Jan. 20, 1931. H. PEIN 1,789,637

RECEIVING APPARATUS FOR ELECTRIC TELEGRAPHS

Filed Dec. 22, 1928 2 Sheets-Sheet 1

Fig. 1.

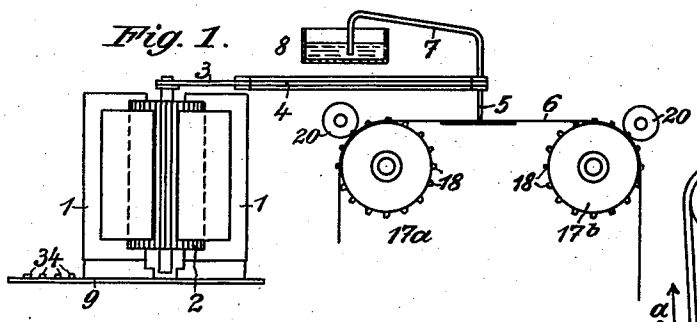


Fig. 2.

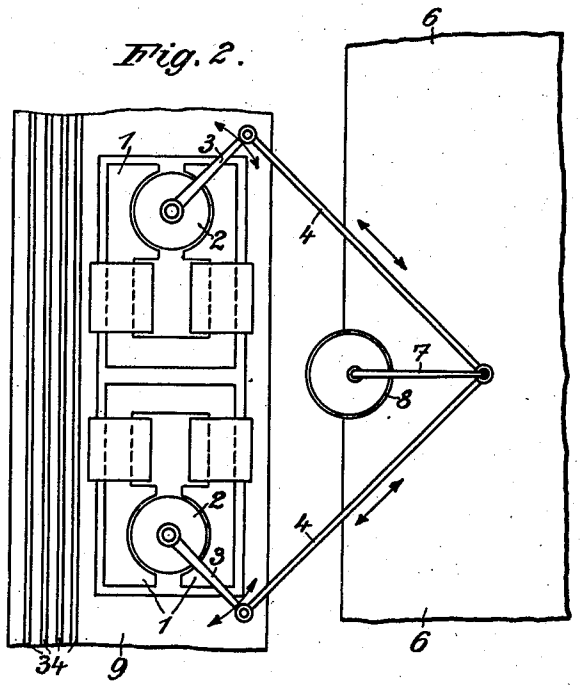


Fig. 3.

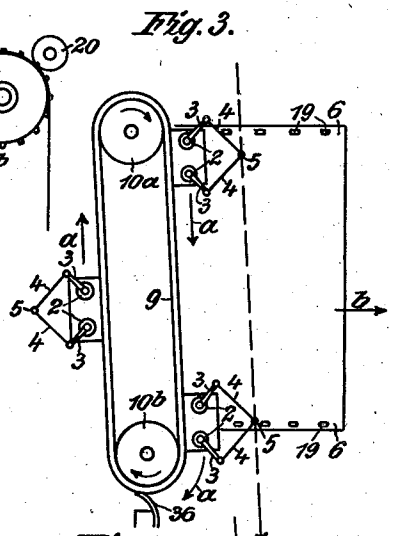
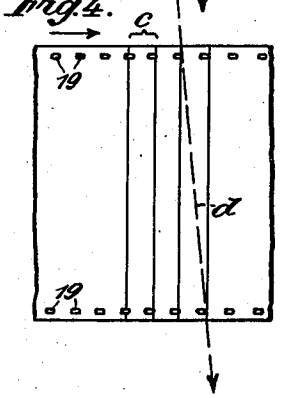


Fig. 4.



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Fig. 6.

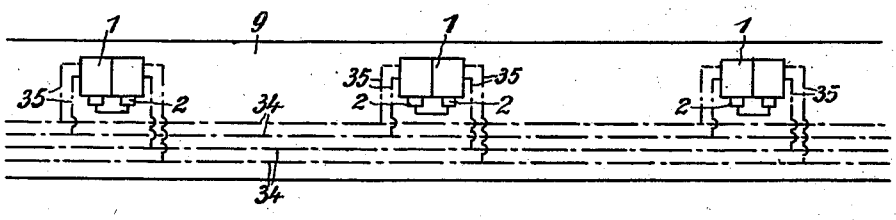


Fig. 5.

