Correspondence.

Cheap Telescopes.

To the Editor of the Scientific American:

In your issue of December 13, 1873, W. M. asks: How can a mechanic construct a cheap telescope powerful enough to see Jupiter's moons, Saturn's belts, etc.? The following is a plan which I adopted more than twenty years ago:

I called on a dealer in optical lenses and selected a meniscus, one inch in diameter and of 48 inch focus. This was for my object glass. I had already in my possession a two lensed double convex jeweller's eye glass; one of these lenses was used for the eye piece, its focal length being a trifle over one inch. The tube was made of pine wood. A piece of straight evenly grained one inch pine board, two inches wide and eight feet long, was cut in the middle; and the two pieces, after making a tapering semicircular groove in each, well glued together. This done, the next thing was to give it a round, tapering form, two inches in diameter at one end and a trifle over an inch at the other. This was done with a common carpenter's plane. I now had a tube four feet long with a tapering hole through its length, and 1¼ inches in diameter at its largest end. Two wooden cells for the lenses were then turned in a lathe, and were made to go on to the tube, as does the cover of a wooden pill box. A round hole, the size of the lens, was made in each, the meniscus being contracted to ⅞ inch, and the eye glass to ¼ inch diameter. The piece carrying the eye glass was made so as to slide some distance on the tube, for adjustment to distinct vision. The tube was painted and varnished, and mounted equatorially; and it proved to be a good instrument, showing Jupiter's moons, their movements and eclipses, handsomely; the ring of Saturn, the horned appearance of Venus, the mountains and craters on the moon, the spots on the sun, etc. Several of the nebulæ were also visible, especially those in *Andromeda*, *Orion*, *Hercules*, and *Sagittarius*. This instrument has been a great pleasure to me and my family of boys and girls, and even my neighbors, and the whole need not cost over two dollars, beside the time in making, provided one is a mechanic.

The meniscus (concave on one side and convex on the other) is the proper form for a single lens object glass, and a plano-convex lens makes the best form for the eye piece. Care must be taken to so set the lenses in their cells that their foci will meet centrally. When this is the case, the lenses are said to be well centered, and in that way we get rid of most of the prismatic color. Another point that wants attention is the mounting. Absolute steadiness is required for close observation. I used to put mine upon a post set firmly in the ground. The equatorial arrangement for mounting is described in nearly every work on telescopes.

I hope not only W. M. but a thousand others will be induced to build themselves telescopes. There is no one thing that can be put into the hands of youth that will enchant them like a telescope. They will leave all other amusements and gather around that marvelous revelator.

Alvan Clark, of Cambridgeport, Mass., "the Herschel of America," many years ago might have been seen peering into the heavens with his little home-made tubes. He had asked the question: How can I make a cheap telescope? That question he answered for himself, and now his name and his fame are everywhere connected with his ponderous achromatics. B.

Bellows Falls, Vt.

Keeping Poultry to Enrich Lands.

Colonel Waring, in his "Elements of Agriculture," says: Poultry dung is nearly equal in value to Peruvian guano (except that it contains more water). If granted that a hen will consume, of the different kinds of grain, meat, and vegetables, during the year, the equivalent of two bushels of corn, which weigh 120 pounds, then it is certainly low enough to place the excrement—the result of the digestion of these two bushels—as equivalent to fifteen pounds of guano. As the manure from 100 fowls, during a year, would amount to 1,500 pounds of guano, taking the above supposition as at least safe: and as 300 pounds is ordinarily sufficient for an acre of corn, it will be seen that the manure from 100 fowls will make compost enough for five acres. The experiment has been tried by the writer, of applying, to one acre of corn in the hill, the manure of twenty hens one year, mixed with swamp muck, in the proportion of one part hen manure and three parts muck, and the result was a better crop than upon an adjoining acre enriched, for sake of experiment, with a good fair ordinary dressing of stable manure.

New Bridge over the Hudson.

The corner stone of a new railway bridge, to span the Hudson river at Poughkeepsie, N. Y., was recently laid with masonic ceremonies. In an engineering point of view, the work will be an extensive one. Its object is to connect Boston, Providence, Portland, Worcester, the iron ore regions of Connecticut, Duchess county, and the Hudson river with Scranton, Easton, the Delaware river, the coal and oil fields of Pennsylvania, Harrisburgh, Pittsburgh, Oswego, Buffalo, and the West, by a route in which there will be a gain of some eighty miles in a total of 318 miles, or a saving of some thirty per cent. The structure will be of the truss shape, and the railroad tracks will be on the upper or top chord, at an elevation of 194 feet above the river. By the terms of the charter, the company are empowered to erect four piers in the river, at a distance of not less than 500 feet apart. The entire length of the bridge will be about one mile, of which a trifle less than 2,500 feet is over the channel of the river. The other half will consist of land approaches, mainly on the east or Poughkeepsie side. The land piers will be built of solid granite or blue stone masonry. They will be eight or ten in number, and will vary in height from 20 to 80 or 90 feet. The piers on the bank will be somewhat similar, but higher, and also more massive and substantial. The piers in the river present the greatest difficulty to the engineer, as they must be sunk about 130 feet below the high water level in order to secure a solid foundation. The cost will be about $2,600,000.

