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On taking Daguerreotypes without a Camera. By J. F. MASCHER.

To the Committee on Publications.

The accompanying stereoscopic pictures were taken by me, by means of a box (to be described hereafter) that contained neither lenses, reflectors, or in short any refracting or reflecting medium of any kind. I accidentally made the discovery that photographic pictures could be taken in this manner while prosecuting some experiments relative to stereoscopic ANGLES.

It is well known that two pictures taken with two ordinary cameras placed only $2\frac{1}{2}$ inches apart horizontally, will not when placed in the stereoscope show proper or sufficient stereoscopic RELIEF, yet it is well known that the human eyes are only placed $2\frac{1}{2}$ inches apart, yet are enabled to see solid objects in their proper solidity and relief; and to explain the why and wherefore of these facts has challenged the attention of Professor Wheatstone, Sir David Brewster, and a host of others, leading the above named gentlemen into a very sharp controversy, leaving the main question, the determination of the proper stereoscopic angles, as far as practical results are concerned, in precisely the same condition in which they found it. Under these circumstances we may be permitted to ask, why is it that two pictures, taken by two cameras placed $2\frac{1}{2}$ inches apart, do *not* show sufficient stereoscopic relief? Why is it that we must place the cameras about eight times farther apart than the human eyes are in order to produce the proper relief? When these questions first suggested themselves to me, the following answer occurred to me without at that time being able to prove it to be the correct one; namely, because the lenses in the cameras ($\frac{1}{4}$ size) are twelve times larger than the human lenses (eyes).

In order to ascertain whether this is the correct answer or not, it was only necessary to take two pictures with two cameras having a diaphragm in each, the opening in which are $\frac{1}{8}$ of an inch in diameter, that being the diameter of the diaphragm in the human eye. In executing this experiment, I was very much surprised to find that the focal RANGE of the camera was increased to an extraordinary extent. The cameras had been focussed for a house on the opposite side of the street, but the moment the diaphragm was introduced, the sash in the window, which before was invisible, suddenly became as sharp and distinct as the house on which the focus had been previously drawn. Subsequently, on removing the camera to an upper story of my house, it was found that this increase in focal range extended not only from the house towards the camera, but to an equal extent beyond the house. After ascertaining these facts, it became desirable to find out the cause of them. With this end in view, the lenses were removed from the tube, and only the diaphragm remained in the same. You may well imagine my astonishment at finding the pictures of houses and other objects in the street faithfully depicted upon the ground glass! the letters of signs, &c., reversed, precisely as if the lenses had been used. The next step was to ascertain whether these pictures possessed photogenic properties, which was soon done by substituting a metal diaphragm with an aperture of $\frac{1}{8}$ of an inch in diam-

eter for the paper one of $\frac{1}{8}$ -inch in diameter, putting in a coated plate, leaving it remain 15 minutes, coating it in the usual manner, and a beautiful picture similar to the one herewith sent was the result.

It was self-evident now, that we had the means to do that with one camera, for which two were before deemed indispensable, namely, taking two stereoscopic pictures through two apertures situated only $2\frac{1}{4}$ inches apart. But as a quarter size plate is only $4\frac{1}{4}$ inches long, and as it was desirable to take the two pictures on one plate, two apertures $\frac{1}{8}$ of an inch in diameter were made in the metal plate above alluded to, only $2\frac{1}{4}$ inches apart, and after twenty minutes exposure, the sun shining on the house all the time, the accompanying pictures were the result, thus demonstrating conclusively that two stereoscopic pictures can be taken on one plate with one camera (or dark chamber without lenses) and simultaneously, without either reflectors or refractors of any kind whatsoever!! It may here be remarked, however, that the pictures thus taken on one plate are stereoscopic reverse, that is to say, the right picture is on the side where the left one ought to be, and vice versa, which can, however, be very readily remedied by cutting the plate in two and pasting them together again properly. This stereoscopic reverse was next attempted to be remedied by placing a reflector before the apparatus, but the only effect produced by this device, was the same as the same reflector produces upon pictures taken by an ordinary camera, namely, making the pictures appear in their natural position, so that letters on signs, &c., could be read correctly.

There is another advantage resulting from this camera; it is this. You may make two, four, six, or more sets of holes in the same camera, either all of the same diameter, by which means you will obtain an equal number of stereoscopic pictures with the number of sets of holes, or you may make one set with apertures of $\frac{1}{16}$ of an inch, another $\frac{1}{8}$ of an inch, one set $\frac{1}{4}$ of an inch, and still another set with $\frac{1}{2}$ of an inch in diameter, where you will be certain to obtain at least one set of pictures properly "timed" especially as the other pictures which are not properly timed can be rubbed out before gilding, thus saving the plates.

So much for the actual experiments. Let us see what practical conclusions can be derived from them.

They teach us that a theoretical eye occupies no more room than a *mathematical point*. Secondly, the diaphragm in the human eye is $\frac{1}{8}$ -inch in diameter. Thirdly, that the lenses commonly employed in taking photographic pictures vary from $1\frac{1}{2}$ to 6 inches in diameter.

What is the theoretical difference between these three kinds of eyes? What the practical difference?

