No. 675,495. Patented June 4, 1901.

A. POLLAK & J. VIRAG.

WRITING TELEGRAPH.

(Application filed June 28, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

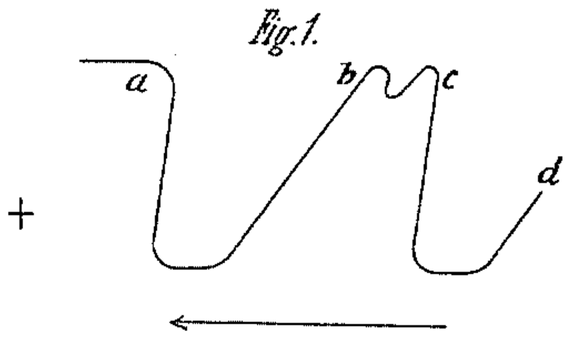


Fig. 3.

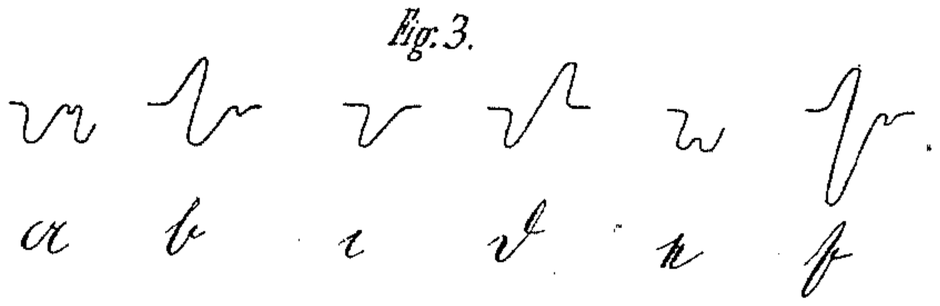


Fig. 2.

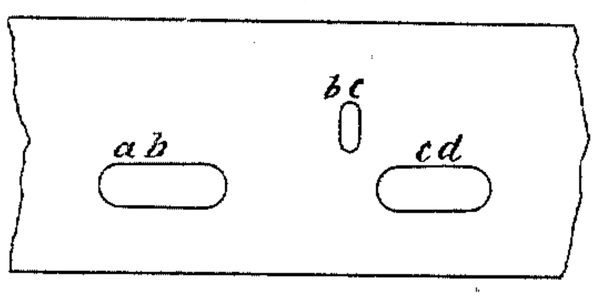


Fig. 4.

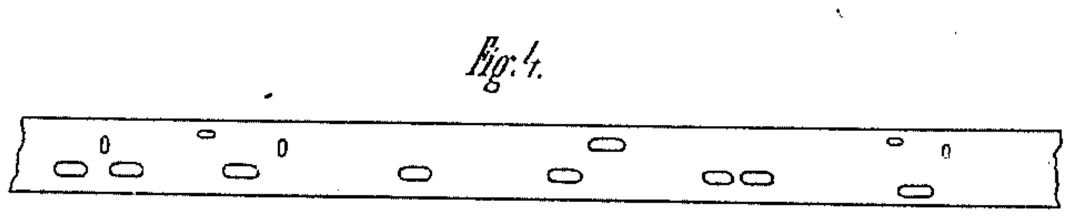


Fig. 5.

