is square, 3 feet x 4 feet 6 inches, and also has an offset a little above the center of the stack. The only place where I could exhaust into the stack now is about five feet *below* the boiler flue, that would be at the bottom of the stack. If I can't exhaust in this place, I would have to carry a line of pipe up on the outside of the building to a point above the boiler flue. Which would be the best? And would I need an elbow in the stack, so the air shoots up, or is it unnecessary? A. You do not give the height of your stack, nor the velocity, pressure and volume of the air from the Root blower, so that it is impossible for us to make any exact calculation; but unless you have a draft very considerably in excess of what you actually require when forcing your boilers, it would not be wise for you to discharge the blower into the stack, because that would have the effect of materially reducing the size of your chimney. On account of the distance of the stack from the boilers, it is more doubtful if you have the draft to spare. In case you try the experiment, insert the discharge pipe from the blower at the base of the stack, with an elbow pointing upward.

(9138) F. A. T. asks: Is there any gain in power by using an Archimedes screw beyond the power required to work an ordinary pump? A. There is no gain in power by using an Archimedes screw over the power required for an ordinary pump. Its efficiency is so low that it is not used in practice, and we therefore cannot tell you where you can see one. The principle of its action is just the same as that of the screw conveyors used for feeding coal into furnaces, to convey grain, etc.

(9139) H. E. asks: 1. Has the Roentgen ray or a similar device ever been perfected to that extent that the human eye can see through a solid body; as, for example, the human hand while the fingers are being moved? A. There is no way known by which the eye can see through an opaque body, such as the hand. By the X-ray we commonly speak of seeing through the hand and other dense bodies. The action is in reality as follows: X-rays traverse many opaque bodies quite freely, but the eye cannot see X-rays. Bones are not easily traversed by X-rays, flesh is. Certain chemical salts transform X-rays into light rays; then the eye can perceive the light rays. On the inside of the box which is held over the eyes is a chemical which thus glows in the X-rays. Place the hand on the end of the box. The bones cut off the X-rays more than the flesh does. The chemical does not glow as much where the bones cut the rays off as where the flesh is, hence the bones cast a shadow on the screen. This is called seeing through the hand. What we see is a shadow. Thick flesh casts more shadow than thinner flesh. By this fact much can be made out regarding the condition of interior organs of the body. It is wonderful enough, but it is not seeing through opaque bodies in any proper sense of the term. 2. Has there been manufactured and in use a slot machine into which a solid body such as the human hand might be introduced and then seen through? A. We do not know whether the slot machine has been applied to X-rays or not. There would be no difficulty in doing this.

(9140) A. C. says: We have a well 184 feet deep that we wish to force water out of to a tank 65 feet above ground. The water stands 16 feet from the top of ground, but we do not know how low it will go when pumping is commenced. The outside casing of well is 8 inches. The suction pipe and discharge pipe is 5 inches. It goes down in the well 163 feet. The air pipe is ¾ inch and goes down 157 feet. The air pressure is 100 pounds. The question is, how far can the water lower and still allow the pumping to go on successfully? In other words, how far must the air pipe be down in proportion to the amount of elevation of water? A. One hundred pounds air pressure will lift a column of water 230 feet high, neglecting friction. The amount of friction will depend on the mechanism used; if the friction is 30 per cent, the 100 pounds air pressure will life a column of water 161 feet high, or from 96 feet below the ground to a tank 65 feet above it.

