

(For the Scientific American.)

Photographic and Stereoscopic Angles.—The True Theory.

The public will expect an answer to Mr. Mascher's article on page 91, this volume of the SCIENTIFIC AMERICAN. His opinions would have been appreciated had his remarks been confined to scientific examples and illustrations—avoiding personal allusions to any neglect or lack in studying and understanding his article on my part.

The article of Brewster, heretofore referred to by me, is upon the size of lenses, as affecting their images, and Photographs made by the same images. A photograph for a stereoscopic tableau is, singly, the same as any other, and if one or both are distorted, separately considered, they must be when stereoscopically combined. My inference was true from that paper. I might have quoted columns, published three years since, which Mr. Mascher, on page 251, last volume SCIENTIFIC AMERICAN, through nearly one half of his whole communication, follows in every essential, thus decidedly endorsing the error into which Brewster and others had been led, and which our "true theory" corrected. Was there the least necessity for so doing. Mr. M. appealed to persons to read Brewster's article, and "that they would not find one word about stereoscopes at all," but I had not so implied, nor used the term "stereoscope."

Here permit me to rectify an error (in the use of Brewster's name, as follows, "In this fact Brewster and others were not mistaken," &c.) into which I was led by the statement of Mr. M., on page 251 (before referred to) in connection with this sentence, "To explain the why and the wherefore of these facts has challenged the attention of Prof. Wheatstone, Sir David Brewster, and a host of others," &c. One of these facts, as Mr. M. has it, is "the human eyes are only placed two and a half inches apart, and see solid objects in their proper solidity and relief." Now, what says Brewster on this point, my denial of which Mr. M. calls "monstrous doctrine?" He says, "we do not see the true forms of objects in binocular vision. . . . But though we see more of the body in binocular vision, it is only parts of vertical surfaces perpendicular to a line joining the eyes that are thus brought into view, the parts of similar horizontal surfaces remaining invisible as with one eye. . . . The two eyes were necessary to give beauty to the human form."

I trust these quotations will be considered ample reparation for inadvertently imputing to Brewster so unphilosophical an idea on Mr. Mascher's authority. This is the doctrine of all writers on Optics. Nor has there been published one word of controversy or difference of opinion on the "two facts" above mentioned, between Prof. Wheatstone and Brewster.

But "writers on binocular vision have spoken of the eyes as if they possessed no compensating power for loss of stereoscopic relief of distant objects." Smith published the fact of the eyes turning outward when viewing distant objects a century since, and it is known to every body that knows an eye from a mathematical point. Did Mr. M. mean to tell us that he had discovered the two ingenious contrivances which he describes? It surely required more than ordinary ingenuity to discover, first, that the eyes having turned outward to their furthest limit, and exhausted their power to discern stereoscopic relief, turn further apart still, and separate objects which they cannot see at all; and, second, that the aperture diminishes for distant objects, when every general writer upon Optics and the anatomy of the eye, tells us that it is for "near objects" that the aperture diminishes.

Stereoscopic relief is lost at a point from which the optic axes converge, and continue onward in a direct line. Beyond this the joints of the body and our powers of locomotion and the telescopic arrangement of lenses permit the selection of such points of sight as will, by parallax, afford the best positions for trigonometrical calculations. This is the only compensating power which the eyes possess for loss of relief of distant objects.

We come now to the fourth section of Mr. Mascher's article containing his proposition for solution. I will arrange, as he proposes, a

quarter size daguerreotype plate and pin. I will take one picture from one point chosen by himself, and then will change the position of the plate by reversing its ends, and take the other picture from his second chosen point. When stereoscopically arranged, he cannot detect the change; or I will turn the pin one half round in the second picture, and it will not appear that there has been any movement of the objects in the interval of taking the pictures. The most inexperienced tyro will know at once, that similar points do not coalesce when the ends of the plate are changed, or when the pin is moved half round, though they seem to.

Let me propose an example: take a small statue of the Apollo Belvidere, and stand it on the window-sill; make one picture, and turn it half round and make the other. Will these coalesce? Surely not. Corresponding points and outlines must be dissimilar enough to show relief, and not so dissimilar as not to blend or harmonize in vision. If two points of sight horizontally are chosen, the extended arm will appear as though viewed with one eye, and will appear in the same plane with the horizontal bars of the window sash, but the body will be seen as from two points, and its vertical surfaces will be relieved, and will stand out from the vertical bars of the sash. But suppose the two points of sight are selected on a vertical line, that is, having the two cameras placed one over the other. The arm is now seen from two points, over and under, whilst the vertical surfaces of the body are seen as from one point. When stereoscopically arranged, the arm will be relieved from the horizontal bars of the sash, whilst the body will be in the same plane as the vertical bars.

