TRICOLOR PHOTOGRAPHY.

While photography in colors is still a thing of the future, it is now possible to show pictures in natural colors by means of uncolored positives used in connection with color screens, the photographic positives being of such a nature as not only to define the outlines of the elements of the picture, but also to control the amount of each of the primary colors entering into the picture. The scheme is not a new one, several eminent scientific men in Europe having experimented in this direction, and Mr. Ives in this country having done a great deal toward perfecting this branch of photographic art.

Recently Mr. R. D. Gray, the well known photographic lens manufacturer of this city, has taken up the subject and carried it to such a degree of perfection as to render it possible to show these beautiful pictures to a large audience nearly as readily as ordinary lantern pictures are shown. He has discovered a particularly good combination of colors for his screens, for taking and projecting views. The colors used for the screens are red, green, and blue, which are slightly modified. On the modifications of these colors depends the success of color photography as now practiced. Of the hundreds of commercial dyes examined by Mr. Gray, not one of them used alone would answer the purpose. After a great many experiments he finally succeeded in effecting the combination of several colors that would fill the requirements. These three color screens, red, green, and blue, in their modified form stand for all the colors of the spectrum.

A positive made from a negative taken through a red screen is transparent in all places where pure red is seen in the subject represented, also more or less in parts representing purple, or violet and orange. A positive taken through the green screen will be transparent in the parts that are green in the subject represented, it will be transparent also in parts representing yellow. In a similar way a picture taken through a blue screen is transparent in the parts representing the blue portions of the subject.

In the illustrations, Fig. 1 represents a transparent positive printed from a negative taken through a red screen; the central spray of the gladiolus is nearly white; in a glass positive it would be nearly transparent. The right hand spray is light gray in color, which in a glass positive is semi-transparent, so that light could go almost unobstructed through this part of the positive. The main portions of the petals in the left hand spray are white, or in a glass positive transparent, while the fringes of the petals are only semi-transparent. The leaves and stalks are very dark, almost opaque, and some of the buds are dark. Now, when the transparency represented by Fig. 1 is projected on the white screen by a beam of red light, all the parts which are here shown light or white will be a more or less brilliant red. The perfectly transparent parts will be bright red, while the gray or semi-transparent parts will be less brilliant.

The glass positive represented in Fig. 2, which is taken through the green screen, is opaque in the parts representing red, but is transparent in the parts representing white, and more or less transparent in the parts representing green and yellow, so that when this positive is projected with green light, the green leaves, stalks and buds receive their proper amount of pure green, and the white portions receive the amount of green which is required in the composition of white light.

In Fig. 3 is shown a glass positive taken through a blue screen, and after what has been already said it will be understood that in this picture, wherever white or gray is shown, the glass positive is transparent, or partly so, thus allowing the blue light with which it is projected to pass in portions representing parts of the object in which more or less blue is necessary in their representation. The central spray being transparent in each picture, allows the red, green, and blue light to pass through to the screen, and the three pictures being accurately registered, these three primary colors when projected in their full strength upon the screen produce white light. Where the blue and green are screened off by opaque portions of the positive, and where the corresponding portion in the positive representing red is transparent, only the red light will show in such parts. In the view in which the green portions are represented and through which green light is thrown upon the screen, the red and blue parts of the picture are opaque; the positive representing the parts containing the blue is opaque in those parts representing the red and the green. By superposing the three pictures on the screen and allowing the beams of light to combine in different proportions in different portions of the picture, or to be shown on the screen uncombined or pure, every color in the spectrum is represented. Under these conditions the right hand spray shows red petals with borders slightly tinged with purple; the left hand spray shows pink petals with the fringes also tinted with purple, and the green is modified by a small proportion of red and blue.

