

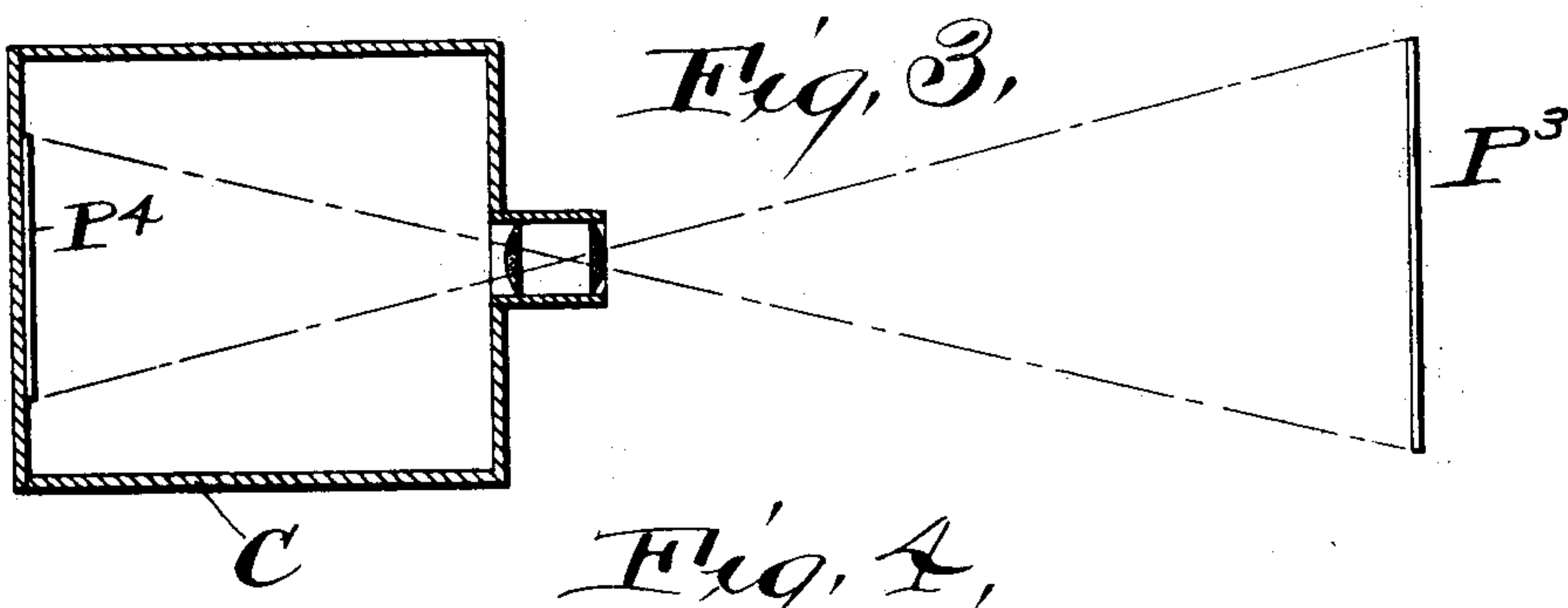
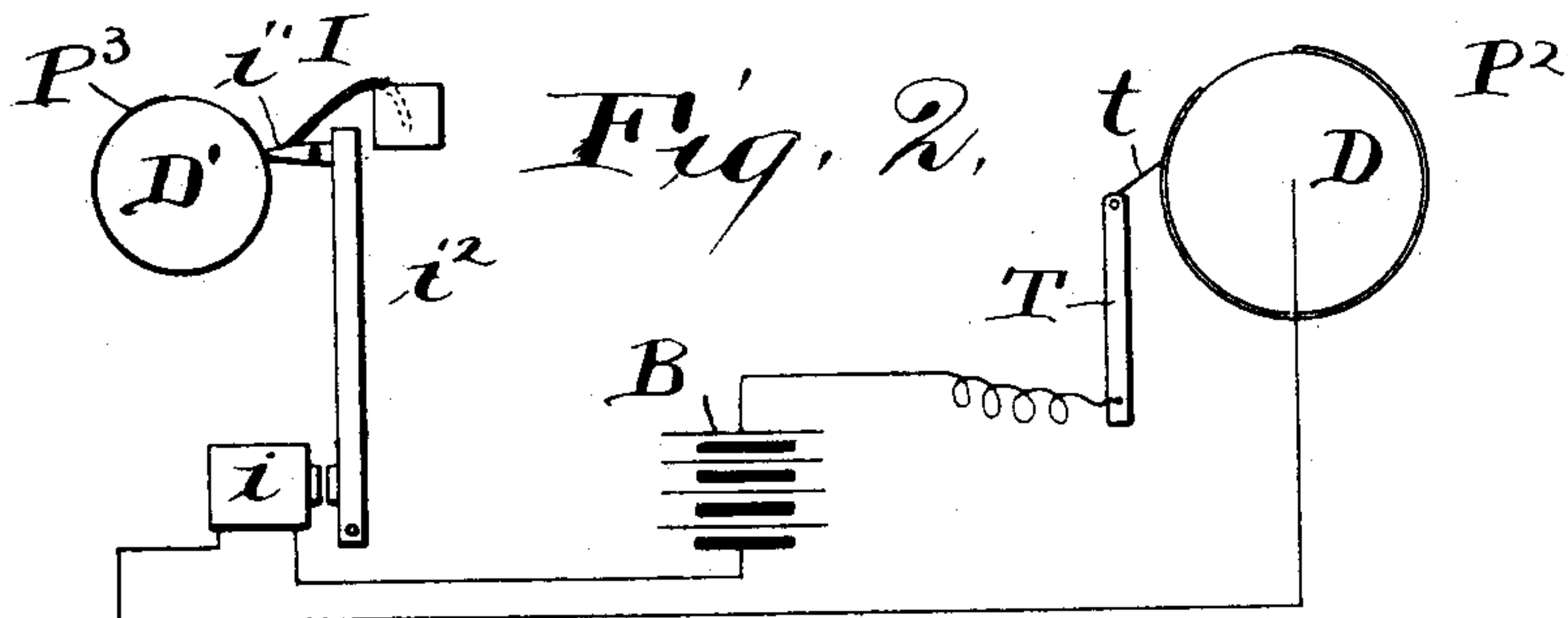
