L. TSCHÖRNER.

IMAGE TRANSMITTING TELEGRAPH.

APPLICATION FILED JUNE 27, 1910.

1,075,614.

Patented Oct. 14, 1913.

Fig. 3.

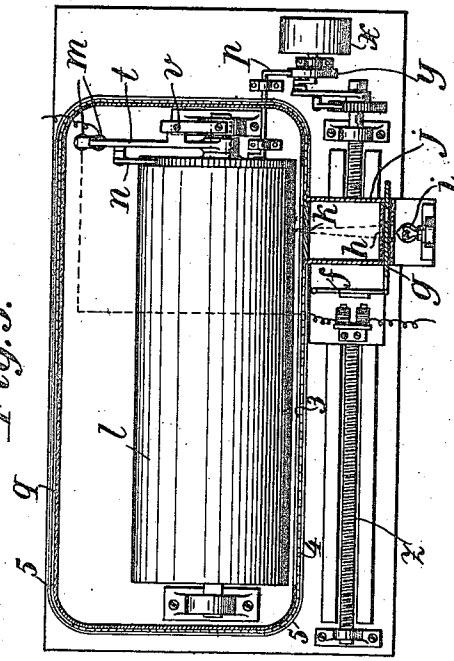


Fig. 4.

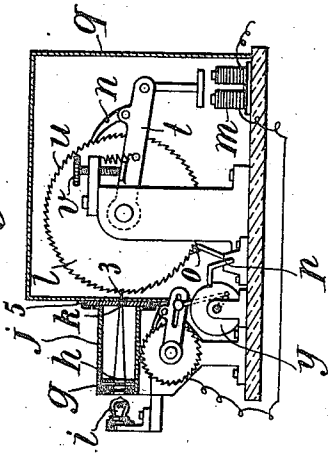


Fig. 1.

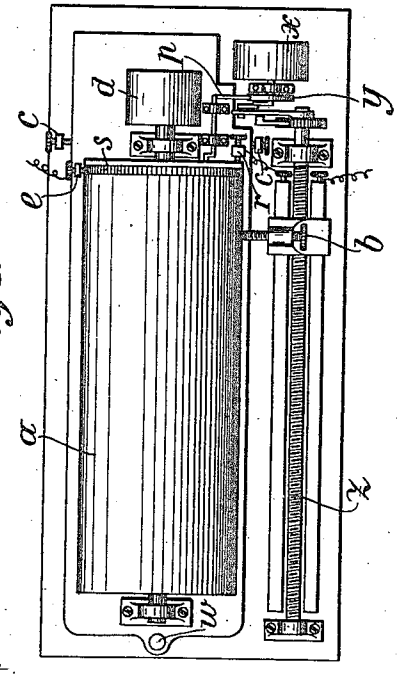
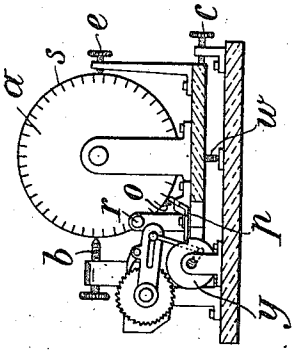


Fig. 2.



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UNITED STATES PATENT OFFICE.

LUDWIG TSCHÖRNER, OF VIENNA, AUSTRIA-HUNGARY.

IMAGE-TRANSMITTING TELEGRAPH.

1,075,614. Specification of Letters Patent. Patented Oct. 14, 1913.

Application filed June 27, 1910. Serial No. 569,149.

To all whom it may concern:

Be it known that I, LUDWIG TSCHÖRNER, of Kandlgasse 38, Vienna, VII, in the Empire of Austria-Hungary, have invented an Image-Transmitting Telegraph; 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.

Methods are in practice of transmitting photographs, handwriting or the like telegraphically by alternately making and breaking a circuit by means of the sender and thereby rendering a stylus or a shutter operative at the receiver for a varying length of time, whereby owing to the constant movement of the support at the receiver according to the duration of the action of the stylus or of the ray of light shorter or longer lines are produced on the writing surface or upon the sensitized film.

The present invention has for its object an apparatus by which, in employing autotypes as the originals, the opening and closing of the circuit effected by the autotype is utilized for operating the receiver support or carrier in such a manner that the roller or drum of the receiver comes to rest when the light shutter or stylus is operated and is actuated only after the contact-piece of the transmitting member passes each successive point of the autotype, whereby according to the duration of the action of these parts dots or points of different magnitude are produced. This process not only renders it possible to reproduce an autotype exactly but in addition autotypes can be produced at the receiver.