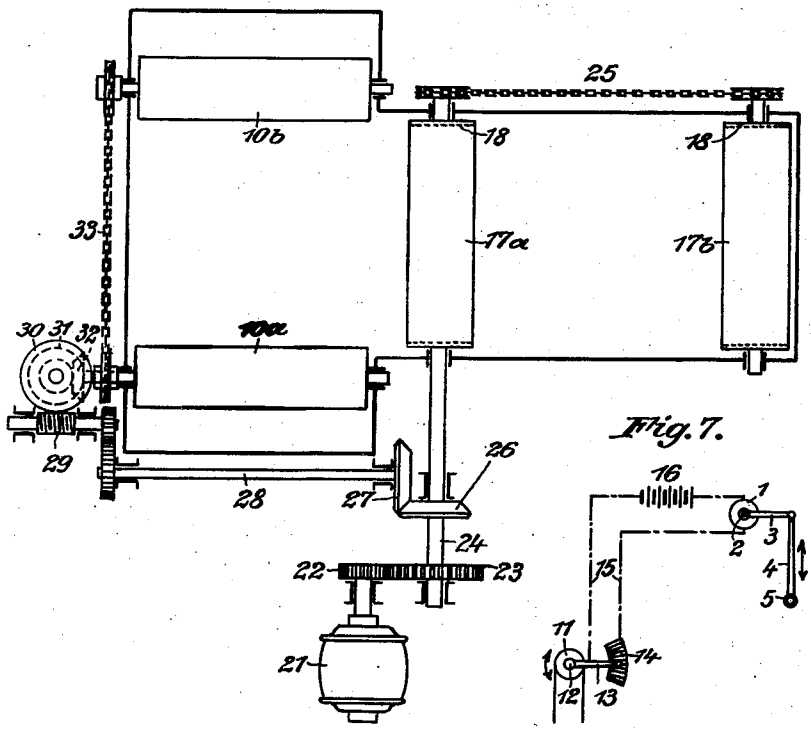


Fig. 7.

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RECEIVING APPARATUS FOR ELECTRIC TELEGRAPHS

Application filed December 22, 1928, Serial No. 327,875, and in Germany October 1, 1927.

This invention relates to electric telegraphs or transmitting apparatus and more particularly to recording or writing mechanism as may be connected therewith.

One feature of the invention resides in an improved method of writing whereby the transmitted communications are written continuously and automatically in the form of successive lines one beneath the other. For this purpose a plurality of writing devices or members are arranged in spatial relation, the distance between the writing devices corresponding to the length of a written line. Said devices or instruments are moved over a recording surface or web intended to receive the communication or message or telegram while said surface is moved at right angles or practically or nearly at right angles with respect to the direction of movement of the said writing devices. Each such writing device is an independent unit, that is to say individually capable of producing upon the paper a line of characters or text received. Preference may be given to a writing device of a type which currently describes letter curves, such as will be described below. The speed of the writing devices on the one hand and the speed of the paper on the other hand is regulated in such a manner that when one of the writing devices has been moved by as much as the length of a line, the web will have advanced as much as the distance between two lines. The result is that as soon as one of the writing devices has finished a line, the next writing device is set to commence the writing of the next line. When feeding continuously both the web and the writing devices at the required rate of speed it will be advantageous to allow said surface or web to cross somewhat obliquely the path of the writing device in action so that the lines written may appear normally square upon the surface and not sloping.

The writing devices may be caused to work simultaneously from the same impulses and to cooperate in such a manner that one device may start a new line while the preceding device finishes the preceding line. The text at the end of one line may then overlap with the text at the beginning of a new line, in other words the end of one line will be repeated at the beginning of the new line so as to insure a clear transition from one line to the other.

