

ing oak, past gardens and fields clothed in fresh tints of green, past all that was charming and refreshing to the vision which a few days before had rested only upon snow and ice, we came upon the city of New Orleans.

The sun was going down behind us, and its

golden light illuminated each roof-top and wall and spire. So that all the length and breadth of this great city was bathed in splendid radiance. It was a noble presentation, and afforded a happy termination of our journey "down the Mississippi."

THE NEGATIVE IN PHOTOGRAPHY.



LIGHT AND DARK SPOTS OF THE OBJECT.

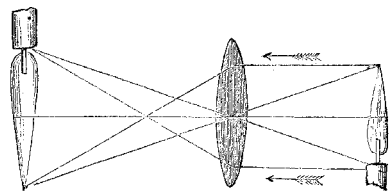
THE word *negative*, which the photographer applies to the first image which he obtains of the subject, whatever it may be, that he is to photograph, is rather a misnomer, inasmuch as the properties which characterize it, though striking and peculiar, do not seem very clearly to involve any idea of negation. If it had been called the *reverse*, instead of the negative, its name would have been perhaps more suggestive of its character. But the name negative is established, and must stand.

In the first impression which the photographer obtains upon the screen in the camera the image is reversed in three respects: first, in respect to top and bottom; secondly, in respect to right and left; and thirdly, in respect to light and shade.

First, the image is reversed in respect to top and bottom, as in the engraving on page 846. The reason is, that the rays proceeding from the upper part of the object *descend*, of course, in going toward the lens, and continuing their course after passing the lens, are brought to a focus at the *lower* part of the screen; while the

rays from the lower part of the object, *ascending*, come to a focus on the upper part of the screen.

Any person may easily observe this effect by means of any convex lens—a sun-glass, for example, or the glass of a pair of spectacles, such as are used by elderly people, and a sheet of white paper. In the evening, when there is but a single light in the room, as of a lamp, or candle, or gas-burner, an image of the flame may be thrown upon the paper by holding it at the proper distance. This image will be more or less distinct according to the perfection of the glass, the general darkness of the room, and the distance at which the glass and the screen are



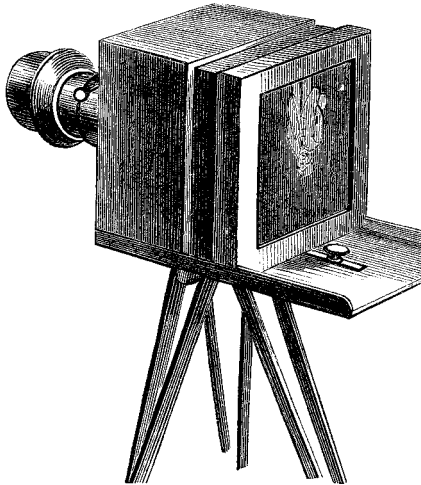


IMAGE REVERSED IN POSITION.

held from the source of light. Under ordinarily favorable circumstances quite a distinct image, both of the flame itself, and also of those parts of the object from which it issues which are most brightly illuminated by it, will be given, and it will be reversed in position.

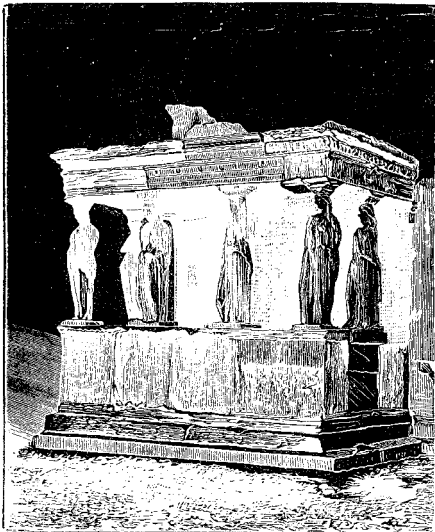
The mode in which the lens accomplishes this inversion is illustrated in the engraving on page 845, where the rays of light, passing from the flame, in the direction of the arrows, through the lens, are refracted or bent in the direction shown by the lines. The image in all these cases is reversed not only in respect to top and bottom, but, on the same principle, and for the same reason, the right side of the object will be the left side of the image, and *vice versa*.

But perhaps the most important of all these reversals, and the only one with the rectifica-

tion of which we have to do in this article, is that in respect to light and shade. The thin, sensitive film which is spread over the plate of glass, or the sheet of metal or of paper, on which the image is to be impressed, consists always of some chemical substance which is *darkened* by the action of rays coming either directly from the sun, or by reflection from any object upon it. Consequently all those parts of the object which are of the lightest color—in other words, which reflect the light most perfectly—will cause the parts of the image corresponding to them to be the darkest, and *vice versa*.

