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THE BOTTLE THAT CANNOT BE REFILLED.

We published not long ago a quotation from one of our city papers, in which the statement was made that a large reward had been offered by wealthy distillers and brewers for the production of a new invention, such as that above mentioned, namely, a bottle which, after the contents have been extracted, cannot be again refilled.

We have been unable to trace up the alleged offer of reward to any reliable source and think it doubtful if it was ever positively made. But there is no doubt the invention is needed and would command a handsome figure, if all the conditions could be realized and a non-refillable bottle could be produced adapted to the general wants of the trade.

In reply to your favor, we beg to state that we have been in the market for years for a bottle that could not absolutely be refilled; but we have come to the conclusion that we cannot obtain such a bottle; for if a bottle was made so perfect that you could not refill same through the neck of the bottle, the bottle could be drilled or cut, and then refilled and closed so as to avoid detection.

LATITUDE NOT FIXED, BUT VARIABLE.

It will now and again happen to the seeker after knowledge that he will have to unlearn as well as to learn; but it will be a rare experience for him to have to call in question such a supposedly fundamental truth as that of the invariability of the earth's latitude.

If there is one fragment more than another of our childhood's "geography lesson" that abides ever with us, it is this: that "the earth turns upon its axis." And now we are told that it does not, and that, as a consequence, it is literally true that the parallels of latitude are perpetually shifting—not much, it is true; but sufficiently to make it comically possible, as was once suggested, that certain dwellers in the proximity of the Canadian border line never know for more than six months together in which country they live.

The axis of the earth, or, to speak more accurately, the axis of the earth's figure, is an imaginary line, passing through the center of the earth, and terminating at its two flattest points, known as the North and South Poles. Up to the year 1888, it was supposed that the earth rotated about this axis.

Between the years 1884 and 1888, Dr. S. C. Chandler gathered together all the observations that had from time to time been made, and, after a careful analysis, was able to prove that these variations are accounted for by the fact that the earth does not rotate about its axis of figure, as above described, but about another axis, which he called the axis of rotation. This axis of rotation bisects the axis of figure at its center, and always preserves the same direction in space; but its poles slowly describe a circle about the poles of the axis of figure.

The motion is fairly well illustrated by a spinning top, whose center of gravity remains in the same vertical line, while the peg and the head describe two circles about this vertical line. The motion of any parallel lines on the top will roughly approximate to the motion of the lines of parallels of latitude on the earth's surface.

The period of the smaller circle is between 423 and 434 days; that of the larger between 361 and 369 1/2 days. The radius of the smaller circle is 14 feet. The center of the circle itself travels in an ellipse, the major axis of which is about 25 feet, and the minor about 8 feet.

A remarkable verification of Dr. Chandler's discovery was afforded by a series of tidal observations extending over 35 years, two of which were taken on the Pacific Coast and one on the Atlantic. These show a mean time of oscillation of the sea's level of 431 plus or minus 4 days, which agrees remarkably

with the period of revolution as mentioned above. Newcomb had pointed out that if the theory of the revolution of the axis of rotation were true, low tide at any spot should occur when the pole of rotation lay nearest that spot—a suggestion with which the above tidal observations fully agree.

THE TEMPERATURE OF LAKES.

According to Desmond Fitz Gerald, M. Am. Soc. C. E., in a paper recently read at the annual convention of the society, the observation of the temperature of the water in lakes and reservoirs is attended with more difficulty than is generally supposed.

The thermophone is based upon the principle of the Wheatstone bridge, and it enables the temperature to be read at the surface of the water, the two metals which form the circuit being suspended at the desired depth. The two arms which complete the circuit at the surface are connected with a telephone which takes the place of the customary galvanometer.

The buzzing sound in the telephonic increases or decreases as the hand passes a certain point on the dial. By continually moving the hand, a point will be found at which the sound ceases altogether. The reading at this point indicates the temperature of the distant coil.

Surface Temperatures.—During the winter, from the latter part of December to the breaking up of the ice in the spring, the temperature of the water under the ice is 32° F. The water then warms at a uniform rate to 72° F. in the middle of June.

Bottom Temperature.—In a pond less than 25 feet deep the bottom temperature varies very little from that at the surface. In the deeper lakes very interesting phenomena occur, which have an important bearing upon the question of domestic water supply.

