

THE STUDY OF THE STARS.

A. E. BEACH.

During the beautiful autumnal evenings few persons can look up into the starry dome of heaven without longing for a better acquaintance with the glowing orbs whose radiance meets the view in every direction. If one turns to the star maps and books of astronomy, there will be found clearly laid down the history, names, colors, magnitudes, and positions of all the principal celestial bodies. But when, after studying the map, he goes out of doors, thinking to carry the chart in his mind, and easily to locate and recognize

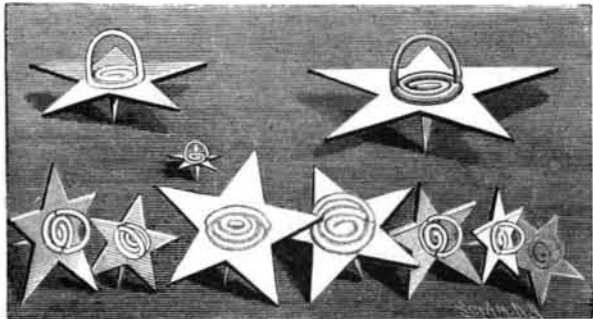


Fig. 3.—LUMINOUS STARS.

individual members of the glittering host, he is sadly disappointed. To his untrained eye the glorious stars appear the same as before, all mixed in inextricable confusion; and for him the map is of little value. Discouraged with the result of this first effort the majority of people abandon the matter and go through life without ever gaining an insight into this the sublimest of the sciences, and never experience the inexpressible delights that attend on this grandest of studies.

To assist the amateur, whether old or young, in the study of astronomy, to render the opening lessons easy and attractive, and insensibly to interest his mind in this most ennobling subject, has led me to design the simple devices which I will now describe.

One form is as follows: I provide a sheet of cardboard, say two feet square, one side of which is covered with what is known as luminous paint. This remarkable substance has the quality of storing up the sunlight, and gradually delivering the same in the darkness. The paint is a chemical combination, chiefly of lime and sulphur. This luminous sheet I pin upon a light wooden board. I also cut out of common cardboard a few small stars of different sizes, to represent stars of the first, second, third and fourth magnitudes, and provide each star with a central pin.

In use the luminous board is held as shown in the engraving, and on it are placed the paper stars. The holder of the board glances upward at the sky, notes the position of the stars, and then arranges their counterparts upon the luminous board, the glowing purple light of which, even in the darkest night, enables him to do this with the utmost ease and satisfaction. The counterfeit stars being thus arranged and fastened upon the board, it is taken indoors and compared with the map or chart, with which the selected group is instantly recognized and named.

In this simple way the forms, positions, and component stars of

all the principal heavenly bodies may quickly be learned by any person without a teacher; and the study, while it instructs and impresses the mind, is, in the highest degree, fascinating.

A still simpler device, but in the same line, is to cut the stars out of the luminous cardboard, and then arrange and pin them as before described upon the surface of a wooden board, say two feet square, painted dead black. In this case the movable stars will appear luminous on the board, even in the darkest night. This is illustrated in Fig. 2. Instead of using ordinary pins, wire round staples bent up as shown in Fig. 3 will be found convenient; these are easily fingered and quickly placed as desired.

A light, convenient, non-warping star board may be made by gluing together, crosswise, three sheets of pine wood veneers. It is needless to occupy space in describing all the uses of this device for promoting the first lessons in star study. Suffice it to say that with the contrivance in hand, together with star maps, such as those that were prepared for the SCIENTIFIC AMERICAN by the late Richard A. Proctor, any person may soon become an intelligent student of the skies; and his knowledge may be greatly supplemented and extended if, at the same time, he provides himself with the admirable book, "Astronomy with an Opera Glass," by that most excellent observer and writer, Mr. Garrett P. Serviss. This work, the Proctor star maps, and other desirable astronomical publications, may be had at the SCIENTIFIC AMERICAN office, book department.

Medical Uses of Carrier Pigeons and Vaccination.

