

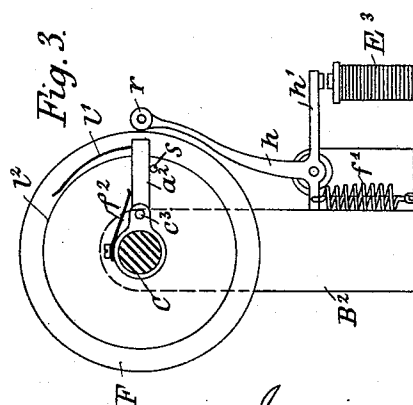
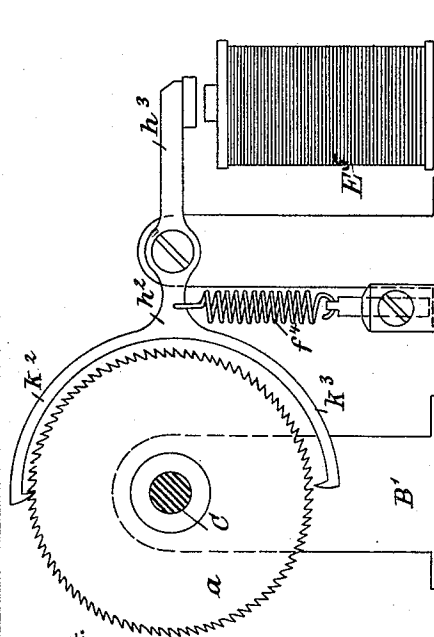
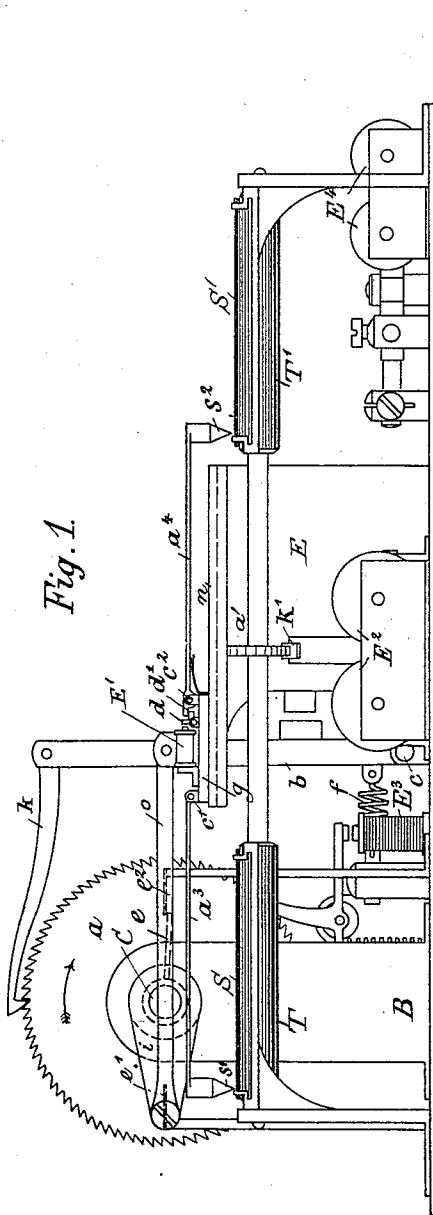
(No Model.)

3 Sheets—Sheet 1.

M. SOBLIK.
TELAUTOGRAPH.

No. 461,152.

Patented Oct. 13, 1891.



Witnesses:
Walter Allen
William H. Chadsey

Inventor.
Max Soblik.
by Herbert H. Jenner.
Attorney.

(No Model.)

