R. A. SIMPKIN.

DEVICE FOR OBTAINING COLOR COMBINATIONS.

APPLICATION FILED MAY 8, 1908.

901.655. **Patented Oct. 20, 1908.**

2 SHEETS—SHEET 1.

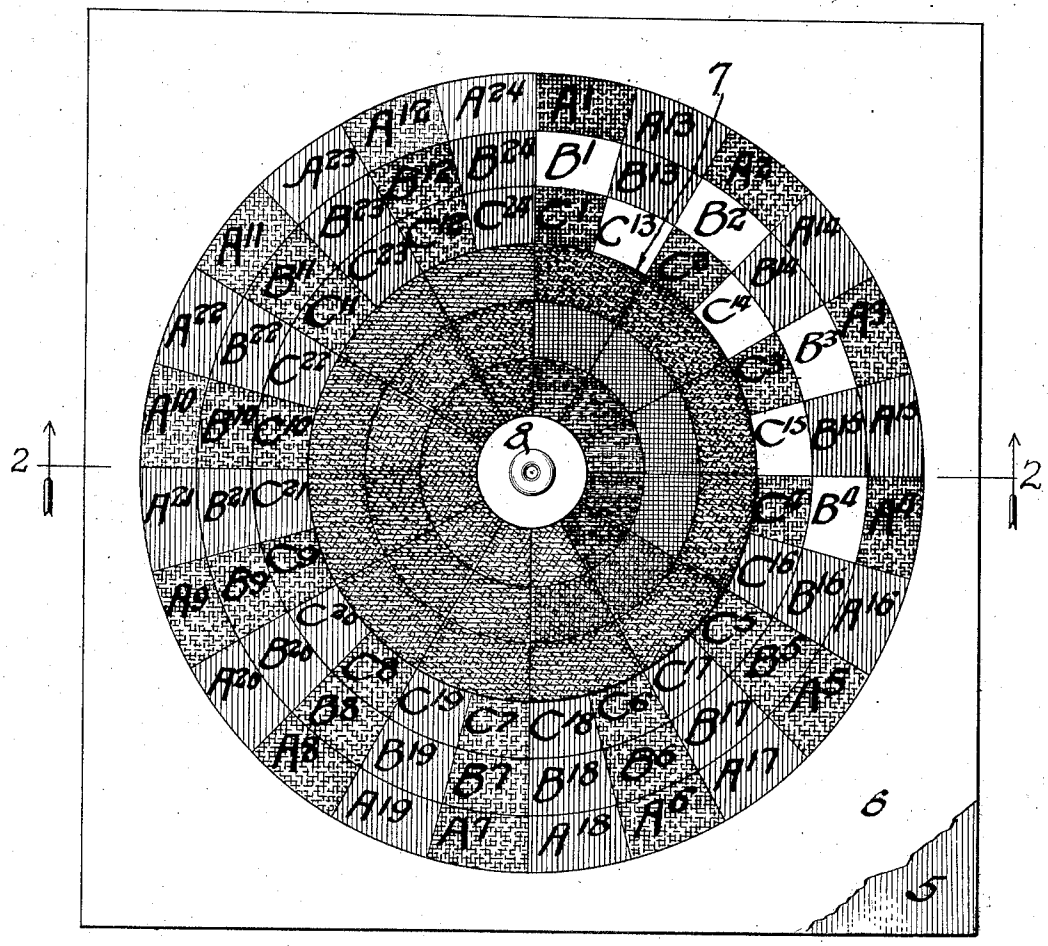


Fig. 1.

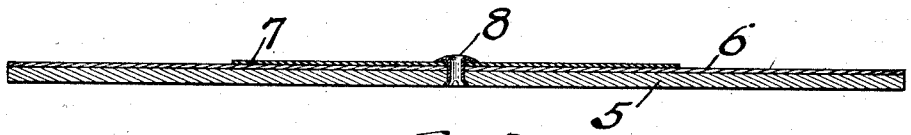


Fig. 2.

