

How Far Will Bodies Sink in the Ocean?

The often repeated inquiries which we receive, as to the depth in the ocean at which heavy bodies will float, prove the great prevalence of the error that water is so compressible as to become at certain great depths considerably heavier, by its own superincumbent weight.

If a body be capable of floating at such a depth, it must satisfy two conditions: First—Its specific gravity must be between 1.000 and 1.044. If the specific gravity is not more than 1.000, it will sink at all; and if it be 1.044 or above, it will sink at any bottom less than six miles deep.

In regard to the bodies of which the specific gravity surpasses that of water slightly, so as to come within the range under discussion, they are all very compressible. All kinds of wood, when submitted to great pressure, so that all the pores are filled, attain the specific gravity of the primitive wood fiber, the lignin, of which the specific gravity is 1.400; and they will sink to the very bottom, like water-logged wood.

SIR ISAAC NEWTON'S EXPERIMENTS.—When Sir Isaac Newton changed his residence and went to live in Leicester Place, his next door neighbor was a widow lady, who was much puzzled by the little she had observed of the philosopher.

The gentleman smiled, and then went up stairs, when, after looking through the window into the adjoining yard, he turned round and said: "My dear madam, the person whom you suppose to be a poor lunatic is no other than the great Sir Isaac Newton, studying the refraction of light upon thin plates, a phenomenon which is beautifully exhibited upon the surface of a common soap bubble."

This anecdote serves as an excellent moral not to ridicule what we do not understand, but gently and industriously to gather wisdom from every circumstance around us.—Druggists' Circular.

A NEW SYSTEM OF PRISON CONSTRUCTION.—The Popular Science Monthly describes a new system of prison construction, which has recently been covered by a United States patent. We extract as follows: "The cells are lined with the hardest cast iron, the doors, windows, frames and sashes being of one piece with perforations. As wrought iron is easily cut and filed, there is none of it used. The plates are connected without bolts or rivets. Any attempt of a prisoner to escape by cutting the walls of a cell is checked at once by the hollow wall system. The space in the wall, floor and ceiling is filled with kiln-dried sand, or other mobile material, which runs through an outlet by an opening that might be made, rendering it impossible for any prisoner to dispose of the same. An inexhaustible supply of this sand is furnished by a hopper constructed near the roof of the building or on top of the cells. Brick or wood walls, and single or double iron lining can be used for this system. In addition to the last mentioned plan, an alarm apparatus is connected with the sand, so that any noise or disturbance arising from cutting in any portion of the cell, is instantly heard in any part of the building. There is no limit to the number of places at which such alarms can be given simultaneously. In general, the system is ample and complete in all its details, and is well worthy attention of cities, counties, States and general governments requiring prisons of any grade of construction or cost.

NEW MATERIAL FOR BUILDING.—A material suitable for blocks and bricks is, according to the invention of Messrs. Smith and Patterson, of Glasgow, made from two mixtures. The first contains coal tar, mixed with small broken stones or shingle, a portion of which should be pulverized or mixed with sand, so that the interstices between the stones of larger size may be properly filled up. The second mixture is composed of clay and pitch; sand or chalk may be substituted for the clay. The first mixture is mixed in a mixing apparatus at a heat which is gradually increased until the product is adhesive to the touch. The second mixture is formed by grinding the powder thus obtained, and is added to the first mixture while its particles are adhesive to the touch. The mixture of the two compounds is confined in a close vessel and heated so as to diffuse the vapors uniformly throughout the ingredients. In manufacturing a building block, the material having been tested is removed while hot to moulds, and pressed and shaped as required.—The Builder.

THE GENESIS OF ATOMS.—Dr. Henry Muirhead recently read a paper before the Philosophical Society of Glasgow on "the Genesis of Atoms, Worlds and Sun-spots," in the course of which he argued in favor of the theory that atoms are formed from other molecules from atoms, masses from molecules, and worlds from masses, all matter having originally been of the same character. From the absence of sun-spots in the periods after Jupiter has been at the point in his course nearest to that portion of space through which the sun next travels, he argued that Jupiter influenced the absence of these spots, his explanation of the phenomenon being that the planet at these parts of his course influenced matter floating in space which would otherwise have gone to cause sun-spots. Incidentally in the course of his paper, Dr. Muirhead expressed his belief that the origin of motion was coeval with the origin of matter.

The New Element—Gallium.

We have already in these columns made allusion to the new element named Gallium, which has recently been discovered by M. Lecoq, an amateur French savant. It was discovered through the agency of spectral analysis. Its spectrum is two bright lines in the violet region. One of these, slightly brighter than the other, is in the 417th degree of the scale, the other is at the 405th degree, and both in the place occupied by the brightest lines of zinc. Chemical analysis shows that it is closely related to that metal. It has not yet been isolated, and is known thus far only as a chloride and sulphate.

Up to the present time only a very small quantity of gallium has been obtained, but M. Wurtz, who presented a paper on the subject before the French Academie des Sciences, has given to some members tubes of solution for experiment; and on asking for a commission to examine into the question and to place gallium on the list of simple bodies, the Academy named M. Wurtz himself, joining with him M. Fremy.