At the last meeting of the Academie de Medecine, Dr. Hervieux, who presides over the Public Vaccination Department at the headquarters of that learned body (vaccinations from the calf are performed gratuitously at the building in the Rue des Saints-Peres every Tuesday, Thursday, and Saturday) read a report by an army surgeon, M. Stroebel, on the transport of vaccine by carrier pigeons. It appears that one pigeon is capable of conveying in one journey from five to six tubes. The utility of this means of transport in times of war is very obvious, and one can imagine the joy of the representatives of the Army Medical Department at the apparition of a flock of these swift vaccine carriers in a besieged town.

Blue Transparencies.

Beautiful blue transparencies may be produced, according to M. Rossel, in the following simple way: Commercial cyanotype paper is exposed beneath the negative until the image will be very intensely visible, when it is thoroughly washed and placed for fifteen minutes in a ten per cent solution of bichromate of

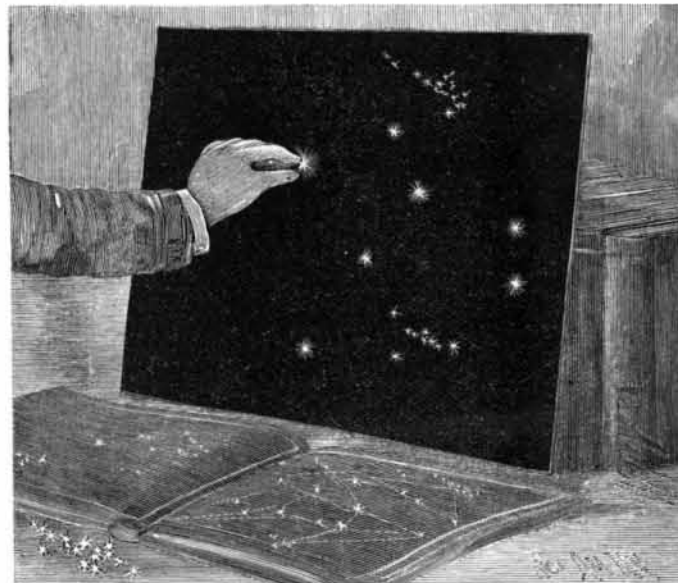


Fig. 2.—LUMINOUS STARS ON BLACKBOARD.

potash. After the print has again been well washed, it is allowed to dry, and then rendered transparent by placing it on a warm glass plate and treating it carefully with paraffin. The print is then framed between two glass plates. The above-mentioned cyanotype paper, giving white lines on a blue ground, may be prepared by placing plain photographic paper in a solution of 24 grammes of ammonio-citrate of iron and 25 grammes of potassium ferriocyanide in 150 c. c. of water, and then drying it in the dark.

Tetanus Due to Hypodermic Needle.

An instructive case is reported in a recent number of the *British Medical Journal*. A patient who had been in the habit of injecting morphine hypodermically into himself came under observation with symptoms of tetanus, which eventually resulted in death. A careful search revealed no other cause for the tetanus

than a small inflamed and suppurating place near the shoulder, which had been caused by one of the hypodermic injections he had given himself. The lesson taught by this case of the importance of the observance of scrupulous cleanliness, even in so small an operation as a hypodermic injection, cannot be too strongly impressed, and the memory of the disastrous effects which may result from the neglect of proper precautions should be firmly fixed in the mind of every practitioner.

THE ordinary hypodermic syringe is known in France as the *seringue de Pravaz*, the instrument having been invented by Dr. Pravaz, of Lyons, whose death is now announced.



THE STUDY OF THE STARS—THE LUMINOUS BOARD.

The Decay of Professional Photography.

