No. 617,892. Patented Jan. 17, 1899.

G. S. TIFFANY.

TELAUTOGRAPH.

(Application filed Aug. 21, 1897. Renewed July 29, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

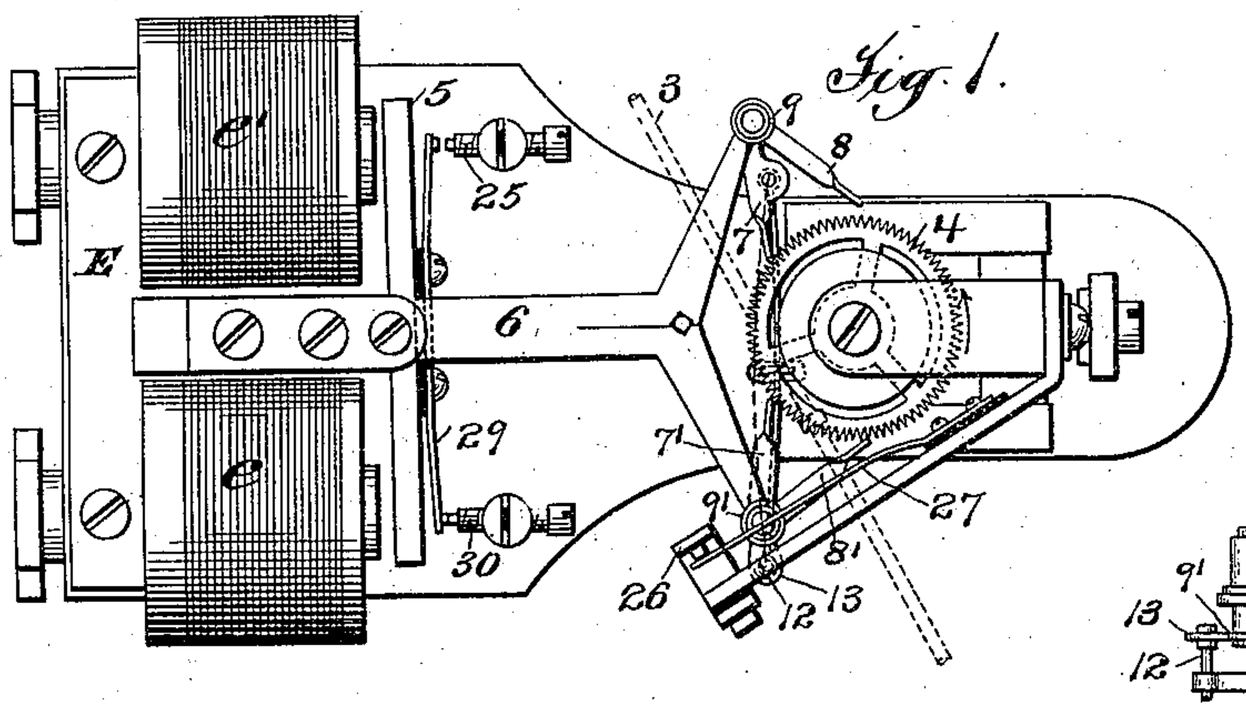


Fig. 2.

