## Correspondence.

### The Chicago 18½ Inch Telescope—A Correction in Obituary of Alvan Clark.

*To the Editor of the Scientific American:*

My attention has just been called to your article on "Alvan Clark" in the SCIENTIFIC AMERICAN of Sept. 3. The 18½ in. telescope lens finished by Mr. Clark in 1862 was for the University of Mississippi, instead of the University of Michigan. The order was given by my predecessor, Dr. F. A. P. Barnard. The completed instrument was sold to the Astronomical Society of Chicago, as Mr. Clark had undertaken the work entirely at his own risk, and the war rendered its acceptance impracticable.

Our pier and dome built for this equatorial are still extant.

R. B. FULTON,
Prof. of Physics and Astronomy.
University of Mississippi, Miss.

### The First Railroad in America.

*To the Editor of the Scientific American:*

In your issue Aug. 20 last, you state that the first American railroad was built in 1825-26, and was used for the purpose of transporting granite from the quarries near Quincy, Mass., to tide water. Will you allow me to claim for my father, George Magers, a Marylander, the honor of designing and directing the construction of the first railroad built in this country, between the years 1814 and 1816, at Falling Waters, near the town of Manchester, in Chesterfield County, Va., on the south side of the James River and a few miles from the city of Richmond? This I believe antedates the building of the Quincy road nine or ten years. He was engaged at the time in superintending a powder manufactory located at Falling Waters, and partially supplying the government's demand for powder during the war of 1812 with England. The road was built for the purpose of conveying the powder from the mill to a magazine located a couple of miles distant, in order to secure greater safety, and to prevent large destruction in case of fire or explosion. It was regularly operated by means of horse power through a number of years and until my father's death, which occurred in 1818. There is still living, in Baltimore, a gentleman of advanced life, Prof. George Elliott, of ballooning fame, who lived with his father at the seat of the mill, and who frequently rode in the carriages used upon the railway, and can verify the truth of the foregoing statement.

G. W. MAGERS.

Baltimore, September 12, 1887.

### Adhesive Gum for Labels, etc.

The following mixture is stated by M. Eliel (*Revue Photog.*) to form a strongly adhesive gum, which will really make paper or parchment paper *stick* to any surfaces on which it may be applied, such as wood, glass, stone, or metal of any kind. It is therefore admirably adapted for use in the pharmaceutical laboratory, and indeed, with certain modifications introduced by our selves, will be welcome among merchants and manufacturers generally. It is made thus:

| | |
|---|---|
| Gum acacia | 120 grammes or parts. |
| " tragacanth | 30 " " " |
| Glycerine | 120 cubic centimeters or parts. |
| Thymol | 2·5 grammes or parts. |
| Water | q. s. to make 1 liter or 1,000 parts. |

Soak the gums separately in a little water, and when the tragacanth is fully swelled, beat it up to the consistence of a thick homogeneous mucilage, and mix this with that of the gum acacia, and pass the whole through a piece of fine linen or "tammy." Add to this the glycerine, in which the thymol has previously been shaken up, and lastly make the whole up to a thousand parts, or one liter by measure, and store in suitable well-corked bottles ready for use.

For the 2½ grammes of thymol we ourselves prefer to substitute 2 grammes of eucalyptol or about 3¼ grammes or parts of Australian eucalyptus oil. With this gum labels or circulars can be made to adhere firmly to tins or metallic drums, etc., and if written or printed with the boracic "label ink," and afterward washed over with "water varnish," such labels, etc., will be very durable, and will remain unaffected by ordinary chemical solutions or dilute acids.

### Weeds.

"Weeds," says a writer in *Social Science*, "are plants in the wrong place. They all probably have their right places and their uses somewhere in nature's economy, though these are sometimes hard to appreciate. The most of them may serve to keep some desolate spot from being entirely bare, and the decay of their repeated generations furnishes mould to the ground, and may in time make it fit to bear something better. They all, too, have elements of beauty, and these will reveal themselves to every one who diligently searches for them. Even the most forbidding are revealed under microscopic inspection as objects of rare beauty. Many of them, if they were not weeds, would be prized as choice flowers, and some of them have been such."