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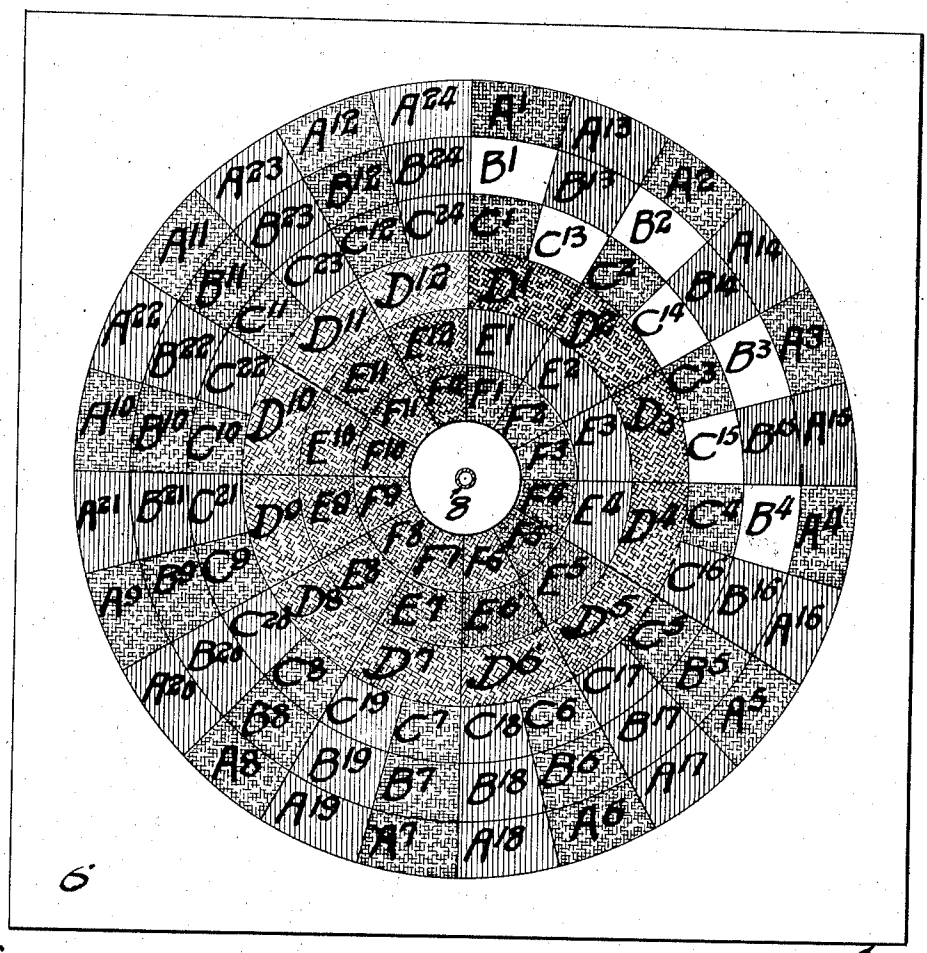


Fig. 3

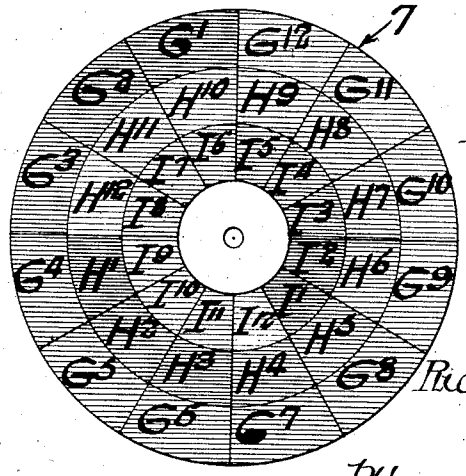


Fig. 4.

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UNITED STATES PATENT OFFICE.

RICHARD A. SIMPKIN, OF CHICAGO, ILLINOIS.

DEVICE FOR OBTAINING COLOR COMBINATIONS.

No. 901,655. Specification of Letters Patent. Patented Oct. 20, 1908.

Application filed May 8, 1908. Serial No. 431,611.

To all whom it may concern:

Be it known that I, RICHARD A. SIMPKIN, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Devices for Obtaining Color Combinations; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a device for indicating the primary color components and the shades thereof required to produce various combinations of the primary colors.