Pending the decision of this commission, a question of doubt has been thrown upon the reality of this reported discovery. The Boston Journal of Chemistry alludes to the fact that even indium has not yet been fully established as a new metal, and adds: But we should almost suspect the identity of this supposed new substance with indium: 1. Because, as mentioned in the report in regard to this new metal, the other metals discovered by the help of the spectroscopic, thallium, caesium and rubidium are mentioned, but indium is ignored. 2. Indium also produces two lines in the violet, one very bright and the other more faint. 3. Indium was also obtained from zinc blende, namely, that of Freiberg in Saxony. 4. Indium has thus far only been obtained in small quantities, and its properties have been imperfectly studied thus far; as it forms a new field for investigation, we are surprised that Prof. Wurtz, so famous in new researches, appears to ignore it.

If the accounts are correct, however, gallium differs from indium in this respect, that an excess of ammonia redissolves the precipitate of hydrated oxide of gallium first formed, while in the case of indium the precipitate of its hydrated oxide is not redissolved by an excess of ammonia. We look with interest for further reports regarding this supposed 65th element.

Engines for Steep Grades.

On railroads where steep grades have to be overcome, it has been the general practice to detach the locomotive and to haul the train up the incline by the aid of wire ropes moved by a stationary engine placed at the top of the hill. If the grade is not too severe, the locomotive is commonly able to take itself up the incline. Where this is possible, two novel modifications of this idea have been introduced, and the locomotive takes the place of the stationary engine. In each system a rope and winding drum is used. In one the drum is fixed on the engine, in the other the drum is fixed at the top of the incline. By the first method the engine is provided with gripping struts that, on being let down, grip the rails and anchor the engine securely. The winding drum is fixed to the frame of the engine, and has the wire rope wound up on it. On reaching the foot of the grade, the engine is detached from the train, the end of the rope is secured to the first car, and the engine mounts the incline to the top, or as far as the rope will permit. The gripping struts then anchor the engine, and, on applying power to the drum the train is hauled up. If the top of the grade is not reached, gripping struts are applied to the cars, and the engine goes and repeats the operation. The grade being overcome, the engine is again coupled and the train continues its journey. By the other system, the winding drum is fixed in a sunken pit at the top of the incline, and is provided with a wire rope for dragging up the train. This winding apparatus is provided with four driving wheels coupled in pairs, and so placed as to have their upper surface just level with the tracks. A gap is left in the rails over each wheel, so that it may turn freely. On reaching the foot of the incline, the engine mounts the hill alone and runs over the winding drum till its four driving wheels exactly coincide with the wheels of the drum. In fact, it rests upon them, and is locked in that position. The wire rope meanwhile is secured to the train. On starting the engine the driving wheels turn those it stands upon by friction, and in place of moving upward it stands motionless and turns the winding gear. By this simple means the train is dragged up the incline till it rests upon the higher level. The engine is then unlocked, and joining its train on the main line, it resumes its duty. On descending the grade, both train and engine are lowered in safety by the rope under the control of a brake on the winding drum. Both of these systems are still in the experimental stage.—Scribner's World's Work.

STREET RAILROAD TRANSIT.—The municipality of Paris, though slow in adopting street railroads, seems to be making rapid improvements in motors for propelling the cars since such railroads have been adopted. Successful experiments were first made on a line between Porte Maillot and the bridge of Neuilly with a new machine driven by compressed air, which took the cars at a high rate of speed with a small power, and with easy management in quickening, slowing or stopping. More recently successful experiments have been made with still another dummy, driven by steam and with coke as a fuel, the inventor being Mr. Harding, an Englishman. As one experiment with it the Correspondance Havas says: "A car containing forty-four persons, all of them comfortably seated, was drawn by this dummy from the Place St. Germain-des-Pris, over the line of the southern tramways of Paris through the Rue de Rennes, the Boulevard Montparnasse, the Avenue d'Orleans and the Avenue de Chastillon, to the fortifications. The trip occupied sixteen minutes going (up hill) and twelve returning, and was performed at the rate of twelve kilometers, or about seven and a half miles an hour. The speed of the dummy was completely under control; the car was stopped and set in motion more easily than with horses, and the horses in the street were not in the least disturbed by the engine. The authorities expressed their entire satisfaction with the experiment."

INDUSTRIAL TRAINS.—Mr. David Robertson, 79 Robertson street, Glasgow, Scotland, has written to the railway commissioners recommending as a means of preventing the personal injury and damage to property which result from railway collisions, that passenger carriages should be constructed of strong vulcanized india-rubber, which he says, can be moulded up to any thickness and degree of elasticity. The carriages would be round at the ends in place of having buffers attached; and these convex ends would become concave in collision, but would not jerk the carriages off the rails like buffers. He proposes that the train should be united by a wire rope passed through eyes underneath each carriage to a winch on a brake behind, which would tighten it up to any tenacity.

S. F. MARKET REPORT.

GENERAL MERCHANDISE.

WHOLESALE. WEDNESDAY M., December 29, 1875.

Table listing various commodities such as Flour, Beans, Coffee, Tea, and other goods with their respective prices and market status.

DOMESTIC PRODUCE.

WHOLESALE. WEDNESDAY M., December 29, 1875.

Table listing domestic agricultural products such as Wheat, Corn, Beans, and other crops with their market prices.

FRUITS AND VEGETABLES.

WHOLESALE. WEDNESDAY M., December 29, 1875.

Table listing various fruits and vegetables such as Apples, Peaches, and other produce with their market prices.

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