In its preferred embodiment the invention avails itself of a writing device where component movements induced from a transmitter are composed in the receiving apparatus to produce a continuous letter curve, such method being broadly known from the so-called "Pein" system disclosed in my Patent No. 1,751,781 (filed Sept. 29, 1925). According to this system the characters or letter curves to be transmitted are decomposed into their components and the transmitter emits electric energies which vary according to the course of the component curves of the characters to be transmitted. The electric energy variations are then, in the receiver, transformed into spatial movements and caused to actuate a writing member or implement in such a manner that it describes the resultant of every two component curves pertaining to a character, and thus, the character itself.

An improved writing device to execute this method, according to another feature, includes a pair of guiding or floating rods being coupled and connected with a writing member for describing the letter curves. The rear end of each rod is separately controlled and under the influence of a component movement as induced from the transmitter. With proper arrangement the writing member will thus describe the character curve resulting from said component movements.

Another feature provides rotary armatures to form the control members for said guiding rods.

Other features and advantages will appear hereinafter.

The invention is illustrated diagrammatically and by way of example on the accompanying drawing on which Figure 1 is a plan of a Pein writing device arranged upon a conveying member and being moved over a paper band upon which the transmitted characters are written; Figure 2 is a side-

view of the arrangement and combination of parts shown in Fig. 1; Figure 3 shows the arrangement of three Pein writing devices upon a common conveying member in such a manner that they are moved successively over the paper band provided for the reception of the communication or message or telegram transmitted, this figure being drawn to a reduced scale relatively to Figs. 1 and 2; Figure 4 explains the cinematic relations arising when the writing device and the paper band are moved simultaneously; Figure 5 shows the means for driving the writing device and the paper band; Figure 6 shows the wiring diagram of the receiving apparatus; and Figure 7 shows a relay arranged in series with the Pein writing devices.

Referring to Figs. 1 and 2, 1 are two magnet frames magnetized more or less by the energy variations transmitted by the transmitter. The magnetization of the one magnet frame takes place in conformity with the course of the one component curve of the character transmitted, and the magnetization of the other magnet frame takes place in conformity with the other component curve of that character. The magnet frames 1 act upon the armatures 2 which are turned more or less according to the intensity of the magnetization of said frames. The armatures are connected by rods 3 and 4 with a writing member or writing pin 5, the movement of which is the resultant of the movements given to the two armatures 2. This resultant is, however, nothing else than the succession of lines constituting the transmitted character. The pin 5 writes the transmitted character upon a sheet of paper 6; it communicates with an ink receptacle 8 by means of a tube or hose 7.

In order to write down the transmitted characters in successive lines, one beneath the other, as in Fig. 3, the writing device 1—5, 7, 8 is moved along over the sheet of paper 6 which, at the same time, is fed forward at right angles or nearly at right angles with respect to the direction of motion of said device. In order to move the writing device along over the sheet of paper, there may be used, for instance, an endless band 9 (Fig. 3) running over two rollers 10*a* and 10*b*. The several writing devices are affixed to said band in certain distinct distances from one another, these distances being so chosen that in that moment in which any one of them has arrived at the end of a line, the next thereof has arrived at the commencement of the following line. In electrical regard all writing devices are connected in parallel. In the constructional form illustrated in Fig. 3, all writing devices are secured to a common band 9 so that all are moved simultaneously and with absolutely the same speed. There are employed in this instance three writing devices in order to prevent any interruption in the writing procedure. The direction of motion of the endless band 9 is indicated by the arrows *a* (Fig. 3), and the direction of motion of the sheet of paper 6 by the arrow *b*.

If the paper is fed forward uniformly, it is suited to the purpose of the apparatus to move the writing devices not actually at right angles with respect to the paper, but somewhat obliquely, the degree of the obliquity being such that the just active writing device is moved not only from the one edge to the other edge of the paper, but also in the direction of motion of the paper by so much, as corresponds to the distance between two lines. There is attained in this way that in spite of the continuous forward feed of the paper the lines are written rectangularly with respect to the paper, as appears from Fig. 4, in which the dotted oblique line indicates the direction of motion of the consecutive writing devices, and *e* denotes the distance between the parallel lines which extend quite correctly at right angles with respect to the paper.

