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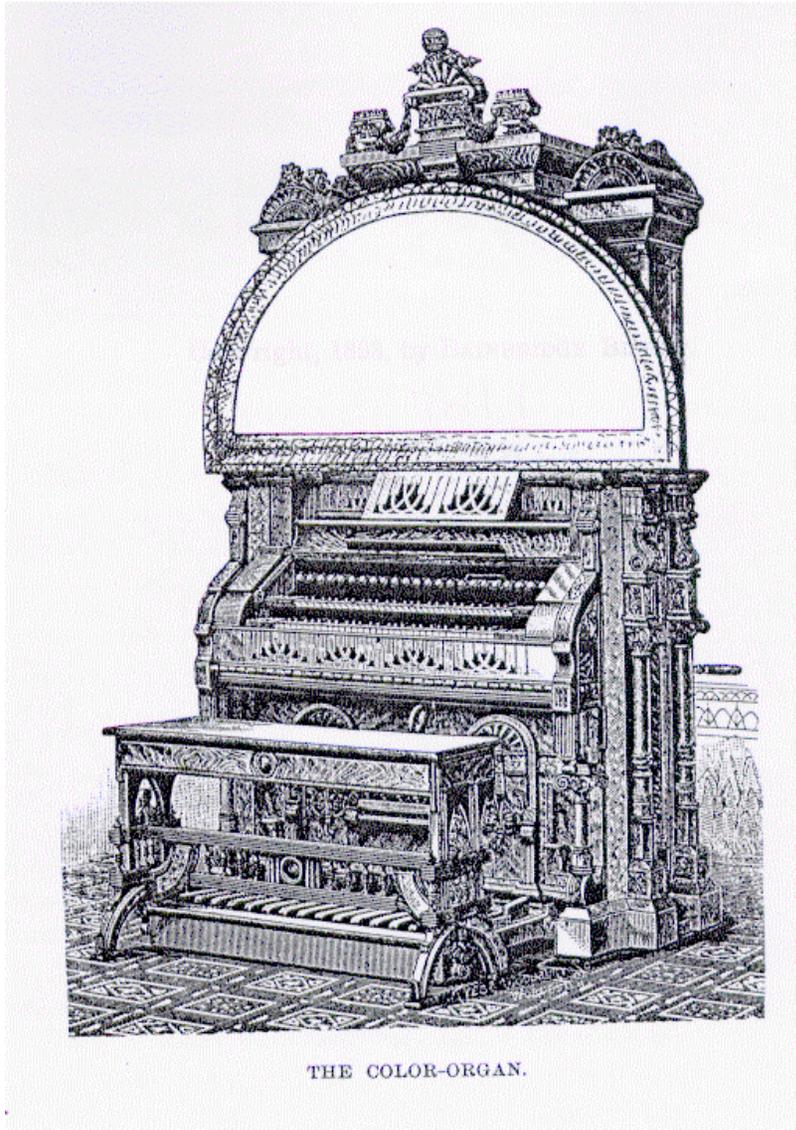
**A SOUVENIR OF THE COLOR
ORGAN, WITH SOME SUGGESTIONS
IN REGARD TO THE SOUL OF
THE RAINBOW AND THE
HARMONY OF LIGHT**

WITH MARGINAL NOTES AND ILLUMINATIONS

BY THE AUTHOR,

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A PLEA FOR A NEW SCIENCE

MUCH has been written concerning the analogy which is thought to exist between music and color, even as far back as Aristotle, who wrote, "Colors may mutually relate like musical concords, for their pleasantest arrangements, like those concords, mutually proportionate."

Many writers, artists, and others up to the present time have theorized on this subject. Some have proposed instruments to carry their ideas into effect; but no practical color-instrument was ever known to be built. From all that had been written, a satisfactory analogy between color and music did not materialize, and the subject remained chiefly one of theory and speculation.

