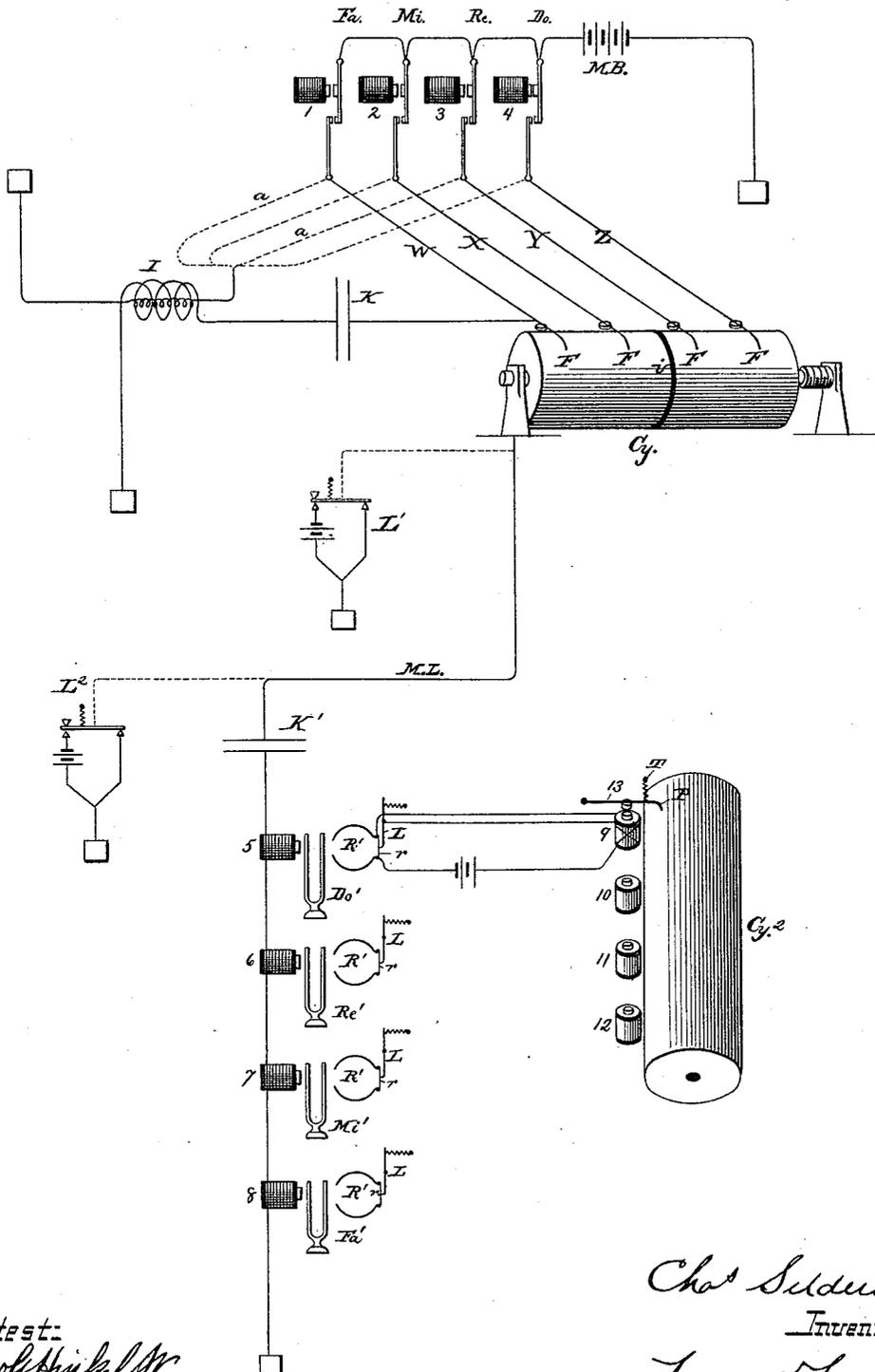


(No Model.)

C. SELDEN.
AUTOMATIC TELEGRAPHY.

No. 365,103.

Patented June 21, 1887.



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UNITED STATES PATENT OFFICE.