A device made in accordance with my invention is designed primarily for use in preparing half-tone plates used in the "three-color" process of color printing for the purpose of determining the shade or intensity of color required in corresponding areas of the impressions printed from three printing plates, whether prepared by the half-tone, stipple or graining process, each used for printing one of the three primary colors, in order to correctly reproduce the color of corresponding areas of a picture or painting to be copied or imitated. The device is, however, adapted for use under other circumstances in which it may be desired to ascertain what primary colors and what shades of the primary colors are required to be combined in order to produce a given secondary, tertiary, quaternary or other color admixture.

The invention consists in the matters hereinafter described and pointed out in the appended claims.

As shown in the accompanying drawings:— Figure 1 is a face view of an apparatus embodying my invention. Fig. 2 is a sectional view thereof taken upon line 2—2 of Fig. 1. Fig. 3 is a face view of the main part or base of the device. Fig 4 is a face view of a transparent disk applied to said base.

In said drawings, 5 indicates a flat base plate or board to the surface of which is applied a layer 6 of paper or other material to which colors may be readily applied. On the surface of said layer 6 is a circular area divided into color segments by circular and radial lines, which segments are variously colored.

7 indicates a disk of thin transparent material, such as celluloid, which is considerably smaller in diameter than the colored area of the base and which is mounted by means of a pivot stud 8 on the base 5 so that said disk may be readily turned or rotated. Said disk 7 is divided by circular and radial lines into segments corresponding with those of the central portion of the base.

As illustrated, the base is provided with six annular rows of color segments, while the transparent disk 7 is provided with three rows of such color segments corresponding in location with the three innermost rows on the base. Said three outer rows of color segments contain two of the primary colors, such as red and yellow, arranged in pairs and graduated in shade or intensity. The three inner rows of color segments contain secondary colors formed by the combination of the two primary colors of the three outer rows, so that if said color segments of the three outer rows be red and yellow, the color segments of the three inner rows will contain the several shades of orange which will result from combining the shades of red and yellow found in the three outer rows. The disk 7 will contain one primary color only, such as blue, in graduated shades, and as said disk is superposed upon the three rows of secondary color segments, the three primary colors will be combined in the three central rows of color segments and by turning the disk to bring the varying shades or intensity of the primary color thereon in superposed relation with the several secondary or orange shades beneath it, any desired color combination may be produced. Each color segment of the central or secondary color portion of the base, moreover, possesses the shade of secondary color due to the combination of the pair of primary color shades arranged outside of and radially in line with it. It follows that the components of any color produced by turning the disk 7 to bring either of its primary color segments over one of the secondary color segments of the base may be found by referring to the pair of primary color segments associated radially with said secondary color segment, together with the particular primary color segment of the disk which is at the time superposed upon said secondary color or orange segment. The secondary color rows include segments bearing the two primary colors on the base, graduated in shade or intensity, and adapted, in connection with the disk bearing shades of the third primary color, to indicate the shade

of any two of the primary colors which are combined to make two of the secondary colors, such as green or purple; the components of the third secondary color, such as orange, being indicated on the base itself.

Referring now to the specific arrangement of the segments used in the device shown in the drawings, the same are arranged as follows: The three outer rows in which the color segments, marked A^1, A^2, A^3, etc., B^1, B^2, B^3, etc., C^1, C^2, C^3, etc., are called primary color rows. In these rows the primary color segments are arranged in pairs while in the three inner rows of color segments, which are called secondary color rows, marked D^1, D^2, D^3, etc., E^1, E^2, E^3, etc., and F^1, F^2, F^3, etc., the secondary color segments are arranged in radial alinement with the pairs of primary color segments from which the secondary color segments are severally derived, it being understood that in the case of any secondary color segment the shades of the two primary colors forming the same can be determined by inspection of the two primary color segments, in the corresponding row, radially outside of the same. In the three rows of color segments on the disk 7, marked G^1, G^2, G^3, etc., H^1, H^2, H^3, etc., I^1, I^2, I^3, etc., the third primary color, as blue, is the sole color and the sections are of gradually decreasing shade or intensity.

