April 18, 1939. F. W. KIESSLING 2,155,094

GRAPHIC METHOD AND MEANS

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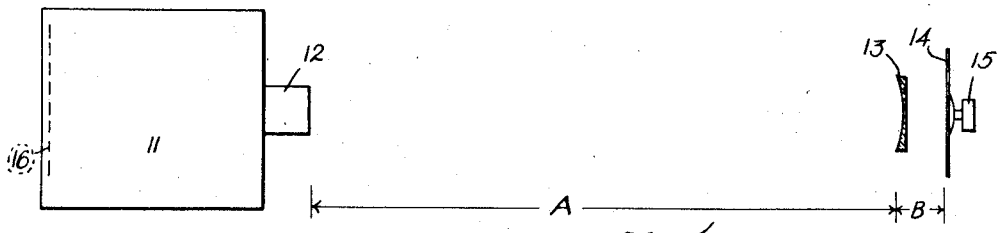


Fig. 1

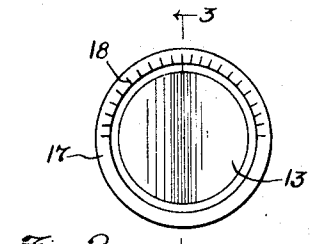


Fig. 2

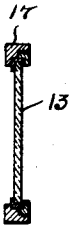


Fig. 3

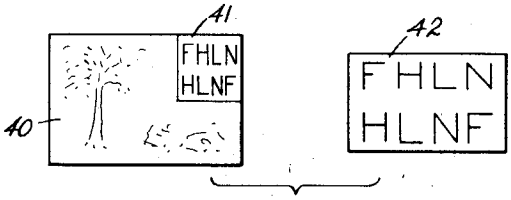
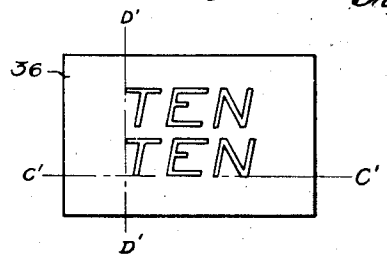


Fig. 4



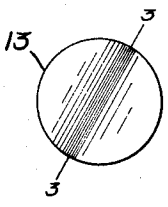
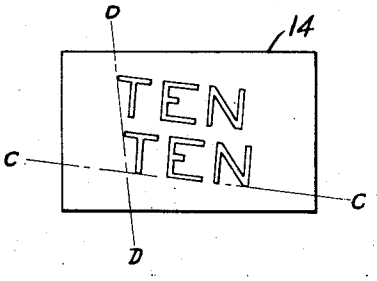
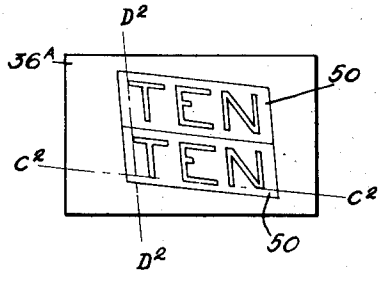


Fig. 5





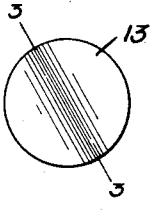
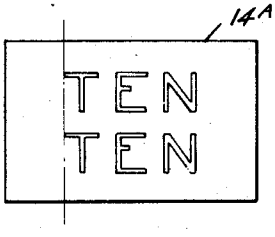


Fig. 6



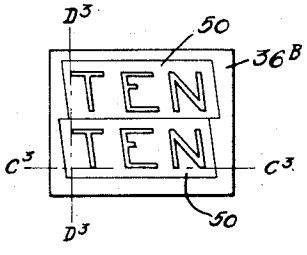


Fig. 7

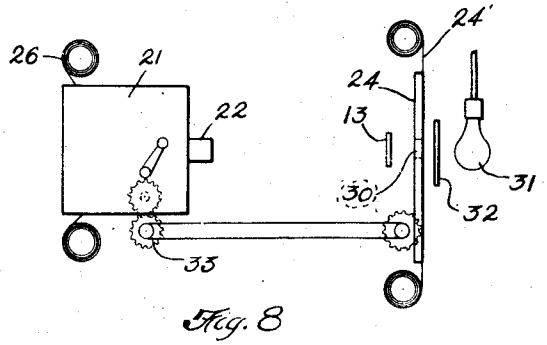


Fig. 8

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GRAPHIC METHOD AND MEANS

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TYPOGRAPHERS SHOULD HAVE A BACKSLANT IN