The point of maximum density of fresh water is 39.2° F. This is about the temperature of the bottom of the lake when the surface freezes. "The several strata lie in their order of density, decreasing gradually until within a few feet of the surface, when they suddenly fall to the freezing point adjoining the ice."

The body of water remains unchanged throughout the winter. At the breaking up of the ice, the surface water warms up to the temperature of the bottom layers; the whole body is thrown into "unstable equilibrium," and circulation takes place from top to bottom. As soon as the surface is 5° F. warmer than the bottom, circulation ceases.

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The Effects of Stagnation.—The deeper, quiescent layers of water gather the organic matter from the waters above, and "decay goes on until the oxygen is used up." The water becomes dark in color and acquires a disagreeable smell.

stated that these lower strata of water, which are unable to get any fresh supply of oxygen from the air, accumulate free ammonia and other solid and gaseous products of decomposition. Hence it is desirable that the domestic supply should be taken from near the surface and waste water drawn off from the bottom. In this way the evil effects of summer stagnation may be partly overcome and the whole body of water improved at the autumnal overturning.

It is possible in the summer to sink a bottle to the bottom of Lake Cochituate and bring up ice-cold water, and, at the same time, fill another bottle with water from the surface that is 80° in temperature. In view of this great difference in temperature and the purity of the surface water, the author of the paper suggests that any one living near a deep lake could obtain very pure ice-cold water during the summer months by taking it from the surface and leading it through a coil of pipe placed in the cold stratum of water at the bottom.

Observations of Lake Superior, taken in August, show a bottom temperature of 38.8° F. in 158 fathoms, the surface temperature being 50° to 53° F.

Prof. Le Conte, in August, 1873, found Lake Tahoe, in California, to be 39.2° at 1,506 feet; 41° at 772 feet, and 67° at the surface.

Nine soundings, taken in Lake Thun, in 1848, to a depth of 550 Swiss feet, show a mean temperature of 40.7°.

The Lake of Geneva, which is 1,000 feet deep, shows a mean temperature of 41.2°, as the result of seven years of observation.

As the result of his own and other observations, the author arrives at the conclusion that "in a lake of the first order, like that of Geneva, the winds produce a mechanical mixture of the layers to a considerable depth below the surface;" "the smaller the lake the less these mechanical effects are felt," "but that this heating is not due to conduction seems to be proved by the fact that, at 65 feet depth, conduction has no effect in seven months' time on the bottom temperature of Lake Cochituate."

THE HEAVENS IN DECEMBER.

The first hours of a December night witness a visible brightening of the eastern heavens upon the entry of Orion and his splendid neighbors Taurus, Auriga, Gemini and Canis Major. One of the finest pageants that Nature affords to the contemplative observer is the vast procession of these starry magnificoes of the sky. Whenever they are visible there is nothing on the earth or in the dome that can take precedence before them. I should be very sorry if my memory could ever lose the impression that they made upon my eye and mind one morning before sunrise on the peak of Etna, last September. Even the great crater on whose broken edge I stood, with its strange fires glowing and moving mysteriously in the depths, and the immense circle of the horizon sweeping 800 miles across sea and land, were spectacles less commanding than that of Orion and his company sentineling the purple-black heavens.

This is a good time, before the heavy snows of mid-winter have rendered the out-of-door use of a telescope inconvenient and uncomfortable, to study the starry treasures that cluster in the constellations just named. The Pleiades in Taurus and the Hyades, forming the V-shaped figure in the same constellation, are superbly beautiful objects for the opera-glass. Is Aldebaran, the chief star in the Hyades, and one of the most beautiful anywhere in the sky, rose red or orange red? That is a question about which observers differ, and every amateur not color blind is entitled to have an opinion of his own concerning the color of that great sun in Taurus, a sun far grander than our own.

Look with a three-inch telescope at the bright white star Rigel in the foot of Orion and enjoy the sight of its little blue comrade. Try ζ, the left hand star in the Belt of Orion, with a little larger telescope. It has a companion whose color is one of the curiosities of the sky, but just what that color is nobody, apparently, knows. The distance between the two stars is about 2.5", and their magnitudes are 3 and 6.5. And do not neglect the Orion nebula hanging below the belt, an object whose interest for astronomer, or wayfarer among the stars, never becomes less. Auriga, too, has many telescopic beauties which lack of space prevents my describing, but to which such a book as Webb's "Celestial Objects" gives a clew, and Gemini presents to us the wonderful twin Castor, yielding its duplicate charm to the smallest telescope.

