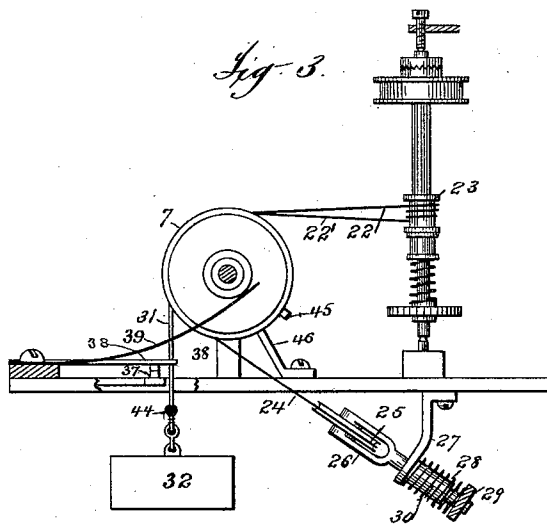
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2 Sheets—Sheet 2.

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Attest
Geo. H. Bots
Jm. Bots

Inventor:
Elisha Gray
By Philip Phelps & Co.
Atty

UNITED STATES PATENT OFFICE.

ELISHA GRAY, OF HIGHLAND PARK, ILLINOIS.

TELAUTOGRAPH.

SPECIFICATION forming part of Letters Patent No. 461,473, dated October 20, 1891.

Original application filed September 17, 1889, Serial No. 324,232. Divided and this application filed August 13, 1890. Serial No. 361,935. (No model.)

To all whom it may concern:

Be it known that I, ELISHA GRAY, a citizen of the United States, residing at Highland Park, county of Lake, and State of Illinois, have invented certain new and useful Improvements in Telaarographs, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

My present invention relates to apparatus for use in the art of telautographic communication, and is a division of my application, Serial No. 324,232, filed September 17, 1889. In the said former application a complete organization of apparatus for telautographic communication is shown and described, and I make reference to that application for a description of those parts of the organization not claimed herein, and with which (as well as with other forms of apparatus) my present invention may be used. In a telautographic instrument such as that to which my improvement relates motion is given to the receiving-pen by means of power derived from a motor, a revolving shaft, a weight, or other power mechanism or force hereinafter generically designated as a "prime motor," independent as regards its source of power of the transmitting-instrument, but controlled or governed in the application of its power to the receiving-pen from the transmitting-instrument. In order to provide for a reversal of the direction of motion of the receiving-pen in correspondence with reversal of direction of motion of the transmitting-pen, it is necessary to interpose between the prime motor and the receiving-pen a reversing mechanism also controlled from the transmitting-station. The mechanism for this purpose described and claimed in the said former application consists of a set of magnet-weights, one set for each of the two crosswise directions of motion of the transmitting-pen. Each of these sets consists of two magnet-clutch weights, each weight being suspended from a disk mounted upon the prime-motor shaft and arranged to be clutched to that shaft at proper intervals to raise the weight. Each of the said magnet-clutch weights is also connected to the drum from which the receiving-pen is driven through the agency of the magnetic

clutch in such manner that they alternately act upon the said drum to drive it in alternately opposite directions.

My present invention consists in a substitute for this reversing mechanism of the same general character, but so organized that greater simplicity of construction and certainty of operation and durability of parts are secured.

In the drawings annexed to the specification, and which illustrate my invention, Figure 1 is a plan view of my improved reversing mechanism. Fig. 2 is a section upon an enlarged scale, taken on the line 2 2 of Fig. 1. Fig. 3 is a side elevation, partly in section, on the line 3 3 of Fig. 1; and Fig. 4 is a section on the line 4 4 of Fig. 1.

The apparatus shown in Fig. 1 to the left of the motor constitutes the improved device as applied to that side of the receiving-instrument which responds to one of the two crosswise movements of the transmitting-pen. The other side of the receiving-instrument is provided with a duplicate of this apparatus. Each of these sets of devices contains two clutch-magnets X' Y', respectively, which are duplicates of each other. One of these clutch-magnets Y' is shown in section in Fig. 2, and will now be described.