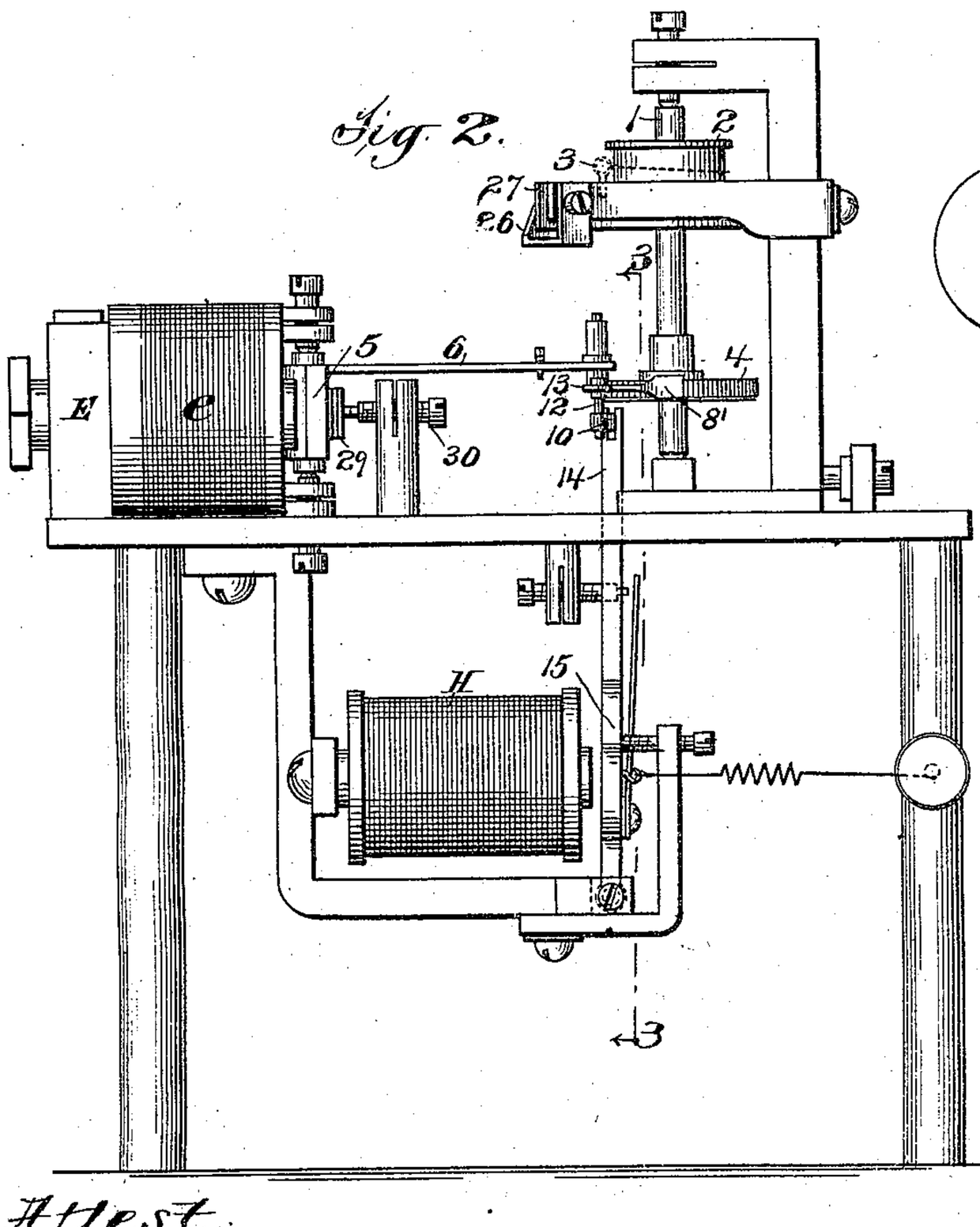


Fig. 3

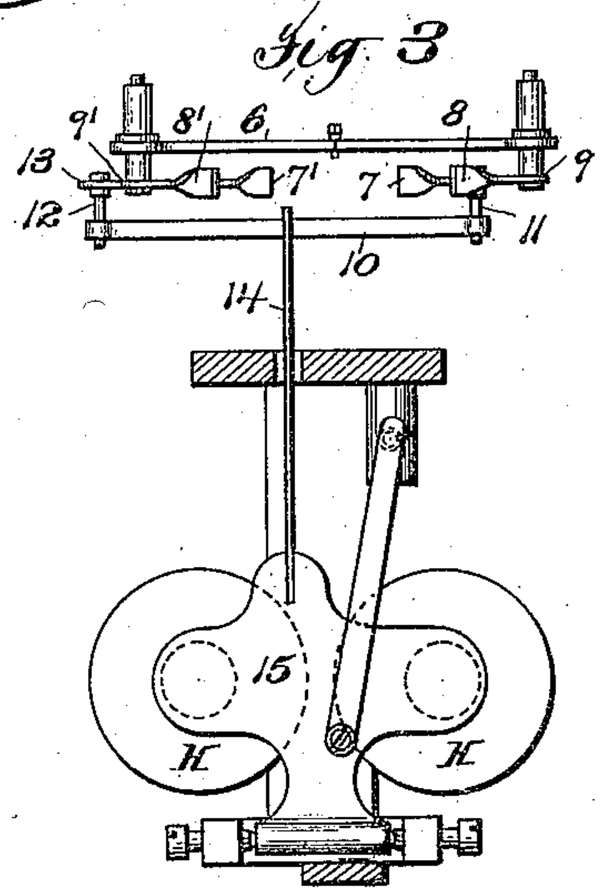
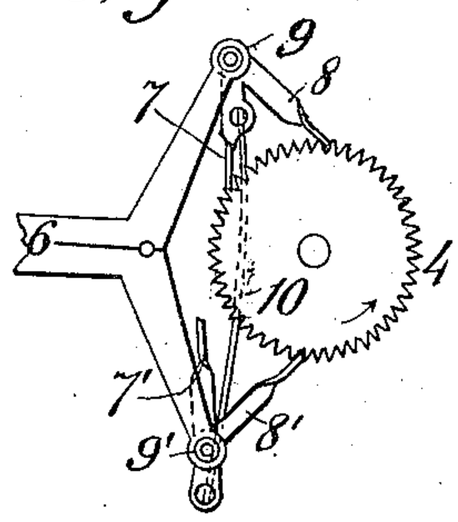


Fig. 1a



Inventor:

Attest.
T. F. Kehoe.
F. V. Bourke

Geo. S. Tiffany
By Philipp Phelps & Lawyer
Attys

No. 617,892. Patented Jan. 17, 1899.

G. S. TIFFANY.

TELAUTOGRAPH.

(Application filed Aug. 21, 1897. Renewed July 29, 1898.)

(No Model.) 2 Sheets—Sheet 2.

Fig 4.