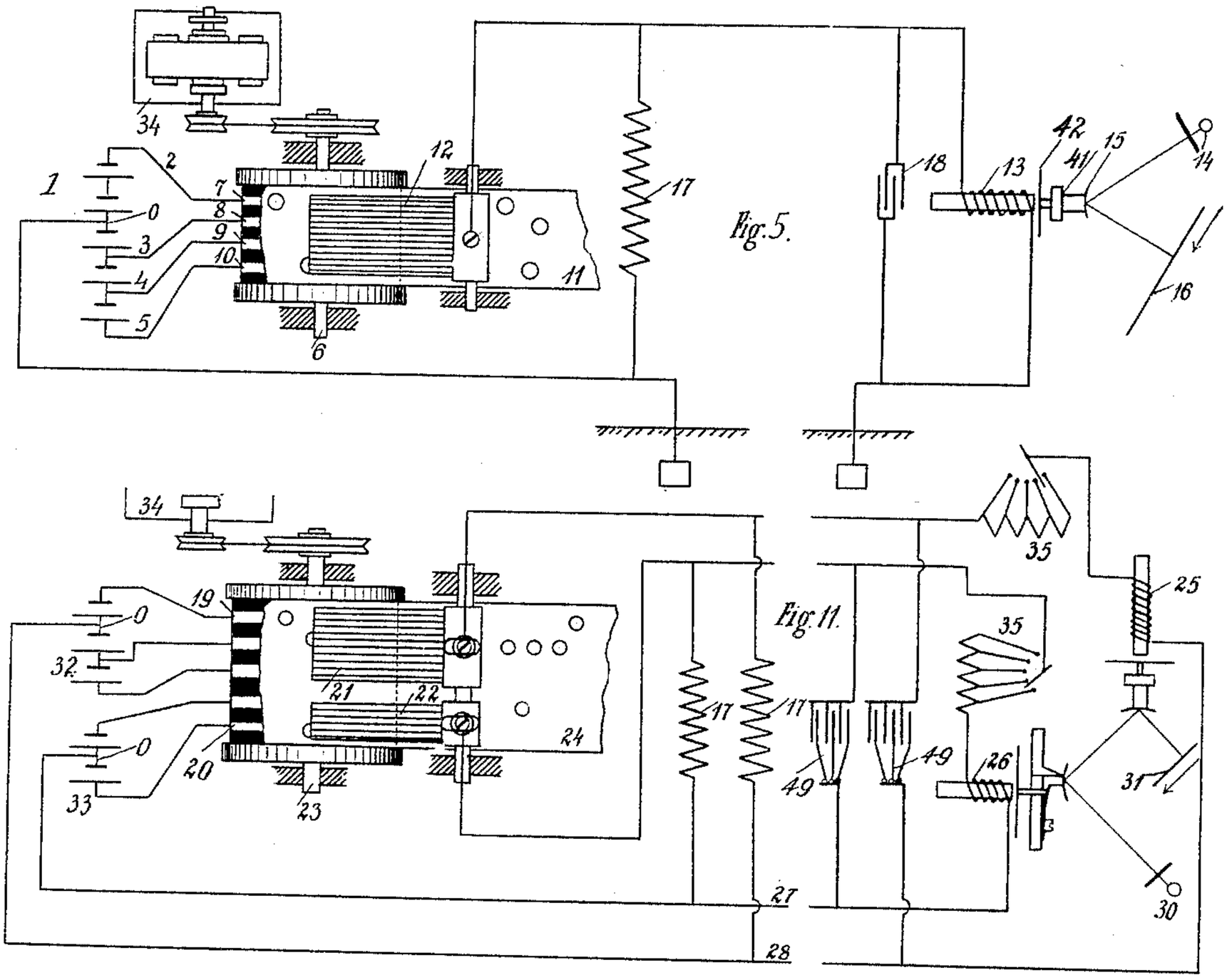


Fig. 11.

WITNESSES:
Web Whitaker
Thomas F. Wallace

INVENTORS:
Anton Pollak and Josef Virag

By Attorneys,
Arthur G. Fraser & Co.

No. 675,495. Patented June 4, 1901.

A. POLLAK & J. VIRAG.

WRITING TELEGRAPH.

(Application filed June 28, 1900.)

(No Model.) 3 Sheets—Sheet 2.

Fig. 6.

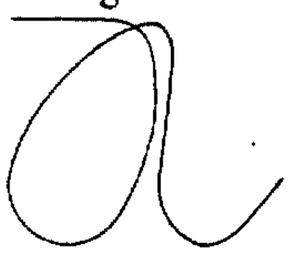


Fig. 7.

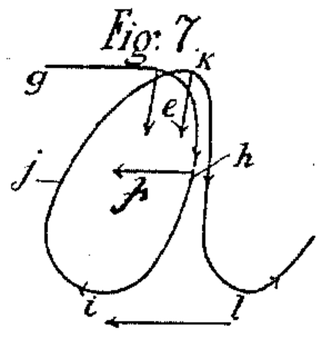


Fig. 9.

Fig. 10.

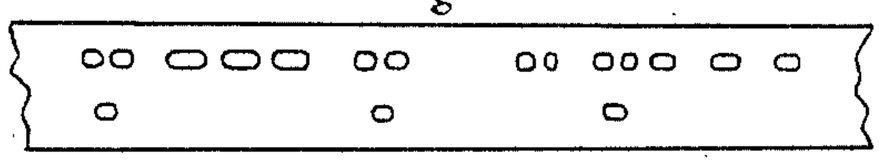


Fig. 8.

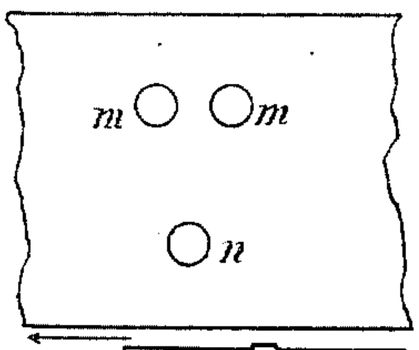


Fig. 12.

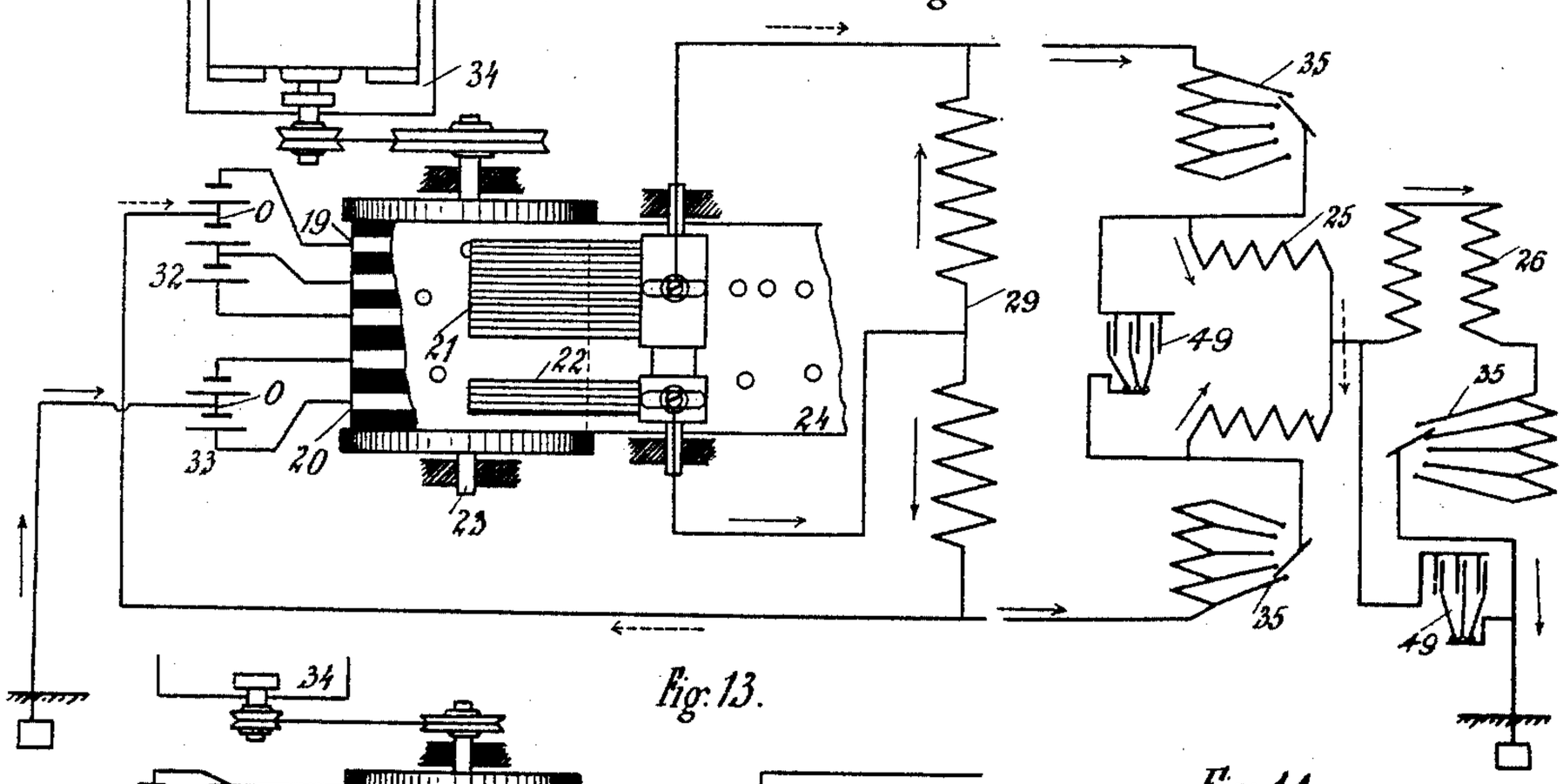


Fig. 13.