If we now arrange these last taken pictures of the "model man," as Mr. M. proposes, lying down, in the stereoscope, what becomes of the arm? Will that appear lying down? Will the windows and all nature in the background appear to be lying down? By the same reasoning, two pictures of the statue, or "man," lying down, made from two horizontal points would represent the same standing up.

If such were the facts, the stereoscope would be, as Brewster terms it, an instrument of "ocular equivocation."

How easy to go to work philosophically and take the two pictures from two points at an angle of 45 degs. with the horizon, giving equal relief to both horizontal and vertical surfaces, with the bars of the sash in the same plane.

I need scarcely allude to the concluding section of Mr. M.'s article. He says, "Having taken a picture according to our claim, it possesses the fault one might naturally expect, and if placed in the stereoscope with the four eyes parallel to the sides of the case, the rounds of the chair will not be parallel," &c. Now, how can the four eyes in the two pictures be parallel in the stereoscope, two being taken from one point of sight, and two from another point. There are two different perspectives to the same vanishing point, and of course the four eyes cannot be on the same line in nature, according to the laws of perspective. Two corresponding eyes in the different pictures may be arranged parallel, and two corresponding points of the chair rounds, but not the four eyes nor the rounds in their length. Therefore, if Mr. M. placed the four eyes on a line, he turned the plates obliquely, and thus, in unskillful hands, a single experiment has resulted unsatisfactorily.

After three years' carefully experimenting, we have never failed in, nor discovered a single exception to, our rule. We have the Apollo, and the Laocoon, the monument and the street, the forest near and distant, the ship on her stocks, with her horizontal bracing, all as perfectly modelled and as perfectly relieved in their horizontal lines and surfaces as in their vertical. The eyes may view all our stereoscopic tableaux, without weariness at all for any length of time, and the artist may copy forms with pencil, brush, or chisel, as perfectly as from nature itself.

ALBERT S. SOUTHWORTH.

Boston, Jan. 11, 1856.

[Two eyes are given to man for another purpose beside beauty of form. A person having only one eye is not a correct judge of distance.—[Ed.]

Our Foreign Correspondence.

NAPLES, Italy, December, 1855.

MESSRS. EDITORS—Reflecting upon the numerous "patented inventions" to be met with everywhere in America, the contrast in the older portions of Europe seems astonishing. Instead of labor-saving machinery, it would appear as if the only improvements required were those that would increase the quantity of labor to be done in Sardinia. However, I actually saw advertisements offering large rewards for a process of manufacturing wholesome flour from the chestnuts, which are the main food of the poorer classes.

Throughout France, agricultural implements, harness, &c., bore no traces of the inventor's brain, they were usually of the rudest construction—many of them plainly indicating that they had been handed down from some remote generation.

In Italy, the first object that attracted my attention were the plows,—an exact counterpart of one of them is described in "Anthon's Classical Dictionary," as having been in use among the ancients. One, which I examined, consisted of a short shoe, or thick triangular slab of hard wood, the peaked end pointed with iron; a donkey and cow were harnessed to the implement by the ordinary contrivances; a long guiding pole attached to the wider end, completed this agricultural curiosity, which by the aid of "the team," opened the ground for a few inches below the surface, with half the rapidity, and less facility, than the same labor could be performed by a pick-axe in the hands of a Yankee farm boy.

The soil hereabouts is mainly cultivated by men, who use a heavy, short handled hoe. I did not mean cultivated, the ground is "pawed up," manured, and flattened down again, ready for the seed, which is sown broad-cast,—nature being supposed perfectly capable of doing all the rest, on the principles, I suppose, that it is dangerous to interfere too much with the ways of Providence.

Cultivators, shovels, spades, and so forth, seem to be wholly unknown. Wood is split by an instrument resembling a blacksmith's hammer, aided by iron wedges, which last perform the main part of the labor. Olive oil is expressed by machinery that should disgrace an old-fashioned cider mill. Rye, oats, etc., are thrashed by the active exertions of a score of bare-footed men and women; who "circulate" over a floor, upon which it has been laid for that purpose. Wheat and other grain, is winnowed or cleaned by repeated washings and dryings on a tile-paved yard in front of the granary.

Flour mills, worked by hand, are common, and make a flour considerably commoner, but perfectly in keeping with other arrangements of a similar nature too numerous to speak of.

