cause of the absence of a dense atmosphere such as the earth has, but not less real for that reason. 2. Is space limitless? It cannot be conceived it has limits, as the mind would inquire what is beyond. Yet every object occupies a fraction of space, and as a fraction is only conceivable in reference to a whole, it would seem that there is a limit; what is the philosophical explanation? A. As to space we know little, and speculation can teach nothing. To a scientific mind it seems fruitless to discuss what can never be settled by discussion. Astronomers now believe there is an end to the worlds in space; but belief is not knowledge. We may know some time, but not till we go beyond the flesh and sense.

(9781) M. O. C. asks: Please give me the difference between a whip-poor-will and the bull-bat; the zoological and common name of each bird, and to what genus each belongs? And if the bull-bat is the same bird as the nighthawk? Also give the distinction between a catamount and a wild-cat. Which, if either, has the long tail? A. The bull-bat and the nighthawk are different common names for the same bird. The scientific name of the bird is *Chordeiles Virginianee*. The scientific name of the whip-poor-will is *Antrostomus vociferus*. The genus of anything is indicated by the first word of its scientific name; the species, by the second word of its name. A catamount is another name for the cougar or mountain lion. A wild-cat is a lynx. It has a short tail, and most of the species have a tuft of hair on the tip of the ear.

(9782) M. F. S. says: 1. Would you kindly explain the real meaning of the word "watt"? One says that a 16-candle-power lamp takes 56 watts, say 60 watts for convenience, per hour. If it takes 60 watts per hour, it should take 1 watt to light it for 1 minute. Yet we all know that it takes the full 60 watts to light it even for one second. A 300-watt dynamo does not give 300 watts per hour, it gives them all the time; if such a dynamo were connected with a watt-meter, would the watt-meter register 300 watts after an hour? A. A watt has no reference to time. It is the unit of electric power. And just as a horse-power works right along, a second, an hour, or any other time and is the same horse-power, so the watt is the same for any time. If a lamp requires 60 watts to light it, it will require the 60 watts for a second just as really as for a whole day. What is paid for on the watt-meter is the watt-hours. If 1,000 watts are used for one hour, that is a kilowatt-hour; and if for ten hours, the consumer must pay for ten kilowatt-hours. This too is just the same as the horse doing work. If one hires a horse which might do a horse-power of work, he will pay for the same horse working for the entire time which he does work. The idea seems simple. 2. Does the sun have any direct influence upon the weight of objects on the earth? Example: Will an object be theoretically heavier at midnight than at midday? A. The weight of objects does not vary from noon to midnight because of the position with reference to the sun. The change of distance from the sun in that time is so small as compared with the immense distance of the sun as to be of no value at all.

(9783) J. S. asks: 1. How does the last part of our names originate? A. The surname, or family name as it is at present, is a name added to and above (*sur*) the individual name. These often denoted the occupation of the man at the time the name was taken. An example is John Smith, or John the "smith." When the peasantry had but a single name, it was well nigh impossible for the officers of the law, or the crown, to locate the man wanted, as one can easily see by considering the case at present. It is far easier to locate a particular John Smith even than a particular John. There are many more Johns than there are John Smiths. Under these circumstances the authorities compelled the adoption of a second name, which was often arbitrarily given, and so we have names of birds, places, colors, and many others as family names. 2. Is it air buoyance that causes the stocks of wheat to be stronger against the wind than if the stocks were solid? A. There is a very common misapprehension regarding a hollow shaft, such as a grain stalk, or a bone, quill, or other tube. A stalk of wheat or a bone is not as strong as if it were of the same *size* and *solid*. It is stronger than if it were of the same *weight* and *solid*. In other words, a given amount of material can be made into a stronger shaft by giving it the form of a hollow cylinder than to make it a solid rod of any shape. It is the stiffness and elasticity of a grain stalk which enable it to stand up against the wind. 3. Can a body be charged purely positively or negatively? Must there not be a little negative electricity in a body that is supposed to be charged positively, and *vice versa*? A. A body is charged positively by giving it an excess of positive electricity. Only as much negative electricity is removed as there is positive electricity communicated to the body. If more positive electricity should be given to the body, more negative electricity would be removed. 4. Why is the negative pole of a medical battery stronger than the positive? That is, stronger to the feelings. A. We were not aware that the negative pole is stronger than the positive pole, to the feelings even, and can give no reason for it. 5. I notice water is a better conductor when hot than it is when cold. Can you give a reason? A. We have never measured the resistance of water at various temperatures, and cannot give any reason why hot water should have less resistance than cold water. 6. Can you give a scientific explanation of the famous painting entitled "In the Shadow of the Cross," painted by Henry Hammond Ahl, which was exhibited at the world's fair, St. Louis? This religious painting is of the Master, and when the room is darkened, the painting appears luminous, which makes the appearance of a pale moonlight. A cross can be seen lying over his shoulders, which is not observable when the room is lighted. A. The painting to which you refer was painted with a phosphorescent paint which glowed in the dark, but did not appear in the light. 7. In going up in an elevator do we not weigh heavier and in coming down weigh lighter? A. A person is no heavier while going up in an elevator than while coming down. If the elevator starts up suddenly, the inertia of the man would cause him to exert a greater pressure on the floor than his weight; and if it was jerked down quick enough it might even leave the man in the air, not pressing at all on the floor of the car. You can hold an apple on your hand, and drop your hand away from it so quickly as to leave the apple in the air above the hand.