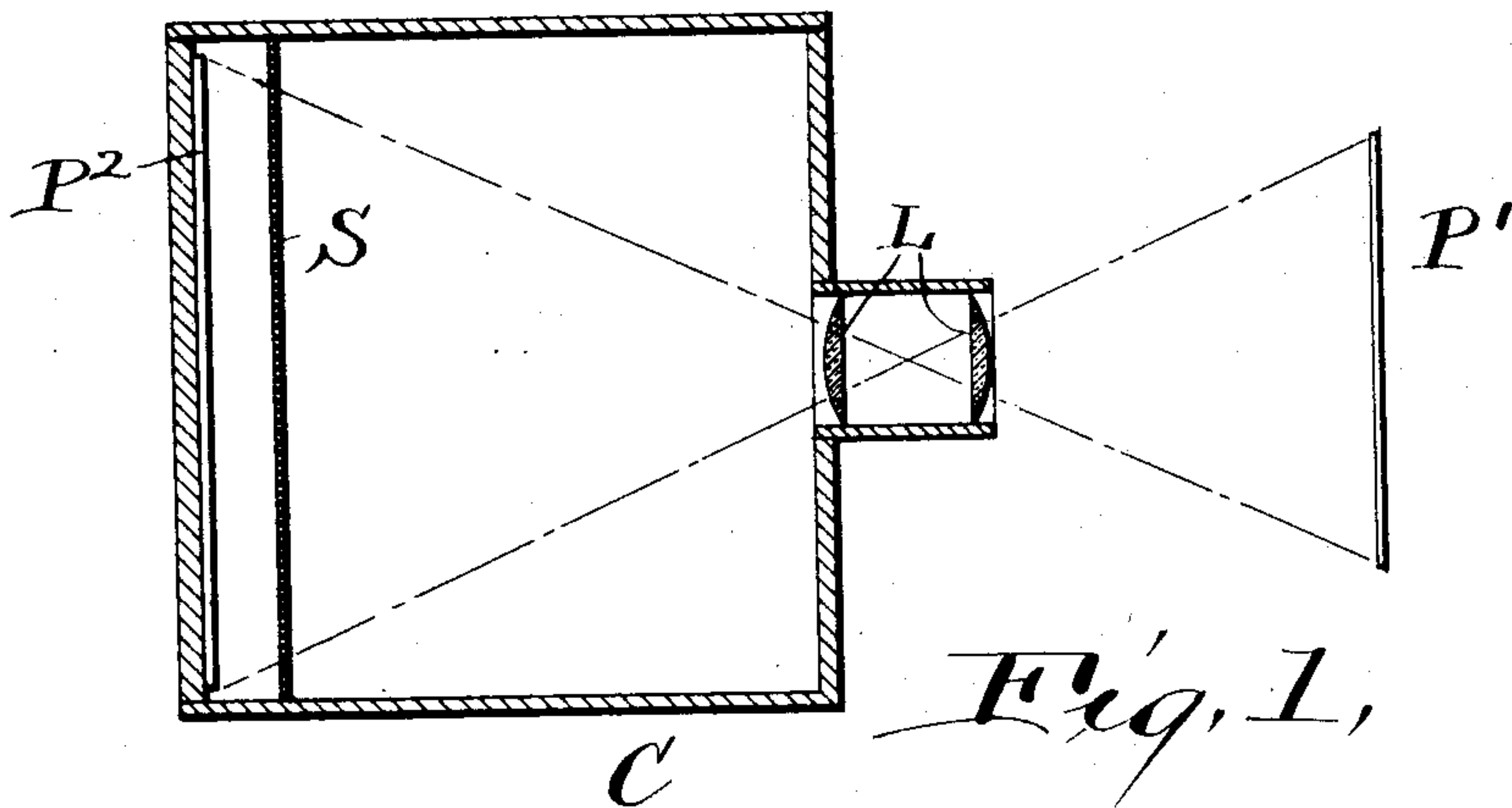
H. R. PALMER.