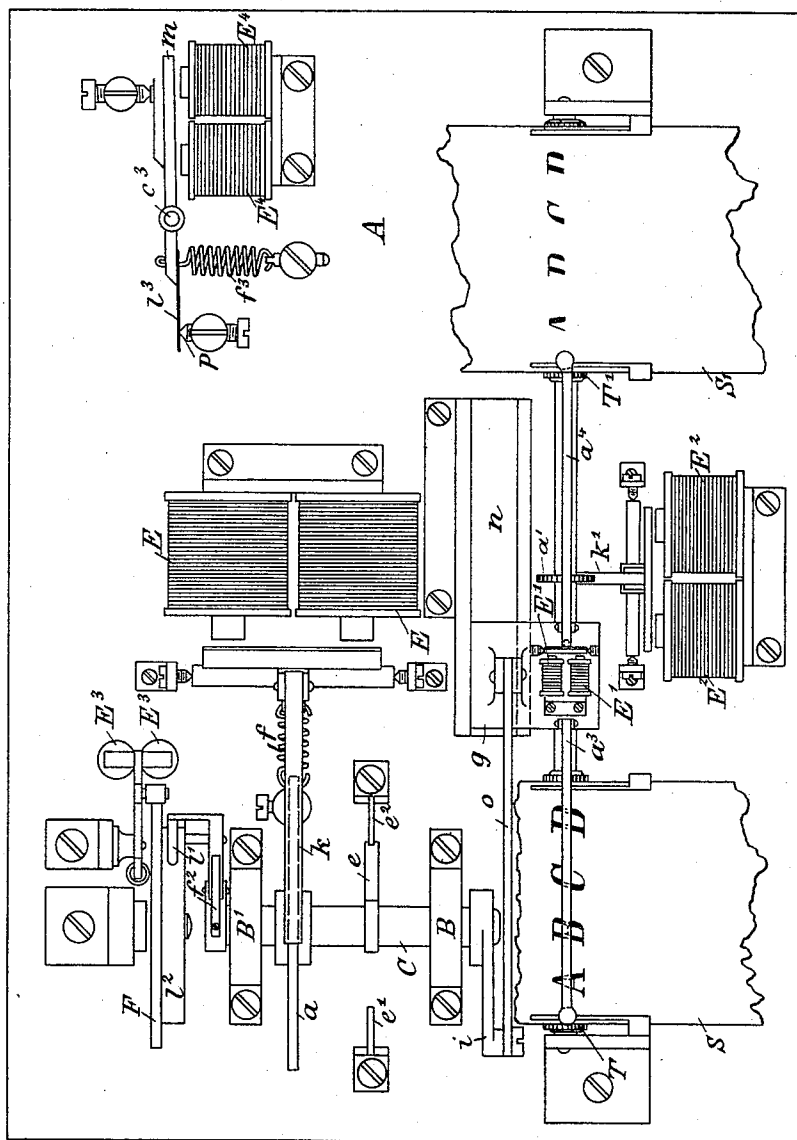
3 Sheets—Sheet 2.

M. SOBLIK.
TELAUTOGRAPH.

No. 461,152.

Patented Oct. 13, 1891.

Fig. 2.



Witnesses:
Walter Allen
William H. Chadsey

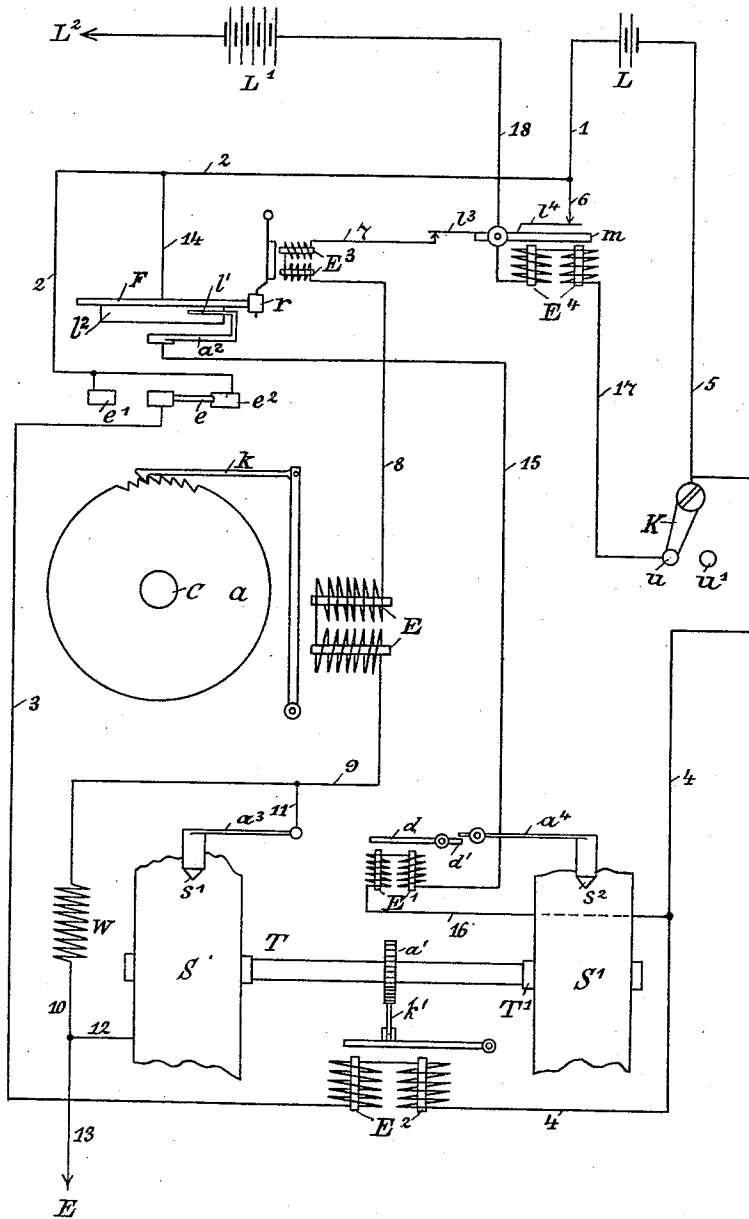
Inventor.
Max Soblik.
by Herbert W. Jenner.
Attorney.

