

T. M. DOWN.
METHOD OF ANALYZING, TRANSMITTING, AND RECONSTRUCTING PICTURES OR THE LIKE.
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1,379,905.

Patented May 31, 1921.

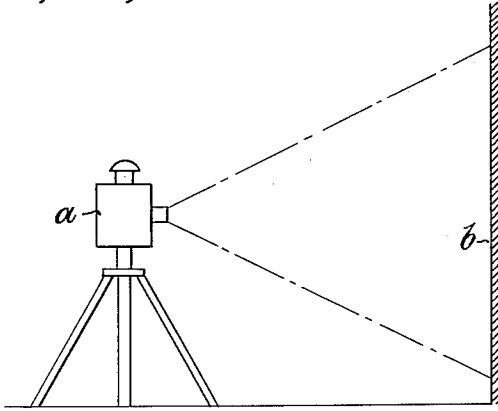


Fig. 1.

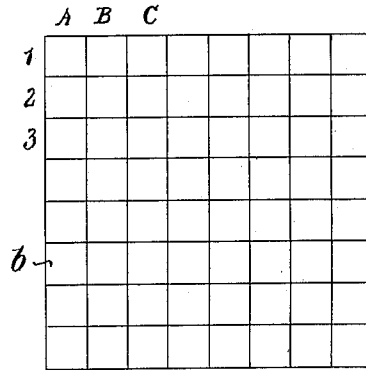


Fig. 2.

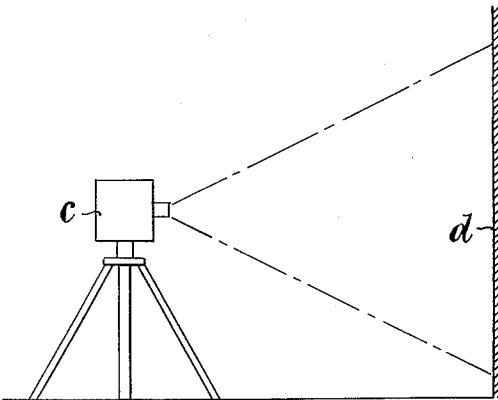


Fig. 3.

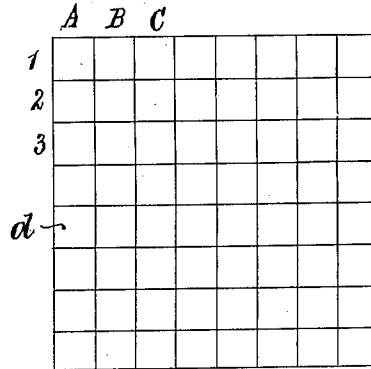


Fig. 4.

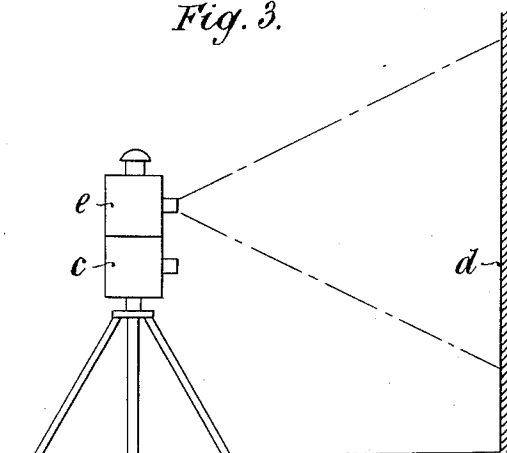


Fig. 5.

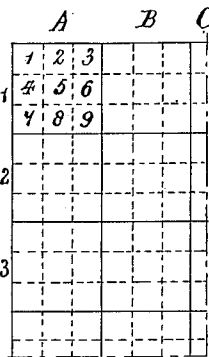


Fig. 6.

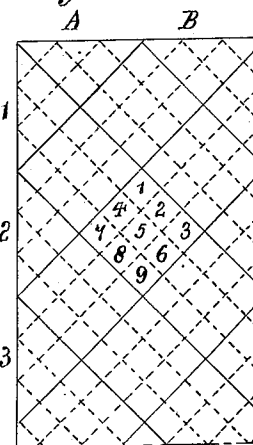


Fig. 7.

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METHOD OF ANALYZING, TRANSMITTING, AND RECONSTRUCTING PICTURES OR THE LIKE.

