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THE AUTOGRAPHIC TELEGRAPH.

The accompanying engravings represent an autographic or copying telegraph instrument, the invention of Mr. Sylvester P. Denison, which is being introduced by the New York Auto-Telegraph Company, of 47 Broadway, this city. With the aid of these instruments, suitably connected by wires, it is possible for any one to send facsimile copies of messages from place to place. The message is written upon a narrow strip of bronzed paper, which is placed over a roller at one side of the instrument; the movement of a lever sends an electric current through the machine, out over the line, and through a second similar machine. The current moves a stylus, which vibrates rapidly over and in contact with the bronzed strip; each time the point in its passage across the paper meets the ink of the writing the current is broken, when a second current passes over the line to the other instrument and through a like stylus, moving back and forth across a strip of paper so prepared as to be discolored whenever the current passes through it. As the two styluses move absolutely in unison, the exact location of each particle of ink that causes a break in the current is reproduced, by electrolysis, on the chemically prepared strip at the second instrument.

The machine requires no attention beyond the switching of the current from the transmitting to the receiving side, as may be required.

Fig. 1 is a perspective view of the instrument, Fig. 2 is a plan view, showing the arrangement of the various parts, and Fig. 3 shows the construction of the mechanism for feeding the strips of paper, and the pole changer. Each instrument is provided with two sets of operating parts, permanently fixed on either side of the feeding device, one to be used for transmitting and the other for receiving, and the connections are so made that when one side is in use the other is switched out of the circuit.

The electro-magnets, E E′, are attached by screws to the permanent magnets, D D′, which are connected in pairs so as to form practically but one, and which are similarly located as to their poles. The electro-magnets can be advanced or withdrawn by the screws. The armatures, H H′, are pivoted so as to vibrate, and are furnished with the rebounding springs, *d d′*, which, by the motions of the armatures, are brought alternately in contact with the screws, *e e′*, set in the ends of the permanent magnets. Fixed to one end of the armatures, and insulated from them, are the contact springs, J J′, the free ends of which act on the relay points, *g g′*, set in the posts, K K′, and connected on the under side by wires to the two field magnets, U U′, in such a manner as at each vibration to bring these magnets alternately into the circuit of a local battery. Secured to, but isolated from, the armature pivots are the arms, L L′, having at their extremities the electrodes or styluses, M M′, arranged to maintain a delicate contact with the paper as they vibrate over its surface.