PROCESS OF DISTANTLY REPRODUCING PICTURES.

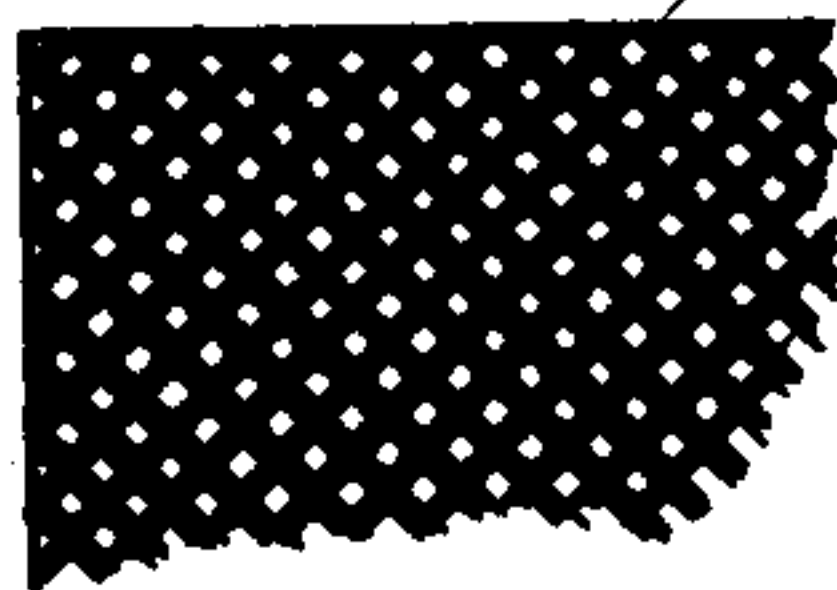
(Application filed Jan. 21, 1901.)

(No Model.)