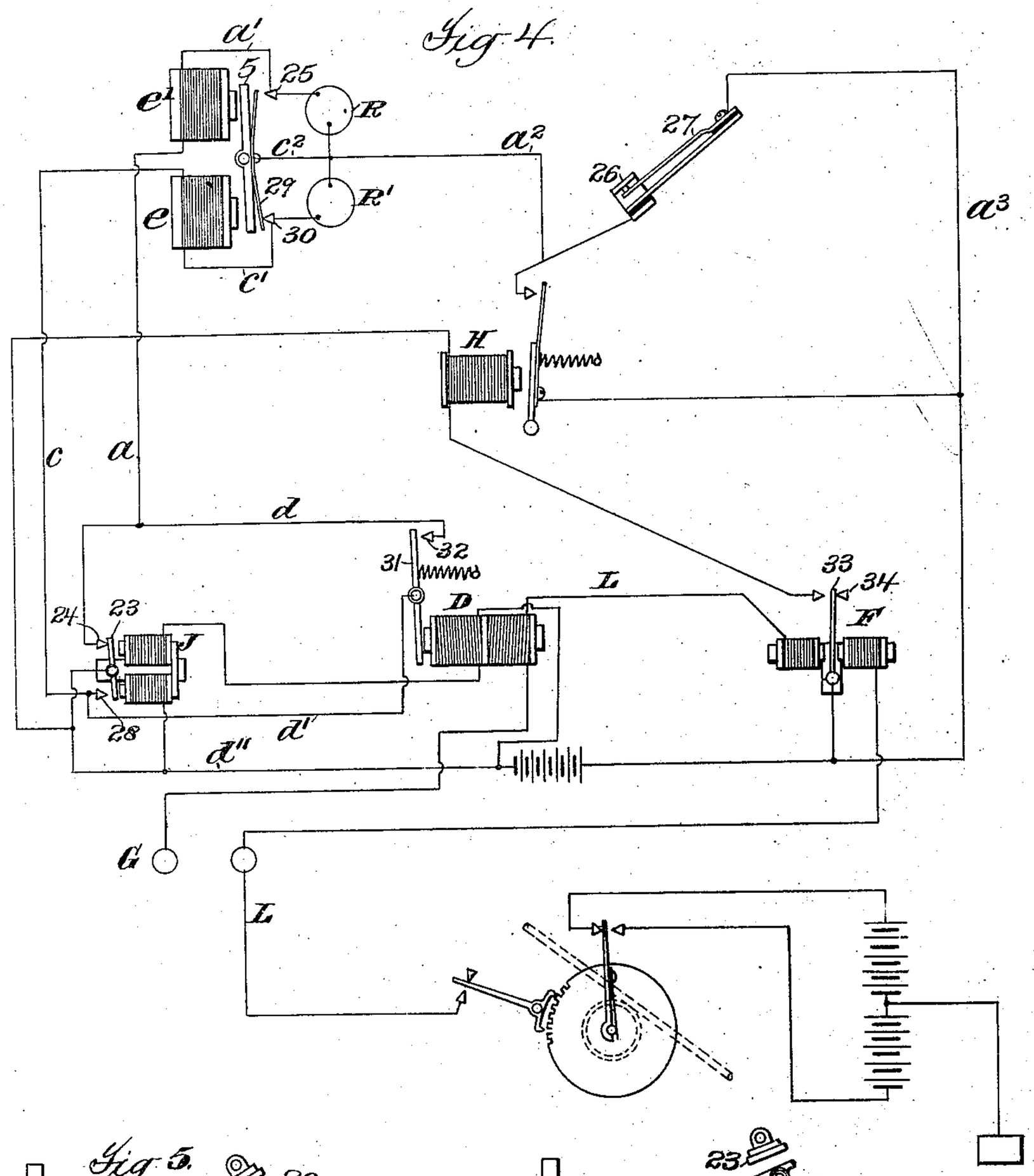


Fig 5.

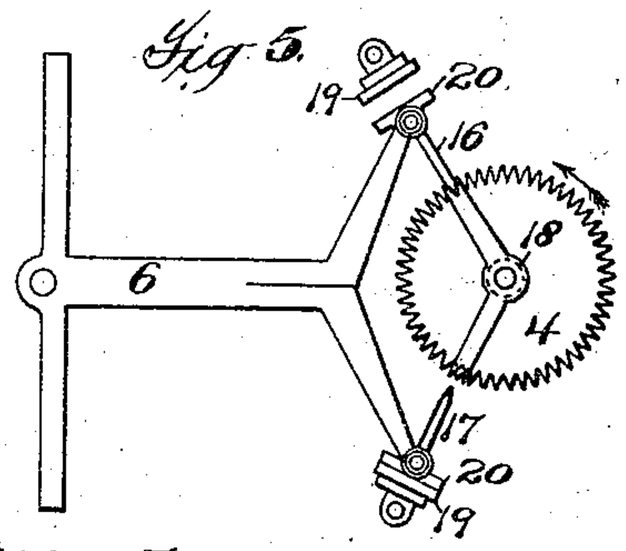
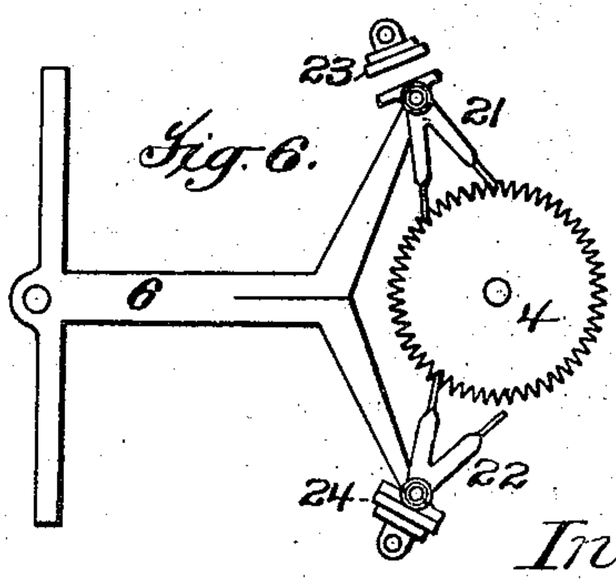


Fig. 6.