(9141) J. A. says: I inclose an extract from a letter from John Anderson, Road Commissioner for the State of New Hampshire, in the White Mountains, to Prof. C. H. Hitchcock, of Dartmouth College: "Won't you consult your chemist at Hanover in relation to a fire-extinguishing powder that can be used in fighting forest fires? If we could send one hundred men into the woods, each having hung over his shoulder thirty or forty pounds of such material, which thrown by handfuls into the blazing points or scattered broadcast into a running fire would deaden it, enabling the shovel men to finish it by throwing on fresh earth, we would have a practical solution of the question that is now in the minds of all in this section. In view of the enormous annual loss it might avert, it would not really matter if such material were expensive. It should be provided by the State in all localities subject to these fires." A. Sodium tungstate might answer the purpose, but it would be too expensive. We do not believe that a forest fire will ever be extinguished without resorting to the methods already in use by all lumbermen, such as beating out, denuding the forest to form a fire belt, etc. Powders are better adapted for extinguishing fire in rooms. We think that the chemical fire extinguisher might prove practical for fighting forest fires.

(9142) C. J. S. says: How long is the scaling ladder in use in the New York Fire Department, and where was it invented, and how long is it in use in Berlin? Which is more improved—New York or Berlin? A. The scaling ladders used in the New York Fire Department were first used in 1883, and they run from 12 to 20 feet—12, 14, 16, 18, 20; at about the first time they were used, a very successful rescue was made by now Chief of Battalion Binns. We have no information relative to the scaling ladders in use in Berlin, except that they are used. In general, we may say American-built fire engines are the best made, and we have never heard it questioned that the secondary part of the fire equipment was any less good. Owing to the methods of construction employed abroad they have fewer fires, therefore there is no such demand for improvements in fire apparatus as here.

(9143) S. B. E. writes: If G. B., Notes and Queries, 9,076, of your paper of July 11, will consult "Popular Astronomy," pages 38 to 52 inclusive, by Camille Flammarion, translated by Y. Ellard Gore, he will find the information he is seeking concerning the eleven motions of the earth.

(9144) F. R. M. says: I have been intensely interested in the unusually fine articles on radiation, etc., that have appeared in the Supplement during the past four weeks. But there are naturally several statements that I cannot understand or reconcile. Crookes, on p. 23,015, middle of third column, says the "free positive electron is not known." This does not seem to agree with Rutherford's X-rays referred to on p. 22,951, middle column, when they are called positive ions traveling toward the cathode. Is any distinction agreed upon between electron and ion? Will cathode rays act on a photographic plate if let out of the tube through Lenard's aluminium window? and if so, how powerfully compared to Roentgen rays? On p. 22,998, bottom of third column, "unless the gases in the tube are extremely rarefied, the rays are quickly stopped and scattered by molecular obstructions." Then why are not the rays immediately stopped and scattered when they reach the air after passing through the aluminium window? Dastre, on p. 22,998, middle of second column, says cathode emission is rectilinear. Crookes, on p. 23,015, middle of second column, says electrons "can turn corners." How can these be reconciled? A. We do not wonder that you are at a loss sometimes among the varied and well-nigh contradictory statements concerning electrons and other minute things claimed to exist by the more advanced theorizers. It is, of course, the office of a scientific periodical to print the papers read at the various meetings of scientific bodies, but they rest for authority, not upon the periodical, nor upon the society, but upon the repute of the persons presenting them. We cannot decide between the claims of the several scientists, but must leave the matter just where they leave it. Only one engaged in investigation can speak with any authority about such matters as you refer to in your note.

(9145) O. N. writes us: Is a 16 candle power bulb frosted more luminous than one that is not frosted? That is to say, will one 16 candle-power frosted bulb give more light than one that is not frosted? A. An incandescent electric lamp with clear glass bulb will emit more light than one with a frosted bulb. The bulb cuts off light. No arrangement of the bulb can increase the light of the filament. It is the filament which gives the light, and not the bulb. Even a bulb of clear glass absorbs some light. One of partly opaque glass will, of course, absorb more light.

(9146) N. A. N. says: Will you please decide if there is a difference between a mile square and a square mile? I hold that a mile square is a mile around it, and a square mile is four miles around it. A. A "mile square" and a "square mile" have each the same area, but the phrases have very different meanings. A mile square is a figure one mile on each side, and all its corners right angles. A square field one mile on a side is a mile square. A square mile contains 640 acres, and may be in any shape whatever, circular, rectangular, etc., or of any irregular form.