### Artificial Rubies.

M. Fremy has returned to his old experiments on the manufacture of rubies. It will be remembered, says *Engineering*, that a few years ago he succeeded in forming small ruby crystals by a chemical or physical process in his laboratory. These crystals were too tiny to seriously compete with the natural stone. He now claims, however, to produce ruby crystals of excellent quality and larger size than the natural stones in use. This result has been obtained by a new process. The older processes of 1877, employed by M. Fremy and M. Feil, consisted in heating to a white heat in an earthen crucible a mixture of aluminum and minium. The red coloration was produced by bichromate of potash. The operation was often made with 20 to 30 kilogrammes of mixture, and gave several kilogrammes of rubies.

Another method was to heat to a high temperature a mixture in equal parts of aluminum and fluoride of barium with traces of bichromate of potash. The crystals thus obtained were remarkable for their neat form, but they were apt to be lamellar. In his recent experiments M. Fremy had the assistance of a talented young chemist, M. Verneuil, attached to his laboratory at the museum. Their first work was to find whether the earthenware crucible of the early experiments influenced the reactions, and they found it did not. Next they found that almost all the fluorides when mixed with alumina produced corundum by calcination at white heat. Fluoride of barium, fluoride of calcium, and cryolite were used by them. Crucibles of platinum were also employed. In the course of the experiments they found that a fluoride, such as fluoride of calcium, exercises on alumina an enormous power of mineralization. Thus they could crystallize all the alumina contained in a mixture of 1 part of fluoride of calcium and 12 parts of alumina. In order to investigate this fact further, they placed at the bottom of the platinum crucible some natural fluoride of calcium, white and transparent, and of great purity. It was covered carefully by a plate of platinum perforated with very fine holes. On the plate was put a layer of alumina obtained by calcination of pure ammoniacal alum. Thus charged, the crucible was heated for several hours at red heat in an earthenware crucible, and it was found that the fluoride of calcium had almost completely transformed the alumina into crystals of ruby remarkable for their neat form and their rose color. Thus alumina without being in contact with fluoride of calcium, and simply affected by the emanations of the fluoride, calcined in the air, is mineralized, losing its amorphous state and changing into a crystalline mass. This discovery is important in the science of mineralogy. It shows how such bodies as the fluorides, heated in contact with moist air, produce emanations which can crystallize amorphous bodies such as aluminum. Hydrofluoric acid, acting in a very high temperature, may play a considerable *role* in the reaction.

### Effects of Lightning on Railway Signals.

The effect of lightning on electrical apparatus of all sorts is a subject on which accurate data seem rather scarce, and its effect on railroad signals especially is a point on which more light is needed. A cardinal principle in signals which are in any degree automatic is that they shall show danger in the event of any derangement, and numberless ingenious devices have been invented to provide against the possibility of a signal standing at safety when it has not been intelligently put in that position; but lightning is such a lawless element and may influence electrical apparatus in so many different ways that the counteracting of the harm it may do is not an easy task. It may make a ground connection, and thus allow a circuit to appear all right when it is not, being closed at one end and open (without battery) at the other. It may melt fixtures so as to permanently hold a signal in the position it is in at the moment; and again it may charge a wire with a current that will actuate the electro-magnets and work the signals when the signal man has taken no action whatever. While the chances of a signal being held any length of time in the safety position from the effects of lightning alone are very small, and while it is probable that nearly or quite all danger in this respect can be guarded against by cautionary instructions to the attendants, it is nevertheless well to make note of all peculiarities noticed, that experience may be compared. In a recent thunder storm at Palmer, Mass., the electric locks on the interlocking machine at the crossing of the Boston & Albany and New London Northern were alternately locked and unlocked several times by atmospheric electricity in the rails at and near the crossing. The storm also showed one of the disadvantages of underground wires. A lightning shock generally runs along a wire until it encounters more than ordinary resistance and then melts the conductor. An underground wire is more likely to have unequally corroded sections than an aerial one, and so furnishes first-class opportunities for the lightning to fuse and part it, where, in the case of a wire hung in the air, the resistance and damage would more likely occur in the office connections or apparatus. As is well known, the electric locks of the Union Signal Company's interlocking machines are so arranged that the circuit, through the rails, when closed, holds the armature away from its slot, and thus leaves the lever unlocked, so that any breaking of a connection by lightning or otherwise will lock the lever; which is in the direction of safety. But anything which should connect the two parts of the circuit so as to leave it normal with the rails excluded would leave the levers permanently unlocked.—*Railroad Gazette.*