The magnetic core 1 has at one end a chamber 3 and at the other end an extension 2, about which is placed an insulating bushing 4, which in turn carries a brass ring 5, which serves as a bearing for a contact-spring and is connected with the magnet-coil. The usual disk 6, of soft iron, supports the soft-iron shell 7 of the magnet at its outer end, forming with the core-shell and a non-magnetic disk 8, supporting the inner end of the shell 7, the inclosed space in which the coil is wound. The disk 8 will preferably be of hard rubber. Within the recess 3 is a stop 9 fast on the shaft 21, and between this and a second stop 10, also fast upon the shaft, is placed so as to have but a very slight endwise play, a brass sleeve 11, free to rotate upon the shaft and provided with friction-bearings 12. The preferred material of this bearing 12 is vulcanized fiber treated with boiling paraffine-wax, which effects the elimination of all moisture and the filling of the pores of the fiber with

paraffine, making a good bearing to run without lubrication. The sleeve 11 carries on its outer end a hard-rubber disk 13, rigid with the sleeve, and just within this a pulley 14, also of hard rubber, is journaled upon the sleeve, being also provided with a loose friction-bearing, preferably of the material above described. Between the pulley 14 and the end of the magnet is a non-magnetic disk 15, preferably hard rubber, and united to it is a soft-iron disk 16, the two together forming a pulley and the former being provided with a pin 17, which passes into a short longitudinal slot 18 in the sleeve 11. (See Fig. 2.) The disks 15 16 are also provided with a friction-bearing upon sleeve 11, preferably of the material before described, and have a slight longitudinal movement with reference to the sleeve, limited by contact with the shell 7 and core 1' upon one side and pulley 14 upon the other. On the inner end of the sleeve 11 is fixed a collar 19, and between this collar and the face of the disk 15 is compressed a spring 20, which tends to force the disk out from the clutch-magnet. The iron disk 16 serves as an armature for the magnet, and when the coils of the magnet are excited the disk is drawn up against the tension of spring 20 until it comes into contact with the end of shell 7 and core 1, the rubber disk 15 being withdrawn from contact with the pulley 14. In this position it is held fast and revolves with the magnet and shaft, carrying with it the sleeve 11 by reason of the engagement of the pin 17 therewith. The pulley 14 is now, however, unclamped, and is left free to revolve in either direction upon the sleeve 11. When there is no current passing through the coils of the clutch-magnet, the disk 16 is pushed back by the spring 20 and clamps the pulley 14 between the disks 13 and 15. The sleeve 11 and all parts mounted on it are then free to revolve in either direction, carrying with them the pulley 14. This may be considered the normal condition of these parts. These two clutch-magnets are placed facing each other upon a shaft 21, journaled in suitable bearings. For convenience it will be considered that the magnet above described is the left-hand magnet in Fig. 1, and I will apply the primes of the same numbers used for designating the various parts to the corresponding parts of the right-hand magnet. To each of the pulleys 14 14' is attached a cord 22 22', these cords passing to opposite sides of the drum 23, and being fastened thereto. To the opposite side of each of the pulleys 14 14' from that to which the cords 22 22' are respectively attached is fixed one end of a cord 24, (see Fig. 3,) which passes about an idle wheel 25, which is journaled between the forks of the Y-shaped support 26, the shank of which passes through a bracket 27 and is held in position by a spring 28, resting at one end upon the bracket and at the other upon a nut 29 upon the end of the shank. This spring serves to keep the cords 24, 22, and 22' always

under tension. Within the spring 28, and about the shank of the support 26, is a sleeve 30, which serves to prevent any possible simultaneous winding of both of the ends of the cord 24 upon the pulleys 14 14' by reason of the pulleys being simultaneously gripped between their respective disks 15 and 13, or by reason of friction between their bearings and sleeve 11. Should such double winding of the cords 24 begin, the spring 28 will be slightly compressed, but speedily the nut will come in contact with the lower end of the sleeve 30, preventing the further advance of the support 26, and consequently checking the double winding of the cords 24. To each of the disks 15 and in a groove formed for that purpose is fixed a cord 31, to the lower end of which is attached a weight 32. The shaft 21, which carries the clutch-magnets, is not made continuous in this construction with the shaft driven by the motor. It carries upon its inner end a soft-iron disk 33, which normally stands in close proximity to the ends of the core and shell of a clutch-magnet D, this latter magnet being fast upon the motor-driven shaft 34. This magnet is shown in cross-section in Fig. 4. The core of the magnet is made of soft iron and is bored out of such a size as to allow the shaft 34 (which is preferably of brass) to slip into the hole and fit tightly therein. The head 47 of the magnet-spool nearest the disk 33 is made of non-magnetic material, such as hard rubber, and the outer shell or covering 48 is made of soft iron as is also the head 49 farthest from the disk. The ends of the outer shell and of the core next to the disk project forward slightly beyond the head 47 and come into contact with the disk 33, this disk constituting an armature for the magnet. The disk 33 is keyed on the shaft 21, and has a slight play endwise of the shaft to enable it to be drawn up against the ends of the magnet-core and shell when the magnet is energized.