Jupiter is still the only planet conveniently situated for observation. It is in Cancer, a few degrees southeast of the cluster of stars called the Beehive, and, about midnight, will be found half way up the eastern slope of the Zodiac. Not much that is new concerning Jupiter has been learned of late, but the unceasing and evidently violent changes that its surface undergoes lend value and interest to all careful observations of its appearance in the telescope.

Venus continues to adorn the morning sky, but, hav-

ing attained her greatest western elongation at the end of November, she is now approaching the sun again. On the 1st she is about five degrees from Spica, or α Virginis, and at the end of the month she will be in Libra, near the borders of Scorpio. She will be near Saturn in Libra on the 22d, and for a few mornings before and after that date, and the conjunction should be a sight worth getting up before sunrise to see.

Mercury is in the eastern edge of Libra at the beginning of the month, moving sunward, and on the 20th the planet will pass behind the sun.

Mars is also in the eastern part of Libra and too near the sun for satisfactory observation. At the close of December it will be among the star clusters of southern Ophiuchus.

Saturn, on the 1st, is about 2° north of α Libræ, rising near 5 o'clock in the morning. At the end of the month it will rise soon after 3 A. M.

Uranus is near Mars at the beginning of the month, and will remain in Libra, being in conjunction with Venus on the 28th.

Neptune is still between the starry horns of Taurus, rising in the afternoon and crossing the meridian in the middle of the night.

December opens with a full moon, the phase occurring early on the morning of the 2d, when the moon is in Taurus. Last quarter occurs on the morning of the 9th in the constellation Virgo. December's new moon falls on the 16th, about 1:30 A. M., first quarter following in Pisces on the morning of the 24th, and the second full moon of the month occurring on the evening of the 31st in Gemini.

The moon passes the planets on the following dates: Neptune on the 2d; Jupiter on the 6th; Venus on the 12th; Saturn on the 13th; Uranus on the 13th; Mars on the 14th; Mercury on the 15th. This rapid series of conjunctions of the moon with Venus, Saturn, Uranus, Mars and Mercury shows, in a striking manner, how those five planets are just now strung along the zodiac in the morning sky.

The sun enters Capricorn and the astronomical winter begins about 8 P. M. on the 21st. It is noticeable that the astronomical seasons accord better with the character of the weather than do those of the civil almanac.

GARRETT P. SERVISS.

Calvert Vaux.

Calvert Vaux, the eminent landscape architect, died in Brooklyn, N. Y., November 21.

He was born in London, December 20, 1824, and was educated at the Merchant Tailors' School, afterward studying architecture under Lewis N. Cottingham. At the suggestion of Andrew J. Downing he came to this country in 1848, became Mr. Downing's partner, and was engaged with him in landscape gardening and architecture, the firm having laid out the ground surrounding the Capitol and the Smithsonian Institution at Washington.

Afterward Mr. Vaux became associated with Frederick Law Olmsted and with him presented a plan for the laying out of Central Park in this city, their design having been accepted after competitive examination, which had been suggested by Mr. Vaux. During the work upon Central Park Mr. Vaux was the consulting landscape architect of the Department of Public Parks. His reputation as a landscape architect was then firmly established, and when Prospect Park was laid out in Brooklyn, in 1865, it was after designs made by his firm. Subsequent to this the firm designed the public parks at Chicago and Buffalo and the State Reservation at Niagara Falls. Mr. Vaux was afterward appointed landscape architect in the Park Department in this city, and with Mr. Olmsted prepared the plans for Riverside and Morningside Parks, as well as for the many small parks which were authorized by the Legislature, and are now in process of preparation. He was probably the best known landscape architect in this country, and was consulted as an expert in matters of that kind by architects all over the country.

In addition to his landscape work, Mr. Vaux designed many country residences in Newport and elsewhere, as well as public buildings in this city; the Belvedere, the graystone tower which stands at the lower end of the reservoir in Central Park, being a specimen of his work. He also published an architectural book entitled "Villas and Cottages."

A Great Bell.

At a few minutes past nine o'clock, October 30, the casting of the great bell for the tower of St. Francis de Sales Church, Cincinnati, began, and the flow of metal was continued for about two hours before the work was completed. It is the largest bell in the United States, and fifteen tons of bell metal were used in the casting. In addition to this, the clapper, which is already cast, weighs 640 pounds. The main dimensions of the bell are: Diameter of the ring, 9 feet; diameter of crown, 5 feet. It is 7 feet high. Swung in the tower, the bell is to cost \$10,000. For illustrations of the mode of casting such bells see SCIENTIFIC AMERICAN of September 7, 1895.

