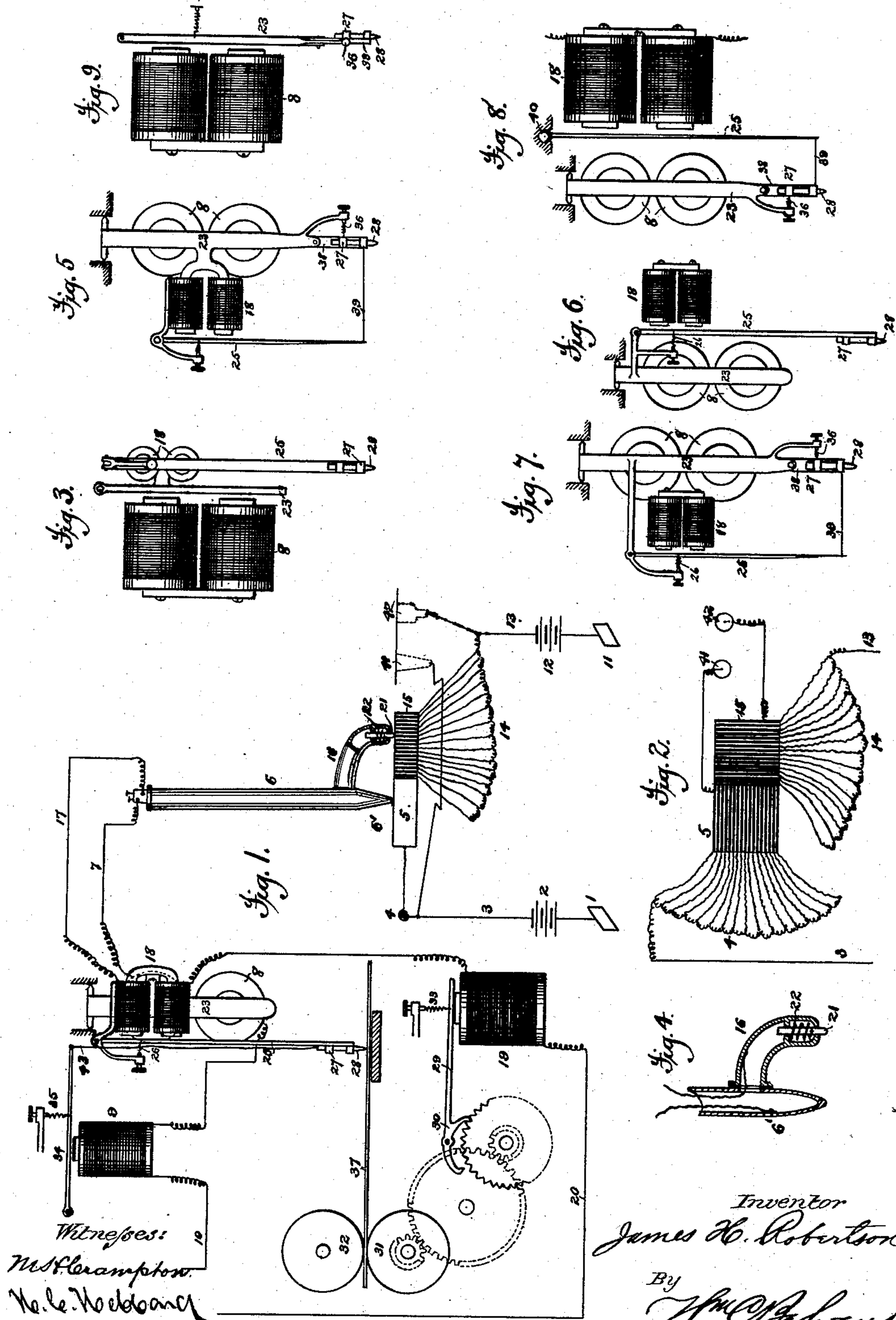


(No Model.)

