

dragged from Finland to its present location by men. Its weight is estimated at 2,000 tons. Iron rails were laid upon which cannon balls rolled, and thus the huge block was drawn by men.

NEW BOOKS, ETC.

KRIECHTIERE UND LURCHE DEUTSCHLANDS. By Dr. Kurt Floericke. Kosmos Gesellschaft der Naturfreunde. Geschäftsstelle Franckh'sche Verlagshandlung in Stuttgart. Price, 50 cents.

In this book Dr. Floericke has presented a popular account of the principal reptiles and amphibians of Middle Europe. To those who are familiar with the German language and desire to obtain a general knowledge of an interesting class of animals, without delving into technical details, the book can be recommended.

THE FIXED LAW OF PATENTS. By William Macomber. Boston: Little, Brown & Co., 1909. Large 8vo.; pp. 1,060. Price, \$7.50 net.

In this work Mr. Macomber has presented in digested form the patent statutes, the decisions of the Supreme Court of the United States, and the decisions of the nine Circuit Courts of Appeals, the three constituting what Mr. Macomber calls "The Fixed Law of Patents." As a piece of compilation and arrangement the book is indeed admirable; as a reference work for the patent lawyer it will be extremely helpful. The principles of patent law, although fairly few in number and simple in essence, have in later years become more or less fogged in the effort of non-technical judges to administer the patent law fairly. In view of that fact, any attempt to bring something like order out of a chaos of decisions is certainly commendable. Because the book gathers up the appellate law, in the language of decisions, it should be of interest to the specialist. Unless he has digested the law for himself, the specialist will hardly have such a compilation. Considered as a whole, the work may be regarded as an orderly statement of the courts' language in important cases, and therefore absolutely authoritative.

INNS AND TAVERNS OF OLD LONDON. By Henry C. Shelley. Boston: L. C. Page & Co., 1909. 364 pp. Price, \$3.

The subject of inns and taverns in London has always been a fascinating one, and the literature concerning them is quite voluminous. The present volume sets forth the historical and literary associations of those haunts, together with an account of the most notable coffee houses, clubs, and pleasure gardens of the British metropolis. The English have always had a reputation of being essentially a home-loving people; still in the seventeenth and eighteenth centuries they seem to have exercised considerable zeal in creating substitutes for that home which they ought to have loved above all else. When the Londoner had procured his taverns and inns, he set to work evolving a new species of public resort in the coffee house. That type of establishment appears to have been responsible for the development of the club as the substitute for the home, and then came the age of the pleasure garden. Both of the latter survive, the one in the form of a more rigid exclusiveness than the eighteenth century Londoner would have dreamed possible; the other is so changed that frequenters of the latter would scarcely recognize the relationship. The engravings are taken from old prints, and are of great interest. The book is beautifully printed and most attractively bound.

IMAGINATION IN BUSINESS. By Lorin F. Deland. New York: Harper Brothers, 1909. 18mo.; 108 pp. Price, 50 cents net.

This little book contains a number of shrewd essays which deal with a curious phase of business. It shows the remarkable part which imagination plays in business, especially to-day.

LIGHT AND HEAVY TIMBER FRAMING MADE EASY. By Fred T. Hodgson. Chicago: Fred J. Drake & Co., 1909. 12mo.; 395 pp. Price, \$1.

The present work is a copious treatise on the modern practical methods of executing all kinds of timber framing, from the simple scantling shed or lean-to to the heavy and complicated timber bridges, centers, needling, and shoring, roughing and railway work, tank frames and taper structures, and is illustrated by 450 engravings and diagrams.

THE ROMANCE OF MODERN MANUFACTURE. By Charles R. Gibson. Philadelphia: J. B. Lippincott & Co., 1910. 12mo.; 320 pp. Price, \$1.50.