The circuit connections are as follows: From the local battery *o'* the current passes through wire *u* and branches through wire *u'*, shaft 34, the coil of magnet D, one end of which is in electrical connection with shaft 34, brush 35, wire *u''*, circuit-breaking switch 36, plate 37, circuit-breaking switch 38, and wire *u'''* to battery. The other branch of the circuit passes through the wire *x* to shaft 21, where it again divides, to the coils of magnets X' Y', respectively, one end of each of which coils is in contact with the shaft 21. From the coil of magnet Y' the circuit passes through brush 39, wire *x'* to stop 40 and armature 41 of magnet J', and thence to battery. From the coil of magnet X' the circuit passes through brush 42, and by the wire *x''* to stop 43 and armature 41 of magnet J', and thence to battery. The cords 31 31' pass, respectively, through the slotted ends of the circuit-breaking springs 38 and 36, and are provided with knots 44 44', so placed as to come

in contact with the ends of the springs 38 and 36, respectively, and raise the one or the other, as the case may be, out of contact with plate 37, thereby breaking the circuit of magnet D. It will be observed that this circuit is dependent upon the contact of both of these springs with plate 37, and consequently will be interrupted by the elevation of either of them. From these connections it is obvious that the circuit of the battery *o'* will be closed through magnet D at all times, except when the circuit is interrupted by one of the two knots 44 44', coming in contact with and raising one or the other of the springs 38 36, and that the circuit of the battery *o'* will always be closed through one or the other, but not at the same time through both of the magnets X' Y', the position of the armature of magnet J' determining which one of these clutch-magnets is energized. Therefore a reversal in the reversing-circuit *e* will cause the circuit from the battery *o'* to be shifted from one of the magnets X' Y' to the other. It will be observed that when either of these clutch-magnets is de-energized the whole structure mounted upon the sleeve 11, and which is then collectively rigid, will be revolved by its weight and give to the drum 23, through the medium of cord 22, a motion of revolution with it. It will also be observed that when either of these clutch-magnets is energized and attracts its armature-disk 16 it becomes active to elevate its weight 32, and its pulley 14 is meanwhile free to revolve, so as not to resist the tendency of the opposed weight to give motion to the drum 23.

The operation of these devices is as follows: Supposing the current on the reversing-circuit to be of such polarity as to cause the armature of the magnet J' to rest against stop 43, the circuit of battery *o'* will pass through clutch-magnet X', clutch-magnet Y' being cut out of circuit. Pulley 14 will therefore be clutched fast to its sleeve 11 and will be rotated under the pull of weight 32, thereby giving a tendency to drum 23 to revolve in the direction indicated by the arrow in Fig. 1. The disk 15' of magnet X' will revolve with the magnet X' and wind up its weight 32'. The pulley 14' will be free to revolve in either direction upon the sleeve 11, and therefore will be drawn by the cord 22', so as to revolve toward the drum 23. As soon as the weight 32' is raised high enough to bring the knot 44' into contact with spring 36 and lift the latter off the plate 37, the circuit of magnet D will be broken and it will release its armature-disk 33, the rotation of the shaft 21 will cease, and consequently the upward motion of weight 32'. Weight 32' will now begin to drop, there being nothing to sustain it, and will drop far enough to again close the circuit of magnet D, when it will again be raised, and will continue thus vibrating until the circuit connections are reversed and it is permitted to descend, giving motion to the pulley 14'. Change of polarity in the circuit *e* consequent

upon a reversal of the direction of motion of the transmitting-pen (as fully described in the application of which this is a division) shifts the circuit of battery *o'* to the clutch-magnet Y', cutting out magnet X'. The position of the parts as now reversed is as follows: The pulley 14' is clutched to its sleeve 11, has become operative to give a motion to drum 23 in a direction opposite to that indicated by the arrow under the pull of weight 32'. The pulley 14 is unclamped and free to revolve, and the disk 15 and magnet Y' are performing the function of raising the weight 32. It should be observed that while the magnetizable metallic surfaces of magnetic clutches, as X', Y', and D, may be in actual contact, I find that in practice it is preferable, in order to prevent sticking or demagnetization, to face one or both of the adjacent metallic surfaces with a layer of non-magnetic material, as parchment. The unison-stops employed in this case are shown in Figs. 2 and 3, and consist of a pin or projection 45 from each of the pulleys 14 and a fixed stop 46, placed in the path of each of the pins 45. The total movement of the receiving-pen in each of its two crosswise directions corresponds to a movement of the corresponding pulley 14 a little less than an entire revolution, each pulley 14 being free to revolve in either direction until its pin 45 comes in contact with one side or the other of its stop 46.

As stated in the application of which this is a division, I mean herein by the term "transmitting-pen" either a writing-instrument of any sort or a simple handle of convenient form to be grasped by the operator and moved to describe the outline of the characters; and by the term "receiving-pen" I mean to indicate any sort of writing-instrument capable of recording a character received, whether or not it employs a writing-fluid; also, as stated in the said former application, the movements necessary to reproduce the message, instead of being imparted to the receiving-pen, may be wholly or in part imparted to the paper; and it is therefore to be understood that a recording-surface movable for the purpose of recording characters is, for the purposes of this application, the equivalent of a movable pen.