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In my younger days I studied art. I was passionately fond of color-harmonies, but could not use them in a way satisfactory to myself. I read "Chevreul on Colors," also Field, and some of the later German works on the same subject, but they seemed to lack what I was looking for. I then tried to harmonize colors by applying the intervals and harmony of music, and failed to do this in a satisfactory manner. I therefore dropped the subject, and confined my efforts to presenting colors in my pictures in subdued and pleasant style.

Years after, certain circumstances drew my attention once more to this matter, and I became dominated with the idea of painting music. I had not the slightest conception how it was to be done, but I gave myself up to the idea with all the abandon and faith of a religious enthusiast.

I procured an organ, and experimented by building an attachment to the keys, which would play with different-colored lights to correspond with the music of the instrument.

I soon found that a simple color did not give the sensation of a musical tone, but a color softened by gradations into neutral shades or tinted grays did so; also, that combinations of colors softened by gradations into neutral shades or tinted grays, with the edges of the main colors blending together, or nearly together, rendered the sensation of musical chords very well indeed.

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The impression or sensation of the lower bass notes I could get only by low-toned or weak colors diffused over the whole field, the higher colors or chords showing smaller on this ground.

Satisfying myself on the above points by careful experiments and comparisons with music, I turned my attention to the construction of an effective and practical mechanism which would play colors and music together.

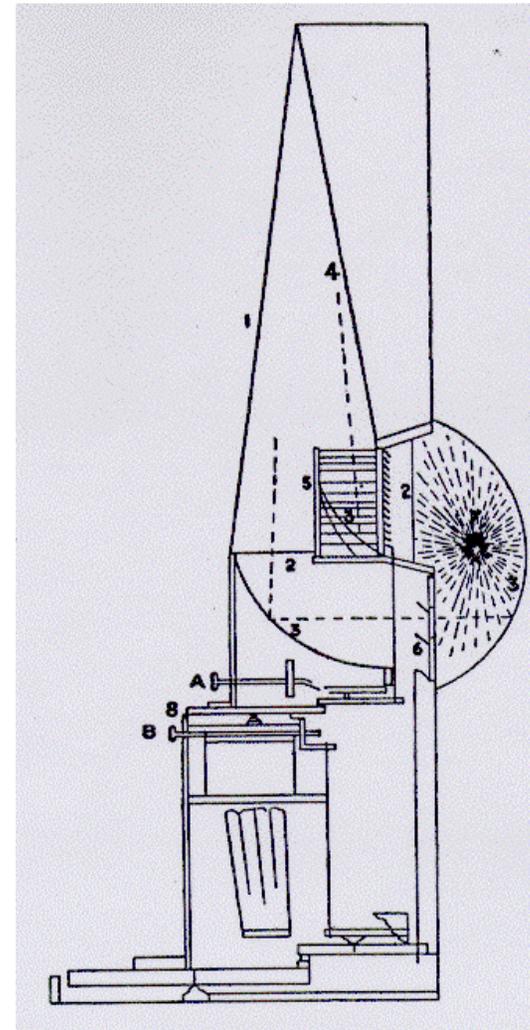
I made a number of experimental instruments, re-modeling and changing them to most fully carry out the idea, and obtain the best effect.

The most satisfactory one I made [see frontispiece] had a large ground glass about five feet in diameter, framed like a picture, and set in the upper part of the instrument. On this the colors were shown. The instrument had little windows glazed with different-colored glass, each window with a shutter, and so arranged that by pressing the keys of the organ the shutter was thrown back, letting in a colored light.

This light, diffused and reflected on a white screen behind the ground glass and partly on the glass, produced a color that was softly shaded into the neutral tint of the glass.

Chords were shown properly, the lower bass spreading over the whole as a ground or foil for the other colors or chords of color, and all furnishing beautiful and harmonious effects in combination with the music.

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1. Ground glass tablet.
2. Ground glasses to diffuse light.
3. Reflectors.
4. White screen.
5. Upper sash.
6. Lower sash.
7. Electric light.
8. Keyboard.
- A. Color-stop for keyboard.
- B. Color-stop for pedals.

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The instrument was placed before a sunny window. An electric light could be used behind it.

