

"Our Inheritance in the Great Pyramid," it is shown that the Great Pyramid of Egypt contains in its interior standards of inch measure, while the exterior gives the same standards in the sacred cubit of 25 inches. One of the most important units of measure is the length of the so-called king's chamber, which is 412.5 English inches, and its breadth 206.2 inches. Now our silver coinage corresponds to these numbers, as the "dollar of the fathers" weighs 412.5 grs., the half dollar 206.2 grs., and the quarter dollar 103.1 grs., which last is a very important pyramid number. On inquiring at the mint why the silver dollar was made of this weight, I was informed that it was the weight of a coin that would readily pass current in the Eastern Asiatic trade. It is therefore a traditional coin, by whatever name it may have been known, for thousands of years.

"But not only does the silver coinage correspond to the inch standard of the pyramid, but our gold coinage corresponds to the cubit measure. The height of the pyramid in sacred cubits is 232.5, and our gold eagle, the unit of gold coinage, weighs 232.2 grs., and the half eagle 116.1 grs.

"The relation of these numbers is such that the area of a square having 103.03 on the side, is equal to the area of a circle having 116.26 for its diameter." (Phillips.) Now as there are 360 degrees in the circumference of a circle, its diameter in terms of seconds is 412529, and its circumference is 1296000. Then the number 412.5 is the thousandth part of the diameter of a circle in terms of seconds, and 1296, the number of square inches in an English square yard, is the thousandth part of the circumference of a circle in terms of seconds. This at once connects English with pyramid measure, and may indicate the origin of both.

"From the standard square yard all the rest of our measures may be deduced. The old English gallon contains 231 cubic inches, which is a number intermediate between the height of the pyramid in cubits, 232.5, and the height of the king's chamber in inches, 230.89. The diameter of a circle is to the side of a square of equal area, as 9 to 8 very nearly.

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"It thus appears that in the weights of the quarter dollar and the half eagle, we have had the squaring of the circle problem typified without knowing it."

#### NOTES OF PATENT OFFICE DECISIONS.

The Commissioner of Patents, in deciding the interference case of *Martin vs. Bogle et al.*, awards priority of invention to *Martin*, who first perfected the operative device in interference, although *Bogle* was the first to apply it in series, in the manner designed for use. The reason for this is that, while the arrangement in series may be more satisfactory and permit nicer adjustment of subordinate mechanism, yet it proves operativeness no more than the test of the single device itself.

The Commissioner also holds that the fact that in one instance a claim is for a single device, and in another for a series of them, does not constitute difference of invention. The state of the art, and the Office latitude in allowing claims, may level the distinction. He also holds that the preliminary statement must be rigidly adhered to, where there is a substantial departure therefrom in the interference contestant's testimony.

The Acting Commissioner, in the interlocutory appeal in the matter of the application of *Siemens* for a re-issue of letters patent, decides that the applicant may include, on re-issue, matter which was neither described nor claimed, but which was actually contained in the original invention; and that the failure to describe such matter in the original patent is no bar to doing so in the re-issue application within the limits of the invention.

#### SHOOTING STARS.

The phenomena of shooting stars and of star showers have, undoubtedly, existed since the formation of the solar system. On any clear evening, a watchful person may see, on an average, two shooting stars every five minutes, and on certain nights of certain years, and on certain hours of the night, they appear in such vast numbers as to receive the name and deserve the title of star showers. Other meteors do not fall in showers emanating from certain constellations, but move in all directions, and from every part of the sky. Such meteors, though, as far as known, differing in no particular from those which come in showers, are called "sporadic." In their normal condition, that is, before visibility, these vagrant bodies are called meteoroids, and only while self-luminous from excessive heat by friction and arrested motion in our atmosphere, are they called shooting stars or meteors. It is important that this distinction be borne in mind, for, if true, then can no meteoroids ever be seen from the earth. In their natural condition they are circum-solar bodies, obeying the laws of motion and gravitation as rigidly as do the planets, and must be treated as such, though more numerous than the leaves of summer. The velocity with which they plunge into our atmosphere is very great, probably about 48 miles per second. The length, in arc, of their visible path varies widely. Occasionally one flashes up, and, increasing in size and brilliancy, disappears, without seemingly having moved a particle. The motion of such a meteor was exactly towards the observer's eye, and consequently it ought not to have any apparent motion. Another observer 20 or 30 miles distant may have seen the same with a path several degrees in length. Their paths may be considered to vary from zero to 90°, or even more. The length of their real paths, that is, in miles, also varies greatly, but the average is about 42 miles. By the time this dis-

ance is accomplished, unless the meteoroid is a large one, it is heated, melted, evaporated, and extinguished, all within the period of not over one second of time. The height at which they are heated to visibility is sometimes as great as 200 miles, but the average is about 75 miles, and at extinction, about 50 miles.