1,379,905.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, THOMAS MACREADY Down, subject of the King of Great Britain, residing at No. 65 Gloucester road, Kew Gardens, Surrey, England, have invented a new and useful Improved Method of Analyzing, Transmitting, and Reconstructing Pictures or the like, of which the following is a specification.

10 This invention relates to an improvement in or modification of the method of enabling the details of pictures, designs and the like to be transmitted, which consists in analyzing the picture or the like by dividing the
15 original picture or the like or a photographic enlargement thereof into sections, estimating the characteristic or features of each section transmitting a statement of such estimation by a pre-arranged code and reconstructing the picture or the like by reproducing the stated characteristic or features in corresponding sections.

For the purpose of carrying out the above described method the original picture or
25 design or photographic enlargement thereof is divided into small sections by intersecting lines, each square being conveniently denoted by a character or number appended to the respective column and row in which it
30 is located.

Now to obtain an accurate reproduction of the analyzed picture it is necessary that the analysis itself shall be correct, also to obtain any appreciable amount of detail and
35 to avoid a too obtrusive mosaic or patchwork appearance in the reproduction, the sections into which the original picture is divided and of which the reproduction is constituted must be small relatively to the
40 total area of the picture. This involves the estimation of comparatively small sections of the picture in juxtaposition to other small sections, which embodies a very difficult, if not impossible, task to obtain accurate results.

In the present invention all permanent enlargements by photography or otherwise at the transmitting end are dispensed with.

According to the invention, the picture
50 or the like is optically projected on to a screen with a magnification of many times greater area than that of the original picture.

Such screen has its surface marked off by
55 intersecting lines inclosing spaces. The in-

tersecting lines may be respectively vertical and horizontal inclosing rectangular spaces, or the lines may be oblique enclosing diamond or lozenge shaped spaces, or the lines may even be curved. The screen may be a textile or other sheet, a board or even the wall of the operating room.

A similar screen is provided at the receiving station.

On receipt of the particulars of the characteristics or features of the various sections of the picture these characteristics or features are inserted by hand in the respective spaces of the receiving screen, and eventually the completed reproduced exaggerated
65 picture is reduced optically, photographically or otherwise.

The intersecting lines on the receiving screen may be non-permanent or photographically non-actinic in order that they
75 shall not appear upon a photographically reduced copy of the reproduction of the picture.

It will thus be seen that the picture to be transmitted and reproduced is considerably
80 enlarged relatively to the original whereby the characteristics or values of the individual sections are rendered crude and easily estimated and at the place of reception a reproduction on a similarly enlarged
85 scale is made, of which the crudities vanish on reduction to the scale of the original picture.

This large reduction from a reproduction of exaggerated size should be distinguished
90 from the ordinary small reductions of a reproduction of normal size for the purpose of making a printing block or the like.

Each horizontal row and each vertical column of spaces on these screens is correspondingly marked or numbered so that each such space may be readily identified at the receiving station, from the transmitted telegram or telephonic or other message. The horizontal rows of spaces may be numbered from the top downward, and the columns may be marked alphabetically from the left with one or more letters. Thus if the telegram or message reads "3 D" the operator knows there is something at the
105 intersection of the 3rd row and the 4th column.

In order more precisely to determine the position of a feature within a space, each single space may be considered as subdivided into smaller spaces, each of which may be marked with a character or number. This subdivision may be effected by lines intersecting the main intersecting lines at right angles, or by lines intersecting the main intersecting lines at an angle, or by lines intersecting the main intersecting lines in a curved manner.

vided into a plurality of sub-spaces, by sub-dividing each by means of imaginary lines, for instance two pairs of imaginary intersecting lines providing nine sub-spaces, 5 each identified by a pre-arranged code. For example, the sub-spaces may be numbered 1 to 9. Hence a number following a code letter would indicate a sub-space of the space indicated by the preceding code number and letter. 10

The character of the features, the localities of which may be indicated as above described, may be conveyed, for example, by a number code. Such number in the absence 15 of a sub-space number would indicate the character of the entire space. Associated with a sub-space number, either preceding or following, the characteristic number, this latter would indicate the character of a sub-space only. 20

The characteristic or feature code may be, for example:— 1 black, 2 half tone (gray), 3 light tone, 4 violet, 5 blue, 6 green, 7 yellow, 8 red, 9 neutral, 0 white. 25