Cycle Notes.

Bicycle Law.—Summing up the law pertaining to bicycles in a general way, it may be said:

1. Municipal corporations or cities are liable to a bicyclist for injuries incurred by reason of defective roads (namely, unguarded embankment, a deep rut, a large stone), provided he is not guilty of contributory negligence. A city is under no special obligation to wheelmen, and the defect must be such as to cause injury to vehicles in general. A bicyclist injured while riding on Sunday for pleasure or business cannot recover in States where "Sunday laws" are in force.

2. A wheelman has a right of action against the driver or owner of a vehicle who willfully or negligently causes a collision or damages his wheel while left standing by the street curb or roadside. It is the duty of a wheelman, however, to avert collision if possible, and he cannot recover damages if his own negligence is the proximate cause of the injury complained of.

3. A traveler riding on the left hand side of the road probably assumes all risk, and is prima facie guilty of negligence.

4. Vehicles going in the same direction, the hindermost may pass on either side.

5. Sidewalks are exclusively for foot passengers, but a foot passenger has a right to walk in the highway, and is entitled to cross the street where he may elect, but is guilty of negligence if he attempts to cross ahead of a vehicle. And the fact that a vehicle is on the wrong side of the road is no evidence of negligence in an action for injury to a pedestrian.

6. A bicyclist employing an immoderate rate of speed on a highway or street may be liable civilly or criminally in case of accident. If he recklessly runs his wheel against a pedestrian, he is liable for assault and battery. Recklessness will sometimes supply the place of criminal intent, and if a bicyclist kills a human being while going at a dangerous rate of speed he may be convicted of manslaughter.

The term "immoderate rate of speed" cannot be accurately defined. It depends upon time, place and circumstances.—Detroit Free Press.

The list of royal cyclists is now so lengthy as to represent every European court, and with the exception of the Princess of Wales and the King of the Belgians, each of whom rides a tricycle, the word "bicyclists" may be substituted for "cyclists."

In the British royal family the list includes the Duke and Duchess of Connaught and their daughters, the Princess Louise (Marchioness of Lorne), the Princess Beatrice, who has only recently learned to ride; the Princess of Wales, the Duchess of Fife, the Princesses Victoria and Maud of Wales, the Duke of York and Princess Victoria of Schlesweig-Holstein, eldest daughter of Prince and Princess Christian.

On the Continent there is no better friend to cycling than the King of the Belgians, who takes the most paternal interest in the wheelmen of his dominion.

The Emperor of Germany has just betaken himself to the pastime, and other crowned bicyclists are the King of Portugal, the King of Spain, that daring huntress the Empress of Austria, the King and Queen of Italy, the King of Greece, and last, but not least, the Czar and Czarina, for whom two tandem bicycles have been made in Nottingham, England.

Of Continental princes and princesses devoted to the bicycle, the list would savor of the Almanach de Gotha.

The bicycle craze has invaded the precincts of the Supreme Court of the United States. A member of this august tribunal may be seen almost daily spinning down the asphalt streets of Washington.

The foremen of the New York Department of Street Cleaning have been mounted on bicycles to facilitate their inspection of the streets.

In Brookline, Mass., a sign reading as follows greets the weary rider: "Wheelmen will find drinking water at the right of the church."

Out in the fields of a suburb of Brooklyn, a land improvement company has erected a comfortably covered shed with racks for wheels and a large ice water cooler.

The new Hudson County Boulevard, in New Jersey, opposite the great city, is accessible to New Yorkers, and affords a fine fourteen mile run.

Commercial travelers who do not require to carry many samples are using the bicycle in Texas, as they do not have to wait for trains between towns.

Australia imported \$400,000 worth of bicycles from England last year.

A correspondent in the L. A. W. Bulletin presents the following formula as a proper mixture of oil for lamps: Take a bottle which will hold a pint, fill it two-thirds full of the best lard oil, and the balance with headlight oil, also add a piece of gum camphor about the size of a small egg, which, being broken in small pieces, easily dissolves. This preparation gives a nice white light, does not char the wick, and will not jolt out.

Folding wooden or wicker crates for bicycle transportation can be purchased in Paris for one franc.

The tenth anniversary of the safety bicycle was celebrated by a banquet in London, a short time ago.