Attest:
P. F. Kehoe.
A. V. Bourke

Inventor.
Geo. S. Tiffany
By Philipp Phelps Lawyer
Attys

UNITED STATES PATENT OFFICE.

GEORGE S. TIFFANY, OF HIGHLAND PARK, ILLINOIS, ASSIGNOR TO THE GRAY NATIONAL TELAUTOGRAPH COMPANY, OF RICHMOND, VIRGINIA.

TELAUTOGRAPH.

SPECIFICATION forming part of Letters Patent No. 617,892, dated January 17, 1899.

Application filed August 21, 1897. Renewed July 29, 1898. Serial No. 687,233. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. TIFFANY, 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 Telautographs, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

My invention relates to improvements upon the telautographic instruments heretofore patented by me.

The invention relates chiefly to the apparatus known in this art as the "escapement" devices; and it consists, so far as regards this part of the invention, in improvements whereby these devices are simplified. Heretofore in the use of escapements it has been found necessary to employ a reversing-clutch of some sort which should cause the reversal in the direction of movement of the receiving-pen in accordance with the reversal in the direction of movement of the transmitting-pen. In my present invention this clutch is dispensed with and instead thereof I substitute as a reversing mechanism means for controlling the application of the pawls to the escapement-wheel, so that the escapement-wheel shall be driven by the pawls in either direction in accordance with the direction of movement of the transmitting-pen. Thus the clutches heretofore employed are dispensed with and the simplicity and certainty of the mechanism are greatly increased.

My invention also relates to certain improvements in the organization of circuits controlling the escapement-magnet, whereby upon each stroke of the armature of the escapement-magnet a resistance is cut into the circuit of the operating-coil, whereby the pull of the magnet on the armature is reduced and the next movement of the armature is expedited, and, further, the current is economized.

My invention also consists, in part, of modifications of and improvements upon the telautographic instrument shown in my application, Serial No. 593,556, filed May 29, 1896, renewed February 11, 1898, renewal number, 669,975. In my said application I have shown a construction of apparatus and organization of circuits wherein impulses of like polarity occasioned by the movements of the transmitting-pen coöperate with induced impulses of opposite polarity induced thereby to control the receiving-pen. In my present application I show a construction and organization wherein the impulses of like polarity occasioned by the movements of the transmitting-pen are transmuted by induction into to-and-fro impulses, which induced impulses control the movements of the receiving-pen.

My present invention also includes other details of construction and organization, which will hereinafter be particularly pointed out.

In the drawings annexed, Figure 1 is a plan view of my improved escapement. Fig. 1ª is a view showing the escapement mechanism in a different position from that shown in Fig. 1. Fig. 2 is a side elevation of the same. Fig. 3 is a sectional elevation on the line 3 3 of Fig. 2. Fig. 4 is a diagram of the circuits at the receiver. Figs. 5 and 6 show modifications of the escapement mechanism.

Referring to Figs. 1, 2, and 3, the shaft 1 carries one of the receiving-drums 2 of the receiving instrument, to which are attached in the usual manner one of the pen-arms 3 and escape-wheel 4. The escapement-magnet E is provided with two coils *e e'* and pivoted armature 5, to which is attached the forked extension 6, carrying the pawls. Each of these pawls consists in the construction shown of two legs 7 8 and 7′ 8′, having faces adapted to engage with the teeth of the escapement-wheel. The legs 7 8 of each pawl are fastened together and each are pivoted to the extremity of one of the forks of the extension 6. The two pawls I designate, respectively, by the numerals 9 and 9′. These pawls are adapted to be so shifted that either of the legs 7 8 may be caused to take a driving position with reference to the teeth of the ratchet-wheel, and the direction in which the ratchet-wheel is moved by the pawls will depend upon this adjustment. That one of the legs of each pawl which is not in driving position with reference to the escapement-wheel will be in locking position with reference thereto and will prevent by its engagement any movement of the escapement-wheel beyond the single step which it takes under the pressure of the other leg. The position of the pawl

shown in Fig. 1 is that for moving the escapement-wheel in the direction shown by the arrow.