The endless band 9 is moved uninterruptedly by rollers 17*a* and 17*b* which are provided with teeth 18 engaging perforations 19 provided in the paper, as shown, so that the paper is drawn along by the rotating rollers 17*a* and 17*b*. In order to provide for a good contact between these rollers and the paper pressing-on rollers 20 are provided.

As the movement of the paper and the movement of the conveying band must be in a certain relation to one another, it is requisite to drive the paper feeding rollers 17*a* and 17*b* and the band driving rollers 10*a* and 10*b* by a motor 21 common to them all. This motor drives a cog-wheel 23 by the intermediary of a pinion 22; said cog-wheel is secured to a shaft 24, to which is affixed the paper band roller 17*a*; this roller is connected with the other paper band roller 17*b* by means of a chain 25 so that both these rollers are driven simultaneously and with the same speed. A bevel-wheel 25 keyed to the shaft 24 meshes with a bevel-wheel 27 secured to a shaft 28. This latter is connected with a worm 29 driving a worm-wheel 30. This wheel turns another pair of bevel-wheels 31, 32; the latter of these wheels is affixed to the shaft of the conveying band roller 10*a*, so that this roller can be, and is, rotated by the motion-transmitting means described. The rollers 10*a* and 10*b* are connected with one another by a chain 33, so that the rotation of the former roller can be, and is, transmitted to the latter roller.

In order to supply the writing devices attached to the conveying member 9 with current, this member is provided with four current-carrying rails connected by four wires 35 with each of the writing devices as shown

in Fig. 6. Each two of these rails conduct a current, the intensity of which is varied according to the course or configuration of the component curves of the just transmitted character. The two magnet frames 1 of the writing devices are connected up to the current-carrying rails 34 in such a manner that always one of them, of each writing device, is in conducting connection with one pair of said rails, and therefore, the respective three magnet frames are connected in parallel. There are, thus, produced in each of the three writing devices, and in all of them at the same time, such variations of current as correspond to every two component curves. The current is supplied to the rails 34 by brushes 36.

As in the example above described several writing devices are actuated at a time, it becomes in many cases requisite to insert into the circuit of every one thereof a relay and to actuate the writing number itself by means of a local current, because the current arriving from the transmitter is not strong enough to actuate two or more writing devices. A suitable relay is shown in Fig. 7. In this figure only one magnet frame is shown; this frame is magnetized in correspondence with one of the two component curves, and said figure shows, besides, only that part of the relay which is intended for the control of that one magnet frame. In reality, the parts shown in Fig. 7 must be assumed to be doubled, when it will be possible to cause both component curves to act upon the writing pin. The relay part shown in Fig. 5 consists chiefly of a magnet frame 11 designed similar to the magnet frame shown in Fig. 1; said magnet frame (11) is magnetized in correspondence with the course of a component curve of the transmitted character by the electric energy variations arriving from the transmitter, whereby the armature 12 is caused to oscillate on its axis, these oscillations corresponding also to the course of the component curve. The armature 12 is connected with an arm 13 sliding over a variable resistance 14; this latter and said arm are inserted into a circuit 15 containing also the battery delivering the local current. According as a larger or smaller portion of the resistance 14 is inserted into the circuit by the arm 13, the intensity of the current flowing in the circuit 15 will be decreased or increased, and in consequence thereof the magnetization of the magnet frame 1 inserted into the circuit 15 will vary in correspondence with the course of the component curves.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

1. Recording mechanism for electric receiving apparatus, including in combination a surface upon which to record a message, a plurality of writing instruments each of which is controllable to write a sequence of any suitable characters, producing a line of the message as it proceeds across said surface, means for moving said instruments consecu ively across said surface, and means for feeding said surface transversely to the path of said writing instruments, the mechanism being operative to write the message line by line, one below the other, upon the recording surface.

2. Recording mechanism for electric receiving apparatus, including in combination a surface upon which to record a message, three writing instruments each of which is controllable to write the line of a message, as it proceeds across said surface, a conveyer in the form of an endless band to carry equally spaced thereon said three writing instruments, allowing the same to pass across said recording surface continually one after the other, the distance between any two consecutive instruments corresponding to the length of a line, and means for feeding the recording surface transversely to the path of said writing instruments, the mechanism being effective to write the message line by line one below the other.