The above assumed rate of motion at which they enter our atmosphere is the result of the sum of the orbital motions of both the earth and meteoroid, but, owing to the earth's attraction, this motion is really very much greater than 48 miles per second, especially for those which move retrograde.

We are now prepared to understand why they are burned up, and so quickly vaporized. The heat thus generated, though all produced where the atmosphere is inconceivably rare, is estimated to be equal to three million degrees Fahrenheit. No known substance, unless of considerable size and density, like the meteoric stones which occasionally reach the earth, can long withstand such a degree of heat, unchanged in form and structure. Before the above facts were known the height of the earth's atmosphere was usually considered to be about 45 miles, but that it is, at least, five times, and probably ten times that distance, is clearly proved by the researches in meteoric astronomy.

When it is considered that, according to Professor Newton, four hundred million shooting stars are daily burned up in our atmosphere (including those that are telescopic), it would seem that the earth must constantly be increasing in weight and size from this cause, and such, no doubt, is the case in fact as well as in theory. Unfortunately the data for arriving at any very exact value as regards their size and weight rests on insufficient evidence. Professor Harkness, of the Naval Observatory, who has made a thorough discussion of all accessible evidence bearing on the subject, has arrived at the astonishing conclusion that their average weight does not exceed one grain. If we assume that those which are wholly telescopic are not larger than sand grains, and probably they are not, those that are visible to the naked eye as conspicuous objects, and especially those that are seen over a radius of 150 miles and fill several cubic miles with smoke must contain several ounces, and perhaps pounds, of meteoric matter, whatever that may be. Suppose we base our calculation on the estimate of ten grains for each meteoroid, this would equal 4,000,000,000 grains, or 290 tons a day, or 106,000 tons a year, sufficient, if distributed equally over the earth's surface, to form, in 4,000,000 years, a stratum equaling in thickness the paper upon which this journal is printed. The moon, as she revolves round both the earth and sun, must also meet with these all-pervading meteoroids, but, having no atmosphere to arrest their motion, they cannot be heated. They must strike on its surface and be instantly converted into the finest powder. This meteoric dust, from excessive attenuation, must be of a light color, perhaps a pure white, which may go far to explain the cause of her reflection of so much light, the which, when her size and distance are considered, seems out of all proportion.

While the writer was observing the memorable star shower of November, 1867, he witnessed a phenomenon which will linger long in his memory. A brilliant meteor from *Leo* passed in a westerly direction, leaving a luminous train of some forty degrees in length. Its head seemed to increase in size and brilliancy as it progressed, when, as suddenly as though it had struck a target, it vanished from sight. Soon a cloud formed, assuming a variety of fantastic shapes, several being perfect delineations of letters of the alphabet. Twice in its peregrinations was the letter N thus formed, these changes occupying some fifteen minutes. Finally, gathering to itself its scattered particles, it became a round symmetrical disk, probably a sphere, which centrally occulted the nebulous cluster in called *Cancer* the Beehive. For almost two minutes it was, from this cause, lost to view. After the occultation it continued visible for ten minutes longer. During its visibility, which was twenty-five minutes, it drifted about fifteen degrees to the north, confirming by observation the truth of the theory that the heated air of the tropics flows to the north through the upper regions of the atmosphere.

#### ADAM SCOTT CAMERON.

It is with regret that we announce the death of Mr. Adam Scott Cameron, of New York, who undoubtedly was personally known to a great many of our readers. He passed away on the 14th ult., of an attack of acute pneumonia; his illness was sudden and painful, but of short duration.

As a manufacturing engineer and constructor of steam pumps he had a wide and excellent reputation; and as a business man of sound principles, his loss will be felt in the many circles where he was prominent.

Mr. Cameron was a native of Scotland, but came to this country when eight years of age. During his youth he evinced a strong desire for acquiring knowledge and an aptitude for self-culture. He attended public day and evening schools, and soon became sufficiently proficient to keep books for a New York firm. He was observing, thoughtful, and industrious, entered into business with indomitable pluck, energy, and perseverance, and studied with assiduity the questions of capital, labor, and finance. The greater part of his life was spent in the construction of the well known Sewell and Cameron steam pumps. Before he was twenty-one years of age he was taken into partnership with his brother, and to the time of his last illness applied himself to business with great success. He was a friend and counsellor to the workmen in the employ of his firm (Cameron & Co.),

and a member of some excellent associations for the advancement of mechanical science. At the commencement of a small pamphlet issued to his employees in 1869, proposing the system of co-operation as a practical business movement, the following sentence occurred: "To assist a person in improving his condition by his own efforts is to make a man of him." Other pamphlets on such subjects as "The Necessity of a Bureau of Mechanics," "The Eight Hour Question," "An Address to the Intelligent Workmen of the United States," were written by him, and widely circulated.

