ARCHAEOLOGICAL RELICS FROM THE SEA.

BY FERDINAND WORTHINGTON.

In 1907 a Greek sponge-fishing craft discovered, three miles off the coast of Madhia between Sousse and Sfax, at a depth of about 150 feet, the wreck of a vessel some 100 feet long and 20 feet beam. The cargo of the sunken vessel consisted of sixty columns of white marble arranged in six rows, the columns being topped with Corinthian or Ionic capitals, and otherwise painstakingly and artistically carved. Furthermore, there were several statues.

M. A. Merlin, Director of Antiquities, of Tunis, has advanced the theory that the vessel was an ancient galley which had left Greece, bound probably for Italy. Contrary winds had driven it on the coast of Tunis, where it foundered at a time which may be approximately placed at about the beginning of the Christian era.

The relics which have been brought to the surface from this ancient wrecked ship are undoubtedly of Greek origin. Several bronze statues have been recovered. One of them, a figure of Eros, is thought to be a replica of the Eros of Praxiteles. There is also a Hermes of Dionysus, fragments of candelabra and of beds, also a statuette about 14 inches high, which might have served as a lamp, for the head is hollowed out to form an oil well.

The marble relics are more numerous than those of bronze. They comprise capitals of various decorative designs; drinking cups embellished with Bacchic bas-reliefs which remind one of the celebrated Borghese vase of the Louvre; statuettes, busts, and the like. One column which was brought ashore measures 13½ feet in height, and nearly 2 feet in diameter at the base.

It may be stated that this artistic treasure trove of the sea was recovered at the expense of the Tunisian and French governments, the Académie des Inscriptions et Belles-Lettres, and several wealthy gentlemen. The French navy assisted in bringing the material to the surface. The divers employed were Greeks who had forsaken their calling of sponge fishing to devote themselves to the more artistic vocation of fishing for statues. All the objects which have been recovered will eventually find a place in the Bardo Museum at Tunis.

A Pure Air Law for Workmen.

BY C. M. RIPLEY.

It costs money to purify anything. Whether it be the Panama Zone that must be made habitable, or a political situation which requires a housecleaning, all of these worthy enterprises require considerable expenditure and there will always be found some who protest. Even our worthy pure food law came in for its share of complaint, and now we learn that the New York labor law requiring a supply of fresh air for the employees of workshops and factories is being subjected to some criticism.

The law reads as follows:

"The owner, agent or lessee of a factory shall provide, in each work room thereof, proper and sufficient means of ventilation, and shall maintain proper and sufficient ventilation; if excessive heat be created or if steam, gases, vapors, dust or other impurities that may be injurious to health be generated in the course of the manufacturing process carried on therein, the rooms must be ventilated in such a manner as to render them harmless, so far as is practicable."

Mr. William W. Walling, chief factory inspector for the State of New York, interprets the law as follows:

"As defined by Dr. John S. Billings, perfect ventilation means that any and every person in a room takes into his lungs at each respiration air of the same composition as that surrounding the building, no part of which has recently been in his own lungs or those of his neighbors, or which consists of the products of combustion generated in the building, while at the same time he feels no currents or drafts of air, and is perfectly comfortable as regards temperature, being neither too hot nor too cold. How much air is required to meet these conditions? Not less than 2,000 cubic feet per hour for each person, with the same amount per hour for each cubic foot of gas consumed whether for light, heat, or power."

Some landlords in New York city have put forth the claim that the amount of fresh air specified by the Department of Labor was an "arbitrary quantity." Several authorities on the subject of ventilation who have been consulted in the matter and who are also entirely disinterested agree that 2,000 cubic feet per hour per person is common practice and is based upon definite laws or rules which have been followed for many years in the design of ventilating systems.