(9147) F. A. F. asks: Kindly answer the following mathematical problem to set your readers right: We have an aquarium, a globe, 6¼ inches in diameter, 6½ inches high; the question is, How many pellets or buckshot ¼ inch in diameter will this globe or aquarium hold? A. The problem you send us may admit of a mathematical solution, but so far as we know it only admits of solution by experiment. Fill the globe with shot and count them. The globe is apparently an irregular solid. You give the dimensions as 6¼ x 6½ inches. This is not a spherical solid, and its shape is not determined by two dimensions only. The rate of curvature of its parts is not given by knowing two dimensions only. If it be assumed that the dimensions are the axes of an ellipse, then the solid is an ellipsoid of revolution and its form is definitely known. But it can hardly be assumed that a globe of glass blown by ordinary processes of the shop is an ellipsoid of sufficient accuracy to base a mathematical calculation upon. If its solid contents simply are known, the number of spheres which it would contain could not even then be calculated without more data. And if the problem were solvable, what would be the use of doing it? We are fond of working upon problems which lead to results of practical value, and though we sometimes work out problems for correspondents, which are simply puzzles, we always feel that the time is misspent, since we are beyond the age when we do such work simply for mental gymnastics.

(9148) A. L. asks: 1. What is the best kind of iron or steel to make a magneto? A. A magnet may be made of tool steel. The higher the grade of steel, the better. 2. What is the best method of making a magnet the most powerful? A. The magnet should be hardened at the ends as hard as it can be made. The middle may be soft. It can then be magnetized by stroking with another magnet or the poles of a dynamo, or by placing it in a coil of wire through which a current of electricity is flowing. All these methods are fully described in textbooks. 3. When a magnet's lifting power is 6 pounds and the object it is lifting is a magnet weighing about 7 pounds and having a lifting power of also 6 pounds, will the former lift it, or must the latter weigh exactly six or lower? A. If a magnet can lift six pounds, it can lift anything less than six pounds. If one of two magnets can lift seven pounds, it will hold up seven pounds or hold itself up against the other if suspended from it. 4. Has a magnet the same amount of repelling force as attractive? A. A magnet will repel with the same force as it attracts. The lifting power of a magnet means that it will lift in actual contact with the weight to be lifted, and not at any distance from it through the air. A narrow gap of air reduces the power of a magnet very greatly.

(9149) W. C. B. says: I am informed that there is a process for making ice whereby liquid air is utilized in place of ammonia; that the installation of a plant of that character can be installed for much less money than the ammonia plant; that the maintenance is much less than the ammonia plant; and that it has other advantages. Will you be kind enough to give me some information on this subject? Is it in its experimental stage, or is the system being used to any extent? Can the tubes of air be secured commercially like ammonia? I am told they are used principally for small plants, but that larger plants use the ammonia. In your opinion, would a plant of 20-ton capacity per twenty-four hours be manipulated more economically with the air or the ammonia systems? A. We think we are safe in saying that nowhere in the world is liquid air in use for ice-making or refrigeration, and in our judgment it will be a long time before it is used for any of these purposes. It is many times as expensive as the ammonia process, and has other disadvantages in comparison with it.

