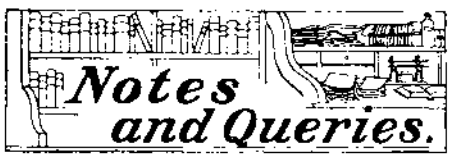
Inquiry No. 4377.—For makers of die stock cutters.

Inquiry No. 4378.—For manufacturers of nuts, short threaded bolts, etc., in large quantities.

Inquiry No. 4379.—For machines for grinding sawdust and shavings into an impalpable powder.



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 This is for our information and not for publication.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.

(9067) C. N. writes: It has been asserted recently in a photo-magazine that the beam of light entering the lens of a camera during the exposure of a plate for 1-1000 of a second is 185 miles long. (1-1000 part of the velocity of light taken at 185,000 miles per second.) It is stated in support of the allegation that the light entering the lens during an exposure has "its origin in the sun, and the beam, or rather the multiplicity of rays, hit the object, are reflected therefrom, and ultimately reach the plate. Without contesting the explanation of the action of light, is the explanation a sound argument that the length of the beam is 185 miles? If not, is the length merely the distance of the object—say 50 feet from the camera? A. The statement as quoted from the journal is quite correct. As much light strikes the plates as light travels in the time of exposure. A second exposure, and 185,000 miles of light waves strike the plate. The light does not stand still between a plate and an object 50 feet away. It comes from the object all the time. It moves as fast from the object to the camera as it does anywhere in the air. And the action of the light is cumulative upon the plate; 185 miles of waves beat against the plate and affect it 1-1000 as much as 185,000 miles of waves would do.

(9068) H. L. F. says: Can a locomotive make better time on a high mountain than on the sea level, provided that the grade is the same in each case? It appears as though if air is rarer there would be less back pressure, and for that reason the steam would act more powerfully on the piston rod. A. Whatever advantage in steam pressure a locomotive would derive at a high altitude from the reduced pressure of the air would be met by the reduction of the quantity of oxygen in the air. If back pressure is reduced by the former cause, the amount of air needed to consume a certain weight of coal would be increased by the latter. We also think that the steaming qualities would be impaired on the mountain. We have not data of actual runs at hand, but should not expect any great difference between sea level and the altitudes attained by ordinary roads.

(9069) J. D. asks: 1. Can a small glass coherer for wireless telegraphy be made to work without the air being exhausted? What is the cost of making one? A. A coherer will work without exhausting the air, but will not be durable owing to the oxidizing of the grains of the metal in the air. The cost of the coherer unexhausted is not large; we cannot say just what it may be. 2. Can I use a small hand dynamo instead of an induction coil to get a spark in front of the coherer? A. A hand dynamo will not give a spark of the sort which an induction coil will give. To send even for a short distance, under a mile, will be best done with a coil giving at least an inch spark. 3. I passed a current from ten O. K. dry cells over the coherer tube, but could not get the bell to ring (a small door bell) except I brought both wires together. The tube was a small glass tube 1½ inches long, two copper wires and some nickel and silver filings. A. Ten or a hundred dry cells will not give any current across a piece of glass. 4. What size spark and what would be the cost of a coil which would enable me to send a message a mile? Please give the amount of wire to make an induction coil which would give a 2-inch spark, and any other useful hints regarding its construction will be anxiously looked for. A. For a 2-inch spark the dimensions should be as follows: Core, 9 inches long and 1 inch in diameter, No. 22 soft iron wire; primary coil, No. 14 magnet wire, two layers on the core; secondary, No. 36 silk-covered magnet wire, 2½ pounds; condenser, 60 sheets of tinfoil, 6 x 6 inches. The paper sheet, 7 x 8½ inches. For the construction of such a coil a book like Norrie's "Induction Coils" is almost indispensable.