A board one foot square, placed 5 feet distant before a theoretical eye, will obscure or eclipse a space of 576 square inches of a back ground, situated 10 feet from this eye. The same board, under the same circumstances, placed before the human eye, will obscure only 564 square inches! Whereas, if it be placed before a $\frac{1}{4}$ size camera, under like conditions, it will only obscure 495 square inches!! A double whole size camera, with lenses 6 inches in diameter, will merely obscure 324 square inches. From this it is apparent, that a picture, taken with a camera, with lenses larger than the human eye, will show more of the object

than what the human eye, placed in the same position, will be able to see. A man can place one of his eyes in such a position, that he can see only one ear and the greatest portion of the face of a person. A camera, placed in precisely the same position, will take a picture in which not only all the objects which the human eye had previously seen, but also the other ear will be clearly delineated! Such pictures are anti-stereoscopic; distortions; disfigurations intolerable in proportion to what the lense, with which it is taken, exceeds in diameter the size of the human eye. Such pictures will do for owls to look at! The back and (to the eye) invisible parts of an object are brought out by such large lenses, as prominent as the natural prominent portions of such objects themselves, and producing by their contrast, flat and inanimate pictures, giving to the face, &c., of the subject a broader, longer, and fuller appearance than they appear to a single human eye. We might with the same propriety call the hide of an ox, when spread upon a flat surface, a portrait of that animal, as to call a picture, taken in a camera with such large lenses, a portrait of the "human face divine." Who has failed to notice the immense difference between the large ("the splendid gilt frames!") so called portraits, both on paper and plate, in Broadway, Chestnut, Washington, and Baltimore streets, and the small miniature likenesses frequently met with in medallions, charms, breast-pins, &c., taken with a good small locket camera. The one looks flat, distorted, and inanimate; the other appears to stand and project right out from the plate, ready as it were at a moment's calling to leap into existence as a living being. So much for single pictures. Let us examine double or stereoscopic pictures.

From what has been said, it will be easy to understand how it is that two pictures taken at an angle no larger than that of the human eyes do not show sufficient relief; for if it be true that each individual picture is more flat than the same object appears to a single eye, then it is also true that the two pictures, when combined in the stereoscope, will present less relief than what two similar pictures would do, that were taken by means of lenses only $\frac{1}{8}$ -inch in diameter, or the same size of the human eye.

In the human eye we find, as in all other parts of the body, the most extraordinary wisdom displayed, and it is only the hand of Omnipotence that could have designed and constructed such a wonderful organ. Not only do we find a single eye perfect in all its parts, but we also find the two eyes arranged in such a manner as to give the greatest possible amount of effect to binocular vision. Who can devise anything better? To imitate and equal, it ought to challenge our undivided attention.

Who ever saw an animal with two eyes each six inches in diameter and 16 inches or two feet apart? Or who, two small ones forming an angle with the horizon of 45° ? My friends in Boston will please forgive me, as I design them no intentional harm.

But what is the difference, it may be asked, if we can compensate, by simply moving the cameras a little further apart, for the deficient stereoscopic relief? To which I answer, that we can indeed make such compensation, but it is always at a little expense of the truthfulness of the picture. Others will no doubt have noticed, as I have done, the great

apparent *shift* of positions of prominent objects in some modern stereoscopic pictures. These prominent objects in the left picture will be found thrown, as it were, to the right; whereas in the right picture they will be found to the left, straining the eye, in some instances very much, in endeavoring to coalesce them. This is especially true with regard to groves of trees, &c. This difficulty is not experienced when looking at the objects themselves, *nor when looking at pictures of such objects when taken*, as the one above alluded to, *through two small apertures only $2\frac{1}{2}$ or $2\frac{1}{2}$ inches apart*. And I have taken the picture of a street in which the most prominent object was only one foot from the camera (dark chamber) and the most distant one (Christ Church) at least one mile distant, yet not only were both in perfect focus (they could not be otherwise) but the eyes could also see them in the stereoscope in their proper stereoscopic relief, without experiencing the least contortion or fatigue.

In conclusion, I may say, that I think I have proven the superiority of small over large lenses in photography. We can now see that we need not look to the increase in size of the lenses, in our cameras, for the production of large photographic pictures that will at all be entitled to be called correct portraits, but that we must look to the perfection of small lenses, as well as to the quality of the chemicals employed. We want chemicals that will work instantaneously, even with small lenses. The human eye produces instantaneous pictures!

I would suggest a mode of assisting the quick action of small lenses. I would set the subject in the open air; take advantage of all the light that can be obtained. Who will be the first to build a skylight room, with the roof and walls removed?

Philadelphia, March, 1855.

Gas and Oil from Vegetable Substances. J. H. Jonsson, London and Glasgow.—Patent dated January 30, 1854.*

This invention has been communicated to the patentee by MM. Kœchlin, Duchatet, and Perpigna, and is patented in this country on their behalf. It relates to certain modes of producing gas for the purposes of heating and lighting, from turf, wood, tar, and the waste or refuse of various vegetable substances, such as cotton, paper, chips, saw-dust, and other similar articles.

For effecting the production of gas from turf, it is merely necessary to place the dry turf in a gas retort and heat it to a red heat, but this gas has very slight illuminating properties. It burns with an almost entirely blue flame, and is altogether totally inapplicable to lighting purposes. Various means have been adopted for carbonizing this gas, but these have hitherto been found inapplicable in practice. The obviation of these difficulties hitherto met with forms one of the main features of the present invention. The operations, which can never be satisfactory if effected at one time, are divided into two distinct processes, and the carbonization of the turf or peat is conducted so as to produce the best

* From the Lond. Pract. Mech. Journ., Feb., 1855.