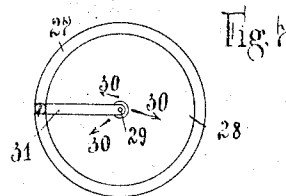
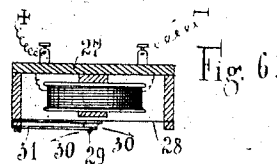
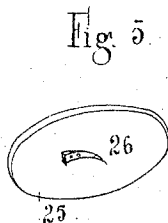
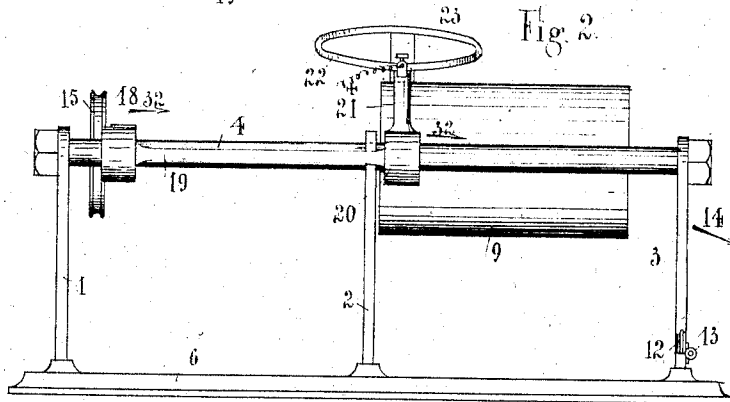
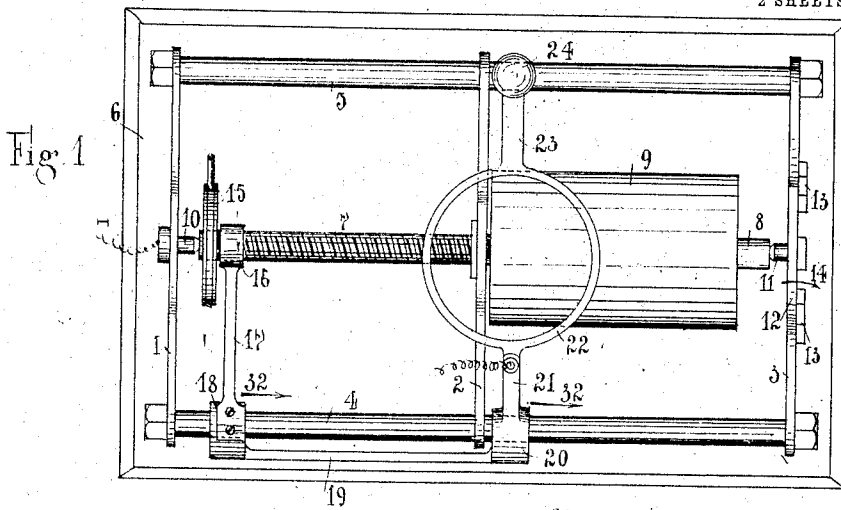


H. CARBONNELLE.
 APPARATUS FOR TRANSMITTING HALF TONE PICTURES.
 APPLICATION FILED MAR. 13, 1907.

1,003,429.

Patented Sept. 19, 1911.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 3.

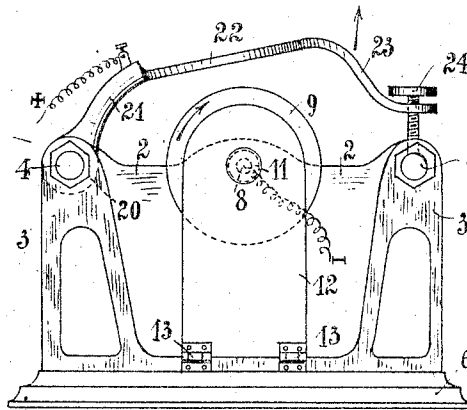
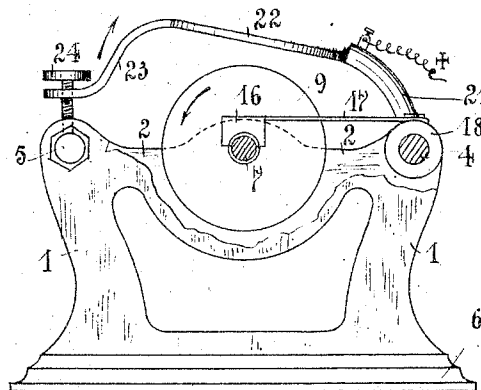


Fig. 4.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR TRANSMITTING HALF-TONE PICTURES.