In the present volume the author has endeavored to trace the evolution of the different industries, and to describe in everyday language the methods of modern manufacture in all of the principal industries. It deals with textile machinery, laundry machinery, needle machinery, thread machinery, shoe machinery, manufacture of pottery by machinery, paper making, manufacture of books, artificial light, manufacture of confectionery, the mechanical baker, clocks and watches, manufacture of iron, making steel rails, the railroad and the locomotive, building a ship, and other chapters. The illustrations and diagrams are particularly clear, and we are glad to note a number of the

best ones have appeared first in the SCIENTIFIC AMERICAN, and that they are reprinted properly credited.

MACHINE DRAWING AND DESIGN FOR BEGINNERS. By Henry J. Spooner, C.E. New York and London: Longmans, Green & Co., 1908. 8vo.; 266 pp.; 743 illustrations. Price, \$1.25.

The author is director and professor of mechanical and civil engineering in the Polytechnic School of Engineering in London, and is the author of valuable works on drawing and machine design. The work is an excellent one, and the drawings which are reproduced are thoroughly common sense. Of course, English practice is slightly different from American, but the differences are not so great as to militate against the value of this book. The questions suitable for examination and home work are valuable, but the Board of Education examination papers are worthless for American students.

AN EXPERIMENTAL STUDY OF BAGASSE AND BAGASSE FURNACES. By E. W. Kerr, M.E., assisted by E. M. Percy, B.S. Baton Rouge, 1909. 8vo.; 106 pp.

During the last few years the writer, who has charge of the instruction of students in the engineering branches of the Audubon Sugar School, has visited a large number of sugar factories in Louisiana for the purpose of gathering data and information for classroom use. In these visits he has been particularly struck with the lack of uniformity in the methods employed for utilizing bagasse as a fuel, both as to the form and proportions as well as to the manipulation of the furnaces. With a view to standardizing as far as possible the methods employed, it was decided to conduct a series of investigations, the object of which should be to gain a thorough insight, by general observation and by tests, into the methods used in Louisiana for utilizing the heat from bagasse. The result of the labors of the author is included in the present pamphlet, which gives his views on the subject most exhaustively and reflects great credit upon the author.

LABORATORY NOTES ON IRON AND STEEL ANALYSES. By Walter Macfarlane. London and New York: Longmans, Green & Co., 1909. 12mo. 462 pp. Price, \$2.50 net.

These notes were in the first instance written for the guidance of the staff in an iron and steel works laboratory, which was for some years under the supervision of the author, and where the results of over 40,000 estimations were annually placed on record. The methods required to be reliable and rapid, so as to control and keep pace with the manufacturing operations. It was necessary that all the analysts should work on identical lines, and the accuracy of the methods were tested in daily practice and confirmed by other analysts. These notes have been explained and published, and are for the benefit of all students. The general aim of the book has been to set out a full course of assaying or analysis in full detail. The work is an excellent one, and is certain of a considerable sale.

MODERN PRACTICE IN MINING. Volume II. The Sinking of Shafts. By R. A. S. Radmayne. New York and London: Longmans, Green & Co., 1909. 8vo.; 275 pp. Price, \$2.25 net.

The sinking of shafts for the purpose of opening out and developing mineral wealth constitutes one of the most important branches of mining; and although a vast amount of information respecting such operations is disseminated throughout the proceedings of the various mining institutions, and excellent chapters are devoted to the subject in many textbooks on mining, so far as the present writer knows, shaft sinking has not hitherto been treated from the British standpoint of the work. While the practice described is British practice, it cannot help but be of interest to the mining engineers in this country. The illustrations are numerous and are well executed on a good scale.

AREIKA. By D. Randall Maciver and C. Leonard Woolley. With a chapter on Merottic Inscriptions by F. L. Griffith. Oxford: The University Press, 1909. 4to.; 56 pp.; 42 plates.

This volume is the first of a series which will record the results of explorations in Egypt planned and financed by Mr. Eckley B. Coxe, Jr., of Philadelphia, and this is the first volume of the series to be known as the Eckley B. Coxe, Jr., Expedition to Nubia. The expedition is to be conducted for five years on behalf of the University of Pennsylvania, and the antiquities that may be obtained will be presented to the University Museum. The district selected for the researches is a part of the country which lies between the First and Second Cataracts, and this first volume records the results obtained in the year 1907. The plates are beautifully executed, and the monograph is an important contribution to the archaeology of a section of the world concerning which very little is known.