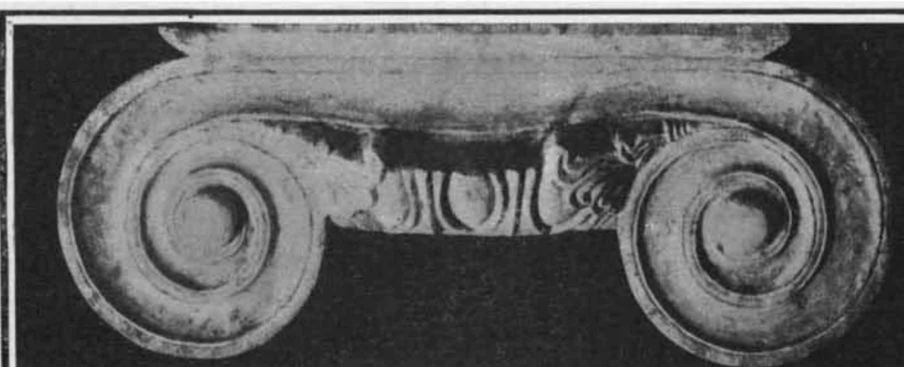
The "Architects' and Builders' Pocketbook," written by Mr. Frank E. Kidder, C.E., Ph.D., states (and this book is an authority and therefore a record of current practice) that 1,800 cubic feet per hour per child should be the standard for school buildings, this amount being required by law both in Massachusetts and New York. It further states that in buildings more closely packed, and occupied for a longer period, the air supply should be from 2,000 to 2,500 cubic feet per hour per person. In giving an example of a school room of certain dimensions, he shows that the standard amount of air would result in the air in the room being changed about eight times per hour—which certainly does not appear to be an excessive amount.

Since the above applies only to buildings where people sit quietly, or for buildings where only children congregate, it is difficult to see how the representatives of the New York Department of Labor can justly be accused of any "arbitrary" action in interpreting the meaning of "proper and sufficient" ventilation.

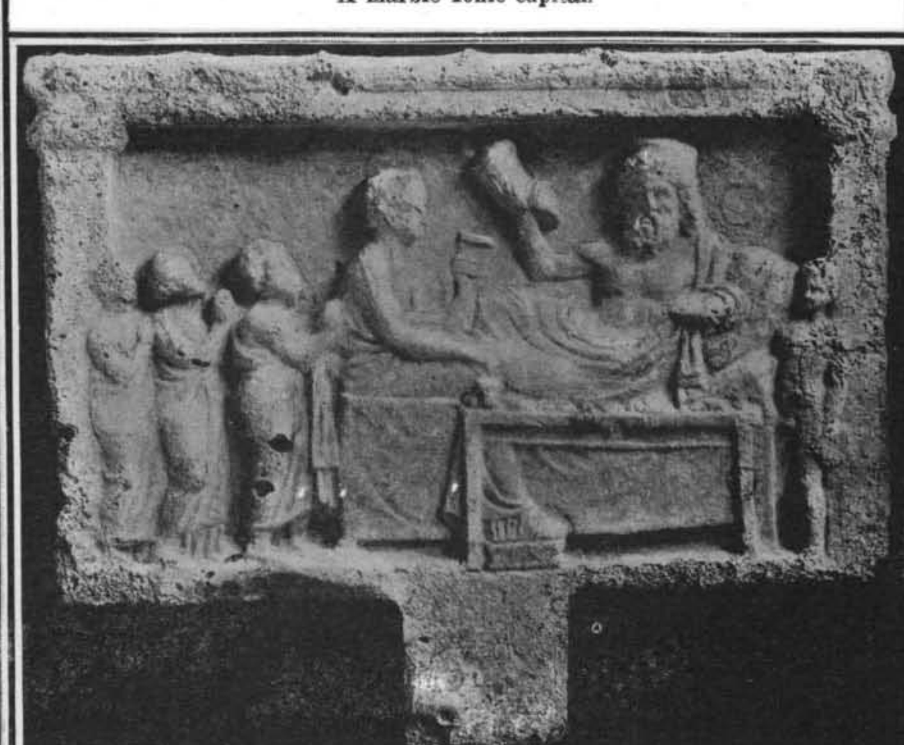
Mr. Percival Robert Moses, consulting, heating and ventilating engineer of New York city, states that he has found the rate of 2,000 cubic feet per hour per person a satisfactory and conservative working basis.