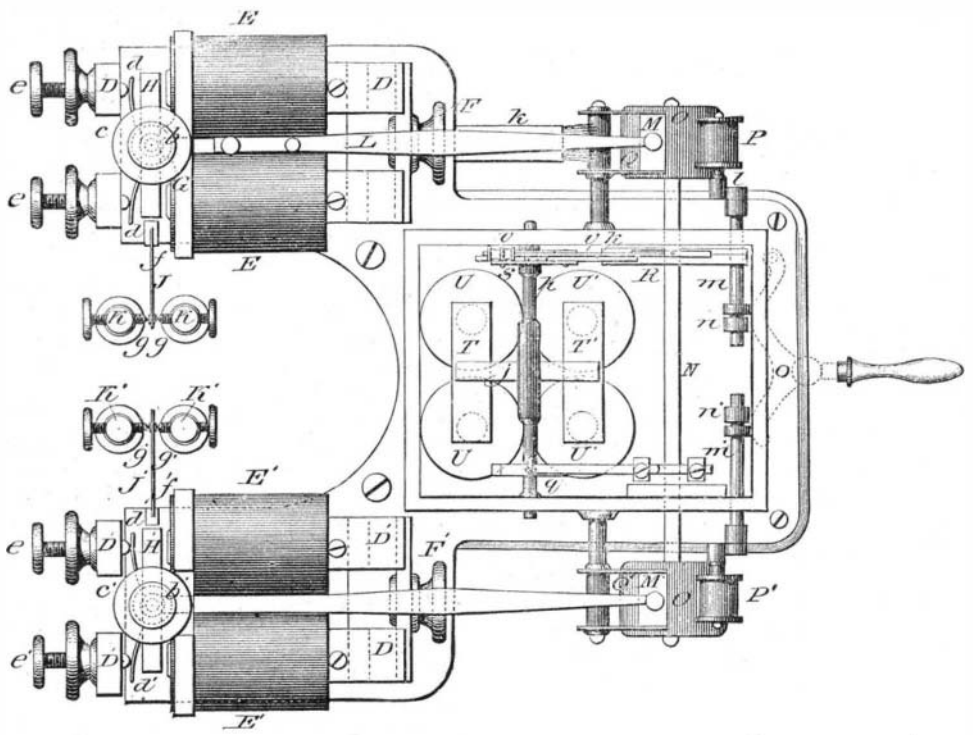


Fig. 2.—PLAN VIEW SHOWING ARRANGEMENT OF PARTS.