To that object an electromagnet may be arranged on the receiver, this magnet being energized by the current serving for the transmission of the picture and its armature being connected with the operating mechanism in such a manner that when the circuit is broken the operation is produced.

A constructional form of such an apparatus is illustrated in the accompanying drawing by way of example, the said apparatus being intended for the production of autotypes, hand writing and the like as reproductions.

Figures 1 and 2 are respectively a plan and an end elevation of the transmitter, while Figs. 3 and 4 are respectively a plan and an end elevation of the receiver.

In the embodiment of the invention here illustrated the transmitter and the receiver comprise drums as carriers for the picture to be transmitted. On the drum *a* of the transmitter which is of conducting material is arranged the picture (in the present case an autotype gelatin copy). The drum is continuously rotated by a clockwork *d*. A resilient contact pin *b* travels over the picture and the circuit of the current is interrupted for a shorter or longer time by the non-conducting points of the picture of different magnitude and closed for a shorter or longer time by the conducting spaces of varying magnitude. Now as soon as the contact pin slides over a metallic place the current proceeds from the battery through the pin *b* over the drum *a* to the contact pin *e* and thence to the receiving station (Figs. 3 and 4). Here the current energizes an electromagnet *f*, the armature of which is connected with a slide *g* of an illuminating device in such a manner that the armature moves the slide so that according as a negative or a positive picture is to be formed an opening *h* in the casing *j* is closed or opened. The light from a lamp *i* passes through the opening *h* and enters the casing *q* as a pencil of rays, through a small opening *k* in the casing *j*; onto the photographic paper or other material sensitive to light stretched on the drum *l* inclosed in said casing. The slot 3 which extends throughout the entire length of the drum is covered on both sides of the casing *j* by blinds 4 hinged thereon and which upon the movement of the casing *j* are displaced to the right or to the left and guided in guides 5 extending around the casing *q*.

By means of the fine ray of light impinging on the film, a vignette, that is to say a point of light gradually decreasing in luminosity toward the outside, is formed thereon as in the preparation of ruled screen photographs for purposes of photo-lithography and which, according to the duration of the exposure of the film, when it is developed, produces a smaller or larger dot, thereby accurately reproducing the tone values of the original picture.

Simultaneously with the electro-magnet for operating the shutter the same current

energizes a second electro-magnet *m*, the armature of which is connected with an operating lever *t*. When the armature is attracted, that is to say while the circuit is closed, the operating pawl *n* of the spring controlled lever slides over one or more teeth of a ratchet wheel *u* rigidly connected with the drum, while when the current is interrupted it drives the drum to an extent corresponding to the spaces between the centers of the points of the autotype to be transmitted, this amount being adjustable by means of the set screw *v*.

After each revolution of the drum of the transmitter and of the receiver drum, tappets *o* on the drums release a locking lever *p*, thereby releasing a cam disk *y* in connection with the spring casing *x* so that the disk is able to rotate until the reëngagement of the locking lever in doing which it rotates the screw spindle *z* carrying the contact or the illuminating device by a certain amount by the intermediary of ratchet gear, whereby the contact and the illuminating device are displaced in the horizontal direction by an amount corresponding to the spaces between the centers of the points of the autotype. The next series of points then passes beneath the contact pin; after a complete revolution of the drums the pin and the illuminating device are shifted onto the next row of points, and the above procedure is repeated. In this connection it should be noted that in order to obtain exact registration between the contact pin and the centers of the points of the autotype the bearing block carrying the drum is mounted on points *c* at its end so that the picture or its rows of points can be adjusted parallel with the direction of displacement of the contact pin by means of a set screw provided on the other end of the bearing block.

In the apparatus described above therefore the transmitter controls the passage of currents of different duration with pauses of different length, into the line wire, these currents being transformed on the sensitized film of the receiver by the illuminating device into points of different magnitude as in an autotype.