For example, in our leading engraving the faces of the three figures, and certain points and portions of the dress, reflect the light strongly, and appear white in the engraving; while other portions, either from their color or from their being in a position to reflect less strongly the direct rays of the sun, appear more or less dark. Now, as the darkness or brightness of an object depends upon the degree in which it reflects the sun's rays, it is plain that the bright parts will throw most light into the camera, and affect those parts of the sensitive plate on which they fall most powerfully. In other words, the parts of the object which were lightest in the object will be darkest in the image; and, on the other hand, those which were dark in the object will throw *less* light into the camera, and will leave the corresponding parts of the image comparatively light.

It is usual, in speaking of the effect of the sun's rays upon the sensitive chemical plate in the camera, to attribute the efficiency to the *light*; but, strictly speaking, it is not the action of the luminous rays to which the change is due, but to certain other rays accompanying, and to some extent intimately blended with, the light-producing rays. Light and color are really sen-

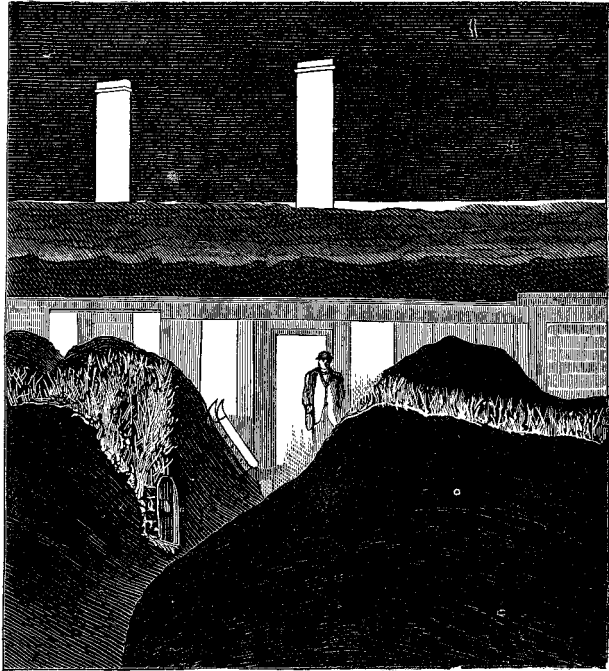


NEGATIVE.



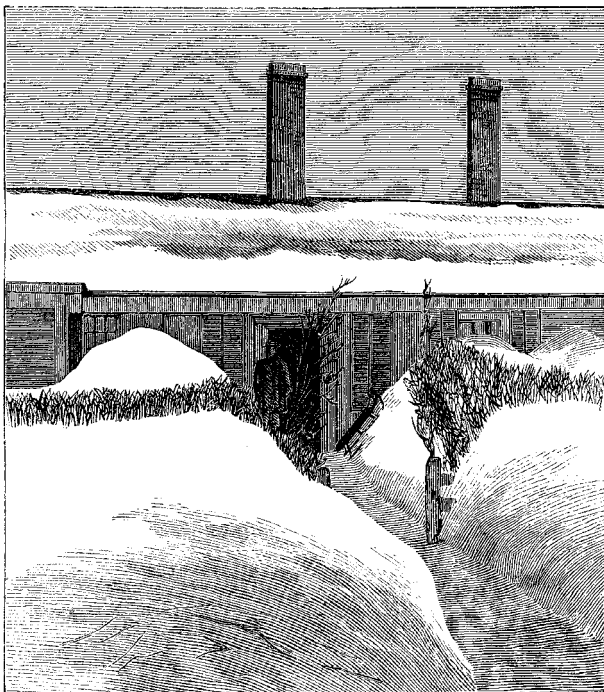
POSITIVE.

sations of the human mind, produced by the action of certain emanations from the sun upon the human sensorium, through the eye, and the portion of the cerebral system connected with it. The change produced in the sensitive plate in the camera is, on the other hand, a *chemical* effect produced upon a material substance. It is found, moreover, that the emanations, or radiations, which produce the one effect are different from those concerned in the other, and that, although the two influences usually accompany each other, they are really distinct in their nature and action, and may be, to a great extent, separated. The former are known by scientific men as the luminous rays, while the latter are designated the *actinic*, or chemical rays. These rays are, in a measure, separable from each other in the spectrum, and the actinic rays may even be so far isolated that photographic effects may be produced in the dark—



WINTER SCENE—THE NEGATIVE.

that is, without any luminous rays whatever striking upon the sensitive surface.



WINTER SCENE—THE POSITIVE.

In the same manner the rays of *heat* and light, which usually come combined in the radiations of the sun, may be separated by suitable devices, so that we may have solar heat without light, and solar light without heat. This separation is sometimes effected by natural means, as, for example, in the case of the moon, which sends us an abundant reflection of the sun's light, with a scarcely appreciable portion of his heat; and that of the *ground*, which, during the night, after a warm summer's day, returns to the atmosphere the *heat* which it received during the day, without any portion of the *light* which accompanied the heat in its emission from the sun.