2 Sheets—Sheet 1.



*Fig. 4,*



Witnesses,  
E. B. Gilchrist  
F. D. Ammen

Inventor,  
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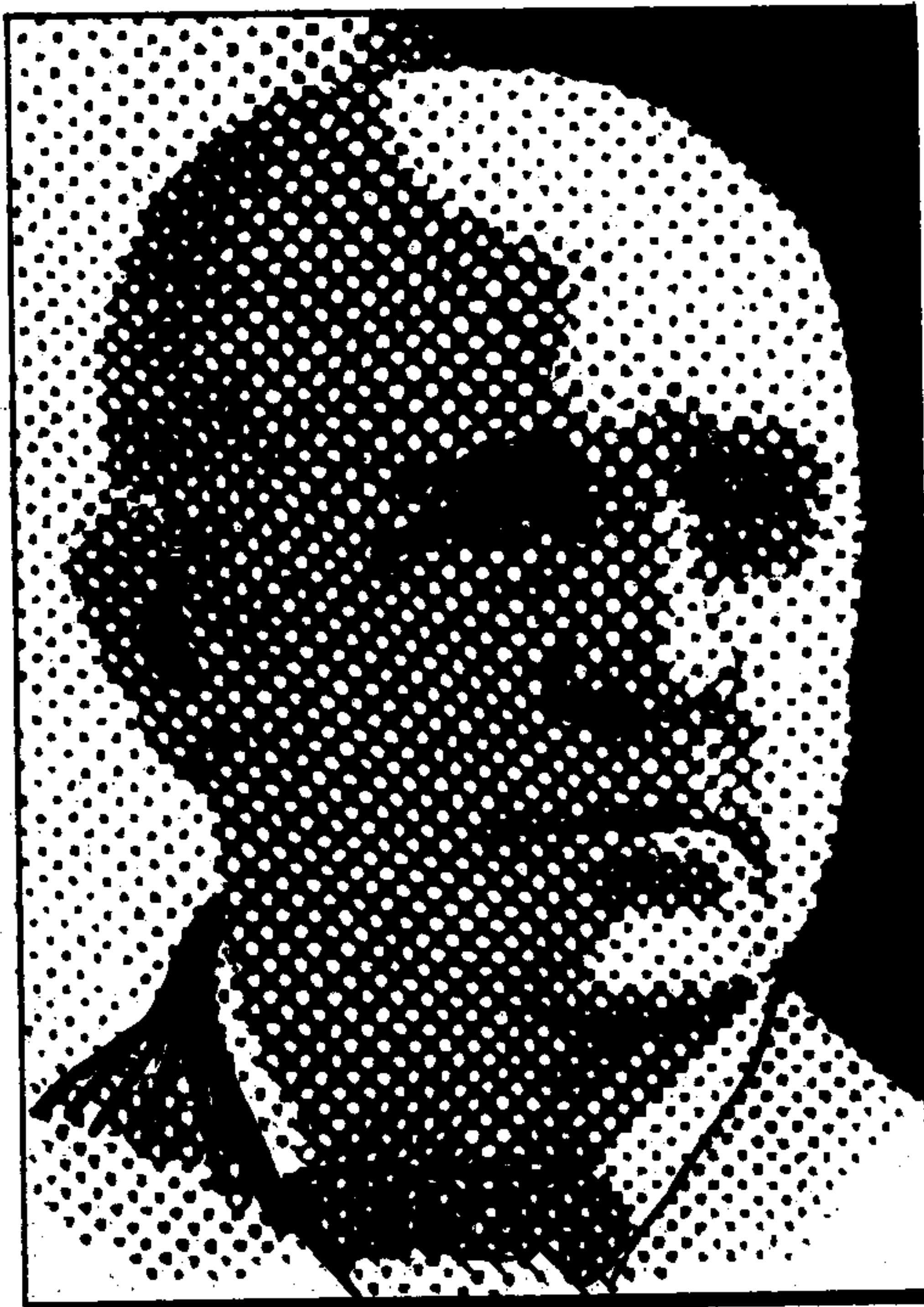
2 Sheets—Sheet 2.

*P'*



*Fig. 5,*

*P<sup>2</sup>*



*Fig. 6,*

*P<sup>4</sup>*



*Fig. 8,*

*P<sup>3</sup>*



*Fig. 7,*

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# UNITED STATES PATENT OFFICE.