Throughout this country there are a few steam mills or factories, owned chiefly by English or French capitalists—who are looked upon by the country people as akin to the witches that anciently annoyed the good people of Salem.

I find many articles "old" here, for which patents have been granted in the States; for example, Russ pavements have been in use, in every little town in these parts, for centuries. The darkness of my first evening in an Italian inn, was lighted by a copper lamp, similar, in every respect, to the "swinging" articles lately patented at home; and, if I am good at guessing, I should "calculate" that Mr. Richardson took his first notions of a "Tube Telegraph" from a very ingenious arrangement, in all the large hotels of this country, where iron chairs, tables, washstands, bedsteads, repeating fire-arms, chain pumps, awning frames, speaking tubes, and dumb waiters, have almost gone out of fashion. J. P. B.

Floating Mahogany Logs.

MESSRS. EDITORS—In my youth, like other wild boys, I had a burning desire to see the *ultima thule* of the earth's surface, so I went out on my first voyage in the mahogany trade to the old city of Santa Domingo, which is so renowned for fine mahogany. We had to raft our timber some distance down the river, and some of the logs would swim or float, while others would sink. We therefore moored the heavy logs and light ones close together, by using spikes, little eye bolts, and rope, precisely

as is done at Porto Rico, and thus we floated them all to the vessel—the light logs sustaining the heavy ones. Every cubic foot of crotch mahogany weighs about one-half more than that of plain grained mahogany; this will explain the cause why some mahogany logs float and others sink in water, and why iron dogs or spikes are driven into the heavy logs to make them float, by connecting them thereby to the light floatable logs. J. C. Monticello, Fla., Jan., 1856.

Regenerative Steam Engine.

In Fairbairn's account of the machinery of the Paris Exhibition as published in the London *Mechanic's Magazine*, we find the following:—

"Amongst other novelties of the Exhibition is the engine of Mr. Siemens. It is upon the regenerative principle, or that of rendering active the latent heat of steam by a process of applying heat to the steam of the cylinder as it is exhausted at the end of the stroke. This steam having performed its work upon the piston, is discharged through conducting pipes into a second and third cylinder, and these two latter are enveloped by exterior cylinders, having furnaces at the ends, and on which the heat currents of these furnaces impinge, giving to the lower end a temperature in the interior of almost 500°. This increase of temperature surcharges the steam as it passes from the center cylinder, doubles its volume, and acting upon the piston or plunger by its expansion, drives it forward ready for the same repetition in the succeeding stroke. The steam thus expanded and reduced in temperature, is passed by another conducting pipe into the opposite side of the piston, which, acting upon it in a state of saturation, having received some additional heat in its passage through some wire gauze which fills the annular space between the two cylinders over the furnaces, it is again ready for the succeeding stroke. In this way the engine is worked, the steam making a constant circuit, and worked over and over again with about 1-10th of supply from a small vessel or boiler attached immediately above the heated cylinders. The results, according to Mr. Siemens, are highly satisfactory, and produce from the same quantity of coal more than double the force of the steam engine."

[This is certainly a *pure* steam engine, the same steam being used over and over again without condensation into water, and is the only one of the kind we have ever heard of. All the heat required (and consequently the only fuel) is simply to replace that lost by the expansion of the discharged steam. This is the idea clearly set forth in the foregoing description—the steam making a constant circuit, and worked over and over again. Now while we confess this engine will require but little fuel, it will exert just as little force, for to us it appears that the amount of radiation or loss of heat in it is just the exact exponent of the force exerted. Its supposed economy appears to be based on fallacious reasoning. How can it be otherwise? Let us suppose for a moment that there is no loss of heat in this engine, how will it operate, or will it operate at all? It will not move. The steam vessel into which the steam of the cylinder is exhausted, must be of a lower temperature than the exhausting steam, or the resistance will be equal, and balance the direct action of the steam. It is, therefore, evident that in a *pure* steam engine like that of M. Siemens', the amount of radiation or loss of heat at each stroke, is the exponent of the force of the engine.

The Fate of Mummies.

The mummies of Egypt are sometimes quarried by the Arabs for fuel, and, whether those of the Pharaohs, their wives, their priests, or their slaves, are split open and chopped up with the same indifference as so many pine logs. The gums and balsams used in embalming them have made them a good substitute for bituminous coal; and thus the very means employed to preserve them have become the active agents of their dissipation.

The Life Saving Benevolent Association of this city have presented to Capt. Nye, of the steamer *Pacific*, a gold medal, as a testimonial of his humane conduct in saving 19 of the crew of the wrecked ship *Jessie Stephens*.