Notes and Queries.

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

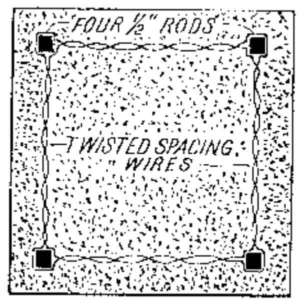
(9965) R. B. asks: Could you please tell me why a lamp chimney becomes heated when placed on a lighted lamp, glass being diathermanous for luminous rays of heat? A. A lamp chimney becomes heated because there is a hot mass of matter inside it. So does the earth's atmosphere by the sun's rays. The atmosphere absorbs about 40 per cent of the rays of the sun, so that they do not reach the earth at all. The flame of a lamp is luminous from solid particles of carbon in the flame. This radiates heat. The glass intercepts much of that heat, and by this it is itself heated. There is no substance which can transmit all the heat which strikes it. Glass becomes hot in the sun's rays.

(9966) H. N. asks: The ground is frozen about two feet deep in winter, and water pipes buried four feet and imbedded in sawdust are secure from frost; but in spring, when the surface of the ground for several inches deep has turned to mud and the air is quite warm, the troubles begin with the pipes freezing. I am told that the frost travels downward when warmed above. What is the scientific explanation? The warmer the weather gets, the worse the pipes freeze. A. We have never before heard of the phenomenon you describe, that frost penetrates the earth deeper in the spring after the surface begins to thaw. We suggest certain considerations which may help to a solution of the problem. Ice is a non-conductor of heat. When the surface of a lake is covered with ice, freezing of the water on the under side of the ice goes on very slowly. The same is true of the earth under snow and ice or frozen ground. Hence the frost does not penetrate as deeply as it would upon an open and dry surface of ground. After the surface snow or ice has thawed, the earth and frozen ground below are still several degrees below freezing, and as the cold water from the surface settles into the earth deeper and deeper, it freezes again below the frost line, when the ground was covered with a solid layer of ice and snow, which protected it from deep freezing during the winter.

(9967) C. W. B. asks: 1. Will you kindly answer through the columns of your valuable paper the following question: Specific gravity of a liquid showing 60 deg. gravity by Baume hydrometer and temperature 60 deg. F. Would that be 0.6 gravity, or is it 60-180 gravity, 180 being the difference between the point at which water starts to freeze (32 deg.) and starts to boil (212 deg.)? If neither, will you kindly explain what per cent 60 gravity would be by the Baume hydrometer? A. The Baume scale is graduated in equal spaces. It does not give specific gravities at all. A different scale is used for liquids heavier than water from what is used for liquids lighter than water. Thus 60 deg. Baume would be a specific gravity of 1.652 for a substance heavier than water, and 0.745 for a substance lighter than water. There are two 60 deg. in the Baume scale. 2. What is the atmospheric pressure to the square inch on the top of Pike's Peak? At what temperature does water start to boil on the Peak? A. Pike's Peak rises 14,147 feet above the sea. When the barometer is at 30 inches at sea level and the thermometer at 32 deg., at the top of Pike's Peak the barometer would stand at 17.5 inches, and water would boil at 185.9 deg. F. The pressure of the atmosphere under the same conditions would be 8.575 pounds per square inch.

(9968) G. B. asks: Is there a Portland or a hydraulic cement made which on being mixed with the proper proportions of sand and water can at once be dropped into the bottom of a lake of water and will set and harden there just as good as though it were used above water? Is there a hydraulic lime for such purpose? A. Replying to your inquiry, we would say that there are several hydraulic cements and lime which will harden under water in the manner you describe. Hydraulic lime is like common lime except that it will harden under water. Artificial lime can be made by mixing together in suitable proportions thoroughly slaked common lime and unburnt clay, tempering the mixture with water, and then burning it in the form of bricks or rounded balls in an ordinary lime kiln. With mortars of hydraulic lime the volume of sand should not be less than two times that of the lime paste, in order to secure the best results regardless of cost. The usual proportions are, however, the same as in common mortars. Hydraulic cements, in mortars of proportions varying from one part cement and two parts of sand to one part cement and four parts sand, set better and attain a greater strength under water than in the open air; in the latter, owing to the evaporation of the water, the mortar is liable to dry instead of setting. This difference is very marked in dry hot weather.