(9070) A. N. asks: 1. How can I make a wireless telegraph? A. The set of wireless telegraph apparatus which is best adapted to be made by an amateur is described in the Scientific American, September 14, 1901. 2. I have 2½ pounds of No. 31 B. W. G. double-cotton-covered copper wire. Now I want to know how to use this wire to the best advantage in making an induction coil, not making it (the coil) any longer than possible. How much wire must I use in the primary coil, and size? Is paraffine wax as good to insulate the layers as shellac? Can oiled paper be used on a small coil of about ¼ inch? In making a coil, is it best to have the coil long and thin or short and thick? A. A wire as large as No. 31 is not to be advised for making an induction coil. It will, however, give some spark, but not as long as No. 36 wire would give. The data for a coil are fully given with mode of construction and figures and dimensions of all parts in Norrie's "Induction Coils," which we can send for $1 by mail. If you buy the book, you will find all the questions you have asked explained, and more which you will soon be desirous of asking as you go on with the work. 3. Is there any easy way by which B. W. G. may be changed to B. & S. wire gage, or B. & S. to B. W. G.? A. There is no relation between the B. W. G. and the B. & S. sizes of wire. The way to compare sizes is to have a copy of both tables and see the diameters of the sizes in each.

(9071) D. A. A. asks: What horse power could be developed with latest improved turbine, with stream of water filling 12-inch pipe with fall of 10 feet? A. A stream filling a 12-inch pipe does not signify the quantity of water flowing in any given time, which is essential in estimating horse power. You will find in Scientific American Supplement, Nos. 788, 789, 791, 805, 1049, a very complete series of articles on the measurement of water power and its development by water wheels and motors; 10 cents each mailed.

(9072) J. C. McC. asks: 1. Would like to know how I can estimate the lifting power of an electro-magnet. A. The usual formula for magnetic traction as given in Thompson's "Electromagnet" is that a magnet will lift 147 pounds per square inch of polar surface when there are 100,000 lines of magnetic flux per square inch of cross section of core of magnet. It will be easier for you to put the current upon the magnet and find how much it will lift. Or if you wish to work the matter out by theory, get Thompson's "Electromagnet," price $6, or Fleming's "Magnets and Electric Currents," price $3.50, and study it up. 2. Can the porous cups and carbons of Leclanche batteries be renewed? If so, how? A. The carbons of a battery never are exhausted. As long as they last, they are as good as ever. The material in the porous cup, the dioxide of manganese, becomes exhausted of oxygen, and is thus worn out. The porous cup is often filled with iron rust in its pores, and is usually thrown away when exhausted.

(9073) M. F. S. says: Will you please give, in an early number of the Scientific American, a receipt for polishing horns for hat racks, etc.? A. First scrape with glass to take off any roughness, then grind some pumice stone to powder, and with a piece of cloth wetted and dipped in the powder, rub them until a smooth face is obtained. Next polish with rottenstone and linseed oil, and finish with dry flour and a piece of clean linen rag. The more rubbing with the stone and oil, the better the polish. Trent sand is used in the Sheffield factories. It is a very fine and sharp sand, and is prepared for use by calcining and sifting.

(9074) J. F. R. says: Have you any articles in Scientific American Supplement showing the construction of a spark coil giving a spark of 2 inches or upward? Also an article showing an adjustable vibrator for same? A. Our Supplement No. 160, price 10 cents, gives full plans for a coil giving with ease a spark 1½ inches long. By winding a half pound more of wire on the secondary you should obtain a spark 2 inches long from the coil. A better proportioned coil with winding in sections for sparks may be found described in Norrie's "Induction Coils." These descriptions tell how to make vibrators as well as all the other parts of the coil.

(9075) J. W. H. says: Will you kindly tell me how to rid a house of cockroaches? A. Some years ago we had a cockroach powder analyzed and found it to consist of powdered borax 90 per cent; corn starch 10 per cent, and a little coloring matter. We think this will answer your purpose.