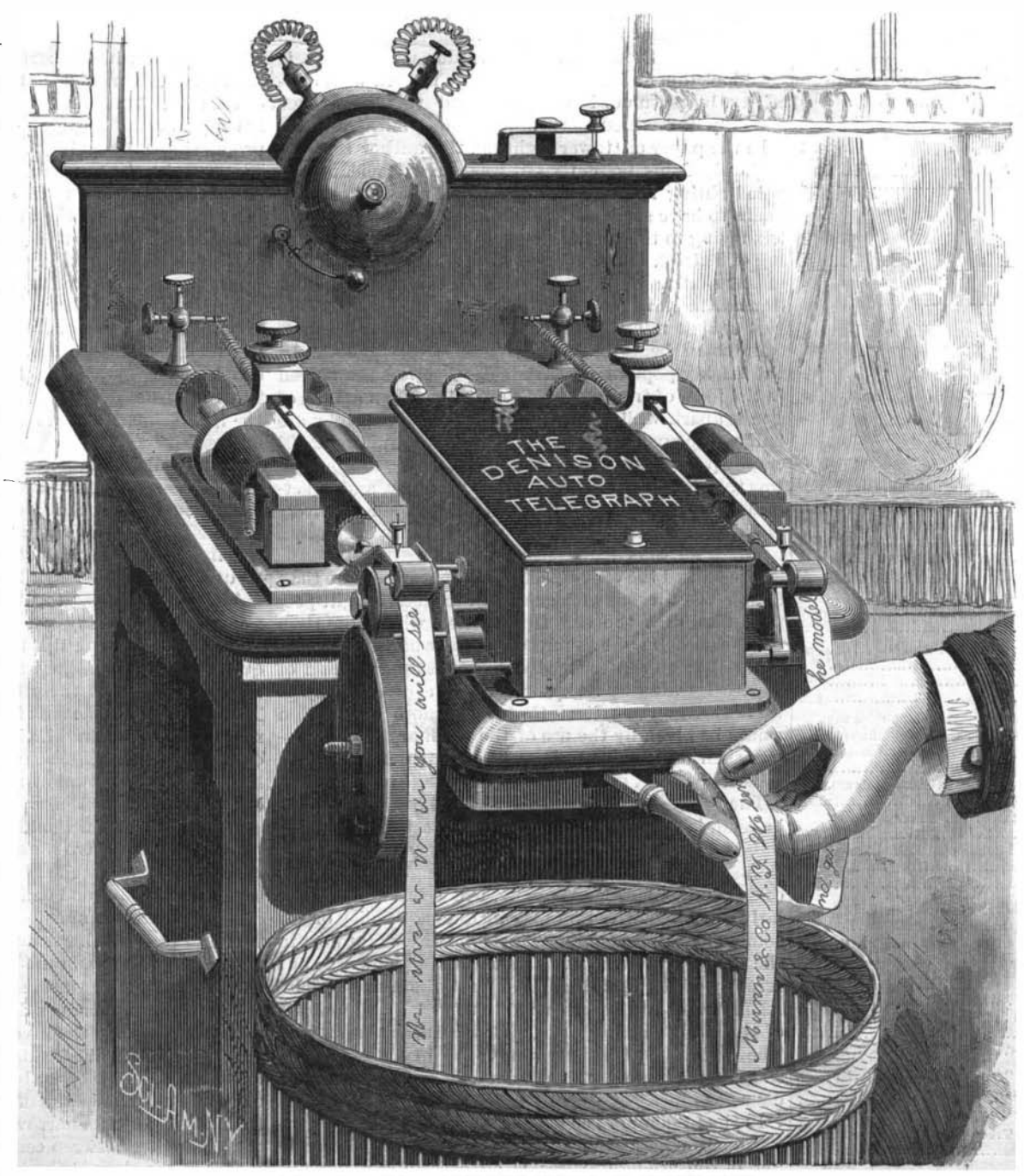


Fig. 1.—THE AUTOGRAPHIC TELEGRAPH.

The feed mechanism is mostly contained in the box, C, and consists of the magnets, U U′, their connected armatures, T T′, which, as the magnets are alternately energized, impart a tilting or rocking motion to the shaft, *h*, to which they are fixed, the lever, S, also fixed to the shaft, pawls, *k k′*, ratchet wheel, R, and the escapement, V, with its connecting levers. As the rocking motion is imparted to the lever, S, the pawls engage alternately in the teeth of the wheel and cause it and its shaft to revolve step by step. By means of the escapement only one tooth is allowed to pass at each movement, thereby preventing irregularity of the feed. The shaft, N, extends through the sides of the box, and on each end it carries one of the feed rollers, O O′, which are about the width of the paper strip; they are adjusted so that their center line is opposite the electrodes, M M′, when the latter are at rest. The friction rollers, P P′, turn freely on spindles set in the arms, *l l′*, attached to the shafts, *m m′*, which have arms, *n n′*, extending down through slots in the base, so that the cam lever, *o*, as it is moved to the right or left will alternately bring one of the rollers in sufficiently close contact with one of the feed rollers to firmly grip the strip of paper, while the other is removed to leave the paper free. Thus while both feed rollers are constantly revolving, when the machine is being operated, only one strip of paper is feeding. The strips of paper are guided by metal plates, Q Q′, supported on studs secured in the sides of the box. On the transmitting side a wire brush maintains a metallic connection continually on the transmitting strip; the brush is thrown back when that side of the instrument is not in use.

The pole changer has three plates on the periphery of a wheel and two contact rollers, as shown in Fig. 3. A rocking motion, sufficient to carry alternate plates under the two rollers, is imparted to the wheel by an arm, *r*, attached to the rocking shaft, *h*. This motion reverses the polarity of the line in which the magnet, E or E′, is placed and causes the armatures, H or H′, to vibrate one stroke, and by the contact spring, J J′, and one of the relay points, *g* or *g′*, to actuate the opposite pair of the feed magnets, U U′, which by attracting its armature rocks the shaft, *h*, in the reverse direction, when the arm, *r*,

(*Continued on page* 132.)

THE AUTOGRAPHIC TELEGRAPH.

(*Continued from first page*).

turns the wheel so as to bring the plates back to their former position. This is repeated again and again as fast as the power of the current and arrangement of the parts will allow.

On the underside of the bed, A, is a switch, operated by the handle shown in Fig. 2, which throws the currents of the several circuits used into either the transmitting or receiving side. Each machine is provided with wires leading to the switches from the binding posts, where the line and battery wires enter, so arranged that the currents will only be closed through theline and local circuits when the transmitting side in one machine and the receiving side in the other are thrown in by their respective switches. A separate wire is used for the transmission and recording of messages. The current from the battery enters the machine, and is carried through the switch to the insulated arm, L, then through the stylus to the transmitting strip, then to the brush and to the second line wire. At the receiving machine it is directed by the switch to the arm (in Figs. 1 and 2 the receiving and transmitting sides are reversed), then through the stylus and receiving paper to the guide, Q', and to the ground. Where the stylus on the transmitting strips encounters only the tinned surface, the current passes through a local circuit, that presenting the lesser resistance; but where it meets the ink the local circuit is broken, and the current passes over the line to the other instrument, that being the only route it can then take.