J. H. ROBERTSON.
AUTOGRAPHIC TELEGRAPH.

No. 407,692.

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AUTOGRAPHIC TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 407,692, dated July 23, 1889.

Original application filed February 3, 1885, Serial No. 154,795. Divided and this application filed May 21, 1889. Serial No. 311,516. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. ROBERTSON, a citizen of the United States, and a resident of Rutherford, Bergen county, New Jersey, have invented a new and useful Improvement in Autographic Telegraphs, of which the following is a specification.

My invention relates to autographic telegraphs of the class in which the marking-point of the receiving-instrument moves in obedience to electric currents varied in force by the movements of the style or tracer of the sending-instrument; and it consists of the several combinations of parts hereinafter described and claimed.

In the accompanying drawings, which form a part of this specification, Figure 1 is a side elevation of an apparatus embodying my invention. Fig. 2 is a plan view of the two groups of conducting strips and resistances. Fig. 3 is an end view of the receiving-stylus-controlling magnets and armatures of Fig. 1. Fig. 4 is an enlarged detail view of the sending stylus or tracer. Figs. 5, 6, 7, 8, and 9 represent modifications, in which Fig. 9 is a side view of one of the two magnets and armatures shown in Fig. 8.

Referring to the drawings, 5 indicates a group of conducting-strips separated by suitable insulating material and constructed to present a smooth flat surface for writing with a stylus or contact-maker. Between every two adjacent strips a resistance, as 4, is introduced, which preferably consists of a coil of wire, but may have any other approved form. The several resistances are all connected together and to the wire 3 and battery 2, grounded at 1. A second group 15, in which the conducting-strips are arranged at right angles to those of the first group, is placed in proximity to the latter, as indicated in the drawings, and said strips are connected to resistances 14, as in group 5, and to the ground at 11 through battery 12 by wire 13. The stylus or contact-maker with which the characters are traced on the two groups of conducting-strips consists of a handle 6, held in the hand of the operator, and of an arm 16, secured thereto but insulated therefrom. The handle 6 of the stylus has contact-point 6',

which makes contact with group 5 and is connected with conductor 7, while the arm 16 cooperates with group 15 and is connected with conductor 17. By placing the two groups of conducting-strips side by side a short arm only is required and the operator can more readily keep both contact-points of the stylus in contact with said groups.

To still further guard against the possibility of one of the contact-points breaking contact with its group through careless handling of the stylus, I provide the arm of the stylus with a vertically-movable spring-pressed point or pin 21, which permits a certain amount of vertical movement of the arm without breaking the contact of the pin with its group of strips. The said pin or point is suitably guided in the arm and is caused to project by a spring 22, fastened at one end to the pin and at the other to the arm, said spring serving also to electrically connect the said parts. The handle or contact-point 6' of the stylus or contact-maker, which operates in fact as a circuit-closer, is connected by a conductor or wire 7 with an electro-magnet 8, the two poles of which act upon a light armature 23, pivoted in front of the same. Said armature carries a small and light electro-magnet 18, arranged at right angles and similar in form to electro-magnet 8, and also an armature, as 25, therefor. The latter, as illustrated, is pivoted to a support or arm secured to the side of its own electro-magnet. The armature is held in its normal position and is retracted to said position when its magnet ceases to be energized by an adjustable spring 26. Armature 23 is likewise connected to an adjustable spring. (Not shown.) The arm 16 of the stylus is connected by conductor or wire 17 with the electro-magnet 18, which operates the armature 25, the latter moving at right angles to armature 23.

To the armature 25 is loosely attached a pencil, pen, or other marking-instrument 28, which rests upon a strip of paper 37, on which the message is to be reproduced at the sending-station, a similar apparatus being located at the receiving-station. The duplication of the reproducing apparatus in the same circuits is to enable the operator to see what he has out-

lined on the conducting-strips, and a record to be preserved of the matter transmitted. The said marking-instrument passes through suitable guides 27 and rests on the paper by the force of gravity.