M. SOBLIK.
TELAUTOGRAPH.

No. 461,152.

Patented Oct. 13, 1891.

Fig. 5.



Witnesses:

Walter Allen
William H. Chadsey

Inventor.

Max Soblik.
by Herbert W. Jenner.
Attorney.

UNITED STATES PATENT OFFICE.

MAX SOBLIK, OF BERLIN, GERMANY, ASSIGNOR TO PAUL ADOLPH, OF SAME PLACE.

TELAUTOGRAPH.

SPECIFICATION forming part of Letters Patent No. 461,152, dated October 13, 1891.

Application filed March 23, 1891. Serial No. 386,070. (No model.)

To all whom it may concern:

Be it known that I, MAX SOBLIK, engineer, a subject of the King of Prussia and German Emperor, residing at Berlin, in the Kingdom of Prussia and German Empire, have invented certain new and useful Improvements in Telautographs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to devices whereby drawings, plans, manuscripts, printed matter, and the like may be exactly reproduced at a distance; and it mainly consists in arranging a shaft both at the transmitting and receiving stations, so that both shafts are set in motion simultaneously by means of an electric current, and thereby cause two pins or styles to reciprocate in a simultaneous and identical manner, one of which is guided at the transmitting-station by an insulating-surface having the design or writing to be copied formed upon it, so that certain modifications in the electrical resistance and consequent electrical undulations are produced, whereas the other style, arranged at the receiving-station, is alternately moved by the said electrical undulations to and from the surface to be written or drawn upon. In this manner a precise copy of the drawing, writing, or type arranged upon the guiding-surface at the transmitting-station is obtained at the receiving-station.

In the accompanying drawings, Figure 1 is a side elevation of the instrument. Fig. 2 is a plan thereof. Fig. 3 is a detail view of a contact arrangement adapted to rotate simultaneously with the shafts. Fig. 4 shows an escapement adapted to be operated by an electric current and to be employed in those cases where the simultaneously-moving shafts of both stations are not operated by an electric current, but by clock-work suitably arranged at each station; and Fig. 5 is a diagram illustrating the manner in which the electric connections for operating the telautograph are made.