3. Recording mechanism for electric receiving apparatus, including in combination a recording surface upon which to record a message, a plurality of writing instruments each of which is controllable to write a line of the message, as it proceeds across said web, means for moving said instruments consecutively across said web, means for continuously feeding said web in a direction transversely and obliquely to the path of said writing instruments, said obliquety allowing the lines of writing to be produced squarely upon said web, the web being fed the distance between two lines while any one of the writing instruments is moved the length of a line.

4. In electric receiving apparatus, in combination a recording surface to receive the text of a message, a plurality of writing instruments each including a pair of magnet frames, a rotary armature in each of said frames, each armature to respond by rotation to the influence of the associated frame, and also including a system of levers also forming pairs interconnecting a pair of armatures and effective to compose the movements thereof, there being a writing member connected with said levers to describe resultant character curves, two circuits, parallel connections between said circuits and the said associated magnet frames so as to operate each writing instrument in an identical manner by two component impulses, means for moving said instruments consecutively across said recording surface,

and means for feeding said surface transversely to the path of said writing instruments, so that line by line is written, one below the other.

5. In electric receiving apparatus in combination a recording surface to receive the text of a message, a plurality of writing instruments, each including a pair of magnet frames, a rotary armature in each of said frames, and also including a system of levers interconnecting a pair of armatures and effective to compose the movements thereof, there being a writing member connected with said levers to describe resultant character curves, a conveyer in the form of an endless band to carry said writing instruments consecutively across said surface, means for moving said surface transversely to the path of said writing instruments so that line by line is written one below the other, parallel connections between said circuits and their associated magnet frames so as to operate each writing instrument in an identical manner by component impulses.

6. In electric receiving apparatus, in combination a surface upon which to record a message, a plurality of writing instruments each including a pair of magnet frames, a rotary armature in each frame, and also including a system of levers interconnecting a pair of armatures and effective to compose the movements thereof, there being a writing member connected with said levers to describe resultant character curves, means for moving said writing instruments consecutively across said surface, means for moving said surface transversely to the path of the said instruments, two relay circuits, each conducting component impulses and having parallel connections with its associated magnet frames, each circuit including a battery, a variable resistance and including a movable conductor in the form of an arm to vary said resistance while sliding thereon, an armature controlling said conductor arm, a magnet frame surrounding said armature, and a primary circuit energizing the latter magnet frame in conformity with the path of a component curve of a written character.

7. In electric receiving apparatus in combination a plurality of writing instruments, each instrument including a pair of magnet frames and responsive to two component electric impulses so as to transform the same into a resultant character curve, two relay circuits, each representing a component impulse and having parallel connections with its associated magnet frames, each circuit including a battery, a variable resistance, and including a movable conductor to vary said resistance while sliding thereon, an armature controlling said conductor, a magnet frame surrounding said armature, and a primary circuit energizing the latter magnet frame in conformity with the path of a component curve of a written character.

8. In electric receiving apparatus in combination a plurality of writing instruments including a pair of magnet frames and responsive to two component electric impulses so as to transform the same into a resultant character curve, two primary circuits representing two component impulses, and a relay circuit coupled with each primary circuit so as to reflect the primary impulse and parallel connections between each relay circuit and the associated magnet frames so as to energize the magnet frames in conformity with the component curve of a written character.

9. Recording mechanism for electric receiving apparatus including in combination a surface upon which to record a message, a plurality of writing instruments to work simultaneously from the same impulses, each instrument controllable to write a line of the message, as it proceeds across said surface, means for moving said three instruments consecutively in a cycle across said surface to produce the message line by line one beneath the other, means for continuously feeding said surface transversely to the path of the writing instruments, the mechanism being timed in such a manner that one instrument writes the end of a line of text whilst the following instrument writes the beginning of a new line and that said end is repeated at said beginning by reason of overlapping so as to insure clear transition of the text from said end to said beginning, the distance between any two consecutive writing instruments being somewhat smaller than the actual length of a line of writing.

In testimony whereof I affix my signature.

HEINZ PEIN.