No. 632,435. Patented Sept. 5, 1899.

J. T. BENTLEY.

PHOTOGRAPHIC CHARACTER.

(Application filed Feb. 12, 1898.)

(No Model.)

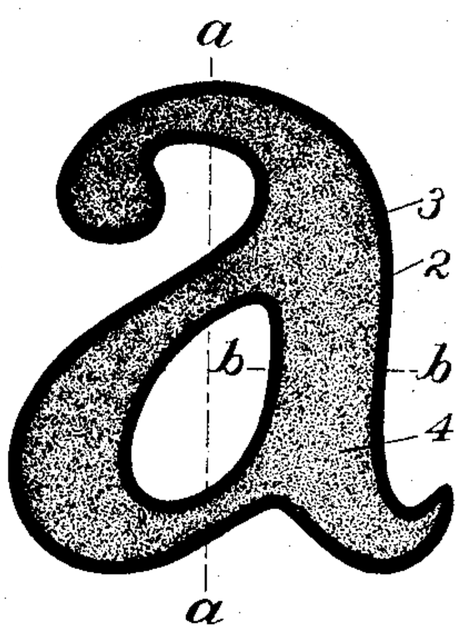


Fig. 1.

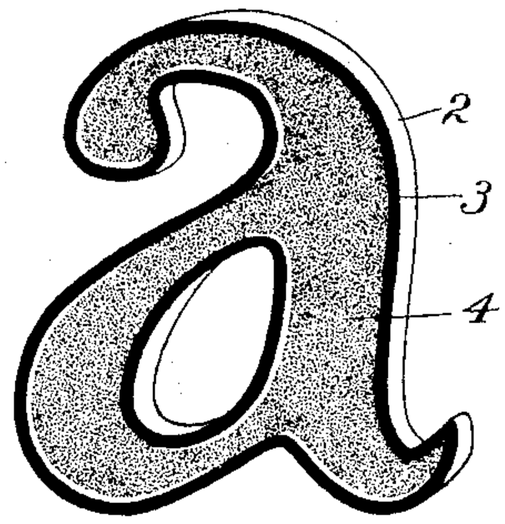


Fig. 2.

Fig. 3.

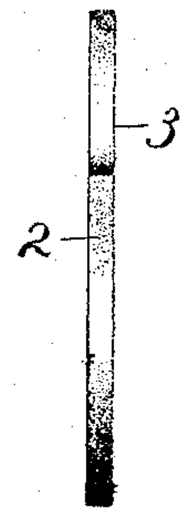


Fig. 4.

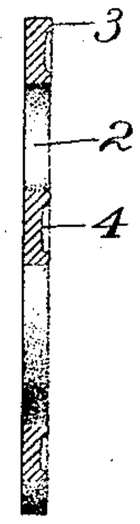
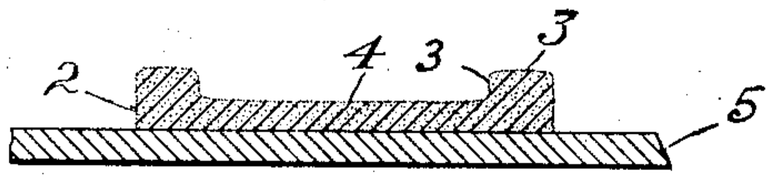


Fig. 5.



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PHOTOGRAPHIC CHARACTER.

SPECIFICATION forming part of Letters Patent No. 632,435, dated September 5, 1899.

Application filed February 12, 1898. Serial No. 670,074. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. BENTLEY, a subject of the Queen of Great Britain, residing in Englewood, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in the Production of Characters, of which the following is a specification.

This invention relates to the production of characters, designs, letters, figures, or analogous symbols.

The object of the invention is to provide a design, character, letter, figure, or symbol with such structure that when used for the purposes of photoreproduction the reproduced character will be sharply and clearly defined and can be reduced to a much greater extent than has been practicable heretofore with characters as ordinarily formed and without any appreciable destruction of any part of such reproduced symbol.