During the spring of 1873 Mr. Cameron was elected president of the Bull's Head Bank of the city of New York; and although the youngest president of any bank, at least in New York city, he displayed wonderful tact and sound judgment in arranging the complicated affairs of the institution; he had suits set aside, obtained subscriptions for new capital, re-opened the bank, and put it in a prosperous condition. This transaction was commented upon by the *London Times* as a notable one, from its having been the first of the kind, and the setting of an example which has since been followed in several instances. The last and recent public utterance by Mr. Cameron closes with these significant words: "Until we return to the old-fashioned habits of honesty, industry, and frugality, our sins will rest upon us. If our *virtues* will not, our *necessities* must bring us back to prosperity. Then we shall be envied among the nations of the earth." At the age of thirty-three Mr. Cameron closed a busy and useful life, in which integrity, generosity, and benevolence were always conspicuous.

#### THE DISTANCES OF THE PLANETS FROM THE SUN.

Sir George Airy, the British Astronomer Royal, has recently published a report on the telescopic observations of the transit of Venus of 1874, made by the English expeditions. Pending the appearance of the deductions to be made from the complete measuring of the photographs, the results reached must be regarded as provisional only. The mean solar parallax determined is 8".764", and this is one tenth of a second less than has been given by the most reliable previous investigations upon different principles. From Professor Newcomb's calculations, now adopted in most of our ephemerides and based on observations of Mars, the lunar equation of the earth, the parallactic inequality of the moon, the transit of Venus of 1769, besides Foucault's experiments on light, it appears that the mean distance of the earth from the sun is 92,393,000 miles. According to Sir George Airy's determination this distance must now be considered as increased to 93,321,000 miles.

For purposes of comparison and also to correct some errors which were present in our recent article on "how our world looks from other worlds," which we translated from the French of M. Flammarion, the well known astronomer, we append the following statement of correct distances of the planets from the sun. Mercury, average mean distance, 35,392,000 miles; Venus, 66,134,000 miles; Earth, 93,321,000 miles; Mars, 139,311,000 miles; Jupiter, 475,692,000 miles; Saturn, 872,137,000 miles; Uranus, 1,753,869,000 miles; and Neptune, 2,745,998,000. As regards the fixed stars, the distance of *α Centauri*, probably the nearest, is about twenty billions of miles, and light occupies about  $\frac{3}{4}$  years in travelling from that star to the earth.

#### The New Steamship "City of Washington."

If comparison is made between capacity and strength, this steamship, just placed on the New York, Havana, and Mexican Mail Steamship Line, appears to be undoubtedly the strongest mercantile iron vessel ever built in this country. She was constructed by Messrs. John Roach & Son, at Chester, Pa., and is of superior model and plan. The plates of the hull are  $\frac{1}{4}$  inch and upwards in thickness. There are three decks, the two upper ones being mostly of iron. The length of this vessel is 323 feet; beam, 38 feet; depth, 37 feet 6 inches; draught when loaded, from 21 to 22 feet; tonnage, 2,618 tons. She can carry 10,000 boxes of sugar, besides light freight, and her outward passage capacity in bulk is 2,500 barrels. The saloons and staterooms are attractive for their comfortable appearance and elegant fittings. The engines are of the compound type, and have a high pressure cylinder 40 inches in diameter; low pressure cylinder 74 inches in diameter, with a stroke of 6 feet. The pressure of steam carried is 80 lbs. The condenser has 4,000 square feet of condensing surface. Diameter of propeller is 16 feet, with a mean pitch of 26 feet. The engines are constructed with steam valves on the Corliss principle, and are reversed quickly with little manual exertion. Steam is supplied by two vertical boilers having square bases. There are eight furnaces in each boiler, and altogether about 3,000 tubes, 2 inches outside diameter and 7 feet long. There 370 square feet of grate surface and 1,400 square feet of heating surface. The engines are rated at over 2,000 horse power, and with 63 revolutions per minute, an average speed of 14 knots per hour is attained.

F. Alexandre & Sons, the owners, state that the *City of Washington* will make the voyage between New York and Havana in less than four days.

COFFINS from Norway, says the *British Trade Journal*, represent the latest phase of foreign competition, a cargo of several hundred having been landed, ex steamer *Cambria*, during the past month. In this lugubrious branch of home industry America is also competing, and in a warehouse almost within a stone's throw of our office may be inspected a stock of 2,000 American coffins and caskets.