

## CORRESPONDENCE.

*To the Committee on Publications.*

GENTLEMEN:—Having observed, in a communication to the *Photographic News*, a criticism of certain claims which I made in a paper read before the FRANKLIN INSTITUTE, in November last [JOURNAL OF THE FRANKLIN INSTITUTE, January, p. 54], I addressed the following reply to the editor of that journal, and would like to have the same published also in the JOURNAL OF THE FRANKLIN INSTITUTE.

F. E. IVES.

Mr. C. H. Bothamley, in the *Photographic News*, January 11th, says: "Recently Ives has described a process of heliochromy, of which he says, 'I claimed for this process that unlike any similar process yet suggested, it was based upon a true conception of the nature of light and color-vision, and was a strictly scientific method of accomplishing the object sought after.' Now, as a matter of fact, a strictly scientific process of the same character was described by Dr. Vogel, in 1885. Moreover, Vogel's process does not differ very greatly from the later process of Ives."

By this time, I am well used to having my original inventions and discoveries claimed for others, but I am surprised that so intelligent a writer as Mr. Bothamley should have failed to see at once that there is a very, very great difference between Dr. Vogel's process and my own. It is even somewhat amusing to know that while some are professing not to be able to see any essential difference between my principle and that of Hauron, others may be equally unable to see the difference between it and one that calls for the production of more than twice as many negatives, and in no way, even remotely, suggests my plan of representing most of the primary spectrum colors by color mixtures. I am sure a comparison of the three methods must make it evident to any unprejudiced person that each one is vitally different from either of the others.

Hauron's principle, as nearly as I have been able get at it, was simply that of making sets of heliochromic negatives by exposing sensitive plates through "orange, green and violet glasses," and from these negatives, prints in blue, red and yellow pigments, superimposed on a white surface. Although no approved theory of the nature of light and color-vision warrants such an assumption, Hauron assumed that this method should produce pictures correctly reproducing the light and shade and color of the objects photographed.

Dr. Vogel's principle is stated by Mr. Bothamley, in the *Photographic News*, September 9, 1887, as follows: "Vogel proposes to make a much larger number of images, and to use sensitizers corresponding with every region of the spectrum—for example, naphthol blue for red, cyanine for orange, eosine for yellow, safranin for green, and fluorescein for bluish green, the ordinary sensitiveness of the plate being sufficient for blue and violet. In taking the negatives the intensity of the blue and violet must be

reduced by means of a yellow screen. The fragmentary images thus obtained are transferred to stones, and each is printed in a color complementary to that part of the spectrum to which the particular plate was sensitive. This complementary color is found, however, in the dye which is used to sensitize the plate." Mr. Bothamley adds, "it is obvious that the greater the number of spectrum regions represented by separate images in this way, the more accurate will be the reproduction of the different shades and variations of color." In short, Dr. Vogel's principle really calls for a different negative and print for each primary spectrum color, of which there may be said to be either seven or a thousand, although even at the least estimate, which is quite unscientific, the number is already so great as to make the process absolutely unworkable wherever it is necessary to expose all the plates simultaneously, as in landscape photography. It is also certain that no known color-sensitizers will sensitize bromide of silver for such narrow bands of the spectrum exclusively. The process is not scientific, because it is impossible. My own method is perfectly distinct from Hauron's, in that I do not expose sensitive plates through "orange, green and violet glasses," and from Vogel's, in that I do not make separate negatives for each region of the spectrum, but only three, and in such a manner as to secure curves of intensity which correspond to the action of the light rays upon the sets of nerve fibrils which produce color-sensation. This, in fact, is my principle, which is undoubtedly new and true, and is carried out by exposing color-sensitive plates through compound color-screens, which have been adjusted by experiment in photographing the spectrum itself, until they yield negatives having curves of intensity like the curves of a diagram correctly representing the action of the spectrum upon the sets of nerve fibrils in the eye. A knowledge of the true nature of light and color-vision makes it evident that there is no theoretical requirement for more than three negatives, with which accurately to reproduce the color effect of every part of the spectrum, and of every natural color, provided that these negatives are made according to this principle.

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### BOOK NOTICES.

ANNUAL REPORT OF THE CHIEF OF THE BUREAU OF STEAM ENGINEERING FOR THE YEAR 1888. Government Printing Office, Washington. 1888. pp. 101. 10 plates.

The annual report of Engineer-in-Chief George W. Melville, U.S.N., is one of the most interesting sent out from the Bureau of Steam Engineering for a number of years. The general work of the Bureau is first treated of, showing briefly the work done at the different navy yards and on board each vessel in the naval service. A statement is made of the repairs and work necessary to keep the ships efficient, and of what will be of considerable interest to the public generally, the condition of the machinery for the new vessels. The details of all changes of designs authorized are made matters of public record. Each navy yard is taken up, and a recommendation is