Fig. 9

TYPOGRAPHERS SHOULD HAVE A BACKSLANT IN

Fig. 10

TYPOGRAPHERS SHOULD HAVE A BACKSLANT IN

Fig. 11

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GRAPHIC METHOD AND MEANS

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ABCDEFGHIJKLMNOPQRSTUV
WXYZ

abcdefghijklmnopqrstuvwxyz

Fig. 12

ABCDEFGHIJKLMNOPQRSTUV
WXYZ

abcdefghijklmnopqrstuvwxyz

Fig. 13

ABCDEFGHIJKLMNOPQRSTUV
WXYZ

abcdefghijklmnopqrstuvwxyz

Fig. 14



Fig. 15



Fig. 16



Fig. 17

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Patented Apr. 18, 1939

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UNITED STATES PATENT OFFICE

2,155,094

GRAPHIC METHOD AND MEANS

Fred W. Kiessling, Cleveland Heights, Ohio

Application June 24, 1936, Serial No. 87,033

2 Claims. (Cl. 95—5)

This invention relates to a means and method for use in the field of graphic arts such as photoengraving, rotogravure, photolithographing, printing, and also in still and motion photography. The aims of the invention include the transformation of representations to be used in printing (employing the term "print" in its broadest sense to cover a wide range of graphic reproducing methods including photographic printing), in certain particulars while retaining other particulars unchanged. My invention is applicable to any suitable subject matter, for example either to characters such as letters and numerals or to pictorial illustrations or the like.

For example, the invention is for the purpose of performing such operations as are listed below, it being understood that the list does not exclude operations not specifically included.

(*a*) Changing the inclination of a printed character or a series of such characters with respect to the horizontal base line by purely mechanical and optical methods without the necessity for any re-designing or employment of artistic skill.

(*b*) Changing printed characters to a more contracted or more expanded form, that is, a fatter or leaner character, either with or without alteration of height or inclination.

(*c*) The changing of all parts of such characters proportionally.

(*d*) The application of the foregoing aims to the reproduction of pictures for further reproduction by graphic means.

(*e*) The application of my method and means to the making of photographic films and the like, particularly those intended for projection purposes.

(*f*) The application of my method and means to the production of evanescent images, such as moving or still pictures projected upon a screen.

Amplifying certain of the aims of my invention as mentioned above, one purpose is to permit printed matter to be initially set up in a standard form of type of convenient size and afterwards transposed into a variant of that standard form and into a size determined by the space to be filled. The method of obtaining this result is more fully explained in the body of the specification. This principle is also applicable to pictures.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain means and one mode of carrying out the invention, such disclosed means and mode illustrating, however, but one of various ways in which the principle of the invention may be used.

In the accompanying drawings:

Fig. 1 is a diagrammatic plan view of apparatus for the practice of my invention;

Fig. 2 is a front view of a lens used in the apparatus of Fig. 1 and on a larger scale than Fig. 1;

Fig. 3 is a vertical central section on the plane 3—3, Fig. 2, omitting all parts behind that plane;

Fig. 4 is a diagrammatic illustration of an application of my invention;

Fig. 5 illustrates diagrammatically a method and result of the use of my invention in the composition of type forms exhibiting inclined variants of a basic form;

Fig. 6 illustrates diagrammatically another method and result of the use of my invention in the composition of type forms exhibiting inclined variants of a basic form;

Fig. 7 illustrates a step subsequent to Fig. 6;

Fig. 8 is a diagrammatic side elevation of apparatus for the practice of my invention with moving images;

Fig. 9 illustrates a composition in selected basic type to be modified by the application of my invention;

Fig. 10 illustrates a modification of Fig. 9, being a back slant;

Fig. 11 illustrates another modification of Fig. 9, being an italic;

Fig. 12 illustrates a composition in another selected basic type to be modified by the application of my invention;

Fig. 13 illustrates a contracted modification of Fig. 12;

Fig. 14 illustrates an expanded modification of Fig. 12;

Fig. 15 illustrates a normal portrait to be modified by the application of my invention;

Fig. 16 illustrates the same portrait narrowed by the application of my invention; and

Fig. 17 illustrates the same portrait broadened by the application of my invention.