(9076) G. B. asks: 1. I have read that the earth has eleven motions. Please explain them. A. We have never seen the statement that the earth has eleven motions, and cannot explain them. It has more than eleven motions. It rotates upon its axis, causing day and night. It moves around the sun, causing the year. It goes with the sun in space. Of this and all other motions of the earth we are not conscious. It is moved by the attraction of the moon to and fro each month, some thousand miles or more. It is moved to a less degree by each of the other large planets, seven in number. This would make eleven motions, but there are others. It has recently been found that the earth shifts a little, so that the north pole of the earth seems to describe a path in the earth. The axis is not always in the same place. In addition we have the familiar motions of nutation, due to the change of position of the moon with reference to the ring of matter around the earth's equator, and precession of the equinoxes due to the similar positions of the sun. All these may be found given in any textbook of astronomy. Todd's "New Astronomy" is a reliable work upon the subject. 2. What were the two prize problems that were solved in 1687 and 1716 by Sir Isaac Newton? A. We cannot find that Newton solved any prize problems in the years stated. His *Principia* was published in 1687, and he became the most famous man of his time. In 1693 he published the method of fluxions. Perhaps it is to this that reference is made. In 1713 the final publication of the *Principia* as we have it occurred. Newton was then 71 years old. We doubt if he competed for any prizes after that date. 3. Give a formula for the pull toward the plane of rotation of a centrifugal engine governor, the single-arm type. A. The pull of centrifugal governor balls toward the plane of rotation is equal to their centrifugal force due to velocity, minus the weight of the balls, multiplied by the sine of the angle of the arms to the plane of rotation, if horizontal. 4. How can aluminium be powdered? A. Aluminium can be powdered by mechanical means, as emery, etc., are powdered. The various grades may then be separated by the water process. We do not know any way of precipitating aluminium chemically in a finely-divided state.

(9077) A. S. asks: I have some dry batteries that have partly run out, and I would like to know what I can put in them to strengthen them. A. Dry cells are usually thrown away when exhausted. You can punch a hole in the top and fill them with a solution of sal-ammoniac and water, and use them as wet cells till the zinc is used up. Some have charged them like storage cells and given them further life. The cost of this is probably more than the service obtained from the recharged cells. It is probably quite as cheap to buy new cells.

(9078) H. W. H. asks: Is there more expansion of a charge of air and gas when burnt or exploded in a closed chamber than in a jet in the open? What is the cause of a pipe snapping when steam is first turned in it? A. The result of the burning of a certain charge of gas and air is not dependent upon its being in a closed or open space. The same amount of heat and gases should be produced, whether the explosion takes place in the open or in a closed chamber. In the open air the resulting power cannot be used, and is soon dissipated into the space around. The noise produced when steam is turned into a cold pipe is due to the partial vacuum produced by the condensation of the steam. It is called a water hammer.

(9079) P. E. J. asks. When the elements cæsium and rubidium are placed in water they decompose it with the liberation of H, which takes fire, but does Cs give the flame a blue color, or Rb a red? In nearly all books on chemistry I find that the element erbium has never been isolated. On looking through Merck's Index, 1896, a catalogue of nearly every chemical known, I find it thus: "Erbium (E) metal, dark gray powder." Also tell me if this element is not like didymium, which has been split into different elements? A. Cæsium was named from the blue lines which its flame gives in the spectrum, of which there are two. The word cæsium means skyblue. Rubidium in a similar way gives two dark red lines. The word rubidium means dark red. Both are from the Latin.—With reference to erbium, Remsen's "College Chemistry" says: "A final statement cannot be made as yet. It is even questionable whether it is an element."

(9080) J. D. says: Will you kindly tell me how and what preparation is used in sticking pictures on glass so that it will not blister? Most of the art stores have for sale pictures that they call "medallions," which appear to be a piece of glass pasted over the front of a picture. I have endeavored to do this, and have wet my picture and coated the glass with a thin coating of thin white glue and also paste, and also with library paste. It looks very well while it is moist, especially after I have rubbed all the air bubbles out, but after it dries it appears flaky in places, as if the picture did not stick to the glass. I have also tried putting the picture on under water, thinking by this means to keep the air from getting between the picture and the glass. A. According to the Werkstatt, clean the inner hollow side of the glass thoroughly, pour on gelatine dissolved in boiling water, lay the picture on and pour on gelatine again, so that everything swims. Then neatly remove what is superfluous, so that no blisters result, and allow to dry. The following recipe is said to be still better: Gelatine, 16 parts (weight); glycerine, 1 part (weight); water, 32 parts (weight); methylic alcohol, 12 parts (weight). The mixture is prepared by causing the gelatine to swell in water, then dissolving it with the use of moderate heat, adding the glycerine, stirring thoroughly, and pouring the whole in a thin stream into the alcohol.