The strip having the characters written upon it is placed on the transmitting side, and the cam lever, *o*, is moved to bring the friction roller down on the strip and close the circuits through that side; at the distant machine this operation is reversed. The pole changer begins to work, actuating the magnets, E, of one machine and E' of the other at the same instant, so as to cause the armatures to vibrate together. The arms, L L', are vibrated over the surface of their respective strips. The springs, J and J', alternately energize the feed magnets, U U', thereby keeping the pole changer in operation and driving the feed mechanism, so that the paper in each machine is fed forward one step at each vibration. When the transmitting slip has passed through, the handle of the lever is moved to the other side, when the instrument is in readiness to receive a message from the other end of the line.

When not in use, both machines are so set, by properly shifting the switch lever, that an entering current will pass through the receiving side; therefore, when it is desired to send a message from either end of the line, all that is necessary is to shift the switch so that the current will pass through the transmitting side of the sending instrument. Upon shifting the switch to throw the current through the receiving side of the instrument that had been used to transmit, upon the completion of the message the circuits are all broken, and either instrument is in readiness to be uesd either as a receiver or transmitter. Consequently the instruments require no attention whatever except when transmitting, and then only the sending one.

Having thus described the mechanical parts of the invention, we will add that we have witnessed its practical operation at the office of the company with the deepest interest. It promises greatly to modify, if it does not revolutionize, the present modes of telegraphic transmission. The inventor, Mr. Denison, is a young man of only 24 years, self-taught in the sciences. He is evidently gifted with remarkable talents and ingenuity, and in presenting this most useful discovery to the public he deserves the highest honors.

The New York Auto-Telegraph Company will, as speedily as possible, furnish facilities for intercommunication between any desired points, by means of wires and instruments that will enable the users to send facsimile copies of written messages from place to place in substantially the same manner as telephonic messages are now sent.

It is not supposed that the new invention will take the place of or curtail the use of the telephone, but it will fill a want that may be said to have been created by the use of the telephone, and enable people to send written messages in relation to their business operations in the same manner and with the same facility that they now send verbal ones. The advantage is evident, in that it leaves a record of the business transacted and avoids all mistakes of memory or misunderstanding.

The almost instant autographic communication between the presidents or cashiers of banks in every part of the city, with each other, or with the Clearing House, that is made possible by these instruments will be of very great advantage in the conduct of their affairs. And in every other kind of business where the instantaneous transmission of exact communications in written characters to distant points, instead of employing the slow medium of the mails or messengers, or the telephone which leaves no record of what is sent, is of importance, the use of the machines will be of the greatest value.

It is impossible to enumerate the uses to which a teleautograph machine of this character can be adapted or found valuable. The machine itself in its general appearance is not unlike a stock indicator, or "ticker,"