Means for shifting the position of the pawls in accordance with the direction in which the escapement-wheel is to be driven consists in the form shown in these figures of a spring 10, connected to a pin 11, attached to the leg 7 of pawl 9 and also connected to the pin 12, attached to a prolongation 13 of the pawl 9′. The spring 10 is shifted between the positions shown in full and dotted lines in Fig. 1 by the arm 14, projecting upward from the armature 15 of the reversing-magnet H. This arm 14 is slotted at its upper extremity, as shown in Fig. 2, so as to embrace the spring 10, and is preferably very thin, a watch-spring being suitable for the purpose, so that the variations in distance between its point of attachment to the armature 15 and the spring 10 due to its angular movement may be compensated for by the bending of the arm rather than by friction between the arm and the spring 10, greater delicacy being thus secured and less exertion of power required by the magnet H.

It will be observed that the tension given to spring 10 in the position which it occupies in Fig. 1 is to cause the legs 7 and 8′ to always maintain contact with the escapement-wheel, and therefore to act as the driving members of the pawls, the legs 8 and 7′ in this position of the pawls acting as the locking members. In the position shown in Fig. 1 the armature extension 6 has just moved upward, as it appears in the drawing. In making this movement the leg 8′ has pushed the escapement-wheel forward until the leg 7′ came into contact with a tooth and locked the wheel against further movement. Meanwhile the pawl 9 was inoperative and remained with its leg 7 pressed against the escapement-wheel by the spring 10. The next movement of the armature extension 6 will be downward, and during this movement the escapement-wheel will be propelled in the same direction as before by the leg 7 until the leg 8 comes in contact with the tooth of the wheel, preventing further movement, the position of the parts at that moment being that shown in Fig. 1ª. Meanwhile, also, the pawl 9′ will be in operative contact between the leg 8′ and the escapement-wheel, being, however, maintained by the tension of spring 10. Reversal of the position of the spring 10 would, of course, cause the legs 8 and 7′ to become the driving members of the pawls, and the escapement-wheel will then move in the opposite direction. This construction is only one of very many forms that may be adopted without departing from my invention. I regard as within my invention any means by which the pawls may be shifted so as to cause the same in accordance with their position to move the escapement-wheel in either direction.

Another form of construction which may be adopted is shown in Fig. 5, in which the two pawls 16 and 17 are pivoted, respectively, to the two forks of the armature projection 6, these pawls being so placed that they have a sufficient amount of friction on their pivots to hold them in whatever position they are placed. Attached to the shaft of the escapement-wheel is a guide 18, having forked ends, as shown. This guide is fixed. Each pawl is pointed, as shown, and each extremity of the guide 18 has a corresponding notch. As each pawl in turn moves toward the escapement-wheel it enters the notch in one of the extremities of the guide 18. Taking for convenience the description of pawl 16, if it enters the notch of the guide 18 on the left-hand side of the point of the tooth which lies in the notch it will in being deflected by the guide cause the escapement-wheel to move in the direction of the arrow. If, on the contrary, it enters the notch of the guide 18 on the right-hand side of that point, it will cause the ratchet-wheel to revolve in a direction opposite to that of the arrow. The construction is such that the point of the tooth will always be in the center of one of the notches of the guide 18 when the pawl is bottomed in the guide-notch on the opposite side of wheel 4. The position in which each pawl enters the notch will be determined by the position given to it upon the arm 6 by a pivoted stop 19, which engages with the rear surface 20 of the pawl. These stops 19 are connected with the armature of magnet H and are so placed on their pivots by the armature of magnet H as to give positions to the pawls suitably to move the ratchet-wheel in the appropriate direction in accordance with the polarity of the current passing through the magnet H, which in turn depends upon the movement of the transmitting-pen. In place, however, of having the magnet H modify the positions of the stops 19 the latter may be fixed and the armature of the magnet H may give a reciprocating movement to the guide 18. In one of the positions of the guide 18 each of the pawls will on entering the corresponding recess strike against the lower inclined face of the guide, and in the other position of the guide the same pawls will strike against the upper inclined face, causing in the two cases opposite movement of the escapement-wheel.