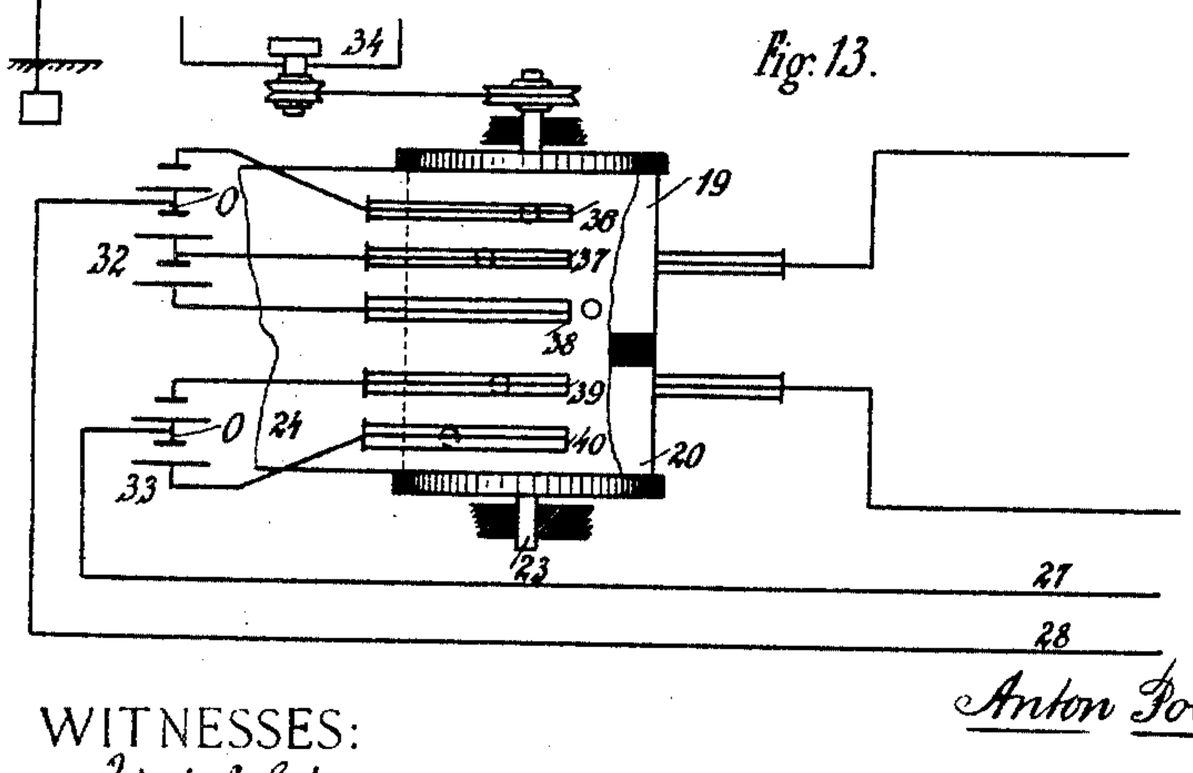
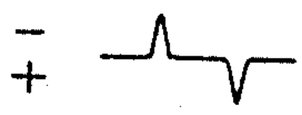


Fig. 14.



WITNESSES:
Fred Whitz
Thomas F. Wallace

INVENTORS:
Anton Pollak and Josef Virag,
By Attorneys,
Arthur O. Fraser & Co.

No. 675,495. Patented June 4, 1901.

A. POLLAK & J. VIRAG.

WRITING TELEGRAPH.

(Application filed June 28, 1900.)

(No Model.) 3 Sheets—Sheet 3.