THE LATE PROFESSOR AGASSIZ.—(See page 2.)

SAMUEL NELSON.

Samuel Nelson, ex-associate Justice of the Supreme Court of the United States, whose retirement from the bench took place about a year ago, recently died of apoplexy at his residence in Cooperstown, N. Y. We extract a portrait of this eminent jurist from the *Science Record* for 1873.

JUDGE NELSON, OF THE UNITED STATES SUPREME COURT.

Born in this State, in 1792, he was admitted to the bar in 1817, and six years later began the active judicial career which terminated in his retirement from public life, a step taken not on account of impaired mental vigor or from fear that the great causes which he would be called upon to decide would be beyond his grasp, but because he felt that the weight of eighty years precluded his assuming the physical labor incident to his full share of the work of the high tribunal of which he was so prominent a member. First circuit judge, then associate justice of the New York Supreme Court, and finally Chief Justice, Judge Nelson, perhaps more than any other of his associates, contributed in the production of the decisions which have shed so brilliant a luster upon the past records of the judiciary of New York, and which are received as high authority in every court where the great principles of the common law prevail. In 1844, he was called by President Tyler to the bench of the United States Supreme Court, to occupy the office from which he eventually retired.

In questions of admiralty and international law, Judge Nelson was considered as one of the greatest living masters, but it is probable that his extended knowledge of these important branches of jurisprudence was even exceeded by his vast experience in the varied and complicated causes arising from the litigations appertaining to patents. In this connection, one of the most eminent lawyers of this city says of him that it was his habit "to labor most earnestly during the trial and upon the argument of causes: and again and again would he descend from the bench, especially when complicated machinery or specimens illustrative of science or models of vessels intended to develope the relations of colliding ships have been before him, and by their close and repeated study strive to understand the real points in controversy. * * So thoroughly did he investigate questions of science and mechanics, and so sound a judgment was he known to form on these subjects, that his opinions concerning them were by courts and counsel accepted as of greater authority than those of any other judge, until finally, and for many years before the close of his labors at the circuit, patentees felt that, when he had passed judicially on their rights, they were substantially settled; and hence there came before him repeatedly, from distant points, cases involving the validity of the most valuable patents in the country; and to his decisions the parties generally submitted without appeal."

One of his last official acts was participation in the Joint High Commission charged with the settlement of the Alabama claims; and here his unexcelled proficiency in international jurisprudence contributed largely to the speedy and equitable adjustment of that grave question of international difference. His death, though sudden, was a fitting close to the evening of a grand and noble life. A slight illness confined him to his chair, in which, surrounded by his family circle, he peacefully breathed his last without tremor or pang, leaving to posterity the rare example of a magistrate, who, for half a century, has preserved his ermine without stain or spot, and whose words will be handed down as the monuments of unvarying justice, stern integrity and profound learning.

SCIENTIFIC AND PRACTICAL INFORMATION.

CHEMICAL SUGAR.

One of the most important of chemical discoveries is that of the artificial creation of alizarine. By reducing natural alizarine by zinc powder, Groebe and Liebermann obtained anthracene, $C_{14}H_{10}$. Then reflecting that coal tar was an inexhaustible source of the latter product, they attempted to obtain, by synthesis, alizarine and even purpurine. But alizarine has for its formula $C_{14}H_8O_5$, and hence it became necessary to add to anthracene 5 atoms of oxygen, and to subtract 2 atoms of hydrogen. To obtain this result, the investigators had recourse to bichromate of potash and sulphuric acid. Then treating the body with a solution of caustic alkali at a temperature above 388° Fah., a blue mass was gained, the aqueous dissolution of which precipitated, by an acid, either artificial alizarin or purpurine, according to the degree of oxidation. This chemical product, now employed in the art of dyeing, has given results even superior to those obtained from madder and its derivatives.

The process briefly reviewed above suggests the idea that sugar might be made by a somewhat similar course. Sugar has for its formula $C_{13}H_{11}O_{11}$, and is resembled by a large number of chemical bodies. Glucose, for example, gives $C_{12}H_{14}O_{14}$; cellulose, $C_{12}H_{10}O_{10}$. Now, supposing that on these bodies a chemical reaction of the same nature as that of bichromate of potash and sulphuric acid on anthracene could be effected, would it not be possible to produce a chemical sugar?

FUSION OF PLATINUM.

The fusion of platinum has been effected by M. Violette. Partly in fragments and partly in a state of sponge, it was placed in a Hessian crucible lined with plumbago, and subjected for one hour to the heat of the furnace. A perfectly fused button of platinum, of the same weight as that of the metal introduced, was found at the bottom of the crucible.