Owing to the fact that, as already explained, the synchronous movement of the receiver drum *l* with the transmitter drum is produced by the making and breaking of the circuit produced by the conducting and non-conducting places of the autotype it might happen that with defective places in the autotype (copy) no interruption of the current would take place; in this case the receiver roller would have its movement retarded as compared with the transmitter roller so that a prejudicial fault in the reproduction of the picture would occur. Now in order to prevent such defects a contact pin *e* slides on a disk *s* rigidly and electrically connected with the drum and presenting recesses or non-conducting dots exactly corresponding with the dots of the picture. Consequently in any case, that is to say, even when various dots of the picture are wanting in the autotype, the current will be interrupted at the proper moment. The non-conducting parts of the disk are, however, so small that although owing to the interruption of the current the armature of the electromagnet *m* is released so that the roller is operated still the shutter is displaced so quickly that the action of the light cannot take effect upon the film. The defects in the autotype might, however, consist in large part of the picture not being conductingly covered. In this case the circuit would not be closed, the result of which would likewise be that as the electro-magnet would not be energized the operation of the drum would not take place. In order to avoid these defects a second conducting pin *r* is provided and slides on the rim of the edge of the disk. On this part of the disk larger non-conducting spaces alternate with narrow conducting spaces which correspond with the spaces between the dots of the picture. Consequently if conducting spaces are likewise wanting upon the autotype notwithstanding this fact, by the intermediary of the contact pin *r* and of the disk *s* the current will be closed for a moment which suffices to operate the electromagnet *m* for the actuation of the drum. By means of this arrangement therefore an absolute corresponding movement of the two drums *a* and *l* is insured. This is also the case if the forward movement of the drum *l* and of the illuminating device of the receiver should be increased or decreased relatively to that of the drum *a* and the contact pin *b* on the transmitter, the only result of which would be that the picture would be reproduced to a larger or a smaller scale.

If hand writing, pen-pictures or the like are to be transmitted telegraphically this is advantageously effected by arranging it as a negative gelatin copy or the like on the picture carrier *a*. In this case the lines consequently form conducting places, while the rest of the surface is not conductingly covered. Upon the rotation of the drum *a* when the contact pin *b* slides over the non-conducting surfaces the circuit maker *s*, *e*, *r* produces the uniform closing of the circuit so that the synchronous movement of the receiver drum with that of the transmitter drum is insured. The shutter is then displaced so quickly that the light does not act on the film. Consequently only the lines of the original are reproduced and this is a connected row of dots. The same is the case when a stylus is used.

By adjusting the shutter or the stylus in such a manner that the slide either opens or closes when the circuit is made or the lever

is moved toward or from the writing surface, a positive or negative copy can be obtained from a positive original or a negative or a positive copy from a negative original.

What I claim as my invention and desire to secure by Letters Patent is:

1. In an apparatus for telegraphically transmitting and reproducing images, the combination of a transmitter and a receiver in circuit, said transmitter alternately making and breaking the circuit, and said receiver comprising a receiving surface, reproducing means adapted to act on said receiving surface, and means producing relative movement between said receiving surface and reproducing means, the making and breaking of said circuit alternately actuating said reproducing means and said movement-producing means.

2. In an apparatus for telegraphically transmitting and reproducing images, the combination of a transmitter and a receiver in circuit, said transmitter alternately making and breaking the circuit, and said receiver comprising a receiving surface, reproducing means adapted to act on said receiving surface, and means producing relative movement between said receiving surface and reproducing means, an electromagnet intermittently actuating said reproducing means and said movement-producing means with the making and breaking of the circuit by the transmitter.

3. In an apparatus for telegraphically transmitting and reproducing images, the combination of a transmitter and a receiver, in circuit, said transmitter alternately making and breaking the circuit, and said receiver comprising a receiving surface, reproducing means adapted to act on said receiving surface, and means producing relative movement between said receiving surface and reproducing means, said reproducing means and said movement-producing means being actuated by the making and breaking of the circuit, and auxiliary means making and breaking the circuit synchronously with the making and breaking of the circuit by said transmitter and synchronously operating said movement-producing means.

4. In an apparatus for telegraphically transmitting and reproducing images, the combination of a transmitter and a receiver in circuit, said transmitter comprising a surface having conducting and non-conducting portions thereon, and a contact-device bearing upon said surface and making and breaking the circuit, and said receiver comprising a receiving surface, reproducing means adapted to act on said surface, and means producing relative movement between said receiving surface and reproducing means, said reproducing means and said movement-producing means being actuated by the making and breaking of the circuit, and auxiliary means comprising contact rings having conducting and non-conducting segments thereon corresponding to the conducting and non-conducting spaces on the transmitter surface, and contact-devices contacting with said rings, said contact-devices coming in contact with the conducting or non-conducting segments respectively when the contact-device of the transmitter is on the non-conducting or conducting spaces of the transmitter surface, whereby the circuit is made and broken and the movement-producing means of the receiver is synchronously moved with the movement between said transmitter contact-device and transmitter surface.