A further object of the invention is to furnish a character, design, image, mark, letter, figure, or symbol with such a raised, elevated, or built-up border that the boundary, edge, or outline of such symbol will, I apprehend, have a different efficiency from the interior or field area thereof, so that such border will in the process of photoreproduction constitute a means for protecting the boundaries or edges of the reproduced symbol, whereby when the negative is utilized to form a printing plate or surface the symbol will be brought out thereon with superior clearness and sharpness and with its edges of superior definition.

A further object of the invention is to provide a symbol with a part thereof of such structure that I apprehend a higher contrast will be obtained between such symbol at its outline and the background or supporting field in connection with which or adjacent to which it may be used than would otherwise be the case, whereby the reproduced symbols will be given highly-defined borders or edges of unbroken continuity.

In the drawings accompanying and forming part of this specification, Figure 1 illustrates a face view of a symbol—such, for instance, as a letter—substantially as it may appear when constructed in accordance with this invention. Fig. 2 is a perspective view thereof. Fig. 3 is an edge view of said letter. Fig. 4 is a cross-sectional view thereof, taken in line *a a*, Fig. 1; and Fig. 5 is an enlarged sectional view taken in line *b b*, Fig. 1, the letter being represented disposed contiguous to a suitable supporting surface or field.

Similar characters of reference designate like parts in all the figures of the drawings.

As a preface to a further description of this improvement in the production of symbols I desire to state that since one of the objects of the invention is to produce an original, one part—as, for instance, the outline or boundary portion—of which may be so reinforced that when used for photographic reproduction such reinforced outline will be highly efficient to give a like degree of efficiency to the corresponding border or outline portion of the negative—as, for instance, by rendering the same more transparent at such outline portion than at the other or interior portion thereof—so that such negative will have a relatively high light-printing efficiency, and since this reinforced portion of the original acts I apprehend with a high degree of efficiency to prevent the action of the light on the negative at the corresponding part thereof, and so leaves the same relatively transparent or clear as compared with the other portion of such negative, it follows that this reinforced portion of the original has for this purpose a higher or a greater degree of efficiency than the interior of such original, whether this be due to a greater or less degree of photographic efficiency of the reinforced outline or boundary of such original as compared with the interior thereof. For the present purposes, however, this reinforced outline or boundary may be considered as having less photographic efficiency than the interior portion of the original, since it may be considered as having less photographic action on the negative at the border portion thereof, and so leaves or renders it more transparent or clear than the interior or body of such negative.

Whenever it is desired to obtain a photoreproduction of letter-press or analogous matter, it is the necessary practice to prepare an original to be placed before the camera. The only practicable way of doing this heretofore is by the use of type. Type, however, can-