NEW BOOKS, ETC.

ORDINARY FOUNDATIONS, INCLUDING THE COFFERDAM PROCESS FOR PIERS. By Charles Evan Fowler, C.E. New York: John Wiley & Sons, 1905. 8vo.; pp. 214. Price, $3.50.

This book, which has reached its second edition, has received numerous valuable additions. The subject of ordinary foundations is more comprehensively covered than heretofore and several new chapters have been added, one of the most important of which discusses the construction of piers by the use of metal cylinders; with timber caissons by open dredging; and the construction of ordinary-sized foundations by the use of pneumatic caissons. Another new chapter is that on cement and concrete, which contains many valuable tables giving the amount of material required for concrete of different proportions. Other chapters which were not in the first edition are one on the subject of foundations, in which the bearing capacity of soil is discussed, and another on building stone, masonry, and the design of piers. The building of piers of timber and pile bents, together with the subject of timber preservation, has been discussed in the final chapters as fully as a general knowledge requires. The book is illustrated with some 150 cuts, many of which are fine half-tone plates.

THE COMPOUND ENGINE. By W. J. Tennant, A.M.I.Mech.E. London: Percival Marshall & Co., 1905. 8vo.; pp. 200. Price, $1.

This is a popular treatise intended as an introductory manual to the study of the compound engine. The first seven chapters give a great deal of information such as is desired by the ordinary person who has very little knowledge of the subject. The eighth chapter deals with the graphic method of indicator diagrams for a two- or three-stage compound of the ordinary, or receiver, type. In succeeding chapters the indicator diagram cylinder ratios and the action of the receiver are dealt with more minutely than in the opening chapters, and the subjects of jacketing, the condenser, and the air-pump are touched upon. The book has three appendices, consisting of Prof. Unwin's paper on "The Construction of Theoretical Indicator Diagrams for Compound Engines," part of a paper on "Expansion Curves," by the author, and tables giving the dimensions of typical compound engines, of the marine, stationary, and locomotive types.

MECHANICAL DRAWING: TECHNIQUE AND WORKING METHODS FOR TECHNICAL STUDENTS. By Charles L. Adams. Boston: George H. Ellis & Co., 1905. 4to.; pp. 204.

The training of the senses so as to give facility and precision in the technique of drawing, and the acquirement of technical methods of execution, are necessary preparatory requirements for a course in engineering or architecture. These are what the author of the present work had in mind when preparing it. The book has a collection of material sufficient to enable the teacher, by judicious selection, to lay out the work of the course, and it is further specialized to meet the needs of individual students. The subject of projection has been omitted, as the author believes that when a course includes descriptive geometry, it is unnecessary to give a portion of this subject under a different name. The book not only goes thoroughly into the technique of drawing and the instruments required, but it also describes pseudo-pictorial representation, wash drawing, and mechanical copying, such as the blue-print process, process drawing, and Patent Office drawing. It is abundantly illustrated with over 160 drawings and plates.

PROCEEDINGS OF THE SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. New York: Engineering News Publishing Company, 1905. 8vo.; pp. 253. Price, $2.50.

This book is the twelfth volume of the "Proceedings of the Society for the Promotion of Engineering Education." It contains some fifteen addresses on engineering education by well-known engineers in its various phases, and also memoirs of the following deceased members of the fraternity: Benjamin Franklin LaRue, Thomas Messinger Drown, Robert Henry Thurston, and Burton S. Lanphear. A suitable index is added to the book, which also contains the names and addresses of all of the members

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