HERBERT R. PALMER, OF CLEVELAND, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ELECTROGRAPH COMPANY OF AMERICA, OF CLEVELAND, OHIO, A CORPORATION OF DELAWARE.

## PROCESS OF DISTANTLY REPRODUCING PICTURES.

SPECIFICATION forming part of Letters Patent No. 713,140, dated November 11, 1902.

Application filed January 21, 1901. Serial No. 43,973. (No specimens.)

*To all whom it may concern:*

Be it known that I, HERBERT R. PALMER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Processes of Distantly Reproducing Pictures, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention relates to the art of making facsimile reproductions of pictures at a distance by means of an electric current; and its object is to extend the practical possibilities of this art, which have hitherto been restricted to the reproduction of line-drawings only.

In practicing my invention photographs and any picture which is made up of variations of light and shade may be accurately and minutely reproduced at a distance.

In my process I avail myself of the well-known half-tone process of producing a printing-plate from a photograph or other picture having gradations of light and shade, which consists of photographing the picture through a screen which will produce a resultant picture made up of absolute blacks and whites, the light coming through a screen always having a tendency to encroach on the black, so that where the picture is light the dots or lines on the half-tone reproduction are smaller or vanish altogether and where the picture is dark these lines or dots are larger until they may merge to produce a continuous black. In this half-tone process the photograph may be taken directly on a metallic plate having a positive coating and the plate thereafter etched by acid, which eats deeper where the lights are, wherefore the raised portions are adapted to carry the ink in printing and print black as desired. In practical use, however, it is found more satisfactory to photograph the picture through the screen onto a transferable negative film, which is then placed over a zinc plate covered with some coating normally soluble, but rendered insoluble by light, whereupon the light portions of the picture which became dark in the negative do not receive on the zinc plate sufficient light to render the coating insoluble, where-

fore this coating washes off, and the etching-acid eats this portion of the zinc plate deeply, as before. A half-tone plate for printing produced by such a process as above described consists of a series of lines or dots placed close enough together so that to the eye they give the appearance of being substantially continuous.

Systems of producing pictures electrically at a distance are well known. They include, briefly, a platen for carrying the transmitting-plate having a picture composed of conductive and non-conductive parts, whereby the current is made and broken between the plate and stylus, and electromagnetic or electrochemical means at the other end for producing corresponding changes on the received material. Such a transmittable picture has been heretofore produced by hand-sketching on the metallic plate with an insulating ink, as sealing-wax dissolved in alcohol. In endeavoring to eliminate this inaccurate hand operation I have hit upon the use of a half-tone plate with the low portions filled in with an insulating substance, as plaster-of-paris. In such use, however, I have found that with the lines or dots of the half-tone plate close enough together to give the eye the desired impression they will be too close for the instrument to respond, the necessary inertia of the parts, the reluctance of the receiving-magnet, the capillarity of the ink at the receiving end, if ink be used, &c., preventing the receiving mechanism from responding to the breaks of the transmitter or preventing the transmitter from breaking at all by reason of an arc continuing the current from one metallic line to the next. On the other hand, if the transmitting-plate has its dots or lines far enough apart for the telegraphic apparatus to take the necessary cognizance thereof they will be so far apart that no satisfactory picture will be presented to the eye; but there will appear simply a series of disconnected dots or lines, giving the general character of the picture, it is true but, on such a coarse scale as to be useless for ordinary purposes. I have found that I can harmonize these opposing requirements by first taking the half-tone picture through a



very coarse screen, (much coarser than is used in the practice of the ordinary half-tone process,) transmitting from this half-tone picture, and reducing the received picture to bring its lines or dots close enough together to give the proper appearance to the eye. My invention includes such a process broadly as well as the more particular operation of it hereinafter described.

I will now give a more particular description of my invention in connection with the drawings, which, though in the nature of diagrams, are believed to be sufficient to fully illustrate the operation.