A symbol to indicate white is necessary only for a sub-space, for instance, a white dot on a black ground, because when the entire space is white it can be ignored, no location or characteristic being transmitted. 30 Examples of the employment of the code are as follows:—

6 E 2=Intersection space of 6 horizontal row and 5th vertical column is half tone.

6 E 51=Central sub-space of intersection of 6 horizontal row and 5th vertical column is black. 35

When the picture or design is projected upon the screen the operator is able to determine whether the projected picture is of 40 the most suitable dimensions for analysis. Should the picture or design be very simple or well defined the enlargement and the number of spaces occupied upon the screen required for complete analysis, may be less 45 than for a more complex picture. The degree of enlargement is determined by focusing or advancing or withdrawing the projector to and from the screen. By suitably restricting the enlargement the length of 50 the telegram can be confined to the absolute minimum for obtaining correct reproduction.

The operator at the receiving station, upon receipt of the telegram or other message, interprets and plots out the details of 55 the picture or design by inserting the transmitted features in the respective spaces of the screen at the receiving station. When this operation has been completed a greatly enlarged representation of the original picture or design is presented which, subject 60 to errors, should be a true and faithful enlarged copy of the original. If in the operator's opinion it is an intelligible picture or design, a copy thereof is made on the 65

desired reduced scale by the aid of the photography or otherwise. However, if it is found that the picture plotted upon the screen is deficient in any respect after having an examination of an optical reduction 70 thereof the omissions and modification are filled in and the defects remedied according to the judgment of the operator (in the manner of a scenic artist) and then the reduction is proceeded with as above indicated. 75

The intersecting lines on the screen may be produced by optical projection from a lined lantern slide. This is of more importance for the reproducing surface, because on completion of the picture the projections of the lines can cease, whereby the reproduced crude picture on the enlarged scale is not encumbered by cross lines which would or might appear on the reduced picture. 80 85

To avoid spherical aberration the lined slide used to project the grid of interesting lines, may itself be produced by photographing a grid of the desired enlarged 90 size.

The shades or tonal values on the large crude reproduction may be produced by various coloring matters singly or superposed, using pads or stamps to plot in the spaces, 95 such that when photographed they give the desired shade or tone values in monochrome.

A series of the same picture taken with different color values may be transmitted and reproduced to enable the picture to be 100 printed by the three or multi-color printing process.

For economy in transmission the code employed may provide for the characteristic of a plurality of sections having all the same 105 feature being transmitted by one code expression or code group.

For rapid filling in or shading of the screen at the receiving end, suitably shaped pads or stamps charged with suitable pigments or scenic artists' wash colors, may be employed, these pads being of the size and shape of the spaces or sub-spaces respectively. 110

The invention is illustrated diagrammatically on the accompanying drawing, in which:— 115

Figure 1 is a side elevation of the optical projector, the respective screen being in section. 120

Fig. 2 is a front elevation of the analysing screen.

Fig. 3 is a side elevation of the camera, the respective screen being in section.

Fig. 4 is a front elevation of the reconstructing screen. 125

Fig. 5 is a view corresponding to Fig. 3 but also showing a projector for the optical projection of the lines on the reconstructing screen. 130

Figs. 6 and 7 are enlarged views of portions of the screens showing the method of subdividing each space.

At the transmitting station:—

- 5 *a* is the lantern for optically projecting the picture on to the analyzing screen *b*, assumed to be a wall surface.

At the receiving station:—

- 10 *c* is the camera for photographically reducing the picture reconstructed on the screen *d*.

- 15 In the modification shown in Fig. 5, in addition to the camera *c*, a lantern *e* is employed to project optically the intersecting lines on the reconstructing screen *d*.

- 20 The method of subdividing each space inclosed by the intersecting lines of the screens *b* and *d*, is illustrated by Figs. 6 and 7, wherein the intersecting pairs of dotted lines indicate the lines imagined to subdivide each space into nine sub-spaces numbered 1 to 9.

I claim:

1. A method of analyzing, transmitting and reconstructing pictures, designs and the like, consisting in optically projecting said picture on an exaggerated scale on to a surface subdivided into spaces by intersecting lines, estimating the characteristics of the portions of said picture contained in each said space, transmitting code descriptions of said characteristics associated with code definitions of said spaces, inserting said transmitted characteristics in corresponding spaces of a large surface correspondingly subdivided by intersecting lines and reducing the picture reproduced on said second surface.