THE AUTOBIOGRAPHY OF SIR HENRY MORTON STANLEY, K.C.B. By his Wife Dorothy Stanley. Cambridge, Mass., and New York: Houghton, Mifflin & Co., 1909. 8vo.; 550 pp. Price, \$5 net.

Stanley was a remarkable man, and this revelation of his personal life and of his keen and unprejudiced view of men and affairs

stands as one of the books of permanent importance in this field. Of all the interesting and important autobiographies that have seen the light in the last decade none perhaps has a wider appeal to all classes of readers than the autobiography of Henry Morton Stanley. The grim workhouse, the squalid life in Liverpool, the terrible experiences at sea, his adoption by a New Orleans merchant, his life as a planter, the enlistment in the Confederate army, the wonderful picture of Shiloh, his life in prison and escape, his finding of Livingstone, the exploration of the Dark Continent, the founding of the Congo State, and his closing years are described with a vigor of style which has rarely been surpassed. The book is beautifully printed and illustrated, and is certain to have a large sale, as it appeals to almost everyone.

MECHANICAL DRAWING FOR TRADE SCHOOLS. By Charles C. Leeds. New York: D. Van Nostrand Company, 1909. Ob- long 4to.; 58 plates and text. Price, \$2.

This work on mechanical drawing has been prepared with a purpose in view of thoroughly grounding draftsmen and others of the various machinery trades in the principles of mechanical drawing. It is also intended to familiarize them with modern drafting-room practice. The author does not believe in using models, as he thinks this tends to develop copyists, and in this he is undoubtedly correct. The author, who is connected with the Carnegie Technical Schools, finds that the results obtained by this system are excellent. The plates are on an enlarged scale, and the drawings from which they are made are well executed. There is a bill of material with nearly every plate.

IRRIGATION ENGINEERING. By Herbert M. Wilson, C.E. New York: John Wiley & Sons, 1909. 8vo.; 625 pp. Price, \$4 net.

The Reclamation Service of the United States now has 21 projects which have reached such a state of completion that water is being furnished settlers for irrigation of their lands. At this date 675,514 acres are under irrigation from Reclamation projects and \$42,932,787 have been expended upon the construction of works completed or in progress. The revenues collected to date from projects in operation and available under the law for re-expenditure on future construction amount to \$1,070,596. The present or sixth edition has been almost entirely rewritten, bringing up to date the tremendous progress made in construction by the Reclamation Service. Since the last edition important changes have been produced in the design and in the materials used in structures on irrigation works as a result of the very general adoption of reinforced concrete for such works.

ARCHITECTURAL PERSPECTIVE. By I. P. Hicks. New York: Industrial Publication Company, 1909. Square 12mo.; 38 pp. Price, 50 cents.

BUILDING PLANS AND HOW TO DRAW THEM. By I. P. Hicks. New York: Industrial Publication Company, 1909. Square 8vo.; 73 pp. Price, 50 cents.

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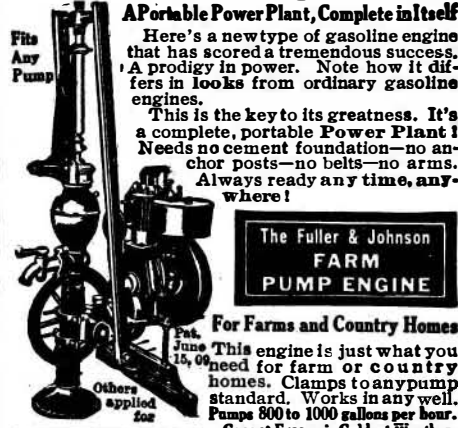
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(Concluded from page 359.)
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TRIALS OF THE "NORTH DAKOTA."