Figure 1 represents a camera and the photograph or picture which is to be reproduced, the camera carrying the screen and sensitized plate. Fig. 2 is a diagrammatic view of the telegraphic apparatus. Fig. 3 represents the rephotographing of the received picture. Fig. 4 represents part of the screen used in connection with the camera shown in Fig. 1. Fig. 5 represents the photograph or picture which is to be reproduced at a distance. Fig. 6 shows the transmitting coarse half-tone plate which is made from the same. Fig. 7 represents the picture produced directly in the receiving apparatus. Fig. 8 represents a reduced photographic reproduction of the picture shown in Fig. 7.

Referring to the parts by letters, the apparatus shown in Fig. 1 consists, substantially, of a camera-box C, with a vertical screen S interposed between the lenses L and plate P<sup>2</sup>. The construction of this screen is further illustrated in Fig. 4, and it is composed of narrow bands, which are preferably diagonal and intersect each other at right angles, the distance between the bands being preferably equal to their width. The effect of the screen in photographing an object P' upon a plate P<sup>2</sup> within the camera is, as heretofore noted, to produce upon the plate P<sup>2</sup> after development a true image of the object, but with the surface of the plate marked by dark spots or cross-lines where the screen intercepted the light. The shadow naturally cast by the bars of the screen is reduced by irradiation of the light and the divergence of the rays as they pass beyond the screen, this encroachment of the light on the dark rounding the light spots and in the high lights reducing the black line-shadows of the screen to a series of small dots or causing them to vanish altogether. The plate P<sup>2</sup> consists either of a sheet of metal sensitized or a suitable transferable sensitized film, as already alluded to. In either event the half-tone plate is etched by immersion in an acid, whereby the plate has a pitted surface, the acid having attacked the surface between the dark spots referred to. Thus if the object P', which has been reproduced, were the photograph shown in Fig. 5 the surface of the plate would present substantially the appearance of Fig. 6, the light portions representing the pits caused by the

action of the acid, producing in this case the effect of a positive reproduction. To the surface of this plate plaster-of-paris or a similar substance which is a non-conductor of electricity is applied, so that it effectually fills the pits therein, the surface of the plate between the pits being afterward made clean and bright by sandpapering. This plate is now a finished transmission-plate.

The transmitting apparatus may consist of any of the well-known devices used in the art of facsimile telegraphy. What I have shown consists, substantially, of a rotatable drum D, the surface of which has metallic connection with the main line. A metallic stylus t, mounted upon a traveler T, holds its point near the surface of the cylinder. As the drum D rotates the traveler traverses its length. An electromagnetic inking device has its magnet i in electric circuit with a source of current B, the traveler T, and the drum D, and its pen i' is in close proximity to the surface of the receiving-drum D'. This receiving-drum rotates in unison with the transmitting-drum, the inking apparatus I traveling in unison also with the traveler T of the transmitting-drum. Now when the half-tone plate, as P<sup>2</sup>, (produced directly or indirectly by the camera,) has been secured facing outwardly upon the rotating drum D, the stylus being properly adjusted, it completes the electric circuit before referred to, and it is evident that this circuit will be established or broken, according to whether the point of the stylus is resting upon the metallic part of the plate P<sup>2</sup> or on the plaster-of-paris filling. The pen i' is normally held removed from the recording-drum, upon which is wrapped a sheet of paper; but whenever the electric circuit is closed it is held in contact with it by means of the magnet i and the armature-lever i<sup>2</sup>. From this arrangement evidently the surface of the receiving-sheet will be covered with a series of closely-ruled lines reproducing the original photograph, as shown in Fig. 7. The drum D' may be smaller than the drum D to reduce the size of the received picture, as shown, or it may be larger or of the same size, as desired, it being understood that the speed of travel of the pen is varied proportionately as the speed of surface movement of the drum is changed.

By having the screen cross-hatched diagonally, as shown in the drawings, the plate will be placed on the drum, with its upper and lower edges parallel with the axis of the cylinder, and the stylus will then trace from one light area to the next across the exposed metallic portions of the plate, giving better results than if it traced parallel with the metallic portions caused by the lines of the screen.