In the form of apparatus shown in Figs. 1 and 2 the simultaneous rotation of the shafts C, one of which is provided at each station

and supported by the framing B B', is obtained by means of two ratchet-wheels *a*, provided with an equal number of teeth, with which engage two transmitting-pawls *k*, operated by the electro-magnets E. When an intermittent current is conducted through the convolutions of the electro-magnets E at the transmitting and receiving stations, each fresh impulse of the current draws the arm *b*, pivoted at *c* and carrying the pawl *k*, to the right in Fig. 1, whereby the wheels connected with the shaft C at both stations are caused to move simultaneously and an equal distance. As soon as the electric current ceases to act the electro-magnet E discontinues to attract the arm *b*, which under the action of the spring *f* is so displaced as to allow of the transmitting-pawl *k* engaging with the next tooth of the ratchet-wheel *a*. To each of the shafts C, which are thus moved simultaneously at the transmitting and receiving stations, is secured a cranked arm *i*, which in revolving reciprocates, by means of the rod or link *o*, the slide *g*, arranged on the carriage-way *n*. To a projection formed on this slide *g* are secured the electro-magnets E' E' and also the arms *a*³ and *a*⁴, pivoted at *c*³ and *c*², respectively, each arm being provided at its extreme end with a style *s*³ *s*².

d d' is the angular armature of an electro-magnet, which is so pivoted as to be attracted by the coils E' E' when these are excited, so that its vertical arm moves to the left in Fig. 1, while its horizontal arm moves upwardly and raises the shorter arm of the lever *a*⁴, whereby the style *s*² is depressed.

Directly underneath the styles *s*³ *s*² are placed the writing-surfaces SS', one of which—say S—consists of a good or medium conductor of electricity, while the lines or strokes of the design or writing to be formed thereon are of an insulating or non-conducting nature, so that when they are encountered by the style, which is a good conductor and moves in contact with such surface, they cause corresponding breaks in the current, as herein-after more fully described, thus producing electrical vibrations. In the apparatus employed as the receiver the surface S', placed under the style *s*², is not a conductor of electricity, but is intended to receive an exact

copy of the strokes or lines existing on the surface S, as will be hereinafter more fully explained.

The feeding of the writing-surfaces S S' takes place under the action of the rollers T T', arranged underneath such surfaces and suitably coupled together. These rollers are operated by the electro-magnets E² E² through the medium of the conveying-pawl k' and the ratchet-wheel a'. The electro-magnets E² E² being both at the transmitting and receiving stations, excited by the same current, it follows that the feeding of the writing-surfaces at both ends is perfectly simultaneous and uniform, just as the speed of rotation of the shafts C.

There is also mounted upon each shaft C a contact or switch arm e, which when the shaft rotates strikes the contact-pieces e' e², and thereby whenever it completes one-half of a revolution closes the electric circuit comprising the electro-magnets mentioned above, whereby the writing-surfaces S S' are moved along.

Each shaft C is provided at one end, at the back in Fig. 1, with a contact or commutator device, of which Fig. 3 is a detail front view.

Upon the base-plate A is provided a supporting-block B², to which is secured a friction-disk F, which is provided on the side turned toward the shaft C with a pin or stud s. As the shaft C turns in the direction of the hands of a clock the lever-arm a², pivoted on the said shaft at c², comes in contact with this pin or stud s, and thereby causes the friction-disk F to participate in the motion of the shaft C.

h is a lever-arm provided with a friction-roller r, which under the influence of a spring f' touches the edge of the disk F, but when the electro-magnets E³ are excited is drawn off the said edge in consequence of the lowering of the lever-arm h'. According as the lever-arm h, with its friction-roller r, is in or out of contact with the disk F this disk is placed, as it were, under the action of a brake or released therefrom. In the former case the pin s pushes back the arm a², overcoming the resistance of a spring f², with the result that the contact-spring l', provided on the outer end of the said arm a², comes in contact with the conducting-surface l² of the disk F and closes the circuit comprising the electro-magnets E, adapted to move the styles.

To generate the intermittent current required for operating the shafts C, both at the transmitting and receiving stations, a special contact-breaker is employed, somewhat similar in construction to one of Neef's hammers, as shown in Fig. 2. It consists of two electro-magnets E⁴ E⁴, which act upon an iron armature m, pivoted at c³ and carrying a contact-spring l³. The arm of this piece m which extends beyond the spring f³ is provided with the contact-spring l³. As this piece or armature m oscillates and alternately comes in contact with and recedes from the contact

p, and as this switch device is inserted into the main circuit or "line," the current passing through the latter is intermittently interrupted, so that the consecutive electric impulses are of the same duration as those produced in the local circuit.