### The Fur-Bearing Animals in Central Park.

The *Fur Trade Review*, of this city, in an article on the fur-bearing animals at the menagerie in our Central Park, laments that so few species are represented, and that better specimens of the few kinds are not procured. It is not creditable to the city of New York, which the editor claims is the headquarters of the American fur trade in the United States. He believes, also, the members of the fur trade are sufficiently public-spirited to accomplish the object, if they will, and suggests that they make an earnest effort to remedy the defect, by securing domestic fur-bearing animals from all sections of the country for presentation to the Park authorities. He claims there need be no very great expense attached to such an enterprise. If the leading fur dealers will request collectors, trappers, and other out of town acquaintances, in a position to comply, to forward such animals as they may secure, there would, he thinks, be a generous and a general response.

The editor of the *Review* suggests the appointment of Mr. Jules Weil, of 123 Mercer Street, a committee of one to receive and duly present to the Central Park all animals received, in the name of the fur trade of New York or the United States, and it is hoped a ready response may be had to the appeal.

### The Cascade Switchback Railway.

The completion of the main line of the Northern Pacific Railroad by the switchback over the Cascades is said to be the most marvelous piece of railroad engineering in the country. Its extent is but thirteen miles, and the cost $350,000. The cost of the Cascade division of the Northern Pacific will reach $8,000,000. The maximum grade on the "switchback" is two hundred and ninety-six feet to the mile. Two decapod engines, weighing one hundred and twenty-five tons each, are used on each train, one on each end of six cars. One of these is ample to draw the train, but two are used for fear of an accident by the uncoupling of the train or otherwise. It has been said that it is impracticable for the Northern to operate a freight traffic over the "switchback," but this is not true, and it has been so proved by a practical test. It is estimated that from thirty-five to fifty freight cars can be handled each way over the "switchback" in twenty-four hours. At this rate, each car holding ten tons, from three hundred and fifty thousand to five hundred thousand bushels of wheat can be sent to the Sound ports in twenty-four hours. There will be no trouble about the Northern Pacific not handling all the freight it can receive. Its management is too far-seeing to cripple its business by a short-sighted policy and deficient modes of transportation. The Stampede tunnel will be finished within eleven months by Nelson Bennett, the widely known contractor.—*Tacoma (W. T.) Ledger.*

### Speed of Cutters.

The *Iron Industry Gazette* gives the following concerning the average speed of cutters on soft cast iron surfaces, making allowance for changes in condition and character of work: "In order to calculate accurately for milling work, the speed of cutter and amount of feed per revolution must be observed; that known, the computation is as follows: Multiply the number of revolutions of cutter a minute by the length of feed of one revolution, and the product is inches a minute that can be milled. Allowing about 40 feet a minute for surface speed of cutter, a ½ inch cutter should run at 300 revolutions a minute, with a speed $\frac{1}{150}$ inch to a revolution, giving a result of 2 inches of light milling a minute. A 1 inch cutter would make 150 revolutions a minute, with a feed of $\frac{1}{100}$ inch on a moderately heavy cut, allowing 1½ inch of milling a minute. A 3 inch cutter would run fifty revolutions a minute, with a feed of $\frac{1}{50}$ inch on heavy work, giving a result of 1 inch of milling a minute. The above are examples selected from observed results in practical shop usage."

### Salt and Gas in Kansas.

At Ellsworth, Ellsworth County, Kansas, as a matter purely of speculation, some persons recently made up a fund to drill the earth to see what they could find. They were told by individuals learned in the geology of the region that the work would be fruitless, and advised not to waste the money, as there were no favorable indications. But the speculators went ahead with the drilling, and at a depth of 740 feet they struck a bed of pure salt, 160 feet thick, after which shale was encountered for 200 feet, and then, at a depth of 1,100 feet, a vein of natural gas was struck which promises to yield fuel in unknown quantities.