(Continued from page 352.)
 that of the motors being identical.
 The five trials of the "North Dakota" over the mile course gave the following speeds: 22.25, 21.48, 22.13, 21.51, and 23.13, the average speed working out at 21.83 knots. She thus not only exceeded the mean speed of the "Delaware" by 0.39 knot, but the turbines exceeded the reciprocating engines by over 5000 horse-power. The maximum number of revolutions of her propellers was 286 a minute, and it was found that 263 revolutions were sufficient to maintain the contract speed of 21 knots.

In the four-hour test under full power the "North Dakota" made 21.71 knots for the first two hours, and 21.64 knots in the third hour. On the fourth mile the failure of a tube in one of the boilers necessitated the shutting down of four out of the fourteen boilers; but even under this greatly reduced power, the speed of the ship was exactly 21 knots.

A feature which, from the military standpoint, is of the greatest importance is the remarkable steadiness of the ship, even when the turbines are being pushed to the limit. Throughout the greater part of the length of the ship it was scarcely possible to tell, from any vibration, that the engines were in motion. This is a feature which is particularly appreciated by ordnance officers; since the vibration which is noticeable on ships driven by reciprocating engines is more or less disturbing to the gun sights. The "North Dakota," which is considerably the largest warship yet built for our navy, has been constructed in record time; and the Fore River Company is to be congratulated on the fact that, had it not been for delays in the furnishing of armor, they would have cut down the record for construction even more than they have. Her dimensions are: Total length, 518 feet 9 inches; beam, 85 feet 2 1/2 inches; draft on trial, 27 feet; displacement on trial, 20,000 tons. She is the most completely armored ship afloat. Her main belt, 7 feet 6 inches wide, tapers from 10 inches at its bottom edge to 12 inches at its top edge. Above this, extending to the gun deck, is a second belt 8 feet wide, tapering from 10 inches at its bottom edge to 8 inches at the top. The 5-inch guns have a protection of 5 inches of armor, and the main turrets and barbettes are protected by 11 inches.

The lines of the ship are particularly fine, in fact, as fine as those of our armored cruisers. She will prove to be a splendid vessel when heading into a heavy sea; for not only has she freeboard, due to her fore-castle deck, of 27 feet, but she is given a very pronounced outward flare, which should serve to lift her comfortably over the waves, and enable the ship to be driven at full speed in heavy weather. An innovation is the placing of the officers' quarters forward under the fore-castle deck and in the superstructure immediately abaft of the two forward turrets.

The battery is mounted on the longitudinal axis of the ship, a disposition which originated with our Construction Department, and is being followed by some foreign navies. The placing of all the guns on the center line enables the whole battery to be trained on either beam, giving the ship a broadside discharge either to port or starboard of ten 12-inch guns. This arrangement, it is true, weakens the end-on fire, which, in

Home-Made Experimental Apparatus

In addition to the following articles, the Scientific American Supplement has published innumerable papers of immense practical value, of which over 17,000 are listed in a carefully prepared catalogue, which will be sent free of charge to any address. Copies of the Scientific American Supplement cost 10 cents each.

If there is any scientific, mechanical, or engineering subject on which special information is desired, some papers will be found in this catalogue, in which it is fully discussed by competent authority.

A few of the many valuable articles on the making of experimental apparatus at home are given in the following list:

ELECTRIC LIGHTING FOR AMATEURS. The article tells how a small and simple experimental installation can be set up at home. Scientific American Supplement 1551.

AN ELECTRIC CHIME AND HOW IT MAY BE CONSTRUCTED AT HOME, is described in Scientific American Supplement 1566.

THE CONSTRUCTION OF AN ELECTRIC THERMOSTAT is explained in Scientific American Supplement 1566.

HOW TO MAKE A 100-MILE WIRELESS TELEGRAPH OUTFIT is told by A. Frederick Collins in Scientific American Supplement 1605.

A SIMPLE TRANSFORMER FOR AMATEUR'S USE is so plainly described in Scientific American Supplement 1572 that anyone can make it.