The chemical and the luminous rays are thus often spontaneously dissevered from each other, to a greater or less extent, by the various reflections and refractions to which the so-

lar emanations are subject in falling upon different substances upon the earth's surface. Some substances reflect well the luminous rays on which their appropriate color depends, but not those necessary to act on the photographic surface. In other words, they look bright and pleasing to the eye, but, as the photographers say, "do not take well."

But to return to our "negative." The light parts of the object, throwing the strongest light into the camera, and thus acting most powerfully upon the sensitive surface there, as has been already explained, will, of course, make the corresponding parts of the image *dark*; while the dark parts of the object, reflecting little light, will affect the sensitive surface but little, and so leave the parts of the image corresponding to them *light*. Thus the lights and shades of the picture will be the reverse of those in the reality.

The engravings on page 846, representing the negative and the positive of the same object, show this reversal of the light and shade very clearly—the former, the negative, giving the effect actually produced, in the first instance, on the sensitive plate, and the second showing the lights as they exist in reality, in the object, and as they ought to be in the picture.

The illustration shows only the third of the three reversals before mentioned, the other two having been corrected before making the engraving. It remains now only to show how this is also corrected, by the production of a positive picture from the negative, after the negative has been obtained from the natural object by the camera.

The negative is usually taken by photographers upon *glass*. The glass is previously covered upon one side with a thin coating of the sensitive chemical substance on which the impression is to be made. This plate, thus coated, is placed in the camera, and exposed for the proper time to the action of the actinic rays existing in the image of the subject formed by the lens—the bright parts of the image becoming dark, of course, and the dark parts remaining bright.

From the negative thus formed the positives, or the copies intended for use, are afterward printed by allowing the light to pass *through the negative* to a sheet of sensitive paper placed beneath it. Of course the image now formed upon the paper will be *re-reversed*, so to speak, and will come out in the proper condition in respect to light and shade; for those parts of the glass which had been most darkened by the bright parts of the image falling upon them will now shelter the corresponding parts of the paper beneath, while those which had been left most transparent will allow the rays to pass through. Thus the picture on the paper will become the reverse, in respect to light and shade, of that on the glass, and will correspond with the subject itself from which the picture is taken.

The difference in character between the negative and the positive image is very clearly shown

in winter scenery, where the snow, reflecting in all its power the full radiance of the sun, blackens completely those parts of the sensitive surface of the negative on which its image falls; while the other objects, which absorb large portions of the actinic rays, represent themselves more faintly. These effects are shown very strikingly in the engravings on page 847, which are copied respectively from a view taken last winter of a portion of the country home of the writer, while the deep snows still remained upon the ground. In this case the reversal in respect to top and bottom is corrected, while those in respect to light and shade, and also in respect to right and left, remain.

MY DISTINGUISHED FRIEND SELTSAM.

I

THE evening of September 19, 1855, I went to call on my old university friend, the distinguished Dr. Seltam, Professor of General Pathology, Clinical Lecturer, Accoucheur to the Grand Duchess, etc., etc. I found him alone in his magnificent drawing-room in Bergstrasse, his elbow resting on a little black marble table and his eyes fixed on a crystal globe, which seemed filled with perfectly clear water.

Spite of the crimson rays of twilight which came in by the three lofty windows opening on the palace gardens, my friend Seltam's lean face, with its razor-shaped nose and prominent chin, seemed to borrow from the globe a frightful sort of livid tint, somewhat like the head of a corpse freshly decapitated, and the red edging of his dressing-gown completed the illusion.

All this surprised me so that I did not dare interrupt him in his reflections, and was even on the point of withdrawing, when a big footman whom I had found snoring in the ante-chamber took it into his head to open one eye and cry out with stentorian voice: "Counselor Theodore Kilian!"

Seltam, with a long-drawn breath, turned slowly round to me like an automaton, and holding out his hand, said, "Salve tibi, Theodore! Quomodo valet?"

"Optime, Adrien," I answered. Then with raised voice: "What are you at there, my dear fellow? I should think you were puzzling over the doctrine of Sangrado!"

But here his face wore so singular an expression that I stopped, confused and astonished.

"Theodore," said he, after an instant's silence, "this is no joking matter. I am studying the ailment of your respectable aunt Annah Wunderlich. What you told me day before yesterday is serious. These fits of ecstatic excitement, these sudden starts, and particularly the venerable lady's exaggerated expressions in speaking of Haydn's 'Creation,' Handel's oratorios, and Beethoven's symphonies, all indicate some dangerous kind of affection."