not be used as an original for disposition before the camera for a number of reasons, the most important of which is that not only the surfaces around the type-faces, but also the spacing-leads, &c., would be photographed simultaneously with the type-faces, necessitating that all such undesired matter be routed out—an impracticable, if not an impossible, procedure—especially if the reproduction was on a comparatively small scale, as it usually is, since it would require considerable labor to rout out the marks and lines of even a page of matter. Therefore it is the necessary practice, as above stated, to make an original to be placed before the camera. This is done by making an inked impression of the type-faces, taken either directly from the type after being set up or from an electrotype or stereotype made from such type, the latter procedure being the usual one in book and newspaper work, respectively, and also one requiring considerable time and labor, and, moreover, being somewhat expensive. From this inked impression constituting the original, since it is impossible to use the type itself for the reasons just set forth, and produced in the manner described and having no structure whatever, but merely a surface representation or simulation of type, and having, moreover, all the imperfections of such type, due to wear and other causes, is obtained by photography a reproduction or negative of the required size within certain relatively narrow limits, which negative is then utilized to form a printing-plate or positive. It has been found, however, that when such matter has been reduced to a comparatively small size it is highly imperfect, this being due mainly to the disintegration and diminution of the letters and the destruction of their outlines and edges. I apprehend that this is due in part to the cutting out or bridging over by the light of the thinner portions of the letters during the formation of the negative, especially as they are usually formed with thick and "hair" or thin lines, so that portions of the letter outlines of the film are rendered opaque instead of transparent, thereby leaving the thicker or larger parts of such letters separated from each other, so that when the film is placed on the sensitized printing-plate the light fails to act through these opaque outline portions of the letters to properly harden the sensitized or emulsion surface on the metal plate corresponding with a similar portion on the negative. Hence portions of the emulsion letters are destroyed or dissolved on the further treatment of the plate, thus permitting the acid, to a bath of which the plate is subjected, to bite into such imperfect outlines, and so leave the plate-letter ragged and imperfect, so that it is practically impossible to secure a large reduction of the original matter, as it "goes to pieces" during the reduction. By my present improvement the symbols—such as letters, figures, characters, &c., which to a certain extent are like type and unlike the inked impressions from such type, in that they have structural formation, but unlike type in that they are photographable—are disposed before the reproducing instrumentality or camera for direct reproduction, and therefore may be made of a sufficient size to permit the thinner portions of such symbols to be reinforced in a similar manner to the reinforcement of other parts of such symbols, and thereby prevent during the formation of the negative the cutting out of any portion of the symbol by the light, thereby preventing the consequent production of defective plate-letters.

In addition to the foregoing reasons for the imperfect reproduction of letters, characters, and analogous matter is that in the use of type there is no way to properly protect the vital parts of the type-faces—namely, the edges thereof—and have such protective feature imparted to the inked impressions, which for the reasons above set forth can only be placed before the camera, since if one part or the edge of such type is raised above the other part then only the raised edge will be printed. Hence as the inked impression is itself without structure, which is a serious objection, since an object being wholly or in part structurally formed can be reduced with greater facility and better results to a far greater extent than a mere simulated form, and is also without any protective means at its boundary or edge portion, it follows that such boundary or edge portion, which is always open to attack both by the light on the making of the negative and by the acid on the making of the metal plate, becomes ragged and broken and disintegrated in its outline, which it has heretofore been impossible to prevent, so that when even a fair reduction has been required it has only been obtained after considerable "touching-up" by an engraver involving long and arduous labor and much expense, and when a comparatively small reduction has been desired it has been found impossible to obtain it and have it of any practicable value even with such touching-up. I have found, however, that by reinforcing certain parts of the original symbols, characters, figures, letters, and the like—such, for instance, as the edge, boundary, or outline portions thereof—they are thus protected from being destroyed, so that their continuity and perfectness is maintained throughout the various steps of the process. This reinforcement, I apprehend, gives a greater efficiency to the outline portion of the original symbol or letter as compared with other parts thereof, and consequently a higher light-printing efficiency in the reproduced negative in the corresponding portions thereof, since the reinforced boundary of the original is so formed in the present instance as to render the corresponding portion of the negative more transparent. In the present instance this reinforcement is obtained by providing each symbol or character forming the original matter to be repro-