(9081) The I. L. & S. Co. ask: Can you furnish us the formula for a dry powder chemical fire extinguisher, such as is used to throw on fire to extinguish? A. 1. Alum 24 per cent, ammonium sulphate 52 per cent, ferrous sulphate 4 per cent. 2. Common salt 60 per cent, sal-ammoniac 60 per cent, sodium bicarbonate 80 per cent. 3. Sal-ammoniac 100 per cent, sodium sulphate 60 per cent, sodium bicarbonate 40 per cent.

(9082) A. G. S. asks: 1. Is there any way to make an electric automobile run by a 5 horse power motor, so that you could charge the batteries while making a run if you used two sets of batteries, or if you had three sets and have two sets charged all the time, while you charge the third, then throw one of the first set out, and throw the third set in the circuit to take the place of the one you threw out of circuit? A. The plan to charge a part of a storage battery of an automobile while the carriage is in use is not feasible. It would require a dynamo on the carriage and a battery capable of running a motor large enough to run the carriage and the dynamo at the same time. The dynamo must furnish current enough to charge nearly one-third of the battery while another third is running the carriage, and the last third is running the dynamo. That is, two-thirds of the battery is to run the motor, and one-third to be charged. If perpetual motion were possible this would be possible. But so long as there is always a loss of power by friction and other resistances the scheme will not work. 2. Is there any power lost in running machinery with belts, and if so what per cent? A. There is a loss by friction, which varies according to the conditions such as the size of pulley, etc. 3. Is there any power lost in the transmission of a current of electricity, and if so what per cent? A. Power is always lost in transmitting electricity. That is, power is required to drive an electric current through a wire. The loss depends upon the length of the wire. A dynamo of moderate size may lose as much as ten per cent. A large one will lose less. The line loss in a long line may be as much as thirty per cent. A motor will lose from five to ten per cent. 4. Can you boil machine oil or linseed oil without having an explosion? A. Oil may be heated without taking fire. Care is always necessary when heating any inflammable substance. 5. Have you a machine shop where you make experiments? A. We have adequate laboratory facilities at an institution of learning in this city.

(9083) C. S. N. asks: As the cause of my electric gas lighter failing to work, I found the connection between the wire from battery and pipe had become loosened. After removing the old wire and making a new connection, I found that the old wire had become silvered in appearance, as if it had been immersed in silver-plating solution. The wire was an ordinary copper bell wire from which I had removed the covering. I have four Gonda cells and 8-inch spark coil. The coil was on + wire between the battery and pipe connection. I afterward changed the spark coil to the — wire; leaving the + wire connected to gas pipe as before. Can you give me an explanation of the silvered appearance of the wire, and could the fact of my long-distance telephone being grounded by means of the gas pipe have anything to do with it? Which wire should be connected with the gas pipe, or does it make no difference? A. We have tested the coating upon the wire, chemically, as well as can be done with so small a quantity. It appears to be zinc. If the pipe to which the wire was attached was galvanized, this would indicate electrolysis, provided the wire was from the positive or carbon pole of the battery. The coating of the wire might be solder if any solder were in contact with the wire. It makes no difference which wire is attached to the gas pipe so far as the service of the bell is concerned. If there is a loose joint and electrolysis takes place, the wire is eaten off, which is attached to the zinc of the battery.

(9084) B. B. H. says. 1. I understand that electricity does not flow through the wire, but around it. Explain in what way wire acts as a conductor to electricity? A. An electric current of ordinary pressure, or voltage, flows through the metal of the conductor. It always excites a magnetic field around the wire, but the wire is in reality the conductor of the current. A discharge of very high potential, such as lightning, passes along the surface of a wire without penetrating the metal very deeply. It is this that your remark refers to, and not to an ordinary current of moderate voltage, as, for instance, any voltage up to 1,000 to 5,000, or any voltage used by man for power or light. All these flow through the metal of the conduc-