1,003,429.

Specification of Letters Patent. Patented Sept. 19, 1911.

Application filed March 13, 1907. Serial No. 362,114.

To all whom it may concern:

Be it known that I, HENRI CARBONNELLE, engineer, a subject of the Belgian King, and residing at Uccle, near Brussels, in the Kingdom of Belgium, have invented new and useful Improvements in Apparatus for Transmitting Half-Tone Pictures; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to a process and apparatus for reproducing at a distance photographs, and the like.

This process consists in principle in the use as a transmitter of a movable or rotatable cylindrical surface made of some material which is a conductor of electricity, to which is applied the plate to be transmitted, made of non-conducting material, such as gelatin, collodion, ink, etc., the said plate moving under a needle which forms a portion of an ordinary telegraphic circuit, or conversely.

The telegraphic circuit connections are shown in the annexed drawing by the positive and negative conductors, see Figures 1, 2, 3, 4 and 6. The words "non-conducting material" is here used, and the words "non-conducting material" throughout the specification, in their ordinary electrical sense, viz: poorly conductive, since it is well known that the terms are entirely relative, no such things as non-conductors existing.

Every time that the needle in question meets a point covered with material of different conductivity, the intensity of the current changes for a period of time in proportion to the length of the said contact, and the said modification of current is transmitted by the line circuit to the receiver which can be identical with the transmitter except that the needle of the latter is replaced by a telephone receiver of which the vibrating diaphragm is provided with a suitable engraver's point which registers the different interruptions of current on a suitable surface, such as metal, gelatin, collodion, etc. The transmitter and the receiver must evidently be operated synchronously, such means being perfectly well known to those skilled in the art, and not needing further explanation. As a sample of such a device, may mentioned the De la Cour wheel. In the said process, the differences in the

thickness of the layer of gelatin, collodion, etc. of the photographic plate (in the case of the transmission of a photograph) play the part of microphonic contacts which faithfully reproduce the half tones of the original. In fact, the pictures or photographs with salts of silver, platinum, etc. formed on or in the body of the layers or supports of gelatin, collodion or other similar mass, are produced, as is well known, by a more or less uniform distribution of the said salts reduced to metallic state by the action of light. The layer retaining the said metal dust forming the picture has however a practically uniform thickness, and consequently a practically constant electrical resistance at all the points in the direction perpendicular of its thickness. But the more or less great proportion of metal retained by the layer of gelatin etc. for forming the picture modifies the said resistance by reducing it more or less according to the proportions of metal which constitute the different points of the picture. If, therefore, the latter is printed or transferred to a surface conducting electricity, each point of the layer of gelatin etc., in the direction of thickness, on passing under the point of the needle or stylus of the transmitter hereinbefore referred to, will vary the resistance of the circuit to a more or less great extent. The effects produced on the armature of the receiver will, therefore, be similar to those produced by a microphone, and the engraver's point of the receiver will penetrate to a greater or less depth into the layer to be engraved according to the resistance of the point which moves under the needle of the transmitter. In this way the receiver faithfully reproduces the original image with all its details.

When the negative or plate block in the transmitter is constituted by a so-called "carbon photograph" the present process utilizes the fact that the layer retaining the pigmentary products, is more or less thick at the different points of its surface, practically in proportion to the shades and lights of the picture. It follows therefrom, from the electrical point of view, that the resistances in the layer differ in accordance with the thickness of its different points. These resistances influence the current transmitted

by the circuit to the point or stylus of the receiver which will engrave in the receiver layer or surface points of depths corresponding to the reliefs and intaglios of the original of the transmitter.

When the original plate is constituted by a picture stripe or grained in any way, the hollows between the different stripes and grains etc. are all of the same depth but the spaces between the stripes, points etc. are proportional to the lights of the picture. The currents acting on the receiver are in this case interrupted at the transmitter for a more or less long time according to the tonality of the original picture. In this case, the transmission can be effected with a plate photo-engraved on a suitable surface, or with a copy printed from the said plate. Nevertheless, in order to avoid the work of photo-engraving, it is more simple to print an image or copy grained or striped by photo-printing or photolithographic means or by other ordinary processes.