I had some trouble in deciding how to space the intervals of color, and what colors to use, but finally decided to employ red for C, and divide the prismatic spectrum of color into eleven semitones, adding crimson or violet-red for B, and a lighter red for the upper C of the octave, and doubling the depth and volume of color in each descending octave, the lower or pedalbass notes or colors being reflected evenly over the entire ground. The whole effect was to present to the eye the movement and harmony of the music, and also its sentiment.

The instrument was arranged with a stop so that music and color could be played separately or together.

I cannot say that a musical composition played alone in colors could be recognized by every one; perhaps persons familiar with the instrument might recognize some melodies.

One day while walking I saw a brilliant display of rainbows; around and between these bows the sky was a warm reddish-gray. The whole appearance filled me with an overpowering sense of the harmonic series or chord, as played upon an organ. Why, there were all the colors my instrument gave when this chord was played, with the same number of octaves of color, and in the same order and intervals. The warm reddish glow over the sky was the fundamental C ; the secondary

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bow, although reversed, presented the octave and fifth or dominant as its strongest colors (red and greenish-blue); the primary bow to the eye seemed to give four principal colors, red, yellow, — *i.e.*, green-gold, — greenish-blue, and violet, the very same colors my organ gave, and in the same order, when playing the harmonic series or chord; the supernumerary bow on the inner edge represented the higher notes of the series.

When I realized this I was overcome, and felt myself in the presence of a great revelation, for I thought this wonderful display had been placed before the eyes of all humanity since the times of earliest history, and the riddle had not been rightly guessed nor understood.

Men see as they are taught to see. Therefore, to obtain unprejudiced confirmatory evidence to justify this novel view, I have thought it necessary to question uneducated persons and children, whenever a rainbow appeared, and in every instance they have designated the four colors, red, yellow, — *i. e.*, green-gold, — greenish-blue, and violet, and no others. Also, in naming the colors of the secondary rainbow they notice red and greenish-blue as the strongest.

It is true that passing a thin ray of light through a prism shows the intermediate colors, caused by the blending of the four principal colors, red, yellow, — *i. e.*, green-gold, — bluish-green, and violet, which in this case would give the seven colors of Newton.

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It is instructive to look through a prism at a piece of white cardboard. Place it on a dark-gray surface, look at it with the edge turned toward the eye, then gradually slant it so the face of the card can be seen. This will show on the card the four principal colors, and also demonstrate how the colors blend and change by overlapping. [See Fig. 1.]

A person with good eyes can also see on the card, between the bands of color, the fundamental which appears to the eye as a warm reddish-gray. This fundamental hue is seen where a rainbow appears on a waterfall.

When looking through a prism at miscellaneous objects, the colors seem to be floating in a warm reddish-gray in the light, and a reddish-brown in the shadows. The Japanese, more than any other people, seem in their art to understand the use of this fundamental tone, and the harmonic intervals of colors.

It appears to me that light is the fundamental, and the three rainbows make up the harmonic series or chord; and on this foundation it is possible to evolve a new science, the "Harmony of Light," somewhat analogous to music, or the harmony of sound, and one which may be associated with music, and designated by the signs and symbols of musical harmony.

It must be remembered that light seen through a prism or near a rainbow appears of a reddish hue, its proper color as the fundamental; although when seen

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near a rainbow its reddish tinge is sometimes neutralized by the color of the sky and clouds.

A study of the science of color-harmony shows the importance of tinted grays or neutral shades. A good colorist is the one that makes the best use of the neutral shades. Crude colors alone are barbarous. Very little crude color do we see in nature's harmonies. The flesh-tints of Raphael and Titian owe much of their exquisite quality and beauty to the skilful use of colored grays.