tor. 2. In what is the Edison socket considered a better s et than the T. H. socket? A. We cannot say at we think one of these sockets is better than the other. Both have their friends. One uses a screw, the other holds the lamp by springs. 3. How is it that lightning goes from earth to cloud, as well as from cloud to earth? Electricity does not flow from negative to positive, and the earth being considered as negative, how does the lightning go from earth to cloud? A. We have many times stated in these columns that the direction of the flow of electricity is entirely conventional. We agree to the ordinary flow from what we call positive to what we call negative. An alternating current is considered to flow both ways alternately. The fact is that lightning frequently surges to and fro between the cloud and the earth a dozen times or more in what we call a flash, and it is all over in a very small fraction of a second, so that no one can say that he saw it go either way. It is as easy to see the flash go up as it is to see it come down. 4. A short time ago I was in a telegraph office, and there was a thunder storm going on around us; every lightning stroke would cause the telegraph instrument to tick, as if the key has been opened and closed. Why should the lightning affect the instrument in such a way? A. Induction charges a telegraph line when a lightning storm is near, and the current sparks across the instruments and the lightning arresters with the snapping sound which you heard. It is a common occurrence. 5. What kind of a conductor of electricity does liquid air make? A. Liquid air is an insulator, just as gaseous air is. It is not a conductor of electricity at all.

(9085) G. A. S. asks: In order to settle a controversy, will you kindly give a solution of the following problem in the next issue of your paper: A claims that if a gun be fired from the rear of a rapidly moving train, at a given point, in the opposite direction, and the velocity of the bullet is exactly the same as that of the train, when the train has traveled one mile distant from the point of discharge, the bullet will be one mile from the train, or at the point of discharge. B claims that the bullet will be beyond the point of discharge, when the train has traveled the distance of one mile. Who is correct? A. For a full answer to your inquiry regarding a gun discharged from a train in the direction opposite to the motion of the train, see the SCIENTIFIC AMERICAN, Vol. 88, No. 19, Query 8997. A is right.

(9086) A. M. W. says: In your paper of June 6, Notes and Queries, 9036, in regard to clear glass assuming a violet color: A number of years ago I resided in various mining towns of Colorado, and often found pieces of glass of an amethyst color. On one occasion I found a broken table goblet, but the portion that lay upon the ground was not as perfectly colored as other parts. I do not remember ever finding any of this colored glass only on very dry, rocky slopes and where it was exposed to direct hot sun rays. Occasionally I would find a piece that was blotched as though rain drops had dried so quickly that the outer edges of the spots had a seared appearance, but it was color only and a little darker on these edges. At that time my impression was that it was necessary for the glass to be in a very dry, rocky place, fully exposed to the sun, and after little showers and spattering drops from surrounding rocks, in drying quickly from the hot sun that it caused some chemical action that formed the coloring.

(9087) J. H. writes: Will you please inform me who manufactures the gas ignition pellet for sale? Also what the ingredients are, and in what proportion they are mixed, and how fastened to the mantles which render them self-igniting mantles? A. There is only one substance within our knowledge which can be heated by a stream of gas striking it, so that it will ignite the gas. That substance is spongy platinum. It is used in the Döbereiner lamp, where a stream of hydrogen impinges on a platinum sponge. Platinum in this form is capable of absorbing 800 times its volume of oxygen, which does not enter into combination with it, but is simply condensed into its pores, and is available for combination with other bodies.

(9088) C. M. Z. asks: Please tell me what is the voltage of a good dry cell 1½ x 4 inches. Will a battery of this size light a small lamp of 2 c. p. and 4½ or 5½ volts? Is one battery 8 inches long and 1½ inches diameter as good as two batteries 1½ x 4 inches long? A. The voltage of a dry cell is about 1.5 volt. To light a lamp of 5½ volts will require four cells in series. The size of a cell does not affect the voltage. This is determined by the materials employed. The size of a cell determines the current it will give and the time it will last.

NEW BOOKS, ETC.

THE LOCOMOTIVE. New Series. Vol. 23. Hartford, Conn. 1902. 8vo. Pp. 191. Price $1.

Through the courtesy of J. M. Allen, A.M., M.E., the editor of the Locomotive, we received the last volume. This interesting publication is issued by the Hartford Steam Boiler Inspection and Insurance Company, and deals with matters germane to steam boilers, power, etc., but occasionally there are published excellent scientific articles on various subjects. The periodical is well illustrated by half-tone and line drawings. Among the features of the Locomotive is a list of boiler explosions with details.

ELEMENTS OF STEAM ENGINEERING. By H. W. Spangler, Arthur M. Greene, Jr., and S. M. Marshall, B. S. in E. E. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 1903. 8vo. Pp. v, 275; 273 figures. Price $3.