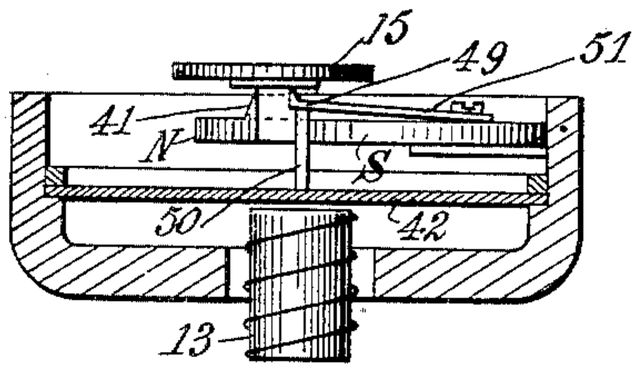


Fig. 15

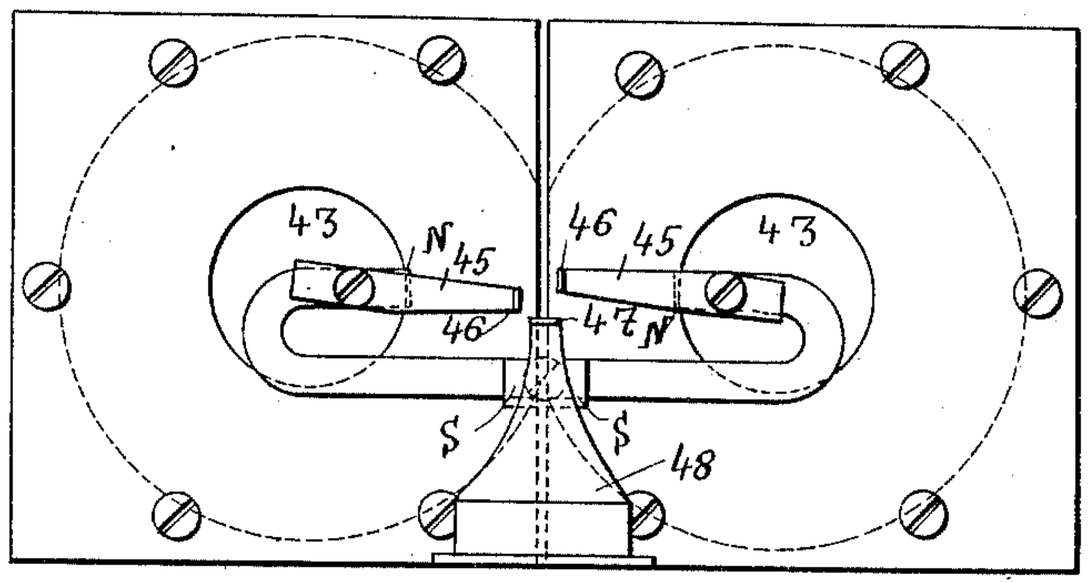


Fig. 17

Fig. 16

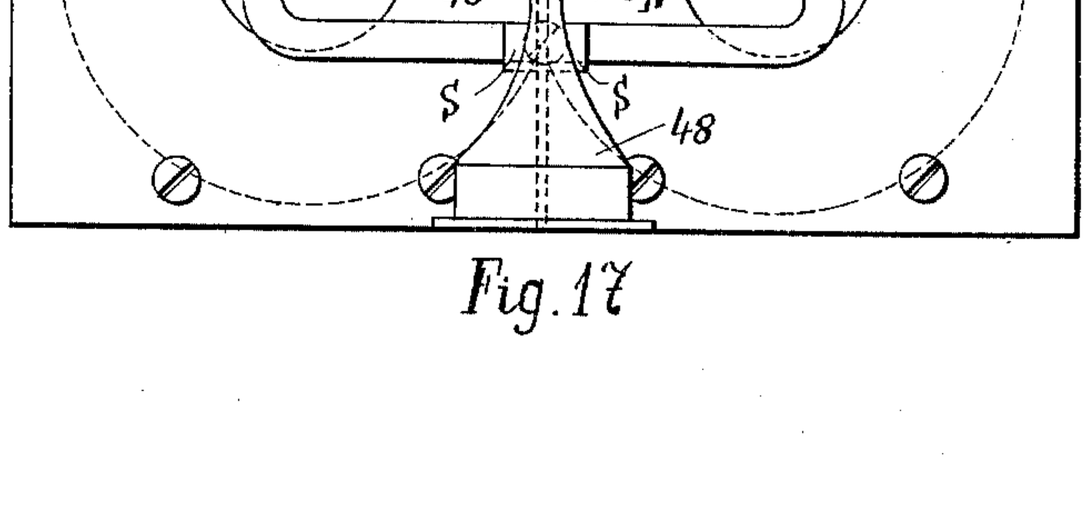


Fig 18

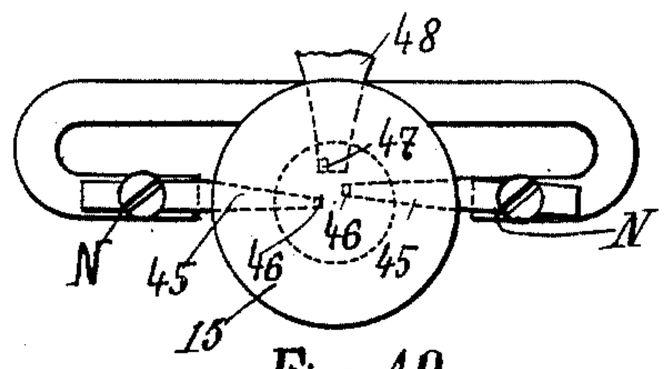


Fig 19

WITNESSES
Fred White
Thomas Wallace

INVENTORS:
Anton Pollak and Josef Virag,
By Attorneys:
Arthur G. Fraser & Co.

UNITED STATES PATENT OFFICE.

ANTON POLLAK AND JOSEF VIRAG, OF BUDAPEST, AUSTRIA-HUNGARY, ASSIGNORS OF ONE-HALF TO VEREINIGTE ELECTRICITATS ACTIEN-GESELLSCHAFT, OF SAME PLACE, AND FRIEDRICH SILBERSTEIN, OF VIENNA, AUSTRIA-HUNGARY.

WRITING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 675,495, dated June 4, 1901.

Application filed June 28, 1900. Serial No. 21,968. (No model.)

To all whom it may concern:

Be it known that we, ANTON POLLAK and JOSEF VIRAG, residing at Budapest, in the Empire of Austria-Hungary, have invented certain new and useful Improvements in Writing-Telegraphs, of which the following is a specification.

This invention relates to systems of writing telegraphy—that is to say, to that form of telegraphic transmission wherein the receiving instrument is caused to trace in a substantially continuous unbroken outline the written letters composing the matter transmitted. We thus use the word "trace" in this specification and claims to indicate the generating of the letters or characters by the movements of a single point, whereby it forms a substantially continuous line as distinguished from those systems in which the receiver has means for simultaneously forming a series of points or dots which are incapable of movement, and hence can trace continuous lines only by reason of the movement of the paper past them. In such latter systems the vertical lines of the letters are formed by the simultaneous impression of a series of points or dots one above another.

In its preferred form this invention provides a system of telegraphy in which the characters so written or traced are automatically transmitted—that is to say, the matter is transmitted in the form of current impulses which are automatically or mechanically sent over the line—and in which the receiving instrument is acted upon by such impulses to record the transmitted matter in written or script characters. The written characters are distinguished by following a set or conventional form instead of being a facsimile of characters written at the transmitting-station, as in the so-called "facsimile-telegraphs" or "telautographs." Hence the writing according to our system may be termed "non-autographic."