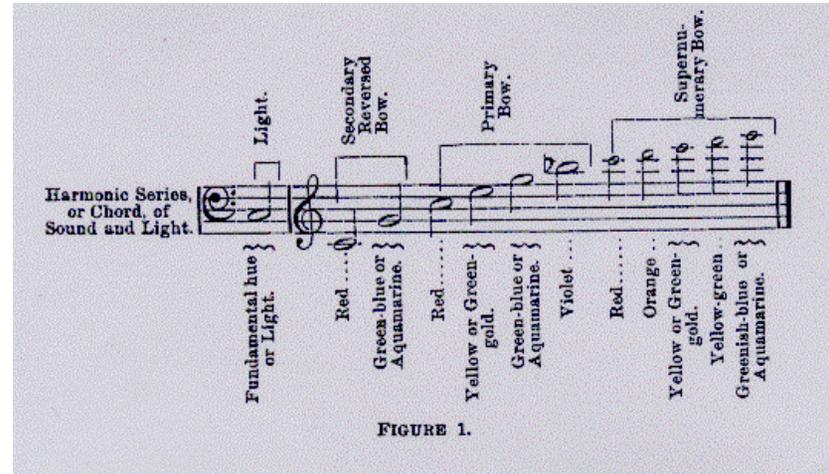
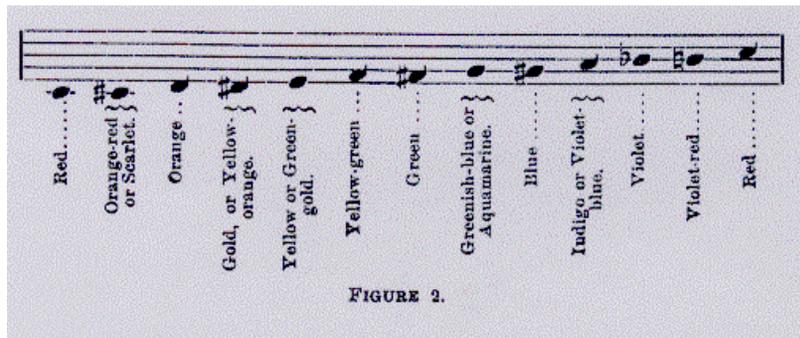


Fig. 1 shows what relation the principal colors of the rainbow bear to the harmonic series of music or sound. Fig. 2 shows the color-scale in semitones.

By carefully examining the scale it will be seen that

a direct contrast of color comes in as a discord, — for example, a true green and red, or an orange and blue; but if we change the green for a bluish or yellowish green, the effect is much more harmonious. The effect will also be harmonious if we take a violet-red or an orange-red to contrast with green. The same harmonious



effect will be produced by varying the orange and blue in a like manner. If we wish to make the colors howl, or imitate Chinese musical harmony, we can use crude colors directly contrasting.

The natural harmonic chord of light, as illustrated by the rainbow, shows red as its fundamental or keynote; for this reason I think we should take red for C, the key-note of the natural scale. It will be observed that its dominant is greenish-blue, its subdominant yellow-green. The greens of nature seem to be made up of combinations and masses of greens inclining to these two hues. A pure crude green seems to be out

of place in a landscape, and, if seen, it generally produces a harsh and discordant effect.

The organs which I built, and which were burned, were arranged with stops and pedals. The colors of the pedal-bass could be used as a fundamental accompaniment to tint the ground with the key-note color to show the key or the change from one key to another, or could be used by the musician, at will, to aid the expression of the sentiment of the music. Or the stops could be used to tint all the colors, to show the key or changes of key, and to aid the expression of the sentiment of the music. By use of the stops the color-part of the instrument could be partially shut off, or as much of it used as desirable, at the will of the musician.