In a loft 25 feet wide and 100 feet long, containing

A bronze Hermes.



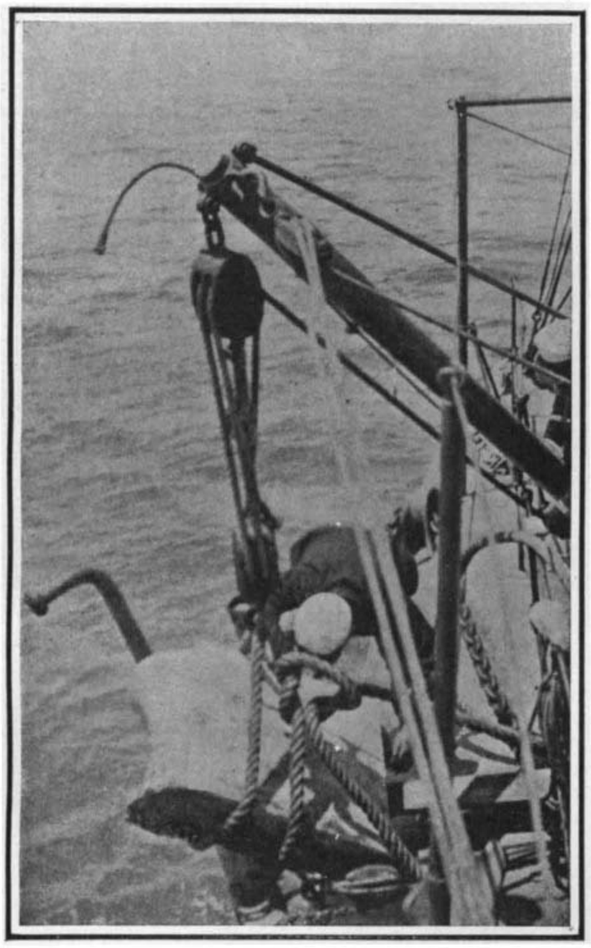
A marble Ionic capital.



Marble bas-relief depicting a funeral banquet.

A bronze statue of Eros.

ARCHÆOLOGICAL RELICS FROM THE SEA.



Fishing for archæological relics.

80 workmen, and lighted with electricity, the amount of air required would be $80 \times 2{,}000 = 160{,}000$ cubic feet per hour. This amount of air per hour would move at the rate of about 1/8 of a mile per hour, and would be sufficient to change the air in the loft six times per hour, assuming a 10-foot ceiling. Since the Massachusetts and New York State laws for school rooms require eight changes per hour, and since some authorities recommend even 50 per cent in excess of this, it appears that the action of the factory inspector hardly comes within the definition of the word "arbitrary" which in the Standard Dictionary means "done capriciously" or "without adequate determining principle," or "non-rational," not done according to reason or judgment; depending on the will alone; tyrannical; despotic; not fixed by rule.

The operating cost for a ventilating system is made up of two items: (1) Power for turning fans; (2) additional heat for incoming air. In a loft building where the tenant will pay for the power, the expense will automatically be divided and the landlord will pay for the extra heat required, since heat is included in the rent. It will also be noticed that again the adoption of electric lighting will cut the bills for operating expense to a remarkable degree. This cut in expense will affect the tenant, since a much smaller ventilating motor will be required, and it will also affect the landlord because less air will have to be drawn in, and hence the cost for heating would be diminished.