(9969) R. L. B. says: I have been using cement and concrete for fence posts, but have found these posts so weak and brittle that they were useless. I have heard that cement may be used successfully for this purpose. Please explain to me how this may be done. A. In reply to your question, we would advise you to use concrete and not cement, as the former is much cheaper. We would recommend the following mixture for your gate posts: 1 part Portland cement, 3 parts sharp sand, 5 parts fine crushed stone or clean gravel. In order to give the posts the necessary strength, whether they are made from concrete or cement, it will be necessary to reinforce them with steel rods. This can be done by means of a good-sized rod passing through the center of the post, or better by means of four smaller rods placed near the four corners of the post, as in manner indicated in cut. If four rods are used, it will be necessary to employ some device to keep the rods properly spaced as the concrete is tamped into the mold. A simple method would be to use strong twisted wire spaced so as to come either end of post, and also in the middle if the post has considerable length.



(9970) R. D. O. says: I would like to have you tell me whether it is practicable to build a fireplace out of concrete. Will it withstand the action of fire as well as brick? How thick should the walls be to protect the studding in the adjacent walls, as it is to be built in a finished house, and the woodwork cannot be made to accommodate it? A. Concrete will not stand the heat of a fireplace, due to the fact that after it is thoroughly dried out, as it will be in such a place, it will tend to crumble away. It may be used around a fireplace very satisfactorily, provided the portions of the fireplace which are in contact with the fire in any way are protected by a lining of firebrick.

(9971) A. A. T. says: I want to know how to mix up Portland cement, and what to put in it to make concrete plaster 1½ inch thick, 12 inches wide, and 4 feet long, to hold up a weight of 150 pounds, the plates to be supported at each end. Would it be advisable to make them with a support underneath? I want to make something that will do away with lumber for greenhouse benches. A. It will be possible for you to use concrete slabs of the size you mention; but, in order that they may support the weight you intend placing on them, it will be necessary for you to use at least two pieces of one-half inch round or square iron through the slabs. The proportions for you to use are: 1 part Portland cement, 2 parts clean sharp sand, 3 parts fine crushed stone. In order that the rods may be held in place while in the mold, it would be better to wind stiff wire around them so as to keep them properly spaced.

(9972) L. H. H. asks: 1. What size spark ought an induction coil give in order to give satisfactory service on a one-mile wireless telegraph "line"? A. A coil giving a 4 or 6-inch spark will work over a distance of one mile for wireless signals under ordinary circumstances. You will find a 4-inch coil described in Supplement No. 1527, and one for a 6-inch spark in Supplement No. 1124, each 10 cents. 2. What is a polarized relay? A. A polarized relay is one with permanent magnets, so that the armature is easily drawn over as soon as the current starts. 3. Would a 150-ohm relay such as used on commercial lines work on the above-stated wireless telegraph line? A. We think a 150-ohm relay will be sufficient for a distance of one mile.