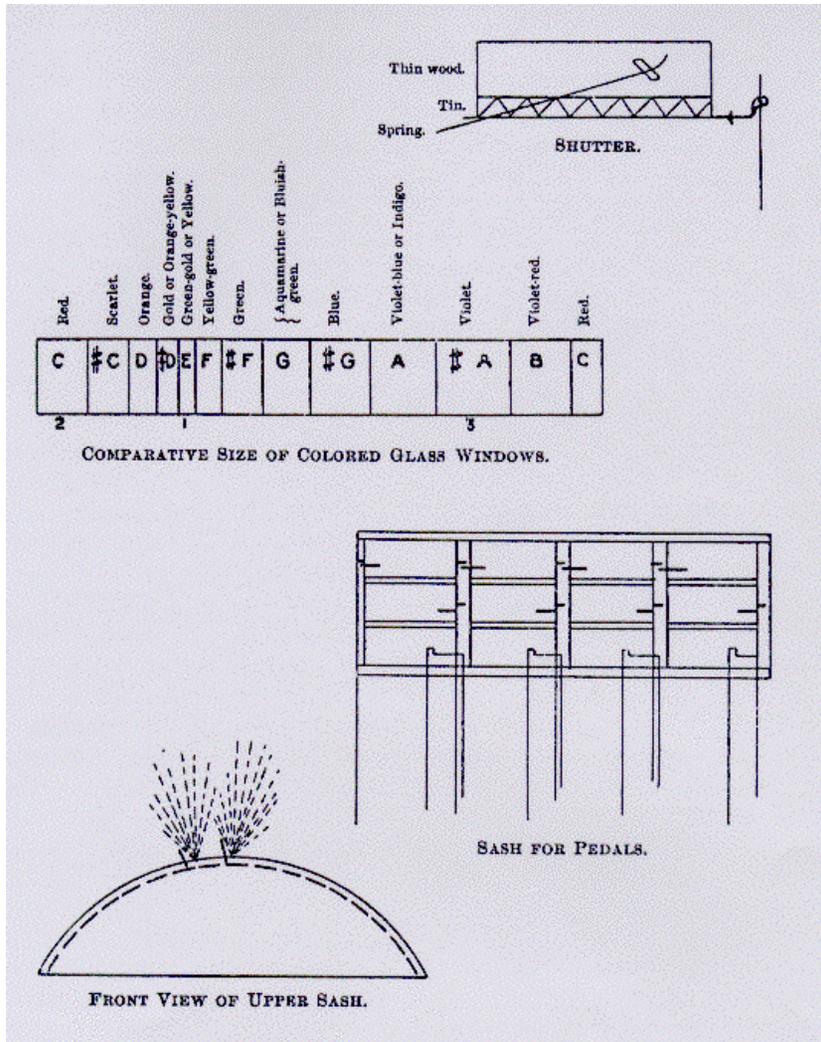
I began work on my color-organ in 1875, and spent nearly five years' time studying the subject and building experimental instruments.

My first organ, which I exhibited in New-York, was very crude, and did not show the principle properly. I built two others that were more successful, and showed the principle in a fine manner.

These two organs showed each octave of semitones as a completed prismatic spectrum of colored light, each spectrum blended into other smaller spectrums in the rising scale, and into larger spectrums in the descending scale. The effect imitated the natural spectrums very well indeed, the only difficulty being the

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want of colored glass of the exact tint for making the colored light for some of the semitones.

It will be seen that by manipulating the keys and pedals all possible combinations or mixtures of colors could be produced at pleasure, all softly graded and blended into each other. The pedal-bass of twelve semitones threw a soft, even tint over the whole tablet or color-picture as played, or could be otherwise used as heretofore stated.

White glass coated with aniline gave the violet-red and violet for B and B flat very well; these are liable to fade, and would have to be renewed. Hues of ruby glass answered for C and C sharp. Silver stained glass answered for the orange and gold. For the greens and blues I used colored glass. I could not get glass suitable to give pure, strong tints for some of the colors. They must be specially manufactured, if possible. Some colors come out better and stronger than others; it may be because light is pitched to a certain key or chord, or the eye may be more sensitive to some colors than to others.