2. A method of analyzing, transmitting and reconstructing pictures, designs and the like, consisting in optically projecting said picture on an exaggerated scale on to a surface subdivided into spaces by intersecting lines, estimating the characteristics of the portions of said picture contained in each said space, transmitting code descriptions of said characteristics associated with code definitions of said spaces, inserting said transmitted characteristics in corresponding spaces of a large surface correspondingly subdivided by intersecting lines and photographically reducing the picture reproduced on said second surface.

3. A method of analyzing, transmitting and reconstructing pictures, designs and the like, consisting in optically projecting said picture on an exaggerated scale on to a surface subdivided into spaces by intersecting lines, estimating the characteristics of the portions of said picture contained in each said space, transmitting code descriptions of said characteristics associated with code definitions of said spaces, inserting said transmitted characteristics in corresponding spaces of a large surface correspondingly subdivided by intersecting lines and photo-

graphically reducing without said intersecting lines the picture reproduced on said second surface.

4. A method of analyzing, transmitting and reconstructing pictures, designs and the like, consisting in optically projecting said picture on an exaggerated scale on to a surface subdivided into spaces by intersecting lines, estimating the characteristics of the portions of said picture contained in each said space, transmitting code descriptions of said characteristics associated with code definitions of said spaces, inserting said transmitted characteristics in corresponding spaces of a large surface correspondingly subdivided by non-actinic intersecting lines and photographically reducing the picture reproduced on said second surface.

5. A method of analyzing, transmitting and reconstructing pictures, designs and the like, consisting in optically projecting said picture on an exaggerated scale on to a surface subdivided into spaces by intersecting lines, estimating the characteristics of the portions of said picture contained in each said space, transmitting code descriptions of said characteristics associated with code definitions of said spaces, inserting said transmitted characteristics in corresponding spaces of a large surface correspondingly subdivided by optically projected intersecting lines and, after cessation of said projection of said lines, photographically reducing the picture reproduced on said second surface.

6. A method of analyzing, transmitting and reconstructing pictures, designs and the like, consisting in optically projecting said picture on an exaggerated scale on to a surface subdivided into spaces by intersecting lines, estimating the characteristics of the portions of said picture contained in each said space, transmitting code descriptions of said characteristics associated with code definitions of said spaces, inserting by tonal-valent colors said transmitted characteristics in corresponding spaces of a large correspondingly subdivided surface and photographically reducing in monochrome the picture reproduced on said second surface.

7. A method of analyzing, transmitting and reconstructing pictures, designs and the like, consisting in optically projecting said picture on an exaggerated scale on to a surface subdivided into spaces by intersecting lines, estimating the characteristics of the portions of said picture contained in each said space, transmitting code descriptions of said characteristics associated with code definitions of said spaces, inserting by tonal-valent colors said transmitted characteristics in corresponding spaces of a large surface correspondingly subdivided by intersecting lines and photographically reduc-

ing in monochrome without said intersecting lines the picture reproduced on said second surface.

8. A method of analyzing, transmitting
5 and reconstructing pictures, designs and the like, consisting in optically projecting said picture on an exaggerated scale on to a surface subdivided into spaces by intersecting lines, estimating the characteristics of the
10 portions of said picture contained in each said space, transmitting code descriptions of said characteristics associated with code definitions of said spaces, inserting by tonal
15 valent colors said transmitted characteristics in corresponding spaces of a large surface correspondingly subdivided by non-actinic intersecting lines and photographically reducing in monochrome the picture reproduced on said second surface.

20 9. A method of analyzing, transmitting

and reconstructing pictures, designs and the like, consisting in optically projecting said picture on an exaggerated scale on to a surface subdivided into spaces by intersecting lines, estimating the characteristics of the
25 portions of said picture contained in each said space, transmitting code descriptions of said characteristics associated with code definitions of said spaces, inserting by tonal
30 valent colors said transmitted characteristics in corresponding spaces of a large surface correspondingly subdivided by optically projected intersecting lines and, after
cessation of said projection of said lines, photographically reducing in monochrome
35 the picture reproduced on said second surface.

In testimony whereof I have signed my name to this specification.

THOMAS MACREADY DOWN.