A 1/2-H.P. ALTERNATING CURRENT DYNAMO. Scientific American Supplement 1558.

THE CONSTRUCTION OF A SIMPLE PHOTOGRAPHIC AND MICRO-PHOTOGRAPHIC APPARATUS is simply explained in Scientific American Supplement 1574.

A SIMPLE CAMERA-SHUTTER MADE OUT OF A PASTEBOARD BOX, PINS, AND A RUBBER BAND is the subject of an article in Scientific American Supplement 1578.

HOW TO MAKE AN AEROPLANE OR GLIDING MACHINE is explained in Scientific American Supplement 1582, with working drawings.

EXPERIMENTS WITH A LAMP CHIMNEY. In this article it is shown how a lamp chimney may serve to indicate the pressure in the interior of a liquid; to explain the meaning of capillary elevation and depression; to serve as a hydraulic tourniquet, an aspirator, and intermittent siphon; to demonstrate the ascent of liquids in exhaustive tubes; to illustrate the phenomena of the bursting bladder and of the expansive force of gases. Scientific American Supplement 1583.

HOW A TANGENT GALVANOMETER CAN BE USED FOR MAKING ELECTRICAL MEASUREMENTS is described in Scientific American Supplement 1584.

THE CONSTRUCTION OF AN INDEPENDENT INTERRUPTER. Clear diagrams giving actual dimensions are published. Scientific American Supplement 1615.

AN EASILY MADE HIGH FREQUENCY APPARATUS WHICH CAN BE USED TO OBTAIN EITHER D'ARSONVAL OR OUDIN CURRENTS is described in Scientific American Supplement 1618. A plunger battery of six cells, a two-inch spark induction coil, a pair of one-point Leyden jars, and an induction coil, and all the apparatus required, most of which can be made at home.

SIMPLE WIRELESS TELEGRAPH SYSTEMS are described in Scientific American Supplements 1363 and 1381.

THE LOCATION AND ERECTION OF A 100-MILE WIRELESS TELEGRAPH STATION is clearly explained, with the help of diagrams, in Scientific American Supplement 1622.

THE INSTALLATION AND ADJUSTMENT OF A 100-MILE WIRELESS TELEGRAPH OUTFIT, illustrated with diagrams, Scientific American Supplement 1623.

THE MAKING AND THE USING OF A WIRELESS TELEGRAPH TUNING DEVICE, illustrated with diagrams, Scientific American Supplement 1624.

HOW TO MAKE A MAGIC LANTERN, Scientific American Supplement 1546.

THE CONSTRUCTION OF AN EDDY KITE. Scientific American Supplement 1555.

THE DEMAGNETIZATION OF A WATCH is thoroughly described in Scientific American Supplement 1561.

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THE MAKING OF A RHEOSTAT is outlined in Scientific American Supplement 1594.

Good articles on **SMALL WATER MOTORS** are contained in Scientific American Supplements 1494, 1049, and 1406.

HOW AN ELECTRIC OVEN CAN BE MADE is explained in Scientific American Supplement 1472.

THE BUILDING OF A STORAGE BATTERY is described in Scientific American Supplement 1433.

A SEWING-MACHINE MOTOR OF SIMPLE DESIGN is described in Scientific American Supplement 1210.

A WHEATSTONE BRIDGE, Scientific American Supplement 1595.

Good articles on **INDUCTION COILS** are contained in Scientific American Supplements 1514, 1522, and 1527. Full details are given so that the coils can readily be made by anyone.

HOW TO MAKE A TELEPHONE is described in Scientific American Supplement 966.

A MODEL STEAM ENGINE is thoroughly described in Scientific American Supplement, 1597.

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A CHEAP LATHE UPON WHICH MUCH VALUABLE WORK CAN BE DONE forms the subject of an article contained in Scientific American Supplement 1582.

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(Concluded from page 361.)