What I claim is—

1. The combination of a receiving-pen or other driven mechanism, a weight for giving movement to the driven mechanism, mechanism for raising the weight, mechanism for connecting the weight alternately to the weight-raising mechanism and to the driven mechanism, and a magnetically-controlled clutch governing the said connecting mechanism, and acting thereby to alternately cause the weight to be raised and the driven mechanism to be moved, substantially as described.

2. The combination of a receiving-pen or other driven mechanism, a weight for giving movement to the driven mechanism, a shaft, mechanism for rotating the shaft to raise the

weight, and electrically-controlled mechanism mounted on the shaft for connecting the weight alternately to the shaft and to the driven mechanism, substantially as described.

5 3. The combination of a receiving-pen or other driven mechanism, a weight for giving movement to the driven mechanism, a shaft, mechanism for rotating the shaft to raise the weight, a pulley on the shaft from which the
10 weight is suspended, a pulley on the shaft connected with the driven mechanism, a clutch-magnet, and mechanism controlled by the clutch-magnet to connect the weight-pulley alternately to the shaft and to the pulley con-
15 nected with the driven mechanism, substantially as described.

4. The combination of a receiving-pen or other driven mechanism, a weight for giving movement to the driven mechanism, mechanism for raising the weight, mechanism for connecting the weight alternately to the weight-raising mechanism and to the driven mechanism, a magnetically-controlled clutch controlling the connecting mechanism, and
25 acting thereby to alternately cause the weight to be raised and the driven mechanism to be moved, and means for automatically arresting the operation of the weight-raising mechanism when the weight has been raised to a
30 sufficient height, substantially as described.

5. The combination of a receiving-pen or other driven mechanism, a weight for giving movement to the driven mechanism, mechanism for raising the weight, mechanism for connecting the weight alternately to the weight-raising mechanism and to the driven mechanism, and a magnetically-controlled clutch controlling the said connecting mechanism, thereby to alternately cause the weight
40 to be raised and the driven mechanism to be moved, and a second clutch, as D, controlling the operation of the weight-raising mechanism and provided with connections, whereby it operates to automatically arrest the operation of the weight-raising mechanism when
45 the weight has been raised to a sufficient height, substantially as described.

6. In a telautographic system, the combination of a receiving-pen, two weights for giving
50 movement to the receiving-pen respectively in different directions, mechanism for raising the weights, mechanism for connecting the weights alternately with the receiving-pen and the weight-raising mechanism, and two
55 electrically-controlled clutches for controlling the said connecting mechanisms thereby to cause the two weights to be alternately raised and the receiving-pen to be alternately driven in different directions, substantially as de-
60 scribed.

7. In a telautographic system, the combination of a receiving-pen, two weights for giving movement to the receiving-pen respectively in different directions, mechanism for raising the weights, mechanism for connecting each weight alternately with the receiving-pen and the weight-raising mechanism, and two magnet-clutches controlling the said connecting mechanisms thereby to cause the two weights to be alternately raised and the receiving-pen to be alternately driven in different directions, substantially as described.

8. In a telautographic receiving-instrument, the combination of a receiving-pen, a pen-drum connected thereto, two loose pulleys, each connected to the drum by a cord, a tension device operating to keep the cords taut, and means for alternately revolving one or the other of the pulleys as one or the other direction of movement of the receiving-pen is required, substantially as described.

9. In a telautographic receiving-instrument, the combination of a receiving-pen, a pen-drum connected thereto, two loose pulleys, each connected to the drum by a cord, two loose pulleys carrying weights, and means electrically controlled from the transmitting-station for connecting one or the other of the pulleys connected to the drum with a weight-carrying pulley, according to the direction of motion required for the receiving-pen, substantially as described.

10. In a telautographic system, the combination of a receiving-pen, a pen-drum with which the pen is connected, a rotating motor-shaft, two pairs of loose pulleys mounted on the shaft, one pulley of each pair carrying a weight and the other pulley of each pair being connected with the pen-drum, and means electrically controlled from the transmitting-station for alternately connecting each of the weight-carrying pulleys to the motor-shaft and to the other loose pulley of the pair, whereby the raising of the weights is effected by the shaft and the driving of the receiving-pen is effected by the weights, substantially as described.

11. The combination of the magnet Y', the spring-pressed armature-pulleys 15 16, mounted so as to move to and from the magnet, the sleeve 11, and the pulley 14, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ELISHA GRAY.

Witnesses:

S. WINTHAL,
J. J. KENNEDY.