A preferred apparatus for the practice of my method is illustrated diagrammatically in Fig. 1 and comprises a camera 11, preferably of the style known as a copying camera, in which the lens is indicated at 12 and the plate or film is indicated at 16. The camera lens 12 is preferably of focal length in the range between 12 and 24 inches, although this distance, like all others mentioned herein, is to be taken as illustrative and not as

limiting. The camera is used with a small stop for sharp definition.

At an appropriate distance A in front of the camera lens 12 I employ a lens 13, which I call the modifying lens, closely in front of the object 14 which is the basis of the new composition. The object 14, such as printed matter or a picture, is mounted on a board (not separably indicated) at a distance B behind the lens 13 which depends upon the relative size of the object 14, of the lens 13, and of the expansion or contraction to be produced. The board which carries the object 14 is mounted on a stand 15 for rotation on a horizontal axis. Ordinarily A will be at least five times B, as shown by Figs. 1 and 8.

The modifying lens 13 is cylindrically plano-concave, as apparent by a comparison of Fig. 1 with Fig. 3.

A modification of the apparatus of Fig. 1 to the continuous production of successive images is illustrated in Fig. 8. In that figure a motion picture camera 21 with sensitized film 26 is set up in proper relation to a lens 13. Behind this lens 13 there is a board 24 having therein a sight opening 30 through which the successive frames of a film 24' are exhibited, this film being illuminated by a source of light 31 which is properly diffused, for example by an opalescent glass 32. The lens 22 of the camera 21 and the lens 13 are given proper mutual adjustment to produce on the film 26 the resultant modified images taken from the successive projections through 30. Synchronous drive of the sensitized film 26 and of the projection film 24 is accomplished by suitable mechanism, diagrammatically shown and generally indicated by the reference character 33.

As previously mentioned, the possibilities of my inventive method and apparatus include setting up matter in some type which the printer has available perhaps only in one size and weight, not immediately suitable to the purpose in hand, and afterwards transforming this printed matter in one or more features. It is intended that the original 14 will, if necessary, be a reduction from the actual printed matter to such a size that the entire area of 14 can be included in the field of the modifying lens 13. Referring to Fig. 4, suppose that in making up an advertising page 40 the space 41 at the upper right corner is to be filled with print but the only type available is of a size too large for the space and improperly proportioned as to height and width, so that when the text is printed it will occupy a space 42 of different size and different shape from the available space 41. Thus the shop doing the printing has type of the required face (as block, Caslon or the like), but not of the required size and proportions, but since the specific size is necessary only for this one job it is not economical to purchase type of the proper size for the purpose. In order to put the typed matter into the space 41, it is set up and printed in the type available and in the wording and line arrangement desired, thus presenting a proper appearance in the space 42. After being so printed, this matter is reduced in size and also contracted in width to conform both to the size and proportions of the space 41. Such a contraction is illustrated in Fig. 13, where the type originally printed was that shown in Fig. 12. In Fig. 13, however, there has been no diminution in the height of the letters. If a further variation is required, such as italic or a back slant instead of the vertical letters, further transformation may also be accomplished by the means and method of my invention. Such possibilities are illustrated in Figs. 10 and 11 which are respectively a back slant and an italic taken from the printed matter of Fig. 9, although there is no reduction in size, width or height between Fig. 9 and Figs. 10 and 11.