In large systems the services of an expert heating and ventilating engineer would probably prove valuable, and it is possible so to design the equipment that a judicious "recirculation" of the air from halls and basements will effect an economy in the fuel bill. This air is seldom impure and requires much less heat than if cold air were brought in from outside. It is also possible in buildings where high-pressure steam is available, or where boilers which have been run at low pressure can be run at a higher pressure, to adopt the following policy: Provide steam engines to operate the fans and turn the exhaust steam into the heating coils—thus getting a double use out of the steam and cutting down the electric bill. This idea could be carried still further in many instances, and economies could be made (especially in the winter) by abandoning electric pumping, again lowering the electric bill. This is the stock argument of the advocates of isolated plants, who contend that great economies result in buildings of a million cubic feet or more if engines are installed and electricity is made on the premises. It is a fact that steam at high pressure only contains about 6 per cent more heat than steam at low pressure. Thus the argument that electricity can be made and a building heated with exhaust steam is advanced. The layman does not appreciate one very peculiar fact about steam: that at five pounds pressure it is only about 6 per cent cheaper to make than at 100 pounds pressure, showing that the cost does not increase in proportion to the pressure.

In the future it is probable that factories and loft buildings will be equipped with ventilating apparatus at the outset, with the ducts concealed in the walls and the fans located in the basement. A model building of this character has recently been completed in New York city, in which the landlord at the time of construction had the ventilating system installed at his expense, after the design of a prominent consulting engineer. Thus the cost of operating a system and the responsibility of maintaining it in good condition does not rest upon the tenant.

It is natural during this transition period and before the betterment of the standard of building construction has become general, that some differences are bound to arise between the Factory Inspection Bureau and the landlords and tenants. It is to be hoped that this condition is but temporary.

In the report of the United States Bureau of Labor at Washington, D. C., it is shown that deaths among factory workers due to consumption, were divided as follows:

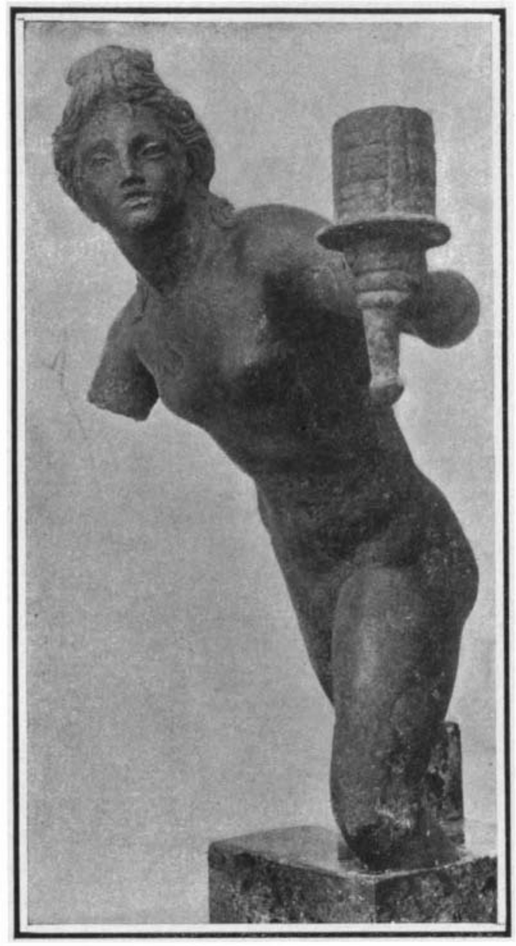
Employees exposed to metallic dust...36.9 per cent
Employees exposed to mineral dust...28.6 per cent
Employees exposed to vegetable fiber dust ....24.8 per cent
Those exposed to animal and fiber dust.32.1 per cent

The occupation showing the highest consumption mortality was grinders, among whom 49.2 per cent of all deaths were from that disease.