This book is intended to bring before the beginner examples of the various forms of steam apparatus used in modern steam power plants; to explain simply and briefly the construction, use and reasons for using these various parts of machines, and to give a working vocabulary in this branch of engineering. Although the book is primarily prepared for first year students in engineering schools, it will probably be of use to the general reader and to many of the young men in manual training schools and institutes.

HEREDITY AND SOCIAL PROGRESS. By Simon N. Patten. New York: The Macmillan Company. London: Macmillan & Co., Ltd. 1903. 12mo. Pp. vii, 214. Price $1.35.

Prof. Patten has presented here what may well be considered a thorough and clear discussion of a subject which, thanks to Herbert Spencer, has become of constantly increasing importance within recent years.

PROBLEMS IN ASTROPHYSICS. By Agnes M. Clerke. Containing 81 illustrations. London: Adam & Charles Black. 1903. Pp. xvi., 567. Price $6.

The present work deserves more than usual attention by reason of the scholarly standing of its author as a writer on astronomical subjects. The book which lies before us is characterized by the same excellence which it was our privilege to note in the author's recently published "History of Astronomy During the Nineteenth Century." It is the purpose of the present work not so much to instruct as to suggest. The volume represents a kind of reconnaissance, and embodies the information collected by astrophysical scouts and skirmishers regarding the practical lines of advance and accessible points of attack. The book is divided into two parts, the first of which discusses solar physics, and the second, problems in sidereal physics.

LEAD AND ITS COMPOUNDS. By Thomas Lambert. Illustrated by 40 plans and diagrams. London: Scott, Greenwood & Co. New York: D. Van Nostrand Company. 1902. Pp. xiv, 228. 8vo. Price $3.50.

The author shows in this volume the great strides which have been made in the metallurgy of lead and zinc. He has incorporated the latest applications of electrical science, not only in cleaning the ores, but also in their after-treatment. The work contains a description of the pigments of both metals, their mixture and properties. The value of the book is enhanced by a chapter devoted to the assaying and analysis of lead and zinc ores, and the quantitative test of paints and oils.

SIDEROLOGY. THE SCIENCE OF IRON. By Hanns Freiherr v. Jüptner. Translated from the German by Charles Salter. The Constitution of Iron Alloys and Slags. With 11 plates and 10 illustrations. London: Scott, Greenwood & Co. New York: D. Van Nostrand Company. 1902. 8vo. Pp. viii, 344. Price $5.

This book may be regarded as a compilation of our present knowledge of iron as it is to be found in the widely-scattered literature on the subject. The work furthermore gives to the student an account of the researches which have been already carried out and explains to the consumer of iron and steel the connection between the various properties of iron and steel, their constituents, and the methods of working the raw material. The work is divided into three portions, the first of which, after describing the theory of solution deals with the microscopical and chemical constituents of iron and slags. The second part treats of the connection between the chemical composition, the working, the microscopical structure, and properties of iron and steel. The third part deals with the reaction between the metal, slags, and other reagents.

THE ART OF ENGRAVING. A Practical Treatise on the Engraver's Art. With Special Reference to Letter and Monogram Engraving. Specially Compiled as a Text-Book for Students and Reference Book and Guide for Engravers. With 200 original illustrations. Philadelphia, Pa.: Keystone Publishing Co. 1903. 8vo. Pp. 199. Price $1.50.

This seems to be a thoroughly practical book of utility to the skilled engraver as well as to the learner.

THE NEW INTERNATIONAL ENCYCLOPÆDIA. Editors Daniel Coit Gilman, LL.D., Harry Thurston Peck, Ph.D., L. H. D., and Frank Moore Colby, M. A. Volume VII. New York: Dodd, Mead & Co. 1903. 8vo. Pp. 888.