(9150) A. S. asks: A friend of mine says if a piece of iron is laid where the sun can shine on it, it will get hotter than a thermometer would show the atmosphere to be. I claim he is wrong. If it would be as he says, the iron would have the property of drawing heat, and an iron pail of water would show a greater registration on a thermometer than the air would. Nearly every one I have spoken to says he is right, so as a last resort I turn to you. A. Any metal laid where the sun can shine fully upon it and at the same time be protected from drafts of air will become much hotter than the adjacent air. We have just laid out a roll of sheet copper in which was a thermometer. The ends were closed by paper to protect the air from passing through the roll and cooling the thermometer. By its side in the sun was another thermometer, and still a third was in the shade close by. The thermometer in the shade showed 82 deg., that in the sun showed 122 deg., while the one in the copper roll read 138 deg. As the mercury rose to the very top of the bore of the stem, it is not certain but that the temperature was higher still. Any one who ever picked up a piece of iron which had lain in the sun of a summer day and found it too hot to hold in the hand, knows that the air in the neighborhood is cooler than the piece of iron; or if as a boy you have walked barefooted over stones, or in the sand, on which the sun shone with full force, and had your feet burned, the same fact could have been learned. The scientific reason for this is not difficult to understand. Water is used as the standard for measuring the quantity of heat required to produce a certain rise of temperature. One pound of water is raised 1 deg. by a certain quantity of heat. It will require only one-fourth as much heat to raise a pound of air one degree, one-eighth as much to raise a pound of iron one degree, and one-tenth as much to raise a pound of copper one degree. The same quantity of heat produces very different effects upon different substances upon which it strikes.

(9151) A. F. O. says: I know all about the ordinary thermometric scales, F., C., and R., and their mutual reductions, but "600 deg. A" in President Swinburne's address in the Supplement is new to me. Will you kindly enlighten me? A. "600 deg. A" are degrees of absolute temperature. The absolute zero is 273 deg. below the Centigrade zero. Temperatures are often expressed in the absolute scale, since then the relations are in an exact ratio to each other. 400 deg. A is twice as hot as 200 deg. A. Of course 400 deg. C. is not twice as hot as 200 deg. C., since both are reckoned from the freezing point of water, which is not a real zero of heat. Ice is still 273 deg. C. above zero.

(9152) C. H. S. asks: 1. Without using wireless telegraphy, is there any way to receive a current of magnetism or of electricity from one boat to another, 100 feet or less away, to affect the needle or an electrometer? A. We do not know any way of sending and receiving electrical signals which is not equivalent to wireless telegraphy; that is, an induction coil and receiving instruments, such as a coherer of telephone, or some equivalent electromagnetic device must be used. 2. Can an electrometer be made to register such a current, no matter how feeble? Don't mean to telegraph or telephone. A. An electrometer is not the instrument to employ. It receives and registers static charges, not currents. A galvanometer is probably intended. This may be used in the way mentioned.

NEW BOOKS, ETC.

The Elements of Electro-Chemistry Treated Experimentally. By Dr. Robert Lüpke. Revised and augmented by M. M. Pattison Muir, M.A. London: H. Grevel & Co. Philadelphia: J. B. Lippincott Company. 1903. 8vo. Pp. 255. Price, $2.25.

Although the main purpose of the book is to set forth the purely scientific aspects of electro-chemistry, the practical sides of the subject have not been left altogether unnoticed. Technical electro-chemical processes, and especially the processes of electro-metallurgy, which are so important at present, are referred to in their proper places. The experiments, which form an essential part of the book, are carried out with the simplest possible apparatus.

Les Industries Chimiques et Pharmaceutiques. Par Albin Haller. Paris: Gauthier-Villiers. 1903. Vol. I. 4to. Pp. 405. Vol. II. Pp. 445.

In these two stately volumes Prof. Haller reports on the chemical and pharmaceutical industries which were represented at the last Paris Exposition. After a scholarly introduction he discusses the chemical industry of every European country and of the United States, passing then to improvements introduced since 1889. His second chapter discusses pharmaceutical products and minor improvements, not the least valuable portion of the chapter being devoted to a *résumé* of antiseptics and antipyretics. In a chapter on artificial colorants and the raw material from which they are made, Prof. Haller gives an admirable review of the development of this important branch of organic chemistry since 1889. The products of the distillation of wood, resins, coal, and mineral oils are treated in a chapter by themselves, as are also artificial and natural perfumes. The sixth chapter is taken up by descriptions of mineral colorants or pigments, lacquers, varnishes, paints, inks, blacking, and the like. In the seventh chapter soap-making and stearine industries are treated.