An ingenious conclusion was reached by Mr. Frederick L. Hoffman, of the Prudential Life Insurance Company, based on this report. It is his opinion that by intelligent methods of ventilation and dust removal the consumption death rate among the wage earners would result in an annual saving of 22,238 lives. This would add, quoting the Engineering News, 15.4 years of life for every death from consumption avoided by rational conditions of industrial life. Such a gain would represent a total of 342,465 years of additional lifetime, and by just so much the industrial efficiency of the American nation would be increased. Placing the economic value of a year's lifetime at only $200, the total average gain to the nation would be $3,080 for every avoidable death of a wage earner from consumption, representing the enormous total of $68,493,000 as the annual financial value clearly within the range of practical attainment. Therefore, nothing within reason should be left undone as a national, State, and individual or social duty to prevent that needless but now enormous loss of human life from consumption due to the unfavorable conditions in American industry.

None will deny that the efficiency of workmen varies with their good health and comfort. Slight physical ills are prevented by better surroundings, and the loss to the employee due to absences, or brain made stupid by breathing foul air, are immediate losses to the employer through lowered efficiency, and later involve a loss of trained employees and the necessary breaking in of green help.

Dancing menad, a fragment of a marble vase.



Bronze lamp.

ARCHÆOLOGICAL RELICS FROM THE SEA.

The Technical Utilization of Platinum.

Platinum is one of the most important substances used in modern industry. Its resistance to attack by strong sulphuric acid makes it a suitable material for the vessels employed in concentrating the dilute acid of the lead chambers, and until recently, states Umschau, platinum vessels were always used for this purpose. Its permanence in the air makes it suitable for contacts in electric bells, induction coils and the like, its resistance to the action of chemical reagents causes platinum to be employed in the construction of crucibles, evaporating dishes, scale pans, etc., as well as electrodes for experimental and technical electrolysis. Platinum is little affected by heating to a very high temperature and it is consequently used in the construction of electric resistance furnaces, in which temperatures exceeding 1,800 deg. F. are attained, and in Le Chatelier's pyrometer for the measurement of high temperatures. Another property of platinum which is of great practical importance is the approximate equality of its coefficient of expansion by heat to that of glass or porcelain. A platinum wire fused into a glass vessel will not produce cracks or leakage by unequal contraction in cooling or unequal expansion in subsequent heatings. This property is utilized by the makers of incandescent electric lamps, the carbon filaments of which are connected with the external circuit by short platinum wires, fused through the glass bulbs. For a similar reason the attachments of artificial teeth are made of platinum wire, which is baked with the porcelain mass in the kiln. Finally, the catalytic properties of platinum are utilized in various chemical industries, especially the production of sulphuric acid by the contact process, and in the construction of self-lighting gas burners, etc.

The Rising of the Aral Sea.

The rise which has been noticed in the Aral Sea is a difficult one to explain. It will be remembered that this body of water is one of the greatest lakes in the world, and in some places it has a depth of 220 feet. It receives the water of two large rivers, the Amu-Daria and the Syr-Daria, which bring to it about 2,000 cubic yards per second. During the last century it appears that the level of the lake has varied considerably. Starting from the middle of the century, we find that the level was lowered during 30 or 35 years, and this condition prevailed until after 1880, bringing about changes in the contour of the lake, and the islands became larger. However, we find that in 1899, when Berg explored the lake, it was now rising and had reached a much higher level, so that it overflowed some of the islands, and these had to be abandoned. On shore the railroad tracks had to be moved. The rise in the lake lasted until 1908, and we find that from 1880 to 1901 the level of the lake rose about 6.6 feet. Besides the Aral Sea we find that other lakes of the same region have also risen, so that the region of central Asia is far from undergoing a gradual drying up, as was supposed. Given the mean depth of the lake as 52 feet, the rise of 6.6 feet gives the addition of a mass of water representing one-eighth of the lake's contents. At the Barnoul observatory the rainfall is found to have kept at about the same point since 1875, so that we are at loss to explain the rise of the lakes in this region. In ancient epochs we find similar phenomena in different lakes as determined by geologists, but like the present one they appear to be unexplained.