CHARLES SELDEN, OF BALTIMORE, MARYLAND, ASSIGNOR TO HIMSELF AND WILLIAM T. BARNARD, OF SAME PLACE, AND FRANÇOIS VAN RYSSELBERGHE, OF BRUSSELS, BELGIUM.

AUTOMATIC TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 365,103, dated June 21, 1887.

Application filed September 28, 1886. Serial No. 214,782. (No model.)

To all whom it may concern:

Be it known that I, CHARLES SELDEN, a citizen of the United States, and a resident of the city of Baltimore, and State of Maryland, have invented a new and useful Improvement in Automatic and Autographic Telegraphy, of which the following is a specification.

I am aware of the efforts made by Casseli, Wheatstone, and others in the art of automatic and autographic telegraphy.

My invention relates more to autographic than automatic, and yet it may be said to be a combination of both. I utilize the transmission of electrical pulsations in such a manner as to increase largely the facilities of a single wire by means of devices hereinafter explained, whereby I transmit fac-similes in a much more rapid manner than has heretofore been possible, and my invention may also be utilized to operate a type-writer, a typesetting machine, and perform other kinds of work.

I am aware that other inventors have used a system of harmonic telegraphy for the purpose of transmission of Morse signals, employing certain devices such as I now use to a certain extent; but their success was limited, and the number of tones that were distinguishable in the receiver was so limited that practically the facilities of the wire were not increased very largely. By the combination which I make the receiving-operator would not have to depend upon a tone, but even if he did, the separation of tones by means of resonators which I use, would enable me by such a system to transmit a larger number of messages in the Morse code than have been done heretofore. I recite this simply to make as plain as possible the fact that it is practicable to separate a number of sounds which are being produced in a receiver or a set of receivers, and by means of resonators properly located in relation to the receiver, and to make effective upon a certain instrument one tone only out of a number that are being sent, and this instrument being actuated by such tone com-

pletes certain local movements which enable certain kinds of work to be performed.

In the accompanying drawing, I have represented diagrammatically a transmitting and receiving station equipped with one form of apparatus constructed in accordance with my invention.

I have shown four vibrating transmitters or circuit-controllers, 1 2 3 4. They are shown here as though continuously operated by the influence of magnets in a well-known way; but they may be operated mechanically, or in any way that may be deemed the most economic. A main battery, M B, is used, one pole of which is connected to earth and the other pole to the armature of each of the vibrators, and from the contacts connection is made with a cylinder, CY, through the media of wires W X Y Z and the fingers F F F F, which rest upon said cylinder CY, and when these fingers are in connection with the cylinder in such a manner as to admit of the passage of the current, the current passes by way of the cylinder to the main line, thence through the receiving-magnets 5 6 7 8, and to the earth. For convenience' sake but one complete local apparatus is shown at the receiving-station. This works in connection with the cylinder CY², which is not in electrical connection with either the main line or any of the devices, except that I propose to either rotate both cylinders CY and CY², or to release them so as to admit of their being rotated by means of the action of a magnet which shall be operated by one of the tones passing over the main line.

CY represents a cylinder so arranged that upon it may be placed a message written with insulating-ink upon a conducting-surface, or with conducting-ink upon an insulating-surface, or there may be a stencil placed upon the cylinder, which would serve all purposes.

The receiving apparatus consists of a number of magnets, 5, 6, 7, and 8, (although, as above stated, one might perform all the service,) and these magnets have for an armature a tuning fork or reed, preferably each one attuned in unison with one of the notes trans-

mitted from the transmitting-station by one of the vibrating circuit-controllers. In proximity to the tuning-fork is a resonator, RI, (Helmholtz pattern preferred,) having in addition to its usual manufacture a diaphragm, *r*, made of any flexible material. Bearing upon the diaphragm, when made of conducting material, or upon a metallic strip applied to the same when made of insulating material, is a point carried by the end of a lever, L, in such a way as to admit of the passage of the electric current through it when in contact, the contact being governed by a tensile spring, as shown. A differentialized magnet, 9, in a local circuit, with an armature, 13, having upon it a pen or stylus, P, is so connected electrically that when the diaphragm of the resonator and the point upon the lever L are in a state of unrest one of the circuits of the differentialized magnet is broken, or its resistance is much increased, so that the magnet attracts its armature, and the armature being attracted brings the pen or pencil which it carries into contact with the paper which is on cylinder CY².