duced and which is shown herein as a letter 2, usually formed of ink or pigment or analogous or suitable letter-forming matter, with a reinforcing border or outline 3, of a like matter or material, extending entirely around such letter at its inner and outer boundaries, and in the present construction shown herein this reinforcing-border is preferably obtained by the building up of the edge, whereby such border is of greater thickness, structure, body, or depth than the interior or field portion 4 of the letter intermediate said border portions. According to one theory I apprehend that by raising or building up the edge a relatively high efficiency is given to the letter at its outline portion, as it is believed that such reinforcing-border portion has greater power as a light-absorbing medium than other portions of the letter, and therefore absorbs light substantially from all directions and from all angles and so prevents action of a portion of the light to the amount of such absorption on the negative film when the letter is used for photoreproduction purposes, so that parts of the negative corresponding to the reinforced portions, edges, or borders of the original letter are relatively clear or more transparent than the interior or field portion thereof, whereupon when this negative is utilized to produce a printing plate or surface this relatively clear or transparent border permits the hardening of the border of the reproduced original of the emulsion surface of the plate to a greater extent than would otherwise be the case, which hardened border acts to prevent the acid from impairing or destroying the edge of the letter while biting away the metal surface, as fully set forth in my contemporaneously-pending application, Serial No. 668,728, filed February 1, 1898, so that the metal letter will have its borders or edges sharply and clearly defined and with unbroken continuity. I apprehend also that by forming the letters in the manner hereinbefore described I am able to give to them an efficiency similar to that which is present in natural objects, which can be reduced without any appreciable deterioration or disintegration to that stage where they are so small as to be hardly perceptible to the naked eye, and yet when placed under a powerful glass are found to be as perfect as the original. This high efficiency present in my improved symbols cannot be given to type or to type impressions, since the former could not be used in a practicable manner for the reasons heretofore set forth, and since also owing to their formation and mode of use could not have the structure present in my letter and since the type or inked impressions are but a mere simulation of type having no structure at any part thereof.

I have found that natural objects of comparatively low photographic efficiency when upon a background formed by the atmosphere or by another object or surface possessing a photographic efficiency highly contrasted with such objects show around their boundaries defining the figure of such objects and upon such background a luminous line or line of light, which line of light I apprehend adds increased photographic efficiency to the field covered by it and so produces a contrast in photographic efficiency between the object and its background still higher than the contrast which would exist if such line of light were not present. In using my improved symbol this line of light, while it may not always be perceptible to the untrained or naked eye, is, nevertheless, present to the camera, as has been thoroughly demonstrated by photography, when my improved symbol is used in connection with a background such as above indicated—that is, there appears around the boundaries or borders of such symbol or character field, and upon that portion of the high actinic field which forms the support or background field adjacent to or contiguous to such character field, a line of light similar to that which appears in a similar position relatively to the low actinic natural objects and their high actinic background, and which line of light, by adding increased efficiency to the field covered by it, produces a contrast in photographic efficiency between the character-field and such contiguous boundaries of the high actinic supporting-field higher than the contrast which would exist if no such line of light were present as described. As a result of this phenomenon, both in the case of the natural objects and in that of my improved photographable symbol having the structure described, the photographic reproduction or negative shows a special sharpness and definition at and along the boundaries of the object and its background, so that in using such photographic negative to produce a printing surface or plate the reproduced symbol on the emulsion or sensitized surface of the metal plate has its borders or boundaries so formed as to prevent the acid from eating into or destroying the edges or outlines of the symbols, whereby the plate-letters have, when completed, a sharply-defined outline as perfect as the original from which they are reproduced, even though they may be many times smaller in size, and, in fact, may be so small as to be almost imperceptible to the naked eye, yet when subjected to a powerful glass they are found to be as clear and as sharply defined and as perfect as the original and without any grayness of appearance or appreciable disintegration or destruction of their form. To this line of light, therefore, it is apprehended is due part of the special perfection described as possessed by the reproduction of my photographable symbol possessing a structure such as set forth, and which line of light is not present with type, even if it were possible to use the same as an original to directly photograph, and is likewise not present in a type or inked impression, since this is but mere surface representation or simulation of type,

and therefore does not have any structure which is present in a natural object and is, as apprehended, necessary to form such line of light. This building up of the edge or boundary portions 3 of the letter 2, thereby to reinforce the same, may be done by bringing together at the inner and outer boundaries or outlines of any suitable letter or formation thereof—such, for instance, as a letter in relief—a greater number of highly efficient ink, pigment, or analogous or suitable particles, and preferably so disposing of the same that the border has its face curved in cross-section, (see Fig. 5,) shown herein as convex, thereby avoiding the formation of sharp angles. This border formation may also be obtained by a depression of the interior or field area of the letter and the consequent raising of the border or edge thereof. By the formation of these borders the face of the letter intermediate such borders may have a hollow or slightly concave formation. (See Fig. 5.) This curvature of the border and of the interior portion of the letter need only be sufficient to have it appreciable to the camera.