Our system is distinguished from the common form of continuous-line-writing telegraphy, in which the matter to be sent is manually written by the operator at the transmitting-station, the stylus at the receiving-station being caused to follow autographically the movements of the transmitting-pen. Disregarding the limitations imposed upon such systems by the necessary delicacy and complexity of construction, no rapid transmission is possible because of the necessarily slow movements of the manually-directed transmitting-pen; nor is rapid transmission possible in those systems of telegraphy in which the transmitted matter is broken up into dots and a current impulse sent over the line for each dot, to be reproduced in proper position by the synchronously-moving receiving instrument to record what is, in effect, a facsimile of the message transmitted. The speed of transmission in such systems is effectively limited by the great number of impulses required for the transmission of each character. The present invention provides a system, therefore, in which the message is recorded in ordinary written or script characters and in which a hitherto-unattained speed of transmission is reached.

The present application is directed to the novel method or process involved, the apparatus herein shown as especially adapted for carrying out this method being covered by an application filed by us on the 7th day of December, 1900, Serial No. 39,027, as a division hereof.

Our invention enables us to transmit telegraphically both open and closed characters, which are recorded by the receiving apparatus in a clear and legible manner and in form closely corresponding to ordinary handwriting.

In the preferred form of apparatus for practicing our invention we combine with a suitable receiver capable of responding to current impulses a transmission apparatus capable of automatically sending over the line current impulses which vary in intensity and duration, and preferably also in direction, such variations corresponding to the characters to be transmitted. The transmitted impulses and their mutual relation are controlled by a suitable strip, which is perforated to correspond with each character to be transmitted. Each character is therefore sent over

the line in the form of an impulse or a combination of impulses having such relation to each other that they cause the receiver to move in such manner as to write or trace the character sent.

Referring to the accompanying drawings, which illustrate our invention and the preferred form of apparatus for carrying the same into effect, Figure 1 is a reproduction of the Gothic character "a." Fig. 2 represents a transmission-strip having suitable perforations for influencing the receiver to reproduce the character illustrated in Fig. 1. Fig. 3 is a reproduction of the first six letters of the Gothic alphabet. Fig. 4 is a view of the transmission-strip perforated to produce these characters. Fig. 5 is a diagrammatic view showing the transmission and receiving apparatus. Fig. 6 is a reproduction of the Latin letter "a." Fig. 7 is a diagrammatic view of Fig. 6, illustrating the formation of said letter. Fig. 8 illustrates the perforations for transmitting such letter. Fig. 9 is a reproduction of a connected series of Latin letters. Fig. 10 is a view of the transmission-strip having perforations corresponding thereto. Fig. 11 is a diagrammatic view illustrating the form of apparatus used for sending closed characters. Fig. 12 is a diagrammatic view of a similar apparatus. Fig. 13 is a diagram of a modification. Fig. 14 is a diagram illustrating the common movements of the vibrating diaphragm. Fig. 15 is a vertical section of one form of receiving apparatus. Fig. 16 is a plan thereof with the mirror or reflector removed. Fig. 17 is a plan of another or "double" receiving apparatus with the mirror removed. Fig. 18 is a vertical section thereof, and Fig. 19 is a plan view showing the mirror and its mounting means in detail.

Our invention enables us to transmit telegraphically both open and closed characters. For the sake of simplicity of explanation, however, we will provisionally assume that the characters to be written are as simple as possible—that is, characters in which no closed lines occur. Most of the Gothic letters are of this character and also part of the written Latin letters.

In the construction of our apparatus shown in the drawings we make use of an oscillating "telephone-receiver" of any suitable construction—as, for instance, that shown in Figs. 15 and 16. In these figures a mirror 15 is mounted upon an edge 41, about which it may oscillate. A light spring 51 is fixed at one end to the receiver and at its other end is formed with an edge or point 49, which bears against the under side of the mirror. Between the spring 51 and the diaphragm 42 of the receiver is interposed a light rod 50, which transmits the vibrations of the diaphragm to the mirror at one side of its axis 41, and thus tilts the mirror in accordance with such vibrations. Preferably the mirror has an iron plate fixed to its back and is held in position upon its axis 41 by the maguetic field generated by a suitable magnet N S. The mirror is adapted to direct a ray of light from a source 14 onto a sensitive strip 16, moving in the direction of the arrow in accordance with the positive or negative impulses passing through the coil of an electromagnet 13, introduced in the line, which impulses attract or repel the diaphragm 42. Fig. 14 illustrates the ordinary movements of a ray of light deflected by the mirror when the latter is tilted in opposite directions from its position of rest by current impulses of opposite polarity. Receivers of this type are well known under the name of "oscillometers," examples of which are described by Blondell in the *Electrician*, Vol. 30, p. 571.

Fig. 1 of the annexed drawings illustrates the written Gothic letter "a," which will be seen to consist entirely of substantially upward and downward lines. Starting from a suitable level *a*, the line constituting this letter passes downwardly and thence upwardly to the same level at *b*. Such a line will be termed herein a "letter element." The line from *b* to *c*, constituting the second-letter element in the letter "a," corresponds in contour with the first element, but is smaller in size. The third element of the letter shown consists of the line from *c* to *d*, which corresponds in size and form with the first element. Consequently the letter "a" consists of three letter elements, and of these three the second element differs from the first and third only in size. As the amplitude of the vibrations of the receiver depends upon the intensity of current impulses received by it, it will be seen that to produce the letter "a" at the receiving-station the transmitting device should be capable of sending an impulse, for instance, of medium intensity and duration to form the first element. A slight intermission should then take place in order to enable the diaphragm of the receiver to assume its original position, after which an impulse of lower intensity and much shorter duration is transmitted, which is followed by a short intermission to again enable the diaphragm to assume its original position. The third element is produced by an impulse of the same intensity and duration as the first. In the same manner other letters can be divided up into a few elements. It will be observed that two factors are active in the production of such letters—first, the movement of the sensitized strip, the direction of which is indicated by the arrow in Fig. 1, and, second, the movement of the ray of light caused by the receiver. If the mirror of the receiving apparatus were mounted to oscillate upon an axis extending parallel to the direction of movement of the paper, the two lines of the letter element *a b* would diverge from a vertical line with approximately the same degree of angularity. The desirable slant of the letter is obtained by mounting this mirror upon an axis extending obliquely to such direction. Such slant may be as great as desired,

but preferably approximates that of ordinary handwriting.