(9973) J. C. L. writes: In answering question No. 3 of No. 9938 under Notes and Queries in your issue of April 7, page 294, it is necessary for your reader to have clearly in mind the meaning of the word "tide." The word *tide* as used by sailors at sea means *horizontal* motion of the water; but when used by landsmen or sailors in port, it means *vertical* motion of the water. The primary phenomenon of the tides is, after all, the tidal current, for it is the tidal currents that are referred to on charts, where we have arrowheads and co-tidal lines. They begin from slack water, or no current, and requiring three hours to attain a maximum as given, they immediately slack off again during another three hours, until another slack water is reached, and so on, making four times of slack water every lunar day. In the Caribbean Sea we have practically no tide the year round, the vertical motion never exceeding ten inches when free from wind effects. Where tidal currents come from opposite directions and meet we have the heaped-up effect, with scarcely any tide at all, seen at a point on the southeastern coast of Ireland and on Vineyard Sound between West Chop and East Chop just before you get to Cottage City. The average maximum tide at East Chop is only about nine inches, and at West Chop is even less than that; so much so, that we often find the water higher at low tide than at high tide. This is due to the wind driving the water to a greater height than the height due to the tidal effects. Although the tide is so small, the current is considerable. It is because the tides work in both directions, that the currents there are so treacherous. Along East Chop the tide will be running out on one side of the shoal and coming in at the other, thus producing a cross current over the shoal which causes a great many disasters. A. Certainly the word "tide" has a large number of meanings. It implies three days or a week in "Whitsuntide" and the holidays in "Christmastide." It applies to the motion of water in "ebb" and "flood" tide, and to currents generally in such phrases as a "strong tide." But there can be no doubt that the general sense which admits of no misapprehension is the astronomical sense of the rise and fall of the water in the semi-diurnal motion of a wave over the oceans of the earth. In this sense we always use the simple word; if we wished to refer to a current, we should say a tidal current. We have usually found seafaring men employing the word in the same sense as we have employed it. Indeed, we often find our language colored by the long experience we have had at sea and among sailors. Our correspondent in his letter uses tide and tidal currents in the same senses as we do. The instances he gives are of interest, and are the ones we should have cited had we gone more fully into the subject than we did

(9974) A. J. K. asks how to make solid emery paper. A. Emery paper is frequently found lacking in retaining an equal efficiency, the fresh parts biting too much, and the paper getting soon worn through in many places. Emery has been tried on linen, but with little success. A paper or board has been recommended in which emery enters as a constituent part. It is advised to employ fine and uniform cardboard pulp, with one-third to half its weight of emery powder thoroughly mixed with it, so that the emery may be equally distributed. The mass should be poured out into cakes of from 1 to 10 inches in thickness. They must not be pressed hard. Such a paper, it is said, will adapt itself to the form of the articles and will serve until completely worn out.

(9975) G. W. S. asks: 1. What causes the percentage of oxygen in the air to remain constant when such enormous quantities are being constantly consumed by animals and direct combustion? A. The plant world takes the carbon dioxide which animals exhale and breaks it up again, forming other products and restoring the oxygen to the air again. The processes of nature balance, and there is as much decomposition as there is formation in the long run. 2. Will not a given tank or reservoir empty itself more rapidly of water if provided with a vertical outlet pipe extending in a downward direction and of considerable length, than if provided with the same size hole discharging directly into the air? Would not the increasing velocity of the water as it falls through the pipe cause a partial vacuum in the upper part of the pipe, thus drawing the water out of the tank more rapidly? A. The quantity of water discharged through a vertical pipe is not increased by lengthening the pipe. As the velocity of the falling water is increased, the stream leaves the sides of the pipe and has a smaller cross section. Thus there is an air space around the water in the lower part of the pipe, and the water does not fill any vertical pipe through which it flows freely. You could not draw water out of the side of such a pipe. This would prove that the pipe was not full of water. There is no pressure on the side of such a pipe.

NEW BOOKS, ETC.

Bookkeeping by Machinery. By Erwin W. Thompson. New York: Published by the Author, 1906. 8vo.; pp. 176.

While manufacturing establishments undoubtedly seek to install the latest and most highly perfected machinery in their shops and factories, these same corporations seldom trouble themselves to similarly eliminate hand work in their offices. They appear to look upon the employment of an army of clerks as a necessary evil. In the latter case the use of machines has been mostly limited to typewriters, letter presses, duplicating machines, and an occasional adding machine, and not many offices have their mechanical devices properly co-ordinated. "Bookkeeping by Machinery" is the title of a new book, which describes the use and co-ordination of the various means of mechanical computation now on the market, and shows that much of the drudgery of bookkeeping may actually be performed by machinery in a more accurate and rapid manner than by hand. The book is barely free from the general tendency, conscious or otherwise, to lapse into catalogue phrases, but produces the impression of having been written from the standpoint of the user rather than the maker of the machines.