The operation of the mechanism so far described is as follows: The movement of the stylus across the strips of group 5 and at right angles thereto will gradually decrease the strength of the current circulating in the coils of electro-magnet 8, because of the gradual introduction of resistances into its circuit, and its retracting-spring will therefore gradually pull the armature 23 away from the said magnet, thus causing the stylus to make a straight line across the strip or ribbon of paper. While the armature 23 has thus moved across the paper the armature 25 has not altered its position relatively to its electro-magnet, for no variation in the resistance of its circuit has taken place. The armature 25 was, of course, attracted the instant the stylus made contact with the two groups of strips, but it remained in its attracted position during the said movement of armature 23. When the contact-maker is moved to cross the strips of group 15 at right angles, the resistance of the circuit of electro-magnet 18 is varied, and it will be understood without further explanation that a mark parallel with the strip of paper and at right angles to the mark first referred to is recorded on said strip. It should be noted that if straight lines are traced by the sending-stylus the recorded lines produced by the described mechanism are also straight lines and are not curved to any extent. In fact all lines or characters are and must necessarily be correctly reproduced thereby. This is essential to correct reproduction, especially of phonographic or stenographic characters. When the contact-maker is moved in a diagonal direction or in any direction other than at right angles to the strips, the strength of the current is varied in both circuits, and the marking-instrument will be controlled by the movements of both armatures and will trace a diagonal or curved line, as the case may be.

The paper 37, which constitutes the stationary recording-surface upon which the marking-pen reproduces the letters or characters, is preferably in the form of a ribbon. It remains stationary while the marking-pen is in operation and in the interval is fed forward step by step in the following manner: In the circuit controlled by the arm 16 of the stylus an electro-magnet 19 is included, whose armature 29 operates the pawl 30 of the escapement of a clock-work mechanism, consisting of a coiled spring and gear-wheels, which mechanism revolves one or both of a pair of pressure-rollers 31 and 32, between which the paper passes. When the arm 16 is in contact with the strips of group 15, the circuit is closed and the armature 29 attracted, but whenever the arm 16 is lifted the circuit of magnets 18 and 19 is broken, whereupon

the spring 33 retracts the armature 29, which operates the escapement and causes the paper to be fed forward.

To prevent the marking-instrument from marking the paper during the movement of the latter, I have devised the following means:

In the circuit with the contact-point 6' of the stylus I place an electro-magnet 9, whose armature is located above the marking-pen or pencil and from which the latter is suspended by a fine cord, wire, or thread 43. The length of the suspending-cord is so adjusted that the marking-pen will rest on the paper when the armature is attracted, but will be lifted therefrom upon the breaking of the circuit when the armature is retracted by spring 35. When, therefore, both contact-points of the stylus are lifted from the two groups of strips, the paper is fed forward and at the same time the marking-instrument is lifted.

It will be noticed that if only the contact-point 6' breaks its circuit the marking-pen is lifted, but the paper remains at rest. This construction permits the dotting of letter "i," the crossing of letter "t," and the proper formation of other letters which in ordinary writing require two or more independent strokes of the pen for their formation. In tracing the letter "t," for instance, the contact-point 6' is lifted after the body or stem of the letter has been formed, and then again brought into contact with the paper at the right place to trace the line for crossing the stem of said letter.

Generally in writing the sending style or tracer is lifted after the tracing of every letter, but two or three letters may be traced in succession without breaking the circuits. A greater number than that, however, unless of small size, cannot well be traced in the limited field provided by the strips.

The drawing shows only the instruments at the sending-station; but those at the receiving-station are duplicates thereof, the conductors or wires 10 and 20 leading thereto.

When the sending style or tracer is not in use, its contact-points are inserted in the socket 41 and 42, forming a pen or stylus supporter or receiver, which are made sufficiently deep to hold said stylus in an upright position, and are connected to ground, so that the two circuits will be closed when the marking-stylus—i. e., the sending-stylus—of the other station is in operation.