In the preferred mode of practicing our invention we employ an automatic transmitter which is capable of sending current impulses over the line which correspond to the direction and size of a single letter element. The means we prefer for accomplishing this result will now be described with reference to Fig. 5. Upon a shaft 6 are mounted several conducting-disks 7, 8, 9, and 10, which are insulated from each other by any suitable material and form a rotary drum, which is driven, for instance, by a small electromotor 34. The disks 7, 8, 9, and 10 are connected to points of different potential, and preferably also of different polarity, of a battery 1 by wires 2, 3, 4, and 5. It is obvious that when the line-wire is connected to any one of such points of different polarity and potential of the battery a current impulse will flow over the line-wire and influence the receiver in accordance with the character of the impulse. Any suitable means for automatically transmitting impulses corresponding with the letter or character to be sent may be employed; but we have shown the perforated strip 11, which is fed over the drum by the rotation of the latter, and above such strip is located a brush 12, which is connected to the line and which is adapted to transmit impulses over the line in accordance with the position and length of the perforations passing under it. According to our invention the strip is perforated according to the characteristic impulses which are necessary for the production of each letter to be transmitted. Thus in Fig. 2 the perforation *a b* corresponds in position to the disk 9, connected with the point of medium intensity and (for instance) positive direction of the battery 1. The perforation *b c* corresponds with the disk 8, which is of positive direction and lower intensity, and the perforation *c d* corresponds with the perforation *a b*. The letter elements shown in Fig. 1 are produced by the perforations shown in Fig. 2 and are of one polarity or direction—as, for instance, positive—assuming that the writing is to start from a middle line, (indicated at *a*.) The letter elements extending above this middle line may be produced in such case by a negative impulse. In Fig. 3 we have shown the first six letters of the Gothic alphabet, and in Fig. 4 a transmission-strip perforated to correspond therewith. Assuming that the lines recorded below the middle line are produced by positive impulses, those above will be produced by negative impulses. Thus in the letter "b" the upper perforation corresponds in position to the disk 7 and produces the upward element of this letter. In the letter "f" the lower perforation corresponds in position to the disk 10, and hence transmits a positive impulse of greater intensity than the disk 9, which is manifested at the receiving-station by a greater amplitude of movement of the diaphragm and mirror, and hence a longer element is recorded. If the writing is started at an upper or lower line, the polarity of the impulses may be constantly the same and only the intensity and duration need be variable.

The foregoing description renders it clear that for the recording of any of the different characters only a few—on an average not more than three—perforations will be required. If complicated characters are to be recorded, however, these characters must be subdivided into a greater number of elements, and the length and mutual relations of the perforations of the transmitting-strip must be selected in accordance with the nature of the elements which are to be recorded.

If the characters to be transmitted should not only consist of elements transverse to a horizontal line, but also of elements extending in the same direction as the line—that is to say, closed letters—the single elements are formed by two components acting transversely to each other, and the transmission of separate current impulses corresponding to the character of these components is necessary. In this case two transmitters are required, each of which is adapted to transmit impulses corresponding to the nature of one of these two components.

Fig. 6 of the drawings illustrates a written Latin letter "a," and Fig. 7 illustrates the line representing the components corresponding to the nature of the elements of this letter and indicating the kind of current impulses which are transmitted to the receiver.

Fig. 8 illustrates the perforations corresponding to the written Latin letter "a." In transmitting letters of this character two transmitting apparatus are used and, preferably, two receiving apparatus. A receiving apparatus corresponding to that shown in Fig. 5 is employed for the purpose of reflecting the ray of light transversely of the writing-line in the same manner as before described. In Fig. 7 the direction of reflection of this mirror is indicated by the arrows *e*. For the purpose of directing the ray of light reflected by this mirror in the direction of movement of the sensitive strip we employ a second receiving apparatus similar to the first, but having its mirror mounted upon an axis extended angularly to that of the first, and which is adapted to direct the ray of light approximately in the direction indicated by the arrow *f*. In Fig. 7, starting from the line *g*, an impulse of medium intensity acting upon the first mirror produces a downward line in the direction indicated by the arrow-heads. At approximately the point *h* an impulse reaches the second mirror, which tends to deflect the ray of light rearwardly, the resultant of this compound reflection carrying the ray of light to a point *i*. At this point the impulse upon the first mirror is cut off, with the result that while the second mirror is still acting to reflect the ray of light rearwardly the direc-

tion of such ray is modified by the elasticity of the first diaphragm, which tends to assume its position of rest. At the point *j* the effect of the impulse upon the second mirror being exhausted it is now moved by its diaphragm toward its position of rest, which would direct the ray of light to the point *h*, were it not that the first mirror, still moved by the elasticity of its diaphragm, tends to move such ray to the point *g*. The two mirrors thus modify each other's effect upon the ray of light, which thus follows the direction indicated and reaches the normal level at the point *k*. A succeeding impulse acting upon the first mirror alone now directs the ray to the point *l*, whence it returns to its level by the elasticity of its diaphragm. In Fig. 8 is illustrated the three perforations which are necessary to produce the letter "a" in their correct relative positions. The perforations *m* act to produce the movements of the first mirror and the perforation *n* to produce that of the second mirror. By the proper selection and location of the perforations of the transmitting-strip any of the letters of the alphabet may be reproduced. Fig. 9 represents a faithful copy of two groups of letters written by the apparatus herein described, and Fig. 10 illustrates the perforations of the transmission-strip corresponding to these letters.

