

June 3, 1930.

E. BELIN

1,760,866

METHOD AND APPARATUS FOR TRANSMITTING DOCUMENTS ELECTRICALLY

Filed March 31, 1928

Fig. 1

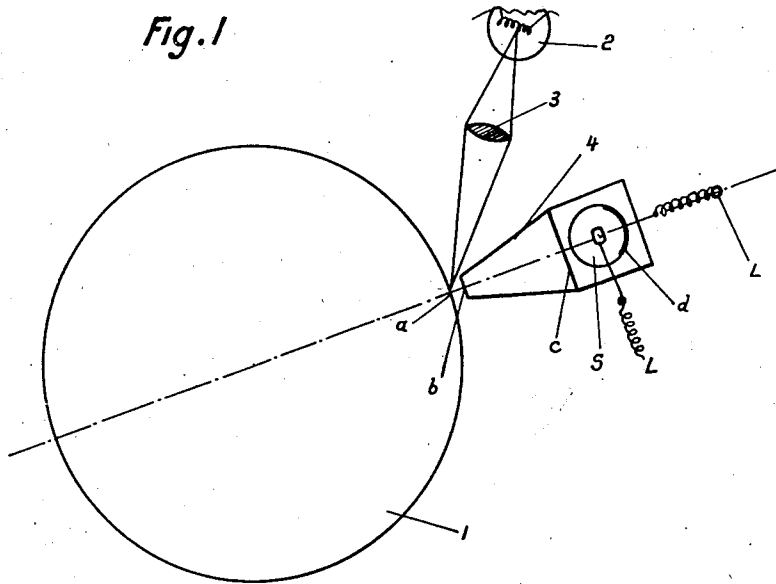


Fig. 2

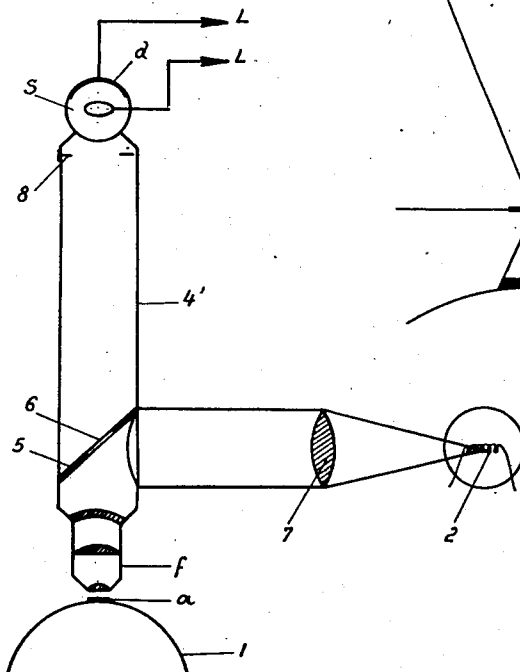
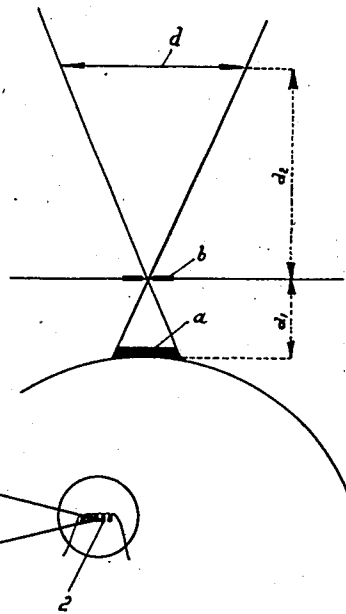


Fig. 3



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UNITED STATES PATENT OFFICE

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METHOD AND APPARATUS FOR TRANSMITTING DOCUMENTS ELECTRICALLY

Application filed March 31, 1928, Serial No. 266,355, and in France April 27, 1927.

This invention relates to a method of transmitting documents by electric means and to an apparatus for carrying the said method into practice.

5 Several processes are known in the art which allow transmission of documents of all kinds such as black and white lines and drawings or mezzotint photographs, electrically, with or without wires to a suitable receiving station. In some cases the document is explored mechanically by utilizing the reliefs or the conductivity, with action on a device modifying a local current; in other cases it takes place optically by transparency, or even with the intervention of reflection and the action of the diffused light reflected on a photo-sensitive element inserted in the local circuit.

10 According to the present invention the document is explored optically, but an optical device produces the image of the illuminated point on the photosensitive element inserted in the local circuit.

15 The said image is, moreover, enlarged by the optical device in such wise that the tonality thereof is reproduced by the photo-sensitive element in an absolutely exact manner. This permits operating with full light, and even in full sunlight and eliminates all light-proof devices generally necessary in optical exploring system.

Method

20 The method of transmission herein cited consists as follows:

1st. In placing the document to be transmitted on a movable arrangement which allows methodical displacement thereof before a point, in such wise that all the surface passes by rather crowded lines before the said point.

2nd. In strongly lighting the document, either in its totality or before the single point of exploration.

3rd. Arranging an optical system to produce the image from the point of the document placed before the point of exploration on the photo-sensitive element.

4th. Inserting the said photo-sensitive element in a local circuit, with or without

amplification, which acts either directly or indirectly on the transmission circuit (electric lines or radio-electric emission).

