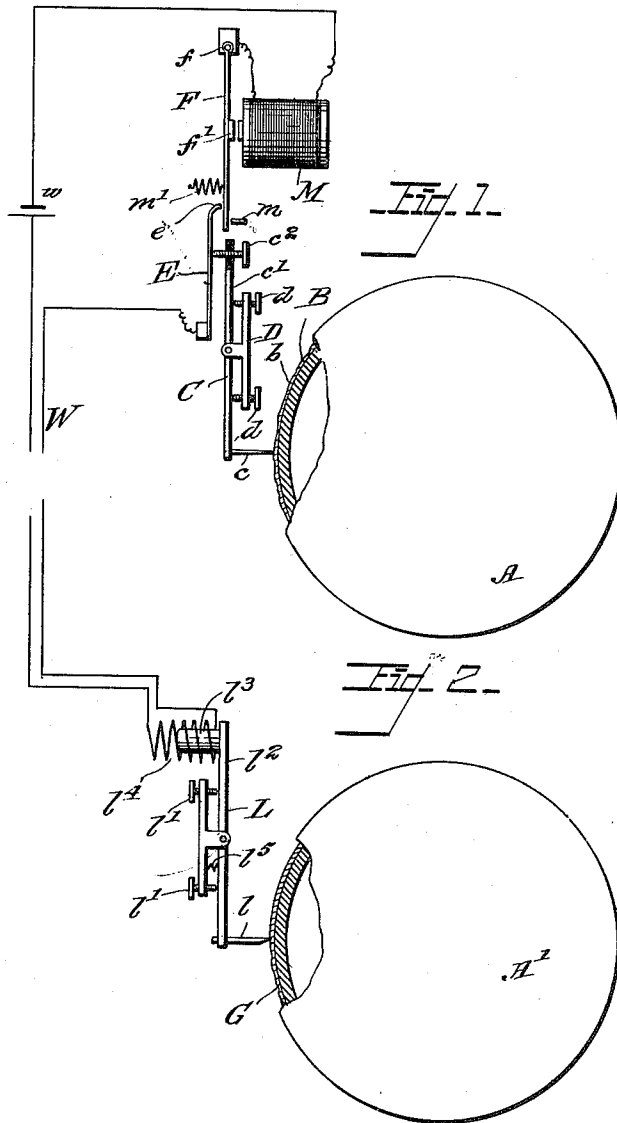


N. S. AMSTUTZ.
ILLUSTRATIVE TELEGRAPHY.
APPLICATION FILED AUG. 30, 1901.

1,011,141.

Patented Dec. 12, 1911



Witnesses

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ILLUSTRATIVE TELEGRAPHY.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, NOAH S. AMSTUTZ, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Illustrative Telegraphy, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to the art of reproducing sketches, photographs, etc., locally or at a distance and its object is to provide a method of transmitting a likeness of the subject at a high rate of speed without detracting from the accuracy and fineness of the result.

In practicing this invention an impulsive current flowing in a circuit independent of the subject may be completely controlled by means of the subject both in respect to the rate of the propagation of the impulses and their duration.

The invention consists in certain operations whereby these results may be accomplished all of which will be more fully described hereinafter and definitely set forth in the claims.

In the drawing which illustrates an adaptation of devices to the purpose set forth above, Figure 1 represents diagrammatically the transmitting apparatus, part of the transmitting drum being shown in section. Fig. 2 represents diagrammatically the receiving apparatus.

Referring to the parts by letter, A, represents the transmitting drum upon which may be secured in any suitable manner a relief-representation B of the subject. An ordinary "carbon-print" serves admirably for this purpose. It will be remembered that undulations of the surface of such a print are incidental to variations in its lights and shades; and I have represented these undulations in exaggerated profile by the wavy line *b*. Adjacent to the face of this print I arrange a stylus *c* rigidly carried by a lever C pivoted to a frame D, and set screws *d* afford means for accurately adjusting the stylus *c* to the print and for limiting its movement.