For some purposes the picture as received, Fig. 7, if the telegraph apparatus is adjusted accordingly, may be artistic enough; but to produce a better effect I prefer to reduce it



photographically. The ordinary camera is employed for this purpose, (represented diagrammatically in Fig. 3, where  $P^3$  is the received picture, as shown in Fig. 7, and  $P^4$  is the final reduction, which appears in Fig. 8.) If the final picture is to be used in a printing-press for printing half-tone work, which is the object primarily contemplated, the plate  $P^4$  will be either (in the case here shown) a metallic plate positively sensitized or a transferable film negatively sensitized which is used to produce the final picture shown in Fig. 8. Thus the process after the picture is received may be substantially the same as that before it is transmitted, except that after transmission the screen is omitted, as when the picture is received it is already composed of absolute blacks and whites.

It is to be understood that the sensitization on the various plates used intermediately in the process may be either positive or negative, as desired, this being a matter of convenience and it being well known how to transform a picture of one character into the other.

Although etching, filling, and cleaning the plate as described is the preferable method of finishing the transmitting-plate, making the surface smooth, clean, and durable, still where a plate is to be used for but few transmissions it is sometimes unnecessary to etch it, the film making then the insulating part and the metal which would be etched the metallic part, a negative thus being produced when the etched plate would be a positive, and vice versa.

Having described my invention, I claim—

1. The process of reproducing sketches, photographs, &c., which consists in making a coarse half-tone representation of the subject, transmitting an image therefrom and producing it on a reduced scale, substantially as described.

2. The process of reproducing sketches, photographs, &c., which consists in making a half-tone representation of the subject by photographing the same through a screen of coarse mesh, and transmitting electrically an image of said representation, substantially as described.

3. The process of reproducing a picture at a distance which consists in enlarging it photographically sufficiently so that the apparatus may transmit it accurately, electrically transmitting it, and in reducing it sufficiently so as to present the proper appearance to the eye.

4. The process of reproducing sketches, photographs, &c., which consists in making a photograph of the subject through a coarse cross-hatched screen, making a metallic half-tone plate by means of said photograph, filling the pits of said half-tone plate with a non-conducting material, making and breaking an electric circuit by means of the surface of said half-tone plate, transmitting an image of said half-tone plate by means of the said

electric circuit, and making a reduced photograph of said image.

5. The process of reproducing a picture telegraphically, which consists in photographing the picture through a screen and thus producing a half-tone plate wherein the light and shade of the picture are represented by absolute elevations and depressions, filling the depressions with insulating material, making and breaking the circuit by means of the plate so produced, and causing corresponding variations on the material at the receiving end.

6. The process of transmitting a picture telegraphically which consists in photographing it through a coarse screen and producing thereby a metallic half-tone plate with the areas abnormally segregated, connecting this plate and a stylus adapted to move relative to it in series with a suitable receiving apparatus which causes corresponding variations in the received picture when the circuit is made or broken at the half-tone plate.

7. The process of transmitting a picture telegraphically which consists in photographing it through a coarse screen and producing thereby a metallic half-tone plate, connecting this plate and a stylus adapted to move relative to it in series with a suitable receiving apparatus which causes corresponding variations in the received picture when the circuit is made or broken at the half-tone plate, and finally photographically reproducing the received picture without the screen to produce a printing-plate.

8. The process of transmitting a picture telegraphically which consists in photographing it through a cross-hatched screen whereby the variations of light and shade in said picture are represented by more or less closely-grouped areas, etching the plate between such areas, filling in such etched part with insulating material, making and breaking the circuit according to whether the resultant surface of the plate at any point is insulated or metallic, and reproducing a picture corresponding to such makes and breaks.

9. The process of transmitting a picture telegraphically which consists of photographing it through a screen cross-hatched diagonally whereby the variations of light and shade of said picture are represented by more or less closely-grouped areas or diagonally-extending lines, using as part of an electric circuit a plate so produced and a cooperating relatively movable stylus which traces over the plate in a direction substantially parallel with an edge thereof and thus makes and breaks the circuit, and in causing said makes and breaks to reproduce a picture represented by broken parallel lines.

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

HERBERT R. PALMER.

Witnesses:

THOMAS MILLS,

ALBERT H. BATES.