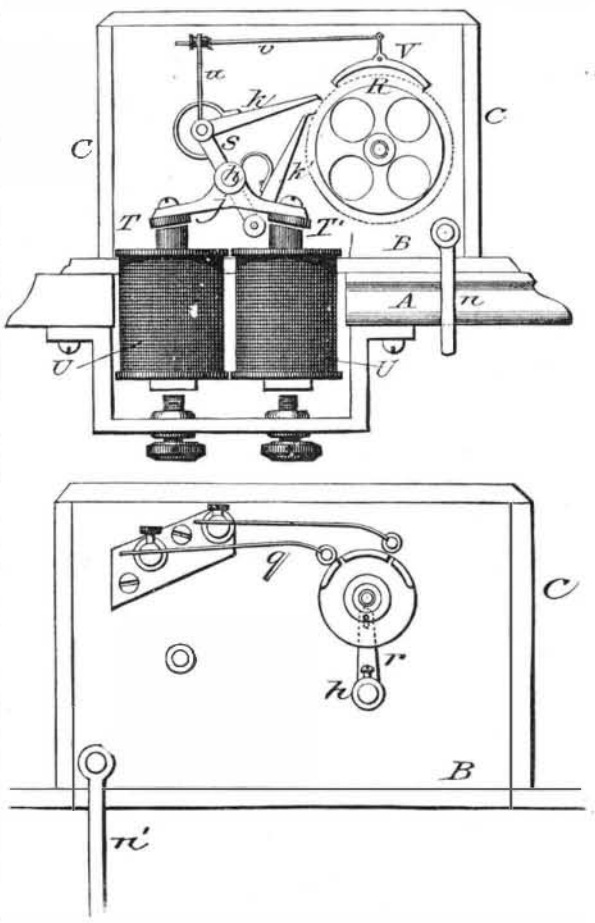


Fig. 3.—POLE CHANGER AND FEED MECHANISM.

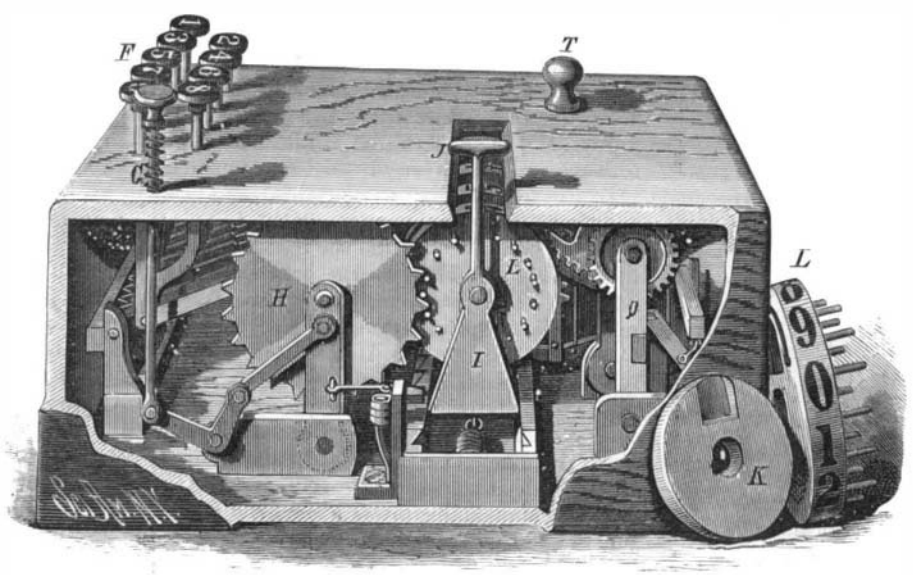
used in brokers' offices. The messages are written and received on continuous strips of paper, the roll of receiving paper being suspended beneath instead of above the machine, as in the "ticker." The roll of transmitting paper stands on the desk of the user, where he can write messages at his convenience, and at any length he desires.

The transmitting paper is a common thin paper, tinned or bronzed on one side, such as is sold in the market in great rolls for use in ornamenting the corners of paper boxes and other cheap articles. The ink used is common ink, with a little silicate of soda or potash added. When the message is written, it is torn off from the roll and taken to the machine, where one end is placed in the transmitting side. By lifting for a moment a small spring latch, which grips the end, and then by moving a small lever, the instrument is set in operation. No clockwork weights or springs are used in producing the motion or operation of the various parts, only a simple arrangement of electro and permanent magnets, operated entirely by the current on the line, and a local battery contained in a box, which forms the pedestal on which the instrument stands. Any child can insert the message and start the machine. The message may be sent backward or forward, and be written in English, German, Chinese, shorthand, or any other characters.