The cylinders CY and CY² are presumed to revolve with about the same velocity, although absolute synchronism is not necessary, and while revolving slowly they feed forward, so that if cylinder CY is allowed to revolve for a given time the fingers F F F F will have traversed the entire surface presented upon the cylinder and within about the same time. The pencils or pens upon the armatures of the differentialized magnets 9 10 11 12 would have traversed cylinder CY² had they been at all times in contact with it.

The operation of the device is as follows: Assuming that the paper on the cylinder CY is a non-conductor, except at such points as conducting-ink may have been placed upon it, and that by proper mechanism both of the cylinders have been started in motion, every time that finger F connected with line Z comes in contact with the ink on the cylinder, the vibrators being in motion, the tone "Do" will be transmitted to line, and this tone will affect alike all of the receiving-magnets 5, 6, 7, and 8, and they will all attract their armatures to some degree. The armature, however, that will receive the pulsations the strongest will be the one tuned to that note—namely, Do—and its resonator RI being tuned to the same note it will amplify that note, and its vibrating diaphragm *r* will cause a variation in the local circuit of the differential magnet 9, which will attract its armature, and the point *p* will be brought into contact with the paper on the cylinder CY² and remain there just as long as that particular tone is being transmitted to line. What is true of this one tone is true of the other tones, and true of all tones which are transmitted.

For convenience the local arrangement at the receiving-station is shown for only one magnet; but it will readily be understood by those versed in the art that the same arrange-

ment may be multiplied as many times as may be desired.

Up to this time I have dealt with the matter as though working directly upon the main line, and I will now go further into another branch of this field.

The dotted lines *a* (shown at the transmitting-station) represent wires similar to W, X, Y, and Z, which in this instance are attached to the primary coil of an inductorium, I. The other end of the primary may be connected with the earth, as shown, or may return to the other pole of the battery, as may be desired. One end of the secondary coil of the inductorium is connected to the earth and the other to one side of a condenser, K, and the other side of the condenser is connected to one or all of the fingers F, the lines W X Y Z in this instance being broken.

In practice it may be best to have a separate condenser for each finger. I thus transmit to the main line induced currents from a derived circuit rather than direct currents from a battery. In case the induced method is used, then the receiving-station with its instruments may be connected to one side of a condenser, K', the other side of which is connected to the main line, and the main line may be extended, as indicated at L' L', and be operated by the usual Morse methods at the same time that the autographic method is being operated upon the derived circuits. Thus it will be seen that by the utilization of harmonic tones and by sending corresponding electrical pulsations to the line through the cylinder, as described, and in connection with the receiving-instruments, resonators, and local circuits operated by the resonator, a perfect fac-simile of what is placed on the cylinder CY will be produced upon cylinder CY².

Having shown that by this method it is possible to actuate magnets in a local circuit which shall attract the armatures and cause the pens affixed thereto to indite, it will be seen that the same magnets may be arranged to manipulate the keys of a type-writer, a type-setting machine having keys, or by their action in turn complete other local arrangements to perform many kinds of work.

The great desideratum in automatic or autographic telegraphy is the time consumed in which a certain amount of work may be performed. Heretofore, so far as I know, harmonic tones sending electrical vibrations to line have never been used for the purpose of automatic or autographic telegraphy, and I, by reason of the peculiar combination of resonators, am able to separate and utilize more tones than has heretofore been done, and I propose by my invention to not be limited to the use of but one line only for the purpose of securing a fac-simile at the receiving-station. Therefore I arrange the cylinder CY in sections, each section being insulated, as shown at *i*, from the other, and if the capacity of one line-wire will only admit of the transmission of eight separate and distinct tones, I connect one line to

one section of the cylinder and another line to another section of the cylinder CY. Then this same cylinder CY, having upon it one original, may be used to transmit over two line-wires at the same time, in which case, at the receiving end of the line, I would have sixteen receiving-instruments, eight being connected through one line and eight being connected through another line, but with all their local differentialized magnets arranged in such a way as to indite with their pens upon the cylinder CY².