Instead of setting in motion the shafts C C at the transmitting and receiving stations simultaneously by means of an electric current, such simultaneous motion may be produced, as before stated, by means of a separate clock-work arranged at each station and adapted to impart rotary motion to each of the shafts. The intermittent electric current in this case only serves for controlling the speed of rotation with the assistance of an escapement. This arrangement is exemplified in Fig. 4, where h² h³ is a double-armed lever, one arm of which carries the pawls k² k³, while the other arm assumes the shape of the armature of an electro-magnet and is placed under the influence of the electro-magnet E⁵. f⁴ is a spring engaging with the arm h² of this double lever and having a tendency to retain the pawls of the escapement in the position shown in Fig. 4.

The electric connections of the various mechanisms hereinbefore described and the manner in which they influence each other are diagrammatically illustrated in Fig. 5.

A current is supplied by the local battery L and (if the switch K is in the position shown in the figure) passes through the conductors 1 and 6 to the contact-breaker constructed on Neef's system, thence through the conductor 17 it passes on to the switch K, and thence through the conductor 5 back to the battery. When, however, the switch K touches the contact u' and the contacts e e' (or e e²) are temporarily closed, the current flows through the conductors 1 and 2 to the contacts e' or e², as the case may be, and thence through the arm e, the conductor 3, the coil of the electro-magnet E², the conductor 4, and the conductor 5 back to the battery. When the switch K bears upon the contact-piece u' and when the contact-spring l' is caused to touch the conducting-surface l² of the friction-disk F, the local current flows through the conductors 1, 2, and 14 to the disk F, spring l', arm a², and the conductor 15 to the convolutions of the electro-magnet E', and, lastly, through the conductors 16, 4, and 5 back to the battery. While the local current is thus caused to complete, according to requirements, either of the three circuits indicated for performing work, to be more fully explained further on, the current supplied by the line-battery L', the flow of which is interrupted by the vibration of the spring l³, passes first through the conductor 18, the contact-spring l³, and the conductor F on to the electro-magnet E³, thence through the conductors 8 to the electro-magnets E, and then either through the conductor 9, the resistance W, and the conductors 10 and 13 to earth or through the conductor 11, the style

s' , the writing-surface S , and the conductors 12 and 13 to earth.

The operation is as follows: When it is desired to reproduce telegraphically at a distance a manuscript, drawing, or printed text, the same is reproduced in non-conducting ink upon a surface being a good conductor of electricity, (tin-foil or the like). This surface is then inserted into the conveying-roller T of the transmitting-station, so that the arm a^3 , with its conducting-point s' , rests upon the said surface. At the receiving-station a writing-surface of any suitable material—for example, paper—is stretched within the conveying-roller T' in such a manner that the arm a^4 , with its style s^2 , is situated directly above this surface. The arm a^3 in this case rests upon the conveying-roller connected with the conductor 12. When the switch K at the transmitting-station, which bears upon the contact u' while it is at rest, is shifted to the contact u , while the corresponding switch K at the receiving-station is left upon the contact u' , there will form at the transmitting-station a circuit through the conductors 1, 6, 17, and 5, which will set in operation the contact-breaker on Neef's system. At the same time, owing to the oscillating motion of the spring l^3 , the main-line current is interrupted from time to time at short intervals, so that the individual electric pulsations will take the following course: The positive current coming from the line-battery L' passes through the conductor 18, the spring l^3 , the conductor 7, the electro-magnet E^3 , the conductor 8, the electro-magnets E , the conductor 9, and then either through the resistance W and the conductors 10 and 13 to earth or through the conductor 11, the arm a^3 , the pin s' , the conducting-surface S , and the conductors 12 and 13 also to earth, for, according as the style s' is in contact with the insulating lines or strokes or with the rest of the writing-surface, which is a good conductor of electricity, it causes the current to follow either the one or the other of these two courses. As for the negative current, upon issuing from the line-battery L' and passing to the receiving-station through the line-battery L^2 it hence assumes the same course as the positive current does at the transmitting-station, except that the style s' at the transmitting-station does not rest upon a conducting-surface, but directly upon the conveying-roller, (or, if necessary, may be dispensed with altogether,) or it may be turned up. In this manner the electro-magnets E at both stations are excited simultaneously and the impulses of the line-current and the shafts C are at both ends caused to perform precisely the same movements at the same moment. At the same time as each shaft C revolves the arm a^2 and the insulating-pin s carry along with them the friction-roller F .