This new volume of the International Encyclopædia takes us from "Ethics" to "Fuller-Maitland." Following the plan which we adopted in reviewing the volumes previously issued, we have confined our attention only to the scientific portions. The article "Evolution" is a most excellent review of the development of Herbert Spencer's theory from the modern, scientific standpoint. A good bibliography is appended to the article. The discussion of "Explosives" may well be considered the best to be found in any of the cyclopedias. Treating as it does of the latest brown and smokeless powder, the article may be considered perhaps the most modern on the subject to be found in any reference book. The article on "Fire Engines" presents all that is worth knowing of modern American fire engines. It is well illustrated by excellent pictures of a chemical fire engine, a hand chemical fire engine, and an American model of 1902. We are glad to note that the subject of modern steel-frame buildings is adequately treated in the article on "Fireproof Construction." For the purpose of illustration, the "Flatiron" building in course of construction has been selected; a better selection could hardly have been made, for the picture illustrates the modern method of constructing the interior steel work first, and then of applying the outer masonry in sections. The scientific biographies are well written. That on Faraday, although brief, is quite adequate. The biography of Benjamin Franklin should have discussed more fully Franklin's scientific achievements. Of the scientific articles in this volume, perhaps the most technical and the most thorough in treatment is the one on "Freezing Point." The discussion of fuel is also good.

TASCHENBUCH DER KRIEGSFLOTTEN. IV. Jahrgang. 1903. Mit teilweiser Benutzung amtlichen Materials. Herausgegeben von B. Weyer, Kapitänleutnant a. D. Mit 277 Schiffsbildern und Skizzen. München: Verlag von J. F. Lehman. 1903. 16mo. Pp. 321. Price $1.

Capt. Weyer's book comes to us this year in a form that is even better than that of the work which he published last year. The information which he gives is fully as trustworthy as that which is contained in some of the more pretentious naval annuals. His tables, so far as we have been able to discover, seem accurate and comprehensive. The publishers are to be congratulated on the manner in which they have issued this work. The printing and the character of the illustrations are much better than those of the previous volumes.

THE STORY OF THE TRAPPER. By A. C. Laut. Illustrated by Arthur Heming and others. New York: D. Appleton & Co. 1902. Pp. xi, 284. Price $1.25.

In the "Story of the Trapper" is presented a vivid picture of an adventurous figure painted with a singleness of purpose and a distinctness impossible of realization in the large and detailed histories of the American fur trade and the Hudson's Bay and Northwest Companies, or the various special journals and narratives. The author's wilderness lore and knowledge of the life, added to an acquaintance with its literature, has borne fruit in the personification of the western and northern trappers who live in these pages.

THE GREAT SIBERIAN RAILWAY FROM ST. PETERSBURG TO PEKIN. By Michael Myers Shoemaker. New York and London: G. P. Putnam's Sons. 1903 12mo. Pp. viii, 243. Price $2.

In these pages will be found a record of a journey over the Siberian Railway from St. Petersburg to Pekin, with a detour to Corea. The author bases his statistical information on the work published by the Minister of Ways and Means of Communication, "A Guide to the Great Siberian Railway."

THE ANALYSIS OF OILS AND ALLIED SUBSTANCES. By A. C. Wright. New York: D. Van Nostrand Company. London: Crosby, Lockwood & Son. 1903. 8vo. Pp. xi, 241. Price $3.50.

The author tells us that this brief account of the methods used in the analysis of oils, fats, and waxes has been written with the definite aim of presenting the subject in a form suited to the needs of the student and beginner, and that it includes all recent developments likely to be found of value in practical work. In accordance with this purpose, the chemistry of the various processes is explained in some detail, and methods which have been recently proposed are fully explained. An estimate has been made to indicate the extent to which reliance may be placed upon methods for detecting adulteration. Stock comparisons for estimating each constant have also been selected.

PHYSICO-CHEMICAL TABLES FOR THE USE OF ANALYSTS, PHYSICISTS, CHEMICAL MANUFACTURERS, AND SCIENTIFIC CHEMISTS. In two volumes, each complete in itself. By John Castell-Evans, F.I.C., F.C.S. Vol. I. Chemical Engineering and Physical Chemistry. London: Charles Griffin & Co., Ltd. Philadelphia: J. B. Lippincott Company. 1902. 8vo. Pp. xxxii, 548.

Mr. Castell-Evans has reason to be proud of his work. He has been a most painstaking compiler, so painstaking, indeed, that his work must at times have seemed little short of scientific drudgery. His task must have involved years of labor. The work has been designed to be of use to all engaged in any branch of chemistry and metallurgy. The volumes will be the means of saving a great deal of time that can be more profitably and pleasantly employed in true scientific work.