Professional photography at the present time is admittedly not in a flourishing condition, and the causes commonly assigned for the depression include, of course, bad trade, severe competition and the influence of the once despised but now potent amateur. We fear, however, that a photographer himself is more often the cause of his own unfortunate position than are those we have just named. No parent in his senses would dream of apprenticing a lad to an ordinary photographer nowadays, and the reason for this strikes us as being equally available as an explanation of the ordinary photographer's lamentations over the smallness of his profits. In the establishment of such a man a clever, intelligent lad of fifteen or sixteen might pick up in the course of a year or so all that was to be learnt there, and probably a little more than his principal was competent to teach him.

For what is to be learnt in ninety-nine studios out of a hundred beyond lighting, posing, exposure, and development? The retouching, as one may gather from our advertisement columns, is generally put out; the printing is more frequently executed by trade printers than not, and in cases to the contrary is chiefly confined to one or, at most, two processes. Again, photographers who do their own enlargements are remarkably few; and, indeed, to sum up the average photographer's business, it may safely be laid down that most, if not all, the work and its numerous varieties is "put out." In such cases, which, we believe, form the majority, we submit that the apprenticeship system is bound to fail on account of the inability of the principal to impart any but a limited range of practical knowledge to the youth he is supposed to teach.

But this is not all. The mere taking of the negative is often, if not exactly, "put out," at least "farmed;" that is, supposing a portrait photographer to have an order for a landscape embracing a house, a piece of architecture pure and simple, an interior, or an *objet d'art*, etc., to photograph, he probably prefers not to undertake it himself, but to employ another photographer, who makes a specialty of such kinds of work, to produce the negatives for him. The growth of specialism in modern photography leaves the average professional photographer much in the position of a mere commercialist, with just the necessary superficial technical knowledge that will enable him to conduct his business with more or less success.

Of course, there are exceptions to the picture we are drawing, but we do not think they are sufficiently numerous to shake the accuracy of the outline. The race of photographers who collodionized and sensitized their own plates, sensitized their own papers, retouched their own negatives, did their own printing and enlargements, and in short carried on in their own establishments most, if not all, the work which to-day is "given out," does not seem likely to be perpetuated among the professionals of the present time.—*Br. Jour.*

Potschke's New Process of Photo-Sculpture.

It is now about thirty years since Villeme, of Paris, introduced his method of photo-sculpture, which it was hoped would revolutionize the plastic arts much in the same way that photography has revolutionized the graphic arts; but the practical failure arose from several circumstances, among which may be mentioned the difficulty of cutting the clay block by the guidance of the silhouettes, and the fact that some of the views taken by the circle of cameras must of necessity be so lighted as not to give clear outlines which could be accurately followed. The new process of Potschke seems to promise well. The model is placed on a turntable, and as a means of providing register for the various photographic silhouettes to be produced, a vertical rod accurately corresponding with the axis of the turntable is attached to the roof of the apartment, and terminates close to the top of the model or sitter. A thin horizontal ring also surrounds the model. A series of silhouette photographs being now taken with the turntable in the required positions, prints are made on stout paper, preferably the blue or cyanofor paper. These are cut out so as to make a set of guiding silhouettes in paper, which silhouettes are stiffened by repeated treatments with silicate of soda. A foot or base is now provided, in the middle of which is erected a cylindrical or axial rod corresponding to the gauge rod referred to as depending from the ceiling over the head of the model. Guided by the impression of the gauge rod, the silhouettes are cut vertically, a width corresponding to the gauge rod being removed, and they are then mounted on the axial rod attached to the foot, wedge-shaped gaps being left between. A horizontal ring corresponding to that photographed gives another register and point of support for the silhouettes, and also gives a means of measuring the angles so as to insure the correct position of each silhouette. In this way a kind of skeleton of the bust is built up in radial silhouettes attached to the vertical or axial rod. The next step is to fill the spaces between the silhouettes with clay or other plastic material, and, when the wedge-shaped gaps are nearly filled, the horizontal ring may be removed. By now

modeling the clay to the outlines of the silhouettes, a sufficient approximation to the bust is obtained for handing over to the skilled work person who must finish it. The model thus obtained can be moulded and cast from by usual methods. It is easy to see how the method here indicated may be subject to wide modifications under various circumstances. It would seem perhaps easier and more satisfactory to cut out the guiding templates in sheet metal, and solder them to the central rod, than to use paper.—*Photographic Work.*

The Great Jetty Works at the Mouth of the Columbia River.