An important point is, that the coils or convolutions of the electro-magnet E^3 and the resistance W are so proportioned that when the

maximum strength of current is attained both the electro-magnets E E and the electro-magnets E^3 E^3 attract their respective armatures, while as the current decreases in strength—for example, when the line-current at the transmitting-station does not pass through the conducting-surface, but through the resistance W —the armatures E E alone operate the pawl k , while the brake-roller r retains the position shown in Fig. 3.

While the toothed wheel a revolves, as described, the arms a^3 and a^4 are moved alternately backward and forward, which causes the style s' at the transmitting-station to move upon the conducting-surface having the strokes or lines to be reproduced formed upon it with an insulating substance. So long as the style is in contact with the conducting-surface the electrical impulses in the main line will continue at the maximum degree of strength and both the electro-magnets E E and the electro-magnets E^3 E^3 will attract their respective armatures. When, however, the conducting-style s' meets one of the insulating-lines of the writing or design to be copied, the main-line current is thereby caused to flow through the resistance W , and in consequence of the resulting diminution of the strength of current the electro-magnets E E are alone operated and not the magnets E^3 E^3 . It follows that at the transmitting-station as the shaft C continues to revolve the brake-roller r under the electric impulse strikes the friction-roller F , and, overcoming the resistance of the spring f^2 , bends backwardly the arm a^2 in such a manner that the contact-spring l' touches the surface l^2 . Thus it will be seen that owing to the variation of the strength of the electrical impulses proceeding from the transmitting-station the local battery at the receiving-station, which in the meantime has remained at rest, is now set in operation, the current flowing from the said local battery through the conductors 1, 2, and 14 to the friction-disk F , thence through the spring l' to the arm a^2 , and thence through the conductor 15 to the electro-magnets E' E' , and finally through the conductors 16 and 4 and the conductor 5 back to the battery. Thus the electro-magnets E' E' are operated, and by means of the knee-shaped armature d d' the style s^2 is pressed down upon the writing-surface S at the receiving-station. The movement of the styles both at the transmitting and receiving stations being precisely simultaneous and the style at the receiving-station being pressed down exactly at the same moment as the conducting-style at the transmitting-station touches one of the insulating-lines, it is clear that the marks made by the style at the receiving-station must exactly correspond to the strokes or lines of the style at the transmitting-station.

In addition to the reciprocating motion imparted to the style at the receiving-station through the electro-magnets E' E' it is also

necessary that after each movement the said style should be shifted in a plane situated at right angles to the direction of its reciprocating motion. This result can be obtained either by arranging the writing-surfaces upon the stationary support and displacing the styles or by making the styles stationary in the horizontal direction at right angles to their horizontal reciprocation and making the writing-surfaces movable. In the drawings one arrangement is shown in which the latter course is adopted. The displacement of the writing-surfaces is obtained through the arm e , secured to the shaft C, which at each half of a revolution of this shaft strikes the contacts e' (or e''). This enables the local circuit 1 2 3 4 5 to form for a short time, in which circuit are inclosed the electro-magnets $E^1 E^2$, adapted to set in operation the carrier-rollers T T'. Thus the writing-surfaces both at the transmitting and receiving stations are moved along simultaneously.

The arrangement herein described may be modified in a variety of different ways as regards the details of the several mechanisms without departing from the spirit of the invention. For example, at the receiving-station instead of employing a writing-surface of any suitable material—such as paper—and causing the line-current to pass through the resistance W and go down to earth, the writing-surface may consist of a material being an electrical conductor, so that the conductor 9 is placed in communication with the style s^2 , so that the current will partly pass through the resistance W and partly through the writing-surface S', the carrier-rollers T T', and the conductor 12 to earth. If desired, the resistance W may be switched out entirely at the receiving-station and the main-line current turned off either through the style s' , communicating for the time being with the conductor 9 and through the conducting-surface on which the style rests, or through the style s' , which, being inoperative, rests upon the carrier-roller r or through both. The remarkable feature in this connection is that during the telegraphic operation the resistance can only be altered by the style which for the time being rests upon the writing-surface at the receiving-station and that the fluctuations of current caused by such changes of the resistance close the circuit which operates the local battery at the receiving-station, so that at the latter the style s^2 is pressed down, while at precisely the same moment the carrier-roller is caused to move the writing-surface the required distance farther on.