Referring now to Figs. 5 to 7 inclusive, steps of and results obtainable by my apparatus and method will be explained

In Fig. 5 certain text matter, which for simplicity consists of the word "ten" repeated, is shown as printed on the card 14 in roman block. Each line of type is inclined from the horizontal as indicated by the reference line C—C. Also, the successive lines down the column are offset as indicated by the reference line D—D. The inclination of the lines C—C and D—D from the horizontal and vertical respectively is predetermined to produce the result shown on the surface 36. With the matter printed as shown on 14, Fig. 5, the lens 13 is inclined in its frame 17 to the proper inclination, as read on the index 18, the distances A—B adjusted according to the magnification desired, the camera properly focused and an image on 14 is photographed on 16. After putting this image through the usual photoengraving or other processes, the print shown on 36 results. In this print stems and bars of the various letters instead of being at right angles as printed, are at oblique angles, the cross alignment C—C of the type has become horizontal, C'—C', and the offset in the columnar arrangement, indicated by D—D on 14 has straightened to the vertical, D'—D', on 36. Thus, each word appears square upon the sheet 36 and the column is straight up and down, but each letter has taken an italic shape as in Fig. 11. Opposite inclination of the lens 13 would have produced a back slant as in Fig. 10. For simplicity, the relative rotation between lens and object is here illustrated as applied entirely to the lens, but obviously it can also be brought about by rotating 14 on its horizontal pivot on the stand 15 or by partly turning 13 and partly turning 14.

In Fig. 6 the printed matter on 14A is shown as properly placed vertically and horizontally, and the entire transformation, including columns, lines and individual letters, appears in the result shown on 36A. In order to rectify the lines C^2—C^2 and D^2—D^2, each word or line is cut as a strip 50 from 36A and these strips are then assembled, for example, on a sheet 36B, Fig. 7, with the lines C^2 horizontal as at C^3, but the successive lines in the column are individually so set that each begins on the vertical line D^3.

Simple expansion or contraction without changing angular relationships is accomplished variously, for example by varying the distances A and B and the camera focus without turning the lens 13, or else by using a lens of different cylindrical curvature, or else by turning the lens axis 3—3 to horizontal. This last shortens the letters without changing width.

A number of combinations may be obtained in these ways, some being illustrated in Figs. 13 and 14 and in Figs. 16 and 17.

The operations discussed may be variously combined, obtaining angular variation with or without change in height, angular variation with or without change in width, change of height without change of width, change of width without change of height, and so on.

Although primarily intended for typography, my apparatus and method is also applicable to pictorial work either for serious or grotesque purposes. Fig. 15 is a normal, that is correct, por-

trait. In Fig. 16 this portrait is shown contracted to a thinner face than natural and in Fig. 17 expanded to a fuller face than natural.

No angular distortions are illustrated in connection with pictorial work, since such angular distortions would ordinarily lead to a grotesque result, but the examples given with letters make the further possibilities with pictures apparent.

Within the range of uses of my invention I mention the following possibilities using the apparatus of Fig. 8. Here both the original 24 (the counterpart of 14) and the film 26 (the counterpart of 16) are moved step by step at suitable speeds as is customary with moving picture apparatus, and the camera 21 includes the conventional interrupting shutter in connection with the lens 22. By suitable setting of the apparatus, including the lens 13, and rotation of the lens 13 or the board 24, or both, the characteristics of the motion picture film 24' exposed through the opening 30 can be transformed in whatever sense is desired onto a moving picture film 45. Thus, results analogous to those of Fig. 5 or Fig. 6 are obtainable.

From the foregoing it will be seen that I have invented a method and an apparatus for carrying out that method whereby basic images may be variously transformed as to size, shape, proportions and inclination, either one or all of the foregoing factors being changed, while at the same time the resultant image is recognizable as a variant of the original. I have provided for doing this by a combination of elements which are in themselves known, although not previously so combined as I use them. The invention is capable of being carried into use by the employment of apparatus known in the graphic arts, and by the exercise of the skill and techniques constantly available in those arts, but greatly extends the possibilities of known instrumentalities.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the means and steps herein disclosed, provided those stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A method of reproducing printed matter which comprises optically displacing lines of such printed matter and optically altering the angular relationship of characters with respect to alignment of said lines and also optically altering the mutual angular relationship of strokes of said characters, photographing lines so altered, separating such photographed lines, and thereafter re-aligning such separated lines in the original columnar relationship of the successive lines while retaining the character alterations, followed by copying from such rearranged lines.

2. A method of reproducing printed matter which comprises optically displacing lines of such printed matter and optically altering the angular relationship of characters with respect to alignment of said lines and also optically altering the mutual angular relationship of strokes of said characters, photographing lines so altered, separating such photographed lines and thereafter reassembling such separated lines on a common sheet while retaining the character alterations.

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