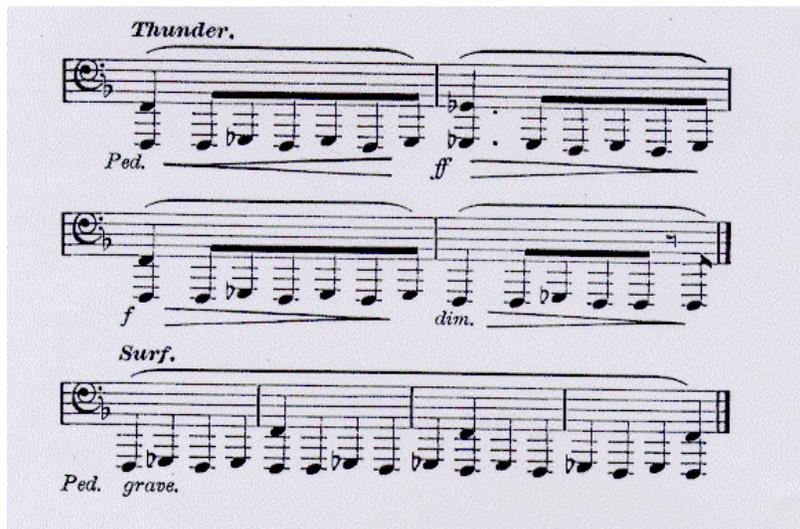
Hues of the so-called yellow pigments are mostly hybrids; they are between the gold and green-gold of the rainbow or spectrum (E and E flat).

It goes without saying that the tonic or fundamental color (prevailing colored light) will have a tendency to change or affect all the colors of a chord, or combination of colors. Much might be written in favor of taking

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red to represent F in the musical scale, for the reason that the great fundamental sounds of nature seem to be in the key of F, or very near it. A person may test this on a piano or organ during a thunderstorm, and do the same in regard to the sound of heavy winds, surf, or waterfalls.

It may be impossible to represent this exactly in musical notation, but let us try:



I believe there is not a shred of all my five years' work in existence, as I have been told the organ I exhibited in New-York was burned with P. T. Barnum's

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country house at Bridgeport. One was burned at a hotel on Lake George; the other was burned in my own house.

If I had not been an enthusiast, I could not have accomplished as much as I did. I was neither musician nor mechanic, and had to do nearly all the work with my own hands. It was an entirely new field, with no precedents or models to fall back upon. The whole matter was regarded by my neighbors as a huge joke.

Some time in the future this color-science will be recognized and adopted. It will be used with music for divine worship. It will also be employed in teaching music and art. It would certainly have been of great value to me when I first began to study art. It will be very useful to artists and decorators.

Colors have their minor and major qualities. Take, for instance, the relative minor of the scale of C, which would be A minor, or the violet-blue key.

Violet-blue always gives me a sad impression similar to the music played in A minor. This will be observed in viewing distant violet-blue mountains at sunset or twilight. The melancholy effect is strongest when the dominant or subdominant color of the minor key is present, yellow and orange; one of which colors we commonly see at such times above the mountains.

The strange sweet Scotch melodies of the olden time were written in an ancient scale of five notes represented by the black keys of a piano or organ. It is

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probable that the old harpers tuned their instruments to this scale. Most of the old Scotch airs can be played entirely upon the black keys. This scale in color would be scarlet, gold, green, blue, and violet.

The Highlanders perhaps were influenced in their music by the prevailing colors of their mountain landscapes, — the sunsets of scarlet and gold, the blue and violet mountains, the vivid greens of the nearer hills and valleys.

The invention of the electric light renders it possible to use color-harmony as an accompaniment to a church organ and sacred music. This can be done on a grand scale. The whole end of a cathedral, behind and over its organ, could be arranged as a tablet or ground on which to display the color-harmonies. Beautiful effects could be produced by a combination of statuary and gauze curtains, which, as the music pealed forth, would flash and fade with the soft, melting hues of colored lights in symphony with the chant of adoration.

As the music softly throbs from the great organ, from its dark structure rises pearly colored light, rivaling the beauty of the dawn, slowly palpitating from one prismatic intensity to another, and, with the swelling tones, beautiful and changing chords of color flash out triumphantly, gradually sinking to soft fundamental hues of violet and emerald, preparing the way for still more splendid color-symphonies.

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Perchance the great organ laments in some sad minor strains; colors subdued and tinged with mournful hues sympathize and mingle their sad harmonies.

But while the grand anthem of praise and glory swells through the vaulted nave, let light worship its Creator even as when

The morning stars sang together, and all the sons of God shouted for joy!