The local circuit of the receiving-station, into which is switched Neef's contact-breaker, should be broken during the telegraphic operation, otherwise, owing to the vibrations of the contact-spring l^3 , the regularity of the pulsations of current transmitted through the main line might be influenced in a manner unfavorable to the desired precision.

Instead of employing a conducting-surface with non-conducting marks for producing the undulations of current necessary for operating the style s^2 and the carrier-rollers T T' the position may be reversed and a surface of medium conducting power may be written upon with a substance being a good electrical conductor. The best course is to employ for this purpose a sheet of a porous material of medium conducting power—say a sheet of paper treated with a conducting substance—whereon the words or marks to be transmitted are written in metallic ink, being a good conductor of electricity. This conducting-liquid partly permeates the paper and at the parts where it does so increases the conducting power of the same to such an extent that when the style s' slides over the surface S, bearing the writing, the strength of the main-line current is alternately increased or abated. These fluctuations of current may, as has been explained in regard to the arrangement above described, be utilized for closing circuits at the receiving-station through the action of electro-magnets and cause the local circuit at that station to operate the style as well as the carrying-roller.

It may be mentioned, in conclusion, that from the same transmitting-station communications of the nature described may be forwarded to a number of receiving-stations either parallel to each other or arranged in succession on the same line. To accomplish this result, it is only necessary to set the switches K to the contact-piece u corresponding to the desired station, whereby the local battery at that station is set in the circuit.

Having now described the nature of my invention and the manner in which the same is to be performed, I declare that what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a telautograph, the combination, with the revoluble shaft C, of the reciprocatory carriage g and intermediate mechanism operatively connecting the said carriage with shaft C, a style carried by the said carriage and adapted to cause variations in the main circuit, a second style carried by the said carriage, an electro-magnet E' , also carried by the said carriage and included in the local circuit, and a circuit-closer adapted to be operated by the said variations in the main circuit, and thereby to cause the electro-magnet E' to operate the said second style, substantially as set forth.

2. In a telautograph, the combination, with the revoluble shaft C, provided with the contact-arm e , of the contact-pieces for the said arm to touch at each half-revolution, the electro-magnets adapted to be energized each time the said arm touches each of the said contact-pieces, the rollers for supporting the message-sheets, the ratchet-wheel secured on the shaft common to the said rollers, and a pawl operated by the armature of the said

electro-magnets and adapted to turn the said ratchet-wheel and rollers, substantially as and for the purpose set forth.

3. In a telautograph, the combination, with
5 the revoluble shaft C and the spring-actuated arm pivoted to the said shaft and provided with a contact-piece, of the friction-disk F, provided with an insulated pin bearing against
10 the said arm, so that the disk is revolved by the arm, and a friction-brake adapted to automatically arrest the motion of the said disk when operated by a variation in the current in the main circuit, and thereby to turn
15 the said arm on its pivot and cause the contact-piece to bear upon the conducting-surface of the disk, substantially as and for the purpose set forth.

4. In a telautograph, the combination, with
20 a main-circuit battery and a contact-breaker for forming the intermittent main current, of the electro-magnets E, included in the main circuit, and the receiving and transmitting styles synchronously reciprocated longitudinally by the electro-magnets E, the local bat-
25 teries, the electro-magnets E', included in the

local circuits and adapted to operate the receiving-styles when excited, the electro-magnets E², included in the local circuits and adapted to synchronously change the relative lateral positions of the styles and the surfaces
30 upon which they bear at each longitudinal reciprocation of the styles, the electro-magnets E³, included in the main circuit and adapted to switch the local currents through the said electro-magnets E' and excite them when
35 influenced by variation in the current passing through the transmitting-styles, and message-sheets of unequal conductivity at different parts of their surfaces and arranged under the transmitting-styles and in the path of
40 the main circuit through the said styles to the earth, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

MAX SOBLIK.

Witnesses:

MARC M. ROTSEN,
SIEGFRIED HAMBURGER.