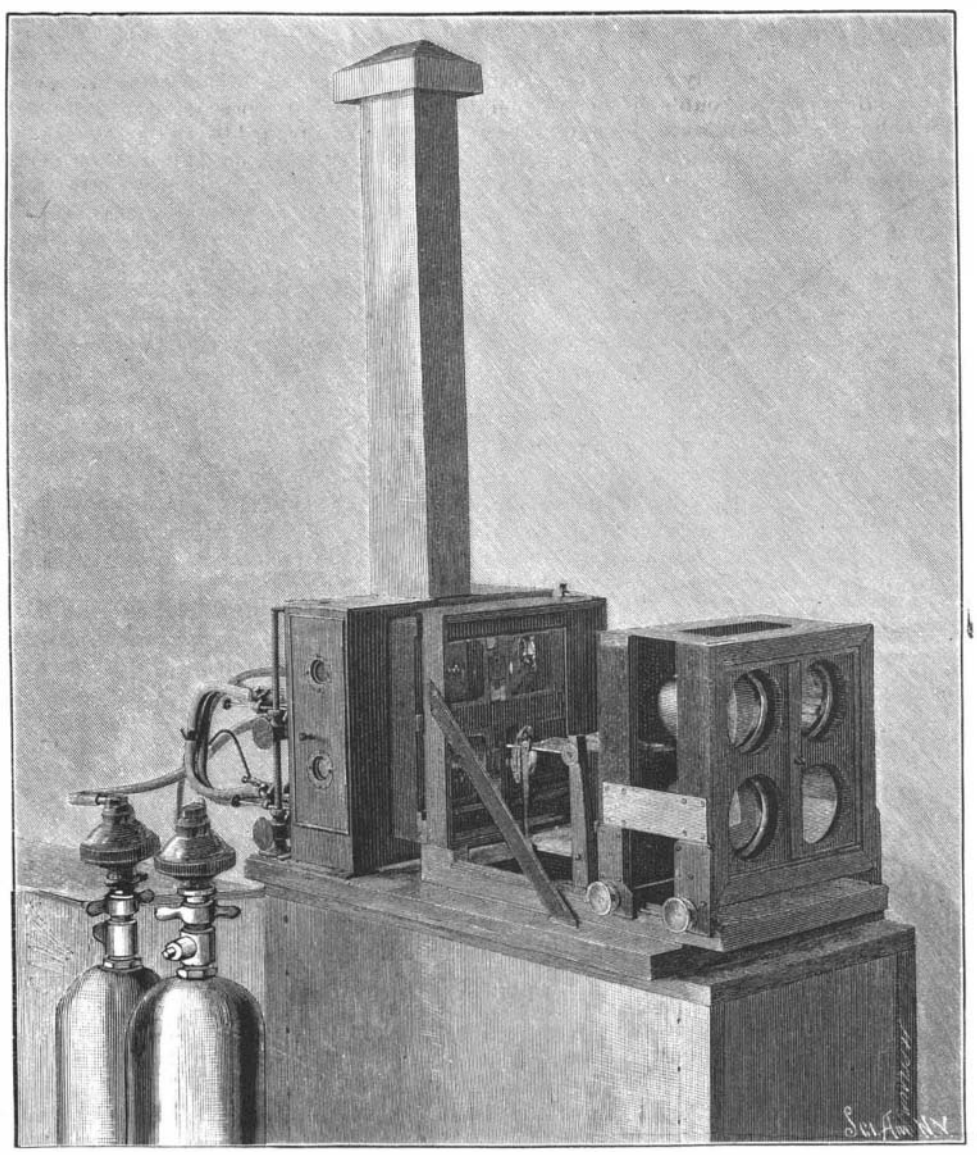

Fig. 4.—TRIPLE LANTERN FOR PROJECTION OF PICTURES IN NATURAL COLORS.

The lantern which Mr. Gray uses for the projection of these pictures is shown in Fig. 4. It consists of three oxyhydrogen lanterns carefully adjusted so as to cause the pictures to register on the screen when the lantern is located at a certain distance. The three positives which are required for the projection of a single view are fixed in a rigid frame, which, when it is inserted in the lantern, brings them into proper relation with the condensers and objectives. Either before or behind the frame carrying the three positives for projection is placed a frame carrying three colored screens, each being placed behind a positive which was made through a screen of the same color. When the images of these three positives are made to coincide on the screen, by means of suitably colored beams of light, although there is no color upon the views themselves, the composite picture on the screen presents all the colors of the thing represented.