In Fig. 6 is shown still another construction in which the pawls 21 22 are two-legged, as in the construction shown in Figs. 1, 2, and 3, and in which the position of these pawls, instead of being determined by a spring, is determined by pivoted abutments 23 and 24, which are shifted by the action of the armature of the magnet H, so as to give the proper positions to the pawls 21 22 upon each contact of these pawls with the abutments.

The forked pawls are pivotally mounted upon the forks of the projection 6 and operate substantially in the same way as the two-legged pawls of Fig. 1.

Referring to Fig. 4, the circuits will now

be described. The instrument is provided with the usual two line-wires, and it will be understood that, as is usual in describing such instruments, but one half of the instrument and circuit connections are shown, these being a duplicate of the other half. One of the line-wires enters at L and passes through a polarized relay F and the primary winding of an induction-coil D to the ground. The secondary circuit of the induction-coil passes through a repeating polarized relay J, by means of which the to-and-fro induced impulses of the secondary coil of magnet D are enabled to control the coils *e e'* governing the escapement. When the armature 23 of the magnet J rests against the stop 24, the circuit of magnet-coil *e'* is closed through wires *a a'*, contact 25, resistance R, wire a^2, contact 26, unison-switch 27, wire a^3, to battery. When the arm 23 shifts to its position against contact 28, the circuit just mentioned will be broken and the circuit of coil *e* will be closed through the wire *c c'*, spring 29, mounted upon armature 5, wires c^2 a^2, &c., to battery. The armature 5 will now move under the pull of coil *e*, and its movement will be hastened by the pressure of spring 29, which is made of some strength and caused to be pulled forcibly against the stop 30 by the action of coil *e'*. As soon as the spring leaves the stop 30 resistance R is cut into circuit, thus diminishing the pull of the coil *e* and causing the armature to more promptly move under the next pull of coil *e'*. Reversal in the direction of movement of the receiving-pen is effected by reversal in the polarity of the pulsations sent to line, which determine the position of the armature 33 of the polar relay F, and thereby the energization or deënergization of the magnet H, the operation of which upon the escapement is as above described. This feature of the invention is of considerable importance for the reason that in order to secure a high rate of speed in the escapement it is necessary that the pull of each coil upon the armature should be reduced after the latter is drawn to the magnet, the promptness of the next successive movement of the armature being thus very materially affected. Further, economy of the current is thus secured.

My present improvement also includes a special organization of circuits for effecting unison. The induction-coils D are provided with a core and an armature 31, which is normally held against the core when the pulsations are upon the line; but when an interruption of these currents occurs the armature 31 falls against the stop 32 and closes circuits from the battery through wire *d''*, armature 23, stop 24, wire *a*, magnet *e'*, wire *a'*, resistance R, (or spring 29 when the armature 5 is in the reversed position to that shown,) wire a^2, contact 26, spring 27, wire a^3, to battery, and another circuit through wire *d''*, armature 23, stop 24, wire *d*, stop 32, armature 31, wire *d'*, wire *c*, coil of magnet *e*, wire *c'*, spring 29 or resistance R', according to the position of the armature 5, wire a^2, and on, as before. The coils *e e'* will be successively energized by these circuits and successively partially deënergized by the movements of the armature 5, and the receiving-pen will thus be kept in motion toward the unison-point of the receiver until a stop on the pen-arm strikes the contact-spring 27 and moves it away from the stop 26, thus interrupting the circuits and bringing the pen to rest. The direction of movement of the pen under these conditions will always be the same, since it will correspond to the movement of the transmitting-pen to the position of unison, which corresponds also to the position of the armature 33 of the magnet F against stop 34, in which position the reversing-magnet H is deënergized. When the transmitting-pen is moved outward to commence writing, the polarity of the pulsations is reversed, the armature 33 of the polar-relay F shifts its position, the armature of magnet H is drawn up, and the circuit of the escapements is closed around the unison-switch 26 27. The paper is shifted in this organization by appropriate connections also controlled by the armature 31 of induction-coils D. It will be observed that in this construction the repeating-relay is operated by induced currents of both polarities instead of by direct currents of one polarity and induced currents of another, as in the organizations shown in my pending applications. The present construction has the advantage of simplicity.