The project under which the work of improving the mouth of the Columbia River is being carried on was adopted in 1884. It contemplates providing a channel across the Columbia River bar, having a depth of 30 feet at mean low tide. This is to be effected by concentrating the water flowing over the bar, and increasing the resultant current to such a degree as to procure the desired depth. Any work for accomplishing this end must be more or less tentative in its character. The work which is now in progress is the building of a low-tide jetty, starting from Fort Stevens, on the south cape, and extending in a westerly direction, with a slight curve to the south, out across Clatsop spit, for a distance of $4\frac{1}{2}$ miles, more or less, as circumstances may require, to a point about three miles south of Cape Disappointment. The jetty is constructed of stone, resting upon a mattress foundation about 40 feet wide and from $2\frac{1}{2}$ to 5 feet thick. The stone extends to the level of four feet above mean low water. The material thus far has been placed in position from a jetty tramway supported upon piles driven along the line of the jetty and 24 feet above the level of low tide. The tramway is a double track, three foot gauge railroad, the tracks being 13 feet between centers and 28 feet above the plane of mean low water. The material is landed at the wharf, and transported to place over these tracks, which are built in advance of the main works. Captain T. W. Symons, United States Engineer, in his latest report concerning this great undertaking, which has just been made public, says:

"Before the commencement of this work, the channel or channels over this bar were very capricious in location and variable in depth. The depths were usually from 19 to 21 feet, and the channels varied in number from one to three, and in location through nearly 180 degrees from Cape Disappointment to Point Adams.

"The results of the jetty already constructed are very marked in the building up of Clatsop spit, and in the effects produced by the concentration of water upon the bar. There is now a straight out-and-in channel, having a width of one-fourth mile, with a depth nowhere less than 29 feet, and for a width of one mile a depth of 27 feet. At the end of last fiscal year the shortest distance from the 30 foot curve on the outside to the same on the inside of the bar was 3,000 feet. This distance is now reduced to 1,200 feet. These depths refer to the plane of the mean of the lower low waters.

"Since the commencement of the work in 1884 there has been used in the construction of the tramway and its repairs 377,660 lineal feet of piling and 2,223,580 feet B. M. of lumber. The cost of the tramway has been approximately \$6.50 per lineal foot. There has been used 18,414 cords of fascines. The mattress work in place has cost \$4.50 per lineal foot.

"Under the contract, dated January 22, 1891, in force with Joseph E. Smith, 150,500 tons of rock were received during the year. The total amount of rock received from all sources since the commencement of the work is 478,890 tons.

"About 25,000 tons of this rock was used in securing the root of the jetty, and in protecting the buildings and railway between that point and the wharf. The balance has been distributed along the line of the jetty. From the end of the jetty back for a distance of 2,500 feet the rock is raised to a level of 4 feet above datum, for 13,000 feet it is at datum, for 5,200 feet it will average 4 feet above, for the remaining distance it will run from this level to high water. Near the inner end of the jetty it was found to be necessary to pile the rock well up toward the high water line, to protect the piling of the tramway from the heavy drift brought down by the river during the winter and spring. At places along the line of the jetty it was observed that there was a decided tendency during the last of the flood tides and the first of the ebb for the water to flow across the jetty in great volume and with considerable velocity. Where this was the case the sand would not deposit in the vicinity, but would be scoured out, increasing the area of the waterway. At these places rock was dumped in until this action ceased. It was found that when the jetty reached the height of about 4 feet above the mean level of low water the flow, during both ebb and flow, was under control. The sand was deposited to the level of low water and above—in many instances on both sides of the jetty.

"Under the contract entered into with Richard Hoyt, April 20, 1891, 1,768 cords of fascines and 3,528

poles were received. These were used in making the mattresses placed under the last 1,000 feet of the jetty.