Mr. Gray spent a large portion of last year taking views in the Yellowstone National Park, Yellowstone Canyon, and in California. These views were shown in New York at Chickering Hall, also in Brooklyn before the Brooklyn Institute. In each case the spectators were surprised and delighted with the results.

AT Forest City, Pa., in the Forest City coal shaft, is what is claimed to be the most powerful electric motor in the world for use in mines. It is mounted on a car 39 inches in height, 6 feet wide and 12 feet 8 inches long. It is rated 75 horse power and is designed to pull 90,000 pounds up a three per cent grade at the rate of 6 miles per hour. The motor is wound for 220 volts. It is used to draw cars a distance of 5,000 feet, and, with a train of 19 loaded cars on the outward trip, the round trip is made in less than 10 minutes. The engine furnishing the power is of 150 horse power capacity.

Fig. 1.—TAKEN AND PROJECTED THROUGH A RED SCREEN.

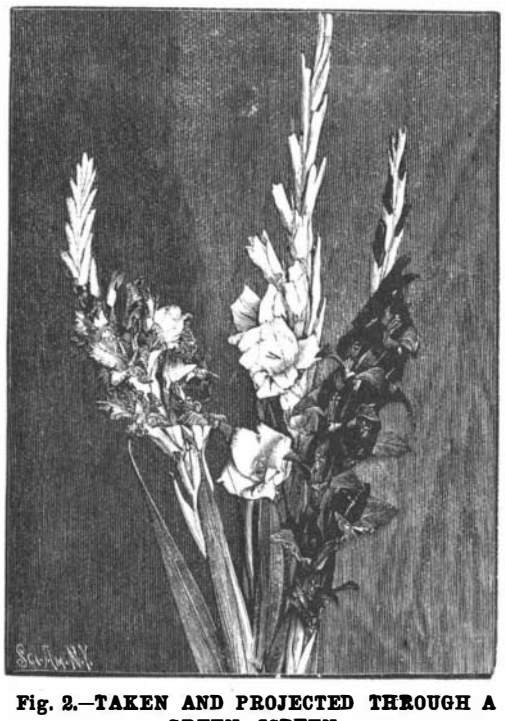

Fig. 2.—TAKEN AND PROJECTED THROUGH A GREEN SCREEN.

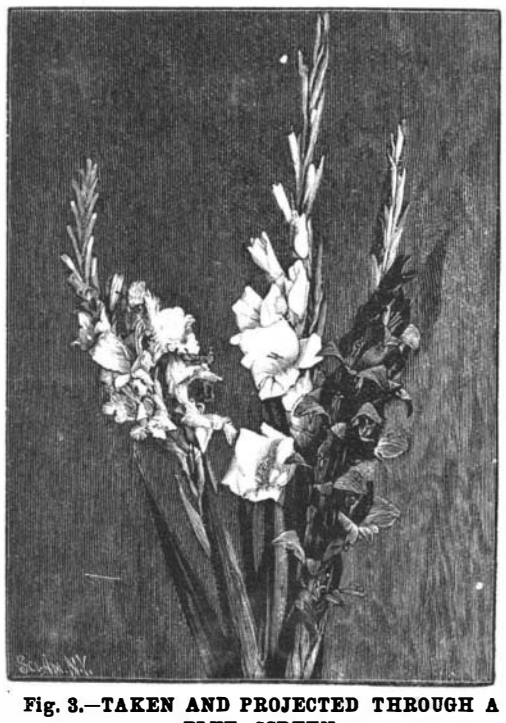

Fig. 3.—TAKEN AND PROJECTED THROUGH A BLUE SCREEN.