From the foregoing it will be seen that by reinforcing the edge or boundary of the symbol or character and forming a border at such edge of the efficiency set forth, such symbol, it is believed, has a relatively higher efficiency at its outline portion than at its interior portion intermediate such outline portions, this being accomplished in the present instance by forming such border of lower photographic efficiency than the interior of such letter, thereby affording, according to one theory hereinbefore set forth, a greater contrast between such border and the high actinic background or field, (represented herein at 5, Fig. 5,) and which will usually comprise a card or a card-supporting surface, so that when the symbol is submitted to the action of light and to photographic reproduction that portion thereof having the highest efficiency forms a relatively clear or transparent space or border on that part of the negative film corresponding with the border of the original, while that part of the negative film corresponding with the interior or field portion 4 of the original symbol is of a less degree of clearness or transparency, owing to the lower efficiency of such interior field, while that part of the negative corresponding with the background or supporting field 5 is relatively opaque, so that it follows that the border portions of the symbol film are therefore more brilliant and the boundaries thereof more sharply and clearly defined than heretofore, resulting in the production of a much better film for the purpose of forming a printing plate or surface than is obtained by the processes ordinarily used, so that it will be seen that by forming the symbol with a reinforcing border or edge it may be utilized to produce a printing-plate or positive having the outlines of the characters sharply and clearly defined and not disintegrated or eaten into by the mordant used to bring such letters into relief, as hereinbefore set forth, and as particularly set forth in my application above referred to.

By the term "symbol" as used in the description and claims I desire to state that it is intended to include within its scope such designs, marks, letters, characters, or figures, and the like as are adapted to be given the construction herein set forth.

The term "edge" as used in the claims is intended to include within its scope the boundary, outline, or border of a letter, and the term "raised" is intended to include within its scope a built-up, elevated, or otherwise increased portion.

By the term "card" or "card-supporting" surface as used herein and in the claims it is intended to mean a surface of that general character and formation, but not necessarily a surface of pasteboard or of any particular material.

I claim as my invention—

1. A photographable symbol in ink, the edges of which are raised above the surface of the body of the symbol.

2. A photographable symbol in pigment the edges of which are raised above the surface of the body of the symbol.

3. A photographable original comprising a surface bearing a symbol thereon in pigment, the edge of which is raised above the surface of the body of the symbol.

4. A photographable original comprising a surface bearing a symbol thereon in ink, the edge of which is raised above the surface of the body of the symbol.

5. A photographable original comprising a card having a symbol thereon, the edge of which is raised above the surface of the body of the symbol.

6. A photographable original comprising a card having a symbol thereon, the body of which is of different efficiency from the surface of the card, and having its edge raised above its body portion.

7. A photographable original comprising a card forming a supporting-surface having a symbol thereon in relief, with an edge raised above the body of such symbol.

8. A photographable original comprising a card having a symbol thereon the body of which is of different efficiency from the surface of the card, and having its edge raised above its body portion and of different efficiency from said body portion.

9. A photographable original comprising a card-supporting surface of relatively high photographic efficiency, with a symbol thereon of relatively low photographic efficiency said symbol having a raised edge of lower photographic efficiency than the major portion of said symbol.

10. A photographable original comprising a surface bearing a symbol formed thereon and integral therewith with its body formed of matter different from such surface and hav-

ing an edge raised above the body of such symbol.

11. The herein-described photographable symbol having a raised border formed at the outline portion of such symbol and of a character whereby when such symbol is used for photoreproduction that part of the negative corresponding with the interior of such original will be relatively transparent while that part of the negative which corresponds with the border of the original will be of greater transparency than the interior thereof, substantially as set forth.

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