ANALYSES OF PIG IRON. Vol. II. Collected and published by Seymour R. Church. San Francisco. Pp. 197. Price $5.

The contents of this volume are in no sense a repetition of Vol. I, but are made up entirely of new and additional analyses, data and leading articles. The analyses published in this volume, as well as in the first, are taken directly from reports furnished by the respective furnaces or their agents. These reports are to be kept on file for the inspection and convenience of subscribers. The book presents authoritative analyses which should be of great service to the ironmonger. The publisher is to be congratulated upon the very handsome manner in which he has issued this book. Its full leather binding, heavy coated paper, fine printing and admirable illustrations are not often found in technical works.

STEAM POWER PLANTS: THEIR DESIGN AND CONSTRUCTION. By Henry C. Meyer, Jr., M.E. New York: McGraw Publishing Co. 1903. Pp. 159.

Mr. Meyer has presented us with a very carefully prepared work on a subject with which many engineers are familiar, but of which they by no means know all that they ought to know. The most noteworthy features of the book are sixteen folding plates of ground plans, sectional elevations, and the like. These will be of especial service to the power engineer.

CONDUCTORS FOR ELECTRICAL DISTRIBUTION, THEIR MATERIALS AND MANUFACTURE, THE CALCULATION OF CIRCUITS, POLE-LINE CONSTRUCTION, UNDERGROUND WORKING AND OTHER USES. By F. A. C. Perrine, A.M., D.Sc. New York: D. Van Nostrand Company. London: Crosby, Lockwood & Son. 1903. 8vo. Pp. vii, 287. Price $3.50.

Dr. Perrine's experience as a manufacturer of insulated wires and cables, as a consulting engineer on their installation, and as a teacher of electrical engineering at Leland Stanford, Jr., University, renders him peculiarly well fitted to prepare a book on electrical conductors. The fourteen chapters of which this work is comprised discuss inductive materials, alloyed conductors, the manufacture of wire, wire finishing, wire insulation, cables and their use, classification of cables, calculation of circuits, Kelvin's law of economy in conductors, multiple arc distribution, alternating current calculation, overhead lines, pole line, line insulators, and underground conductors.

WALLPAPERS AND WALL COVERINGS. A Practical Handbook for Decorators, Paperhangers, Architects, Builders, and House-owners. With many Half-Tone and other Illustrations Showing the Latest Designs. By Arthur Seymour Jennings. New York: William T. Comstock. 1903. 8vo. Pp. 161. Price $2.

The present work may be regarded as an enlarged republication of "Practical Paper Hanging," brought out by the author several years ago. The volume covers the field more fully than the previous work and is furthermore more elaborately illustrated with half-tones of the latest designs of a large number of manufacturers in America, England, and France. Among the chapters which deserve special mention are those on the "Selection of Wall Papers," and "Different Varieties of Wall Papers and their Characteristics." Rules are given showing how difficult or unusual obstacles should be met.

RAILROAD CONSTRUCTION. THEORY AND PRACTICE. A Text-Book for the use of Students in Colleges and Technical Schools. By Walter Loring Webb, C. E. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 1903. 16mo. Pp. xvii, 675. 232 figures. Price $5.

Since the issue of the first edition the author has conferred with many noted educators in civil engineering. As a result, it was decided to recast the whole work and to reduce the size of the book from octavo to pocketbook dimensions. The original text has been almost doubled by the addition of several chapters on structures, train resistance, rolling stock, etc., and also several chapters giving the fundamental principles of the economies of railroad location. The author's primary aim has been to produce a textbook for students.

DESCRIPTIVE GEOMETRY. With Numerous Problems and Practical Applications. By William S. Hall, C.E., E.M., M.S. With a 4to Atlas of 18 Plates. New York: D. Van Nostrand Company. 8vo. Pp. iv, 76.

Textbooks of descriptive geometry, with very few exceptions, deal only with first angle projection, but in the best recent practice in mechanical drawing the third angle is used. Moreover, the third angle is commonly employed in perspective. In this book all four angles are used. The problems therefore become general and a large variety of constructions can be introduced under each problem. By inserting the problems for construction in a separate volume and by having several modifications under each problem, work can be read-