An arm *c'* of the lever C carries an insulated set-screw *c''* the point whereof rests against the face of a light and resilient member E. The tip *e* of this member E may turn downwardly as shown and it lies adjacent to a vibrator or circuit-breaker F sus-

ended at *f* and carrying an armature *f'*. An electro-magnet M cooperates with this armature, a stop *m* serving to limit the movement of the armature when attracted; a light spring *m'* tends to draw the vibrator F against the tip *e*.

An electric circuit W which includes a source of current *w* connects the electro-magnet coils, the vibrator and the member E in series as shown and evidently this circuit would be closed when the vibrator F is in contact with the tip *e* and vice versa.

At the receiving end of the circuit a drum A' is provided upon which may be secured a sheet of yielding or recording material G. A V-pointed recording or engraving tool *l* carried rigidly on a lever L is adjusted by set-screws *l'*, *l''* to the surface of the said recording sheet G; the arm *l''* of the lever L carries the core *l'''* of a solenoid *l''''* and the lever L is constrained toward an extreme position by a light spring *l'''''*. Now the circuit W being closed through the coils of the solenoid *l''''*, the circuit breaker F would be rapidly vibrated in the well known manner, being alternately thrown under the influence of the spring *m'* and the more powerful attraction of the magnet. In this manner electric impulses are continuously propagated in the circuit W and the rate at which these impulses are propagated would evidently be constant so long as the member E were held fixed. Furthermore, if the tip *e* were held nearer to the vibrator F the rate of its vibrations would increase because the circuit would be closed more quickly; so, if the tip *e* were held farther removed from the vibrator the rate of its vibrations would diminish. In other words the member E constitutes a regulator, for the position of the tip *e* controls the rate of propagation of impulses in the circuit W.

The drum A being now rotated while the stylus point *c* is moved or "fed" slowly along the side of the drum, the said stylus will approach or recede from the drum according to the character of the point of the relief passing just beneath it and the tip *e* will be affected by this movement and approach or recede from the vibrator F in a like manner; by this means the rate of propagating the impulses is selectively changed by the variations in the relief or light and shade of the subject. Varying the rate of the impulses affects the rate of magnetization of the solenoid *l''''* and the core *l'''* is

drawn farther in or allowed to recede, affecting the recording tool l , so that this tool reproduces the movements of the stylus c ; thus when the stylus is in a deep depression of the relief, the recording tool l will bury its point in the recording material. The drums A, A' being rotated synchronously by any means, the stylus and recording tool will successively pass over the entire area of their respective sheets and as the point of the tool is V-shaped, as stated, the cuts made in the recording material will vary in width directly with their depth or with the light and shade of the subject, so when the operation has been completed the uncut surface of the sheet G will constitute a printing face, which when the sheet has been mounted on a block, is capable of reproducing perfect likenesses of the subject.

The time constant of the solenoid l^4 , in conjunction with the distance of movement of the core l^3 , determines the mean position of the point l for any given rate of vibration. Supposing the magnetic lag of the solenoid and the damping action of the spring l^5 to be such that at an arbitrary rate of, say, 50 vibrations per second the mean position of the core was such as to be drawn into the solenoid $1/10''$, then should the rate be changed to one-half of its former value the mean position of the core would, approximately, be $1/10''$ farther into the solenoid than with the 50 vibrations per second. Thus by varying the rate of vibration according to the lights and shades of the image to be transmitted the point l will reproduce the relief curve of b , and by reason of the point l being V shaped the record will be formed in grooves of varying widths and depths.

It is old, *per se*, to record a transmitted image in grooves of varying widths and depths but such recording has heretofore been accomplished under the direction of an uninterrupted variable current on the line—a current similar to the modulation curve of the human voice when transmitted by telephone, without the attendant pitch waves and their characteristics.