In Fig. 11 is shown one suitable form of transmitting and receiving apparatus. In this figure are shown two batteries or parts of batteries 32 and 33, insulated from each other, and two groups of disks 19 and 20, connected to said batteries at points of different polarity and intensity. Separate brushes 21 and 22, respectively, conduct the current from the groups 19 and 20, the brushes 21 being connected to the receiving apparatus 25 and the brush 22 with the receiving apparatus 26. The current returns to the battery through the earth, a common line-wire, or separate line-wires 27 and 28, as desired, to the points 0 of the batteries. For the sake of simplicity the two insulated groups 19 and 20 are united in a single drum mounted on a shaft 23, and for the same reason the perforations which respectively influence the receiving apparatus 25 and 26 are formed in a single strip 24. The two receiving apparatus 25 and 26 are each similar to that shown in Fig. 5, the receiver 25, which may correspond to the first receiving apparatus just mentioned, being adapted to direct the ray of light up and down upon the sensitized strip 31 and the receiving apparatus 26 being adapted to direct such ray horizontally or longitudinally of the strip. A ray of light from a source 30, which first falls upon the mirror of the receiver 26, from which it is reflected to that of the receiver 25, and thence upon the sensitive strip 31, moving in the direction of the arrow, traces on such strip a line corresponding to the combined movements of both mirrors. The mirrors of the two receivers are shown as oscillating upon axes extending at substantially right angles to each other; but such axes may be relatively arranged as desired, depending upon the direction of the components by which the letter elements are formed.

In order to sharpen the record, we prefer to employ a condenser or condensers 18, which are connected in parallel with the receiving instrument, as shown in Fig. 5, and we also prefer to employ suitable self-inductors 17, which overcome to a great degree the capacity, self-induction, and resistance of the line.

For the purpose of obtaining the clearest and most legible reproduction of the letters it is obviously necessary that there be a certain difference of phase between the current impulses corresponding to the several components of the letter elements, and with a certain method of perforation this is accomplished by the location of the brushes and can be regulated by the adjustment of same. In order also to regulate the difference of phases at the receiving-station, the capacity of one or the other of the two condensers 49, Figs. 11 and 12, coupled parallel to each of the telephone-receivers, may be suitably modified, or adjustable self-inductors 35 are used with the receivers. In some cases both these regulating devices may be simultaneously used.

In the construction of apparatus just described, which allows of the recording of closed letter elements, the two receivers may be so united that (with the use of the telephone-receivers) the diaphragms of the two receivers are so connected with one single mirror that each diaphragm individually and both jointly are allowed to control the motion of the mirror, this construction being shown in Figs. 17, 18, and 19. In these figures the mirror (which is omitted in Figs. 17 and 18 for clearness) is mounted upon three points 46, 46, and 47, two of which, 46 46, are shown as adjustable relatively to the fixed point 47. Each of the points 46 is formed on the end of a light spring 45, which springs are fixed at their other ends to the poles of suitable magnets N S N S. The springs 45 45 are connected to diaphragms 43 by light rods 44 44, and each is vibrated in accordance with the vibrations of its diaphragm, such vibrations being communicated to the mirror. The exact points on the mirror against which the points 46 46 act is determined in practice by the character of movement desired to be imparted to the mirror by each diaphragm. The point 47 may be carried by a suitable arm 48, as shown in Fig. 17. The mirror is preferably provided with an iron back, so that it is held firmly to its supporting-points by the magnetic fields generated by the magnets N S N S. With this construction the use of a second mirror becomes of course superfluous.

As this invention is devised to enable the most rapid transmission of telegraphic despatches it is desirable for the purpose of preventing disturbances in the line to cut in at

the start of the line parallel self-inducting lines 17, Figs. 5 and 11, as before described, and in this case the manner of making connection, as shown in Fig. 11, may be so modified that one part, 19, of the transmitter is connected in one loop with the corresponding part 25 of the receiver, and the other part, 20, of the transmitter is connected to the center of the self-inductor 29, while the corresponding part 26 of the receiver is cut in a line starting from the center of the first part 25, returning through the earth. This arrangement of connections presents the advantage that the loop is free from induction and the other line has only slight resistance and slight self-induction.

It will be understood that the transmitter may be variously constructed—as, for instance, as shown in Fig. 13, where the single points of the battery are not connected with the disks forming the parts of the drum, but with the requisite number of mutually-insulated brushes 36 37 38 39 40, in which case the formation of the drum of single insulated disks becomes unnecessary. The electrical connection is in this case only changed in so far that the drum of the transmitter is connected to the line.

Obviously other means for the automatic transmission of current impulses may be used instead of the perforated strip of paper.

We have described with reference to our present invention the use of a receiver which is capable of tracing a continuous line. It is to be observed, however, that this refers more directly to the capability or adaptability of the receiving instrument of performing such movements than to the actual record produced. For instance, the breaking up or disconnecting of the outlines of the characters would not avoid the invention, this and other similar modifications being within the scope of our improvements.

We do not limit ourselves in the practicing of our invention to the use of the apparatus herein set forth, as the use of any suitable mechanism in this or in analogous arts which will permit the carrying into effect of our method of telegraphic transmission will be within our invention.

We have described our method or process with reference to only Latin and Gothic characters; but our invention is applicable to those of other formations, and it is to be understood that the terms employed in the claims are also intended to cover such other characters, signs, or symbols as acquire individuality or meaning by reason of their shapes, outlines, or contours rather than those elementary signs such as are illustrated by the Morse alphabet, for instance, which are intelligible largely by reason of their repetition, arrangement, or permutations.

We claim as our invention the following-defined novel features, substantially as hereinbefore specified, namely:

1. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in mechanically imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses adapted to actuate said receiver to trace the message in script characters.

2. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in mechanically imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses which correspond in intensity and mutual relation to the elements of such characters, and which are adapted to actuate said receiver to trace the message in script characters.

3. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in mechanically imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses which correspond in intensity, duration and mutual relation to the elements of such characters, and which are adapted to actuate said receiver to trace the message in script characters.

4. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in mechanically imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses which correspond in intensity, duration, direction and mutual relation to the elements of such characters, and which are adapted to actuate said receiver to trace the message in script characters.

5. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in preparing a means adapted in connection with a suitable source of current to produce for each character of the message to be transmitted a definite and predetermined number of current impulses adapted to actuate said receiver to trace the message in script characters, and with such means mechanically imposing such impulses upon the circuit.

6. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in preparing a transmitting strip or body and under the control of such strip or body mechanically imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses adapted to actuate said receiver to trace the message in script characters.

7. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in perforating a transmitting-strip for each character of the message to be transmitted with a definite and predetermined number of perforations, and under the control of such strip imposing upon

the circuit a succession of current impulses corresponding to such perforations, which are adapted to actuate said receiver to trace the message in script characters.

8. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in perforating a transmitting-strip in accordance with the elements of the characters to be transmitted with relation to a series of contacts electrically connected to sources of current of different strengths, and moving said strip past said contacts, thereby imposing upon the circuit current impulses which are adapted to actuate said receiver to trace the message in script characters.

9. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in perforating a strip with perforations that differ in length and position, in groups which correspond to the characters to be transmitted, moving said strip past a series of contacts electrically connected with sources of current of different strengths, and thereby imposing upon the circuit for the characters of the message to be transmitted groups of current impulses of different durations and strengths, which are adapted to actuate said receiver to trace the message in script characters.

10. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in mechanically imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses which differ in duration and direction, and which are adapted to actuate said receiver to trace the message in script characters.

11. The method of telegraphically controlling a receiver having a vibrating part adapted to be displaced by a current impulse, and to move in a reverse direction from its displaced position after such displacement, and adapted to trace a continuous line in accordance with its movements, which consists in imposing upon the circuit for the characters of the message to be transmitted, definite and predetermined numbers of current impulses adapted to displace said vibrating part in such manner that the lines traced by such receiver shall constitute script characters.

12. The method of telegraphically controlling a receiver having an elastic vibrating part adapted to be displaced by a current impulse and by its elasticity to move in a reverse direction from its displaced position after such displacement, and adapted to trace a continuous line in accordance with its movements, which consists in imposing upon the circuit for the characters of the message to be transmitted, definite and predetermined numbers of current impulses adapted to displace said vibrating part in such manner that the lines traced by such receiver shall constitute script characters.

13. The method of telegraphically controlling a receiver having an elastic vibrating part adapted to return to a normal position when moved therefrom by a current impulse, and adapted to trace a continuous line in accordance with its movements, which consists in imposing upon the circuit for the characters of the message to be transmitted, definite and predetermined numbers of current impulses adapted to displace said receiver from its normal position in such manner that the lines traced by such receiver in responding to the current impulses and in returning to its normal position after such responsive movements shall constitute script characters.

14. The method of telegraphically transmitting messages, which consists in mechanically imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses, causing such impulses to actuate a receiver, having a means for reflecting a ray of light in accordance with its movements, to trace the message in script characters, and recording such script characters upon a photosensitive surface.

15. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in mechanically imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses corresponding to the components of the characters to be transmitted, which are adapted to actuate said receiver to trace script characters in a line which is the resultant of such components.

16. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in mechanically imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses, corresponding in intensity and mutual relation to the components of the characters to be transmitted, which are adapted to actuate said receiver to trace script characters in a line which is the resultant of such components.

17. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in mechanically imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses, corresponding in intensity, duration and mutual relation to the components of the characters to be transmitted, which are adapted to actuate said receiver to trace script characters in a line which is the resultant of such components.

18. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in mechanically imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses corresponding in intensity, duration,

direction and mutual relation to the components of the characters to be transmitted, which are adapted to actuate said receiver to trace script characters in a line which is the resultant of such components.

19. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in preparing a means adapted in connection with a suitable source of current to produce for each character of the message to be transmitted a definite and predetermined number of current impulses, corresponding with the components of such characters, which are adapted to actuate said receiver to trace the message in script characters in a line which is the resultant of such components, and with such means mechanically imposing such impulses upon the circuit.

20. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in preparing a transmitting strip or body and under the control of such strip or body mechanically imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses corresponding with the components of such characters, and adapted to actuate said receiver to trace script characters in a line which is the resultant of such components.

21. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in perforating a transmitting-strip for each character of the message to be transmitted with a definite and predetermined number of perforations corresponding with the components of such characters, and under the control of such strip imposing upon the line successions of current impulses corresponding to such perforations, which are adapted to actuate said receiver to trace script characters in a line which is the resultant of such components.

22. The method of telegraphically controlling a writing-receiver adapted to trace a continuous line, which consists in perforating a transmitting-strip with perforations that differ in length and position, in groups which correspond to the elements and components of the characters to be transmitted, moving said strip past a series of contacts electrically connected with sources of current of different strengths, and thereby imposing upon the circuit for the characters of the message to be transmitted groups of current impulses of different durations and strengths, which are adapted to actuate said receiver to trace script characters in a line which corresponds with the elements of such characters, and which is the resultant of the components thereof.

23. The method of transmitting telegrams which consists in dividing the letters of the writing to be transmitted into components acting transversely to each other, mechanically imposing upon separate circuits two series of current impulses of definite and predetermined numbers corresponding to such components, and causing such impulses to act simultaneously upon the receiver to cause it to trace script characters in a line which is the resultant of such components.

24. The method of transmitting telegrams which consists in imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses adapted to influence a receiver to trace script characters, causing such impulses at the receiving-station to displace a part adapted to move in a reverse direction from its displaced position after being so displaced, and thereby varying the direction of a ray of light, receiving said ray of light upon a photosensitive surface, and continuously moving said surface past the point of impingement of said ray of light, whereby the movements of said vibrating part and said surface form upon the latter script characters constituting the message transmitted.

25. The method of transmitting telegrams which consists in imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses adapted to influence a receiver to trace script characters, causing such impulses at the receiving-station to displace a part adapted by its own elasticity to move in a reverse direction from its displaced position after being so displaced, and thereby varying the direction of a ray of light, receiving said ray of light upon a photosensitive surface, and continuously moving said surface past the point of impingement of said ray of light, whereby the movements of said vibrating part and said surface form upon the latter script characters constituting the message transmitted.

26. The method of transmitting telegrams which consists in imposing upon the circuit for each character of the message to be transmitted a definite and predetermined number of current impulses adapted to influence a receiver to trace script characters, causing such impulses at the receiving-station to displace a part adapted to elastically return to its normal position after being so displaced, and thereby varying the direction of a ray of light, receiving said ray of light upon a photosensitive surface, and continuously moving said surface past the point of impingement of said ray of light, whereby the movements of said vibrating part and said surface form upon the latter script characters constituting the message transmitted.

In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

ANTON POLLAK.
JOSEF VIRAG.

Witnesses:
RAYMOND WILLEY,
LOUIS VANDOR.