The receiver will not be described herein as it may be of any suitable type, known per se, with a movable receiving element moving synchronously with the movable system carrying the document to be transmitted.

The best means, however, is that in which the effects may be regulated as a function of the rate of translation in electrical values of luminous values of the original document.

At the start the luminous values of the document are transformed into electrical values by a photo-electric element. In general, the current thus modulated must be amplified and it results from this succession of phenomena alterations of the modulation which are subsequently aggravated by the line and by the amplifying devices upon the arrival thereof and particularly in the case of radio transmission.

The present invention, which relates to the above described method, likewise relates to means for the realization of the said method, hereinafter to be described in connection with three embodiments by way of an illustrative explanation of the said method.

In the drawing—

Fig. 1 is a diagram illustrating one embodiment of the invention conventionally;

Fig. 2 is a view similar to Fig. 1 of a modification; and

Fig. 3 represents an explanatory geometrical diagram.

In Fig. 1, the document to be transmitted is here supposed to be on a cylinder 1 which turns and is displaced on its shaft, in the manner of a nut on a bolt. It is lighted powerfully by an exterior source which can illuminate in a total manner as the sunlight or in a small region *a* such as by lamp 2 and condenser 3.

In front of the cylinder 1 is disposed a truncated cone 4 whose small base *b* is very near the cylinder and whose large base *c* opens on the photo-sensitive cell S.

The base *b* carries a diaphragm having a very small opening. The said orifice acts as an objective and as will be observed, in the

dark chamber constituted by the cone 4 there will be formed a diverging beam which, in the various straight sections, give larger and larger images of the object or element *a* (Fig. 3).

In this beam is placed the sensitized surface of the photo-electric cell *S*, which may be selenium or cells of alkaline metals or other suitable substances.

If the element *a* is bright or if it is a dark part of the text, drawing or the like, the light of its image at *d* will be different in conformity therewith from whence the action on the element *d* differs and consequently a corresponding variation in the local circuit *L—L* in which the said element is inserted.

As shown in Fig. 3, the precision of the exploration depends upon the ratio of $\frac{ab}{bd}$. The

position of the diaphragm *b* is varied in the frustum of the cone 4 or the diaphragm itself is regulated. The current flowing in *L—L* may be amplified either into direct or alternating current if in this case the document *a* be lighted with a non-continuous light by means of a perforated disc turning in a beam of light emanating from the source 2.

In the second embodiment the diaphragm *b* is replaced by a Stanhope lens having a short focus placed very near the surface *a* and giving at *d* a sufficiently precise image.

In Fig. 2, the two organs of Fig. 1 are united. The tube 4' carries as the cone 4 the photo-sensitive cell *S* and at its other extremity a micro-photographic objective *f*. On the interior a mirror 5 is disposed which is pierced with an elliptical hole 6 and reflects the light from the source 2 whose lens 7 gives a parallel beam on to the element *a*. The image of the element *a* thus illuminated is formed on *d* by the objective *f*. An adjustable diaphragm 8 determines the precision of the exploration.

Amplification and non-interrupted light may be adapted to this embodiment also.

While I have shown what I deem to be the preferable forms of my invention I do not wish to be limited thereto as there might be various changes made in the details of construction and the arrangement of parts without departing from the spirit of the invention comprehended within the scope of the appended claims.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. An apparatus of the type described comprising in combination, document holding and displacing means, a tube, said tube having an orifice adjacent one end, a micro-photographic objective disposed in one end of said tube in close proximity to said means, a mirror having an elliptical hole obliquely disposed in said tube opposite said orifice, illuminating means for said orifice, a photo-

electric cell disposed in the other end of said tube and a local circuit controlled by said cell.

2. An apparatus of the type described comprising in combination, document holding and displacing means, a tube, said tube having an orifice adjacent one end, a micro-photographic objective disposed in one end of said tube in close proximity to said means, a mirror having an elliptical hole obliquely disposed in said tube opposite said orifice, illuminating means for said orifice, means for casting parallel beams of light associated with said illuminating means, a photo-electric cell disposed in the other end of said tube and a local circuit controlled by said cell.

3. An apparatus of the type described comprising in combination, document holding and displacing means, a tube, said tube having an orifice adjacent one end, a micro-photographic objective disposed in one end of said tube in close proximity to said means, a mirror having an elliptical hole obliquely disposed in said tube opposite said orifice, illuminating means for said orifice, a photo-electric cell disposed in the other end of said tube, a local circuit controlled by said cell and an adjustable diaphragm disposed in said tube adjacent said photo-electric cell.

4. An apparatus of the type described comprising in combination, document holding and displacing means, a tube, said tube having an orifice adjacent one end, a micro-photographic objective disposed in one end of said tube in close proximity to said means, a mirror having an elliptical hole obliquely disposed in said tube opposite said orifice, illuminating means for said orifice, means for casting parallel beams of light associated with said illuminating means, a photo-electric cell disposed in the other end of said tube, a local circuit controlled by said cell and an adjustable diaphragm disposed in said tube adjacent said photo-electric cell.

In testimony whereof I have affixed my signature.

EDOUARD BELIN.

Cooley	1,595,651	178-6	115
Ives	1,647,631	178-6	
Parker	1,648,058	178-6	120
Jenkins	Re.16,882	178-6	
Sellers	939,539	178-7	125