The mechanism for operating the marking-pen or receiving-stylus can be modified more or less. In Fig. 5 the marking-pen is attached to armature 23 instead of to armature 25, as in Fig. 1. It is not directly attached to said armature, but to a frame or support 38 pivoted thereto, which frame is connected by a flexible or a rigid connection 39 with the armature 25, so that the frame can partake of the movements of the latter. An adjustable spring, as 36, is employed to return the parts to normal position when the circuit is

broken. This modified mechanism also effects the correct reproduction of the lines traced.

In Figs. 6 and 7 the construction shown in Figs. 1 and 5 respectively is modified, so that both electro-magnets are stationary, thus relieving armature 23 of the weight of electro-magnet 18. While these modifications possess this advantage, they have the disadvantage that the armature is shifted laterally with reference to the poles of its magnet; but as this lateral displacement is but little relatively its effects can in practice be disregarded.

In Figs. 8 and 9 the frame 38 for carrying the stylus is pivoted to armature 23, and is connected by a flexible or rigid connection 39 with the end of armature 25, which latter (see Fig. 8) is hung by a universal joint 40 from a stationary support. In this case also armature 25 can move laterally with reference to its electro-magnet, although it is not directly pivoted to armature 23, as in Figs. 6 and 7.

It will be observed that one of the functions of the transmitting-stylus is to act at times as a member of a switch—that is to say, when it is lifted from the conducting-strips, where it is used for transmitting, to the pen-supporter it switches the transmitter out of circuit and switches in the receiver, the latter result being effected by the co-operation of the stylus with said pen-supporter. The switch or switch mechanism consists, therefore, of the stylus, which acts as the moving member of the switch, the conducting-strips of the transmitter, and the pen-supporter, the said conducting-strips being connected to the transmitter, and said pen-supporter being connected to the receiver, so that in moving the stylus from the former to the latter the transmitter is switched out of and the receiver is switched into the circuit.

I do not claim in this application, either generically or specifically, the combinations, with the pen-supporter, of the parts involved in switching the receiver into circuit, as the same is claimed in my application, Serial No. 154,795, filed February 3, 1885, of which this application is a division.

I am aware of United States Patent No. 217,588 to Edward A. Cowper, dated July 15, 1879, and what is therein shown and described is hereby disclaimed.

I am aware of Patent No. 5,957, dated December 5, 1848, to A. Bain; but I do not desire to lay claim to anything therein shown or described.

I am also aware of English Patent No. 1,242 of 1879, and what is therein shown and described I hereby disclaim.

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

1. In an autographic telegraph, two groups, placed side by side, of insulated conducting-strips connected to resistances, in combina-

tion with a contact-maker or circuit-closer in the form of a stylus the contact-points of which constitute the tracing-points, substantially as described.

2. In an autographic telegraph, the combination, with the receiving stylus or pen, of two electro-magnets and two armatures pivoted to move at right angles to each other, one of said armatures pivoted to the other and the said two armatures arranged to operate said stylus, whereby the latter is moved in a straight line by either of said magnets, substantially as described.

3. In an autographic telegraph, the combination, with the receiving stylus or pen, of two electro-magnets and two armatures pivoted to move at right angles to each other, one of said armatures pivoted to the other and carrying the said stylus, and the said two armatures arranged to operate said stylus, substantially as described.

4. In an autographic telegraph, the combination, with the receiving stylus or pen, of two electro-magnets and two armatures pivoted to move at right angles to each other, one of said armatures pivoted to the other and having its electro-magnet fastened to the latter, and the said two armatures arranged to operate said stylus, substantially as described.

5. In an autographic telegraph, the combination, with the receiving-stylus laterally movable in any direction, of the sending-stylus provided with two contact-points, an electro-magnet in circuit with one of the contact-points of the sending-stylus, and an armature therefor connected to the said receiving-stylus for lifting the latter from the paper, substantially as described.