The three outermost rows of color segments are divided by radial lines into 24 sections or segments, while the three innermost rows are divided by like lines into 12 sections or segments. The three rows of color segments on the transparent disk 7 correspond in size with those of the three innermost rows on the base, each row being similarly divided by radial lines into 12 segments.

The primary color segments of the outermost row A^1, A^2, A^3 are used solely in connection with the secondary color segments of the outermost secondary row D^1, D^2, D^3, etc., and the outermost row G^1, G^2, G^3 on the transparent disk. The segments of the outermost primary color row are, moreover, alternately red and yellow. In the drawings the segments marked A^1 to A^{12} are yellow and graded from the deepest or strongest in shade, marked A^1, to the lightest shade which it may be desired to use, which is marked A^{12}. Between the sections A^1 to A^{12} the yellow shades are uniformly graded from dark to light. Similarly, the segments marked A^{13} to A^{25} are red and graded from the darkest shade of red in section A^{13} to the lightest shade of red in section A^{24}. The twelve sections of the outermost, secondary color row, which is marked D^1 to D^{12}, are colored to correspond with the pairs of primary color segments radially outside of the same. Thus the section D^1 will be a deep orange formed by the combination of red and yellow of the segments A^1 and A^{13}, while the section D^{12} will be a very light orange, formed by the combination of the light shades of red and yellow in segments A^{12} and A^{24}. The outermost row of the third primary color segments on the disk 7 are graded from the darkest blue, section G^1, to the lightest blue in section G^{12}, the graduations of color corresponding with those of the two other primary colors.

Considering now the operation of the device described with respect to the outer primary color row A^1 to A^{24}, the outer secondary color row D^1 to D^{12}, and the outer primary color row G^1 to G^{12} on the disk, by rotating the said disk on the base either shade of the primary color or blue, of the disk may be brought over either of the shades of secondary color, or orange, and a large series of tertiary color combinations may be produced, but in neither of these will either red or yellow predominate because these colors are equally represented in the orange row, although blue will predominate where the darker shades of blue are superposed upon the lighter shades of orange, and vice versa.

In the intermediate primary color row the segments B^1, to B^4 are white and B^5 to B^{12} are yellow, grading from the lightest yellow in B^5 to the deepest yellow in B^{12}, while the segments B^{13} to B^{24} are red, grading from the deepest red in B^{13} to a lighter red in B^{19} and again to a dark red in B^{24}. The secondary color segments E^1 to E^{12} are of the shades produced by the combination of the shades B^1 to B^{24}, segments E^1 to E^4 being of gradually lighter shades of red unmixed with any yellow, while the segments E^5 to E^{12} are of varying shades of orange in which red predominates. Similarly, in the innermost primary color row the segments C^1 to C^{12} are graded from a deep yellow in C^1 to a lighter yellow in C^7, and again to a dark yellow in C^{12}, while the segments C^{13} to C^{15} are white, and the segments C^{15} to C^{24} are graded from a very light red in C^{13} to a darker red in C^{24}. In the corresponding or innermost secondary color row, the segments F^1, F^2, F^3 are pure yellow and the segments F^4 to F^{12} of varying shades of orange, in which yellow predominates. The shades of the two primary colors in the outer row A^1, A^2, etc. are equally balanced or of equal intensity so that neither primary color predominates in the corresponding sections of the outer secondary row D^1, D^2, D^3, etc., while in the intermediate primary color row B^1, B^2, B^3, etc., and corresponding intermediate secondary color row E^1, E^2, E^3, etc., one of the primary colors, as red, predominates, while in the innermost primary color row, as C^1, C^2, C^3, etc., and innermost secondary color row F^1, F^2, F^3, etc., the other primary color, or yellow, predominates.

From the above it will be understood that all of the secondary or orange shades on the outermost secondary row will have the com-

ponent primary colors, red and yellow, in equal intensity, while in the intermediate secondary color row, red will predominate in the several shades of orange, and in the innermost secondary color row, yellow will predominate in the several shades of orange. Moreover, the three corresponding rows of the third primary color, or blue, on the transparent disk 7 will, when said disk is turned or rotated on the base, afford, in the case of the outermost row of shades thereon, a series of tertiary color shades in which neither red nor yellow predominates, but in which either blue or orange may predominate, while in the case of the intermediate row of shades a series of tertiary color shades in which either red or blue will predominate, together with secondary color or purple shades where the blue shades are superposed over the red ones, and, in the case of the innermost row, a series of tertiary shades in which either blue or yellow will predominate, together with secondary color or green shades where the shades of blue are superposed over the several shades of yellow.