Having thus explained how two line-wires may be utilized, it must be plain that any number of wires may be used, and thus the transmission be secured within a given time. I do not confine myself to the use of the cylinder for the purpose named, as other devices in section or not could be operated for the same purpose. Where cylinders are used, however, they should be made so as to be easily taken off and replaced with others, so that as soon as one original has been transmitted the cylinder may be removed and replaced with another, thus admitting of the first fac-simile being removed while the other is in transit, or the cylinder may be arranged like those upon a printing-press, so that by the use of proper devices original and fac simile would be clasped on and taken off almost instantly.

I do not show the mechanism by means of which the cylinders are to be rotated and sent forward, and after having gone the required distance are set back automatically to their normal position, as that is more a matter of mechanical detail, and is not necessary to be commented upon at this time.

Up to this time the subject has been treated as though we had been using in transmission insulated paper upon which is placed a conducting-ink, in which case normally the circuit upon the main line would be open and the receiving-instrument at rest. If, however, it is desired to use a conducting-paper, the ink upon which is an insulator, then all that would be necessary would be to change the position of the cylinder CY² in reference to the pens carried upon the armatures of the differential magnets, so that the cylinder would be indited upon when the differential magnets were not attracting their armatures, and, normally, there would be current going to the line from all of the tones, all of the differential magnets would be charged, and when any of the tones ceased neutrality would ensue in the differential magnets, and by the action of spring T the point would be brought into contact with the cylinder. I do not confine myself to the use of differential local magnets in combination with a resonator, as shown, as the same action may be had by placing a common magnet in a shunt-circuit or in a Wheatstone bridge, when the action of the points upon the armature and upon the diaphragm would have a tendency to break the shunt or to vary the resistance of one arm of the bridge, as

will be clearly understood by those skilled in the art.

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

1. As an improvement in the art of autographic telegraphy, the method, substantially as hereinbefore described, which consists in causing superimposed series of electric impulses controlled by the original to be transmitted to pass over a line, then causing each series separately to generate acoustical vibrations at the receiving-station, and utilizing said vibrations to produce the fac-simile.

2. As an improvement in the art of autographic telegraphy, the method, substantially as hereinbefore described, which consists in causing superimposed series of electrical impulses controlled by an original to be transmitted to pass over a line, then translating each series separately into acoustical vibrations, then retranslating the latter into magnetical vibrations and utilizing these to produce the fac simile.

3. The combination, with a series of differently-tuned circuit-controlling vibrators sending impulses to the line, of an original controlling said impulses, acoustical apparatus responsive to said impulses, and inditing devices controlled by the acoustical apparatus, substantially as described.

4. The combination, with a series of differently-tuned circuit-controlling vibrators sending impulses to line, said impulses being controlled by an original, of acoustical receivers tuned to correspond with the vibrators, electro-magnets controlled by said receivers, and inditing-levers operated by said magnets, substantially as described.

5. In an autographic telegraph, the combination of a series of differently-tuned circuit-controlling vibrators, all connected in the same circuit, a moving original formed of conducting and non-conducting parts, and contacts bearing upon the same, each connected to one of the circuit-controllers, and acoustical receivers tuned to correspond with the vibrators, substantially as described.

6. In an autographic telegraph, a cylinder carrying the original to be transmitted, divided into sections insulated from each other, in combination with a series of contact-fingers bearing upon each of the insulated sections, and a tuned circuit-controlling vibrator for each finger, substantially as described.

7. The combination, with a tuned reed or tuning-fork, of a similarly-tuned resonator provided with a diaphragm, and circuit-controlling devices operated by said diaphragm, substantially as described.

8. The combination, with a tuned reed or tuning-fork, of a similarly-tuned resonator provided with a diaphragm, a circuit-controller operated by said diaphragm, and an electro-magnet in said circuit, substantially as described.

9. The combination, with a series of tuned

reeds or tuning-forks, of a series of similarly-tuned resonators, each provided with a diaphragm, circuit-controllers operated by said diaphragms, and a series of electro-magnets arranged for joint operation, substantially as described.

In testimony whereof I have signed my

name to this specification in the presence of two subscribing witnesses.

CHARLES SELDEN.

Witnesses:

L. A. BURCK,
F. L. FREEMAN.