6. The combination, with the receiving stylus or pen laterally movable in any direction, of the sending-stylus provided with two contact-points, an electro-magnet in circuit with one of the contact-points of the sending-stylus, an armature for said magnet, and a cord connecting the stylus with said armature for the purpose of lifting the said stylus when the circuit is broken and the spring has retracted said armature, substantially as described.

7. The combination, with the receiving-stylus and a pair of pressure-rollers between which the paper is held, of the sending-stylus provided with two contact-points, an electro-magnet in circuit with one of the contact-points of the sending-stylus, an armature therefor operating an escapement, and a spring and system of gears connected with said pressure-rollers for imparting an intermittent movement to the latter, substantially as described.

8. The combination, with the receiving-stylus and the pressure-rollers, of two electro-magnets and their armatures, one of said magnets arranged in circuit with one of the contact-points of the sending-stylus and the other magnet in circuit with the other

contact-point of said stylus, a connection from one of said armatures to the stylus for lifting the same, and an escapement of a clock-work mechanism geared with the pressure-rollers operated by the other armature for feeding the paper, substantially as described.

9. A combined sending stylus or tracer and contact-maker provided with two contact-points serving as tracers insulated from each other and constructed of a size and form to be held and operated by the hand, substantially as described.

10. A combined sending stylus or tracer and contact-maker constructed to be held and operated by hand, and provided with two contact-points, one of which is spring-seated, substantially as and for the purpose set forth.

11. A combined sending stylus or tracer and contact-maker constructed to be held and operated by hand, and provided with two contact-points insulated from each other, one of which consists of a pin suitably guided and pressed forward by a spring connected to said pin at one end and to the casing at the other, substantially as described.

12. A sending-stylus or contact-maker provided with two contact-points, one of which is formed on the handle constructed to be held in the hand and the other on an insulated arm extending from the same near the lower end thereof, substantially as described.

13. In an autographic telegraph, the combination of two magnets and two vertically-arranged armatures therefor pivoted so as to swing at right angles to each other, with a stylus or marking pen or pencil directly connected to the lower end of one of said armatures, substantially as described.

14. In an autographic telegraph, the combination, with a vertically-arranged armature provided with a guide attached to its lower end, of a marking-instrument loosely fitted in said guide, so as to freely move or slide therein, whereby the contact of the marking-instrument with the paper is insured during all the movements of the armature, substantially as described.

15. In an autographic telegraph, the com-

bination, with a receiving pen or stylus laterally movable in any direction and a set of electro-magnets and armatures for moving said receiving-pen, of paper-feeding mechanism and an electro-magnet for controlling the latter for feeding the paper at intervals, substantially as described.

16. In an autographic telegraph, the combination, with a receiving pen or stylus laterally movable in any direction, a set of electro-magnets and armatures for moving said receiving-pen, and a pen-lifting mechanism, of paper-feeding mechanism and an electro-magnet for controlling the latter for feeding the paper at intervals, substantially as described.

17. In an autographic telegraph, the combination, with the receiving-pen laterally movable in any direction and a set of electro-magnets and armatures for moving said receiving-pen, of a stationary recording-surface, such as paper, over which the pen moves to reproduce the message, a feeding mechanism for moving the paper at times when the writing is suspended, an electro-magnet for controlling said feeding mechanism, and electrical connections including said magnet, and a circuit making and breaking means at the transmitter, whereby the operator at the transmitter can control the shifting of the paper in the receiver, substantially as described.

18. In an autographic telegraph, the combination, with the receiving stylus or pen, of two electro-magnets and two armatures pivoted to move at right angles to each other and connected at their operative ends, one of said armatures carrying the other one, together with the latter's adjusting means, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 18th day of May, 1889.

JAMES H. ROBERTSON.

Witnesses:

W. H. BALL,
H. C. HEBBARD.