The device illustrated is adapted for indicating the primary color component of the secondary as well as tertiary and other color admixtures, it being obvious that the primary color components of the secondary colors on the base, may be determined by reference to the primary shades of red and yellow associated with and located radially outside of the several shades of orange contained in the secondary color rows on the base, this being done without the use of the transparent disk.

In making a color component indicating device of the character described for use in half-tone color printing, we prefer to apply the various shades of the primary colors to the several color segments by the use of half-tone plates, in the same manner that said plates are used in doing color printing. It will be understood that in such color printing, the various shades of each primary color result from variations in the sizes of the dots in the impressions from said half-tone plates, which, in the parts or areas to appear in a light shade of the color, the dots are smaller than in the darker parts or areas. The depth or shade of each color on base and disk will, therefore, depend on the sizes of the dots in the several colored areas or segments thereof.

In the use of the device thus made, the person preparing the half-tone plates will note the color of a certain part or area of the colored picture or painting to be reproduced, and by turning the disk 7 will find a color which will match that of the said part or area of the painting. The component primary colors and shades thereof will then be ascertained by noting on the disk and in the primary color rows of the base the three primary color shades corresponding with those of the segments of the base and disk which have been superposed to give the required matching color. The corresponding areas of the three plates will then be treated by an etching process to correspond with respect to the size of the dots printed therefrom, with the dots on the three segments as noted. When superposed prints are made by the use of red, yellow and blue inks, from the corresponding areas of the three plates so prepared, each impression will correspond in shade with that indicated by the said primary color segments on the base and disk, and the color resulting from the combination of the shades so printed will be the same as that of the corresponding color area of the painting.

It will be understood that the device will be used in the manner described whether employed in preparing printing plates for use in what is called the half-tone, stipple, or graining process of preparing such plates.

I claim as my invention:—

1. A color component indicating device comprising a base bearing a plurality of shades of two primary colors, arranged in pairs, and also a plurality of shades of the secondary color which results from the combination of said two primary colors, said secondary color shades being arranged in association with the pairs of primary color shades, from which they are derived, and a transparent member superposed upon the secondary color shades, said member bearing a plurality of shades of the third primary color.

2. A color component indicating device comprising a base having a plurality of shades of two primary colors, arranged in pairs, and also a plurality of shades of the secondary color which results from the combination of the said two primary colors, said secondary color shades being arranged in radial relation to the pairs of primary color shades from which they are severally derived, and a rotative transparent disk, superposed upon said secondary color shades, said disk bearing a plurality of shades of the third primary color.

3. A color component indicating device comprising a base bearing a plurality of shades of two primary colors arranged in pairs, and in circular order, and a plurality of shades of the secondary color which results from the combination of said two primary colors, said secondary color shades being arranged in circular order in radial alinement with the pairs of primary color shades from which they are severally derived, and a rotative, transparent disk superposed upon the part of the base bearing said shades of the secondary color, said disk bearing a plurality of shades of the third primary color arranged in circular order thereon.

4. A color component indicating device comprising a base bearing provided with a

plurality of radial and circumferential lines, dividing the same into radially and circumferentially arranged color segments, and a transparent disk provided with a plurality of radial and circumferential lines dividing the same into radially and circumferentially arranged color segments, said color segments on the base being arranged in two groups or sets, one of which contains a plurality of shades of two primary colors arranged in pairs and the other of which contains a plurality of shades of the secondary color resulting from the combination of the said pairs of primary colors, together with a plurality of shades of both of said primary colors, the transparent disk having a plurality of shades of the third primary color and being superposed upon the set of segments bearing the shades of both the secondary and primary colors.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 2nd day of May A. D. 1908.

RICHARD A. SIMPKIN.

Witnesses:
W. L. HALL,
THEO. T. SCHARKOPF.