This invention does not include the image in the transmitting circuit, this in itself is not broadly new, but I believe it to be new to modify continuously propagated electrical impulses of a uniform rate into impulses of a varying rate corresponding to the variations of light and shade of the image to be transmitted, without recourse to arbitrary, lines, dots or the presence of a grain on the face of the image to be transmitted. To be more explicit. The fundamental impulses are formed at a uniform rate and of successive uniform duration by the image. The propagation is not discontinued at any time during the transmission of the image.

The appearance of the record, micro-

scopically considered, would present the borders of the incised lines with wavy or indented edges corresponding to the vibrations of the tool, but the grooves as a whole would be wider and narrower according to the subject transmitted, *i. e.* at some places wide, at other places narrow and at other points of an intermediate width, etc.

What I claim is:—

1. The method of reproducing sketches, photographs or representations thereof, which consists in continuously propagating electric impulses of uniform rate and duration and varying the rate of propagation and duration of said impulses by means of the subject, and suitably recording the same.

2. The method of reproducing sketches, photographs or representations thereof which consists in propagating electric impulses normally at a uniform rate, varying said rate by means of the subject and receiving a record of said subject thereby.

3. The method of reproducing sketches, photographs or representations thereof which consists in propagating electric impulses, varying their rate of propagation by means of the subject, and receiving said impulses in a suitable manner.

4. The method of reproducing photographs, sketches, or representations thereof, which consists in causing an orderly source of continuous vibrations to be photographically modified so as to conformably control a recording medium and suitably recording the same.

5. The method of reproducing photographs, sketches, or representations thereof, which consists in continuously forming impulses in an electric circuit, in variably controlling the impulse periodicity conformably to the pictorial tonal variations of a subject and suitably recording the same.

6. The method of reproducing sketches, photographs, or representations thereof, which consists in propagating electrical impulses of a fundamentally uniform rate and duration, causing the lights and shades of an image to modify the same, transmitting such impulses and receiving them, thereby producing a variable record through the orderly variation of the rate and duration of the transmitted impulses.

7. The method of reproducing sketches, photographs, or representations thereof, which consists in breaking an electric circuit continuously and normally at regular intervals, and modifying said intervals by means of the subject, and suitably recording the same.

8. The method of reproducing sketches, photographs, or representations thereof, which consists in causing the continuous propagation of fundamental electric impulses normally at a uniform rate, and varying said rate by means of variations in the

light and shade of the subject, and suitably recording the same.

9. The method of reproducing photographs, sketches, or representations thereof, which consists in progressively subjecting the various portions of an image to a translating device, in utilizing a medium of transmission having fundamental rate characteristics and modifying said characteristics in conformity to the image to be transmitted, and suitably recording the same.

10. The method of reproducing sketches, photographs, or representations thereof, which consists in causing the propagation of an electric current of fundamental characteristics and intensity in a circuit that excludes the subject and controlling said characteristics, without affecting the intensity, by means of the subject, and suitably recording the same.

11. The method of reproducing sketches, photographs, or representations thereof, which consists in continuously propagating electric impulses of fundamental intensity and independently of the character of different parts of the subject, and successively varying said impulses by means of said parts of the subject without materially changing their intensity, and suitably recording the same.

12. The method of reproducing sketches, photographs, or representations thereof, which consists in the propagation of electric impulses in a circuit independent of the sub-

ject and varying the rate of said propagation by means of the subject, and suitably recording the same.

13. The method of reproducing sketches, photographs, or representations thereof, which consists in propagating electric impulses irrespectively of the character of different parts of the subject and varying the duration of said impulses by means of the said different parts of the subject, and suitably recording the same.

14. The method of reproducing sketches, photographs, or representations thereof, which consists in impressing electric characteristics on a circuit having a distinctive periodicity independent of the subject, and in selectively modifying the amplitude conformably to a subject without materially changing the intensity value of said circuit, and suitably recording the same.

15. The method of reproducing sketches, photographs, or representations thereof, which consists in causing a continuously moving member to make and break an electric circuit primarily at regular intervals and controlling the length of said intervals by means of the subject, and suitably recording the same.

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

NOAH S. AMSTUTZ.

Witnesses:

F. D. AMMEN,
E. L. PARDEE.