5. In an apparatus for telegraphically transmitting and reproducing images, the combination of a transmitter and a receiver in circuit, said transmitter making and breaking the circuit, and said receiver comprising a receiving surface, reproducing means adapted to act on said receiving surface, and means producing relative movement between said receiving surface and reproducing means, the making and breaking of said circuit actuating said reproducing means and said movement-producing means, the movements of the movement-producing means taking place after each movement of the reproducing means.

6. In an apparatus for telegraphically transmitting and reproducing images, the combination of a transmitter and a receiver in circuit, said transmitter comprising a transmitting surface with the image thereon in conducting and non-conducting spots, and a contact device adapted to make contact with said surface, and said receiver comprising a receiving surface, a reproducing device and an electro-magnet for moving said receiving surface, said electro-magnet being intermittently energized and deënergized by the making and breaking of circuit by said contact-device of the transmitter with the conducting portions of said transmitting surface.

7. In an apparatus for telegraphically transmitting and reproducing images, the combination of a transmitter and a receiver in circuit, said transmitter comprising a transmitting surface with the image thereon in conducting and non-conducting spots, and a contact device adapted to make contact with said surface, and said receiver comprising a receiving surface, a reproducing device and an electro-magnet for moving said receiving surface, said electro-magnet being intermittently energized and de-energized by the making and breaking of circuit by said contact-device of the transmitter with the conducting portions of said transmitting surface, said electro-magnet

operating to move said receiving surface after the completion of each operation of the reproducing device.

8. In an apparatus for telegraphically transmitting and reproducing images, the combination of a transmitter and a receiver in circuit, said transmitter comprising a transmitting surface with the image thereon in conducting and non-conducting spots, and a contact device adapted to make contact with said surface, and said receiver comprising a receiving surface, a reproducing device and an electro-magnet for moving said receiving surface, said electro-magnet being intermittently energized and deënergized by the making and breaking of circuit by said contact-device of the transmitter with the conducting portions of said transmitting surface, said electro-magnet being put into operative condition during the operation of said reproducing device and operating to move said receiving surface after the completion of each operation of said reproducing device.

9. In an apparatus for telegraphically transmitting and reproducing images, the combination of a transmitter and a receiver in circuit, said transmitter comprising a transmitting surface with the image thereon in conducting and non-conducting spots, and a contact device adapted to make contact with said surface, and said receiver comprising a sensitized receiving surface, a reproducing device and an electro-magnet for moving said receiving surface, said electro-magnet being intermittently energized and deënergized by the making and breaking of circuit by said contact-device of the transmitter with the conducting portions of said transmitting surface, said reproducing device comprising a source of light, a shutter and an inclosure having two relatively spaced openings therein through which said light projects onto said receiving surface whereby the light on the opening of the shutter falls as a vignetted bundle of rays through said openings, thereby producing a vignetted light spot upon said receiving-surface varying in intensity according to the duration of said illumination.

10. In an apparatus for telegraphically transmitting and reproducing images, the combination of a transmitter and a receiver in circuit, said transmitter comprising a transmitting surface with the image thereon in conducting and non-conducting spots, and a contact device adapted to make contact with said surface, and said receiver comprising a receiving surface, a reproducing device and an electro-magnet for moving said receiving surface, said electro-magnet being intermittently energized and deënergized by the making and breaking of circuit by said contact-device of the transmitter with the conducting portions of said transmitting surface, said transmitter having contact devices thereon adapted to complete the circuit to said receiver independent of the contact of said transmitter contact with the conducting spots of said transmitting surface, and adapted to break the circuit to said receiver independent of the contact of said transmitter contact with the non-conducting spots of said transmitting surface, whereby said receiving surface will be moved irrespective of defects in said transmitting surface.

11. In an apparatus for telegraphically transmitting and reproducing images, the combination of a transmitter and a receiver in circuit, said transmitter comprising a transmitting surface with the image thereon in conducting and non-conducting spots, and a contact device adapted to make contact with said surface, and said receiver comprising a receiving surface, a reproducing device and an electro-magnet for moving said receiving surface, said electro-magnet being intermittently energized and deënergized by the making and breaking of circuit by said contact-device of the transmitter with the conducting portions of said transmitting surface, said transmitter having contact rings s thereon and contacts e and r, one of which is adapted to complete the circuit to said receiver independent of the contact of said transmitter contact with the conducting spots of said transmitting surface, and the other of which is adapted to break the circuit to said receiver independent of the contact of said transmitter contact with the non-conducting spots of said transmitting surface, whereby said receiving surface will be moved irrespective of defects in said transmitting surface.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LUDWIG TSCHÖRNER.

Witnesses:

ALBIN SCHILLER,

AUGUST FUGGER.