What I claim is—

1. In a telautographic instrument, the combination of means for sending impulses of like polarity to line dependent in number upon the movement in extent of the transmitting-pen, means for producing a series of induced pulsations of successively opposite polarity, and means for moving the receiving-pen step by step operated by said to-and-fro induced pulsations, substantially as set forth.

2. In a telautographic instrument, the combination of means for sending impulses of like polarity to line dependent in number upon the movement in extent of the transmitting-pen, means for producing a series of induced pulsations of successively opposite polarity, means for moving the receiving-pen step by step operated by said to-and-fro induced pulsations, means for reversing the polarity of the said pulsations sent from the transmitter on reversal in direction of the movement of the transmitting-pen, and means for reversing the direction of movement of the receiving-pen controlled by said changes in polarity, substantially as set forth.

3. In a telautographic instrument, the combination of means for sending impulses of like polarity to two line-wires dependent in number respectively upon the movements in extent of the transmitting-pen in each of two directions of motion, means for producing two sets of induced impulses the successive im-

pulses of each set being of opposite polarity, and means for causing the movement in extent of the receiving-pen in two directions operated by said two sets of to-and-fro induced impulses respectively, substantially as set forth.

4. The combination of a telautographic receiving-pen and an escapement for controlling the movement of the same, a magnet-coil and armature for controlling the escapement, a contact-spring mounted on the armature, circuit connections whereby on the movement of the armature toward the coil the said contact-spring will operate to change the circuit of the coil so as to reduce the attraction of the coil for its armature, and a fixed stop against which said spring presses when drawn up, the joint effect of these features of construction causing a greater promptness in the next movement of the armature, substantially as described.

5. The combination of an escape-wheel, a vibrating lever carrying pawls for moving the escape-wheel, a spring for holding the pawls in either of two positions against the escape-wheel, and means for changing the action of the spring and consequently the position of the pawls so as to cause the wheel to be moved by the pawls in either direction, substantially as set forth.

6. The combination with an escape-wheel, a magnet and armature for the same having an extension provided with pawls for moving the escape-wheel, a spring for holding each pawl in either of two positions against the escape-wheel, means for changing the action of the spring and consequently the position of the pawls to cause the escape-wheel to be moved in opposite directions, and a magnet for controlling the last-mentioned means, substantially as set forth.

7. In a telautographic instrument the combination of a receiving-pen, an escapement for driving the pen, a spring for holding each pawl in either of two positions against the escape-wheel, means for changing the action of the spring and consequently the position of the pawls to cause the escape-wheel to be moved in either direction, and a reversing-magnet controlled in accordance with the direction of the transmitting-pen for controlling the positions of the pawls, substantially as set forth.

8. The combination of the escape-wheel with the two-legged pivoted pawl, the two legs occupying such a relation to each other that when either acts as a propeller the other acts as a stop, substantially as set forth.

9. The combination of the escape-wheel, the vibrating forked projection carrying the pivoted pawls, the spring 10 connected with the pawls at a distance from their pivots so as to determine their relations to the escape-wheel, and means for shifting the position of the spring, substantially as set forth.

10. The combination of the escape-wheel and pawls, the spring 10, forked rod 14, and the magnet H, substantially as set forth.

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

GEORGE S. TIFFANY.

Witnesses:
T. F. KEHOE,
G. M. BORST.