For the transmission of writing or drawings, the process can be carried out in several ways. It is possible to write or draw direct on a conducting surface metal sheet by means of a non-conducting ink, or it is possible to write or draw on lithographic transfer paper and to transfer on to a metal or conducting sheet. The latter is then provided with the original reversed and the engraving received at the receiver can serve directly for printing numerous copies of the message received. If the original writing etc. is not reversed at sending off, it is sufficient to advance the receiver in the opposite direction to the transmitter in order to obtain in the former an engraving capable of being used directly for printing.

The half-tones of the picture can be reproduced at the receiver in several ways: either on a layer of any suitable material by hollows in proportion, or in inverse proportion, to the lights by the means already indicated: or on a layer of material by hollows of the same depth but of different surfaces: or on a layer or surface covered with a second layer of comparatively small thickness, of which the tonality is removed by the point or stylus of the receiver for forming the hollows or the contrasts. If this second layer is more or less transparent according to its thickness, it can also be more or less completely removed, in proportion to the shades of the original image.

As original may be used a tin foil on which the engraving photograph etc. has been printed, written, drawn etc. with printer's ink. The tin foil is then stuck on to a sheet of paper which renders it stronger. The tin foil is a conductor, while the image printed with printer's ink forms the non-conducting layer.

Attention is called to the fact that the ink transmits some current depending upon its composition, thickness as applied, and voltage of current used.

For receiving an image direct on white paper, white paper covered with carbon paper may be placed on the receiver cylinder, the rounded off or blunted pin or stylus of the telephone vibrating against the said carbon paper. This is important for receiving telegrams, engravings and photographs, of which it is desired to obtain quickly only one copy. These different means can obviously be combined with each other.

For the printing on paper or on other material of the engraved plates received at the receiver, the said plates may retain the cylindrical shape to be employed direct on a circular press or for photo-glyptic printing.

From the point of view of the rapidity of transmission of telegrams, typograms, etc., the present process enables 300,000 to 400,000 letters to be transmitted per hour, according to the state of the circuits.

The different apparatus can be mounted in duplex as the majority of ordinary telegraphic apparatus.

The apparatus, which can be used for carrying out the hereinbefore described tele-printing or tele-engraving process, can be of various shapes and constructions.

The accompanying drawing shows, by way of example, one construction of an apparatus which can be indifferently used as a transmitter or as a receiver.

Fig. 1 is a plan, Fig. 2 a front elevation. Fig. 3 is a right hand side elevation, and Fig. 4 is a left hand side elevation of the apparatus. Fig. 5 is a perspective view of the disk with elastic needle used for transmission. Figs. 6 and 7 are respectively a vertical section and a bottom view of the telephone cup with engraving point or stylus used for receiving.

The apparatus comprises three frame pieces 1, 2, 3 of any suitable shape, connected by two horizontal rods 4, 5 and secured in a suitable manner to a base plate 6. The sides 1, 2, 3 support a screw-threaded spindle 7 secured to the axle 8 of the supporting cylinder 9, the end of which spindle rotates, for instance, on a cone or conical point 10, the end of the axle rotating on another cone 11 secured to a movable support 12 which may be a portion of the frame 3, and which can be, for instance, turned down on the hinges 13 (see arrow 14 in Figs. 1 and 2) in order to enable the rolls or cylinders with the block to be transmitted or received to be easily put in place or removed. The screw-threaded spindle is provided with a suitable pulley 15 which is driven by a suitable electric motor (not

shown in the drawing) or any other motor generally used in telegraphy. With the said screw-threaded spindle 7 engages a sliding nut 16 carried by a spring blade 17 secured to a ring 18 movable on the rod 4 and secured by means of a bar 19 to a second ring 20, also capable of sliding on the said rod 4. This second ring 20 is in one piece with a bracket 21 secured to a ring 22 which carries a rigid arm 23 through which passes a set screw 24, the blunted end of which can slide on the rod 5 when the apparatus is started.