Asphalt Industrie. By Felix Lindenberg. Vienna: A. Hartleben's Verlag, 1906. 12mo.; 46 illustrations; pp. 320. Price, $1.50.

The author has undertaken in this book to describe in an extended manner the characteristics and the production of natural as well as artificial asphalt, and has included discussions of the manifold uses of which this material is capable. The description of the value and practicability of asphalt in connection with building operations is as thorough as the importance of this aspect of the subject warrants. He also includes an entire series of uses of asphalt, which serve as the foundation for other and different industries, such as, for instance, the manufacture of tiles and insulating plates, of tubes of asphalted paper or wood, of pavements, etc. This book will doubtless prove its value to the asphalt manufacturer and user, as well as the technical man in other fields of industry.

Chemistry of the Proteids. By Gustav Mann. London: Macmillan & Co., 1906. 8vo.; pp. 606. Price, $3.25.

This elaborate and thorough book on this interesting and important branch of chemistry, while based to a great extent on Cohnheim's "Chemie der Eiweisskörper," is nevertheless, largely original, particularly in the later developments of this abstruse subject. While much of the contents is interesting purely from a scientific standpoint, the work will be found of value in many industries dealing with chemistry. The author's experience in his profession and his familiarity with the latest productions and developments therein have enabled him to write a treatise which is not only thorough, but which is clear and as concise as the magnitude of the subject permits. The author's references to quoted authorities are carefully executed throughout.

Heat and Light from Municipal and Other Waste. By Joseph G. Branch, B.S., M.E. St. Louis, Mo.: William H. O'Brien Printing and Publishing Company, 1906. 8vo.; pp. 305; 56 illustrations.

It is undoubtedly true that despite vast expenditures of money, many of our American municipalities are far behind those of Europe in the solving of economic problems concerning the safety and health of their citizens. Particularly is this true in the case of the disposal of municipal and other waste, and the importance of the subject is commensurate with the fact that there is no more serious menace to the health of any community than its refuse. The author of this book deals with the subject from the standpoint of the statistician, the investigator, and the expert, and furnishes many valuable suggestions, not only for the improvement of existing methods and systems, but for the development of others as well. That these improvements are of the most pressing necessity can be gathered from the fact that the disposal of refuse in foreign cities rarely exceeds one cent per capita, while in only one American city, New York, is this figure even approached. In the latter case the cost is two cents per capita, while in the remaining large cities of the United States the cost ranges from twenty-three cents to forty-four cents. The reason for the great difference is the utilization or lack of utilization of the incinerated wastes for the production of heat and light.

Modern Machine-Shop Construction, Equipment, and Management. By Oscar E. Perrigo, M.E. New York: The Norman W. Henley Publishing Company, 1906. 4to.; pp. 343. Price, $5.

This work, which goes into the matter of building, equipping, and managing a modern machine shop or manufacturing plant, is a large and interestingly-written volume illustrated with over 200 detailed diagrams. The book is in three parts, the first of which treats of the construction of such a shop and describes and illustrates buildings of approved form and arrangement. The second part deals with the equipment of the shop with modern tools, machines, and appliances; and the division of the plant into the proper departments for administrative and mechanical purposes. Part III. treats of the all-important question of management, and discusses some of the so-called management and time-and-cost systems, while at the same time putting forward a plain, concise, and accurate system of this kind which may be economically administered and which will give all the important information necessary for operating a business with financial success.

Much of the subject-matter of the book was originally published in Machinery, The Iron Trade Review, and The Foundry, and was read with much interest by practical men engaged in manufacturing enterprises. Besides revising and rewriting a considerable portion of this material, the author has added ten new chapters. The work will be found of great value to manufacturers and practical shop men, as well as to technical students in the pursuit of information on the subjects of which it treats.