The machines are so arranged that when a wire circuit is established between any two of them, with a light battery, both machines are started in motion at once by the lever of the transmitting instrument; and as the written message passes through its machine (as it does in a manner very like the tape in an ordinary "ticker"), a strip of receiving paper passes through the receiving instrument, on its receiving side, and an exact facsimile copy of the characters on the written message is produced on the white receiving strip. As each instrument has a transmitting and receiving side, it can be used alternately to transmit and receive as desired.

ADDING MACHINE.

The entire mechanism is contained in a box on the bottom of which are pivoted two standards, having a shaft journaled in their upper ends. On the shaft are rigidly mounted nine ratchet wheels, adjoining each of which is a lever mounted to rock on the shaft, and having a pawl pressed by a spring against the teeth of its wheel. Each lever is connected by a wire with an arm pivoted on a standard, and pressed upward by a spring. The wires and arms are of different lengths, so that from the same vertical throw of the different arms the ratchet wheels connected therewith will be turned different distances. Rods or push pins project upward through the top of the box, and are provided with heads, F, arranged in two rows, the even numbers being in one row, and the odd numbers in the other. One of the pivoted standards is connected by a rod and elbow lever with a push pin, G, having a head at its upper end; this push pin is pressed upward by a spiral spring. The wheel, H, is rigidly mounted on the shaft, and is provided on its rim with triangular teeth. Two standards, I, united by a bottom plate, slide transversely on a support in the bottom of the box, and carry a shaft on which hubs, K, are rigidly mounted. Adjoining each hub is a loosely mounted wheel, L, having a circular row of ten pins projecting over the hub corresponding to the wheel, and between these are nine shorter pins arranged so that a blank space will be left between two of the longer pins. On that surface of each wheel, L, opposite the one from which the pins project is pivoted a pawl, the free end of which is connected with a spring throwing the outer end of the pawl outward, so that when it comes opposite the recess in the hub, K, it can enter the recess and engage with the long pins of the next wheel. From one of the standards, I, an arm, J, projects upward through a transverse slot in the top of the box. On the rim of each wheel are the numbers 1 to 0 inclusive. A pawl pivoted on a standard, and pressing against a rack formed on the front edge of the plate uniting the standards, I, is connected by a wire with the pivoted standard. In the rear of the box are two standards, Q, pivoted to swing in a vertical plane, and united by a cross piece and a shaft journaled in the top. On the shaft are mounted as many cog-wheels as there are wheels, L, the cog-wheels passing in between the wheels, L, and engaging with the long and short pins. On one end of this shaft is a pinion engaging with a gear pivoted on one of the standards, Q, and an arm, this gear being connected by a fixed cam with a pinion. Sliding vertically in a standard is a bar, T, projecting through the top of the box. This bar is so connected that by properly manipulating it the numbered wheels may be made to show 0 in the opening; the cog-wheels refusing to move the wheels, L, when the teeth meet the vacant space between the pins.



MACNIDER'S ADDING MACHINE.

The push pins, F, are all depressed the same distance, and throw the levers through the same arc; and as the levers vary in length, the arms connected therewith will be thrown different distances. If the push pin, 2, be depressed, its wheel will move two teeth, and if 8 be depressed, its wheel will move eight teeth, and so on. To add the numbers 2, 1, 5, and 3, the proper pins are depressed successively, and the wheel, H, is moved eleven teeth. When the first wheel has revolved ten teeth, its pawl passes into the recess in the adjoining hub, and the second wheel is turned one space, so that the number 11 will show through the slot. The first wheel is no longer needed, and is shifted out of use by pushing the rod, G, downward, whereby the wheel, H, is disengaged from the first wheel, L, and a spring is allowed to pull the carriage carrying the standards, I, one tooth on the rack, when the wheel, H, will engage with the second wheel, L. The second column is added, and then the wheels are shifted again.

This invention was patented by the late Mr. Wm. J. Macnider; particulars can be obtained from Mr. Q. Macnider, of Greensborough, Georgia.

MR. GREENFELL'S explorations on the Mobangi prove it to be the greatest tributary to the Congo, and navigable for 400 to 450 miles.