The apparatus as above described can be used indifferently as a transmitter or as a receiver. For the transmission of a message, photographic negative, writing, printing, etc., the plate to be transmitted is rolled or slid on the supporting cylinder 9, and secured to it in any suitable manner. To the ring 22 is then secured the rigid disk 25 (Fig. 5) which carries on its under surface the elastic needle 26 serving to indicate the non-conducting portions of the original plate and thus to produce the interruptions or the variations of the electric current. The latter are transmitted by the circuit to the receiver constituted by an identical apparatus, of which the supporting cylinder 9, however, is provided with the surface or layer intended to be engraved, and of which the ring 22 carries a telephonic cup 27 (Figs. 6 and 7), of which the vibrating diaphragm 28 is provided in the center with an engraving point or stylus 29. The ring 22 of either the transmitter or the receiving apparatus is adapted to interchangeably receive either disk 25 or the cup 27. To prevent vibrations of the latter in the direction of the arrows 30 (Figs. 6 and 7), the cup 27 is provided with an elastic blade 31 secured at a small distance below the diaphragm 28 and having its free end provided with a small hole which surrounds the point of the said engraving pin or stylus 29. It will thus be seen that in order to transform the transmitter into receiver, it is merely necessary to replace the needle disk 25 by the telephone cup, and to secure a receiving surface to the cylinder 9.

It is evident that, as soon as the pulley 15 of the screw-threaded spindle is started, and the nut 16 engages with the screw-thread of the said spindle, the rings 18 and 20 will slide on the rod 4 in the direction of arrows 32 carrying with them the ring 22 with the needle disk, or the telephone cup, according to circumstances, while the supporting cylinder 9 will advance in one or in the other direction according as the thread of the screw 7 is a right or a left hand one. For this reason, the nut-guide 16 and the screw 7 are made detachable. The spring needle 26 or the engraving point 29 will, therefore, successively touch all the points of the plate

to be transmitted or of the receiving surface to be engraved, as is the case in the majority of phonographs.

It will be seen from the preceding that the apparatus is based on the principle of the screw-cutting and boring lathe, enabling the advance of the tool to be reversed without changing the direction of rotation of the cylinder 9.

The apparatus hereinbefore described may also be used in local circuit for obtaining in a more advantageous and quick manner than by the usual processes, plates similar to those obtained by photo-engraving (that is to say for printing on wall paper, fabrics, etc.) Moreover, the receiver of the apparatus described registers speaking at a distance on surfaces or cylinders similar to those used in the various phonographs. The transmission can be effected—1. By speaking direct in front of a microphone connected to the said receiver. 2. By using a phonographic record to which is added a microphonic contact, this system serving to follow the tracing of cylinders previously provided with record in the usual manner. 3. The transmitter station is similar to the receiver station, but the engraving point secured to the diaphragm of the receiver is replaced at the transmitter by a blunt point which follows the tracing of the ordinary phonographic record-cylinders or surfaces, and the mechanical action generates magneto-electric currents.

Having now fully described my invention, what I claim and desire to secure by Letters Patent is:—

1. An apparatus for transmitting to a distance half-tone pictures, silver photos and the like, said apparatus comprising an electrically conductive support adapted to receive, in electrical contact therewith, an electrically conductive plate of varying conductivity; a tracer; means for causing said tracer to travel relatively to said plate over the surface thereof and in constant electrical contact therewith; and electrical conductors connected to said support and said tracer respectively, said conductors, support, plate and tracer being adapted for connection in series in a circuit leading to a receiving apparatus.

2. An apparatus for transmitting to a distance half-tone pictures, silver photos and the like, said apparatus comprising an electrically conductive support adapted to receive, in electrical contact therewith, an electrically conductive plate of varying conductivity; a tracer; a supporting-arm for holding said tracer in constant electrical contact with said plate; means for causing said supporting-arm and support to move relatively to each other for causing said tracer to travel over said plate in electrical contact therewith; and conductors electri-

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cally connected respectively with said support and said supporting-arm, said conductors, support, plate, tracer and supporting arm being adapted for connection, in series,
5 in a circuit; said supporting-arm being adapted to receive thereon either said tracer or a receiving device.

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

HENRI CARBONNELLE.

Witnesses:

CHARLES HONOLD,
GREGORY PHELAN.