Switzerland. The German cards were printed without the impression of a stamp until 1872, in which year also the first return post cards were issued, in Germany. At the postal congress which met at Berne in 1874, and at which 22 countries were represented, the international post card of the value of 10 pfennigs, 12 1/2 centimes, 1 penny, or 2 cents was adopted. The post card soon became popular and its use extended to other countries. Post cards are now issued in great numbers by 22 governments. In Germany alone more than 1,500 million post cards are used annually.

The private picture post card, which has attained such amazing popularity within the last decade, is nearly as old as the government post card. It is also of German invention and it owes its origin to the Franco-Prussian war. On July 16th, 1870, the first illustrated post card, bearing the picture of a gunner, was placed on sale by Schwartz, in Oldenburg. The manufacture of picture cards was afterward taken up by Brandt in Dresden. The industry, which is still carried on chiefly in Germany, has developed to gigantic proportions. Although many of the cards are striking examples of bad taste and vulgarity it cannot be denied that the best of the so-called art cards and the reproductions of famous paintings and statues have extended the love for the beautiful and that the landscape views have given to many persons some idea of the beauties of their own and foreign lands of which they would otherwise have remained in ignorance.

Expenditure of Muscular Energy in Bicycling.

Bulletin 208 of the U. S. Department of Agriculture contains a description of experiments made by Profs. Benedict and Carpenter, of Wesleyan University, on the expenditure of muscular energy in bicycling. The chief result of the experiments, which were conducted with the aid of the respiration calorimeter, is that in bicycling the muscles of the legs work with an efficiency of 20 to 22 per cent, or, in other words, for each unit of heat produced by the external work of the muscles about four units of heat are lost by radiation, in addition to the heat so lost when the body is at rest. The external work was measured by an ergometer, consisting of a bicycle, the rear wheel of which was replaced by a copper disk, which rotated between the poles of an electromagnet, forming an electromagnetic brake. By this means the work was consumed in the production of induced currents in the disk and was ultimately converted into heat, which was measured by inclosing the whole machine in the calorimeter. The rider was then inclosed, with the machine, in the calorimeter and the heat produced in a definite interval of time was again measured. This heat was made up of three parts: the heat generated in the body in consequence of its muscular activity, the heat which would be evolved in the same time by the body at rest, and the heat produced in the ergometer by the external work of the muscles. The last-named portion had been measured in the preliminary experiment already described, and the second portion was measured by inclosing the man at rest in the calorimeter. These portions having been subtracted from the total quantity of heat produced in the main experiment, the remainder represented the heat generated in the body in consequence of the activity of the muscles employed in bicycling. This remainder was found to be about four times the heat generated in the ergometer, whether the bicyclist worked moderately or strenuously and whether he was experienced or not. Training, therefore, appears to have little effect upon the thermo-dynamical efficiency. It has long been known that the human body is a highly efficient engine, but it should be noted that the high efficiency of 20 to 22 per cent, exhibited in these experiments, has been exceeded by the Diesel and some other highly developed motors.

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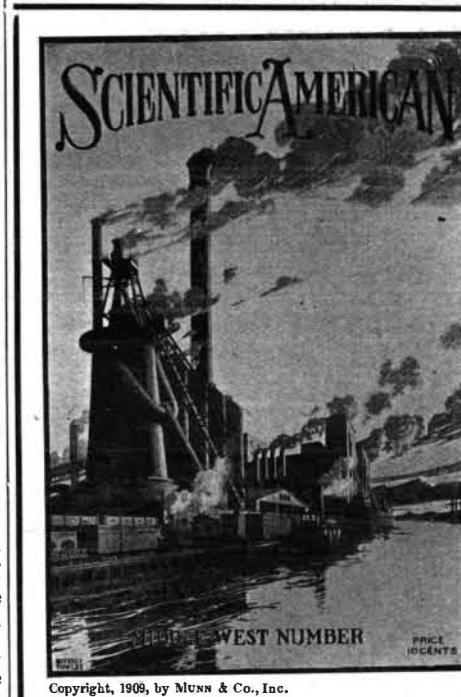
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