"The piles used during the year were purchased in open market at the rate of $9\frac{1}{2}$ cents per lineal foot, delivered at Astoria. The lumber was purchased in open market also, at \$10 per M, delivered at Fort Stevens.

"It is estimated that \$525,000 will be required to finish this work. Should \$350,000 of this be appropriated for the fiscal year ending June 30, 1893, it is recommended that the balance, \$175,000, be made available for the fiscal year ending June 30, 1894.

"The original estimate for the construction of this work was \$3,710,000. Of this amount there has already been appropriated, to June 30, 1892, \$1,337,500. There was a balance on hand at that date of \$24,331.12, exclusive of outstanding liabilities.

"It is proposed to expend this and future sums appropriated in raising the jetty to a height of 4 feet above low water, in those places that are not yet at that height, and in farther strengthening the jetty. There is now about 13,000 feet that is at the level of mean low water. Experience has shown that it will not be safe to leave the jetty at this height. The first half of the tides flowing across the jetty, either ebb or flood, take the sand with them and scour channels. Especially is this the case where there are low places in the jetty. It is only by building up the jetty that this cross flow can be prevented. About 4 feet above low water seems to be the height required. The jetty toward the outer end will need to be protected with large rocks to resist heavy seas."—*Pacific Lumberman.*

International Congress of Experimental Psychology.

At the recent meeting in London, the president read part of a report of the census of hallucinations which, since the last meeting in 1889, has been actively carried on in England and to some extent in the United States, France, Germany, Russia and Brazil. To the question, "Have you ever, while in good health, and believing yourself to be awake, seen a figure of a person or an inanimate object, or heard a voice which in your view was not referable to any external physical cause?" 17,000 answers were received in England. It appears that about one in ten of persons taken at random had experienced hallucinations of some kind, the apparitions being mostly those of living people or unrecognized human figures. A remarkable class was that of collective apparitions, the same hallucinations being simultaneously perceived by two or more different people, although in some of these instances there seemed to be a possibility of verbal suggestion from one to another. But, after all deductions for possible sources of error, there was a strong presumption against chance coincidence, if ordinary accuracy on the part of informants was to be assumed.

Mrs. Sidgwick read a paper on Thought Transference. Numerous experiments had been made, and the successful percipients had been seven in number and were generally hypnotized. One percipient had succeeded in the experiments with numbers, when divided from the agent by a closed door and a distance of about seventeen feet, and the ideas had reached the percipient, as visual impressions recurred with closed eyes, or as hallucinations on a card or paper, and in other ways. Attention was drawn to the fact that only some persons are capable of acting as agents or percipients, and that there is variation in this peculiar ability in the same person on different days, and even at different times on the same day.

The Disgrace of Pinkertonism.

There has been much said and written in the last four weeks about the disgrace of Pinkertonism. Reference has been had in this verdict to the character of the Pinkerton system and of the Pinkerton guards. But there is another disgrace that ought to be emphasized in this connection—the disgrace of a condition of things that requires the importation of dare-devil men to secure rights which local authorities do not guarantee. It is disgraceful that men cannot be secured in the possession of their own property, disgraceful that men cannot go to work except at the risk of their lives in an establishment from which others have voluntarily withdrawn. It would be well for those who join in the general cry against Pinkertonism to have a serious thought or two about the disgraces that are the occasion of Pinkertonism.—*Iron Trade Review.*

The New Star in Auriga again Visible.

Professor Edward S. Hilden telegraphs from the Lick Observatory that the new star that appeared in the constellation Auriga last February, and which faded to about the fifteenth magnitude, so that it appeared very faint through the big telescope, was observed again recently by Professors Schaeberle and Campbell and himself. He says the star has increased in brightness in a surprising manner, being now often and one half magnitude. The present observations, he says, will enable astronomers to get something like a complete history of the remarkable changes to which the star has been subjected.