Die Weissgerberei, Saemischgerberei und Pergament-Fabrikation. Ein Handbuch fuer Lederfabrikanten. Von Ferdinand Wiener. Vienna: A. Hartleben. 1903. 12mo. Pp. 376. Price, $1.75.

Mr. Wiener's book is essentially a practical reference book for the leather manufacturer. Its style is such that the process described can be comprehended even by the layman. In this second edition of his work Mr. Wiener has carefully revised the text and incorporated descriptions of the more important improvements which have been made since the appearance of the first edition.

Technik der Radierung. Eine Anleitung zum Radieren und Aetzen auf Kupfer. Von Josef Roller. Vienna: A. Hartleben. 1903. 12mo. Pp. 376. Price, $1.25.

Prof. Roller's handbook on etching is intended not only for the artist, but also for the art connoisseur. The work discusses thoroughly and clearly the various operations of etching on copper, and likewise contains many an interesting remark on artistic printing and a very instructive review of the various calcographic methods.

The Chemistry of Pigments. By Ernest J. Parry, B.Sc., and John H. Coste, F.I.C., F.C.S. London: Scoot, Greenwood & Co. New York: D. Van Nostrand Company. 1902. 12mo. Pp. 280. Price, $4.50.

The publishers of this work have a reputation for issuing important books upon technical subjects and the present book fully sustains this reputation. It indicates the chemical relationship, composition, and properties of most of the better known pigments. The various colors are treated in groups allied chemically, rather than chromatically; an excellent arrangement. The methods of manufacture of colors have been considered rather from the chemical than the technical point of view. It is not suggested by the authors that the present work is in any

sense a manual of color making, but it will be found most useful by those who are called upon to examine pigments as a guide to the selection of those which are suitable and the rejection of those which as a class, or through individual inferiority are unsuitable for the class of work to be undertaken.

EASY LESSONS IN ROOF MEASUREMENTS. By William Neubecker. New York: David Williams Company. 1903. 16mo. Pp. 31. Price 25 cents.

Twelve short lessons on figuring from architects' or scale drawings the amount of material required to cover a given surface in flat, hipped, or irregular-shaped roofs.

THE ROENTGEN RAYS IN MEDICINE AND SURGERY AS AN AID TO DIAGNOSIS AND AS A THERAPEUTIC AGENT. By Francis H. Williams, M.D. New York: The Macmillan Company. 1903. 8vo. Pp. 757. 428 illustrations. Price, $6.

No discovery of modern times has made a more profound sensation than the discovery of the Roentgen rays, and it is fortunate that instead of being a scientific plaything it has been put to practical use in the diagnosis of disease, and as a remedial agent. In two years there have been three editions of the volume before us, the first edition being exhausted in three months. The descriptions of the apparatus and methods employed are clear and concise, and the half-tones of radiographs are well executed. The subject is treated in a scholarly way and the book is one which we commend not only to the physician, but to the physicist as well.

ELECTRIC WIRING. A Primer for the Use of Wire Men and Students. By W. C. Clinton, B.Sc. New York: E. P. Dutton & Co. 16mo. Pp. 179. Price, 60 cents net.

This little book is intended as an introduction to the art of indoor electric wiring as practised in the fitting up of private houses, stores, etc., with lamps and bell circuits. Worked examples have been given where possible. The book is intended specially for the use of those preparing for the preliminary examination of the City and Guilds of London Institute. We have already expressed our opinion of the English examination system in this column. The practice is, of course, English, but it will prove useful as well to the American student. We regret to note that the title page has no date. All scientific books should be properly dated.

AN INTRODUCTION TO THE STUDY OF TEXTILE DESIGN. By Aldred F. Barker. New York: E. P. Dutton & Co. 1903. 8vo. Pp. 211. Price, $2.50.

A most admirable book. The primary object of this work is to show clearly how the special knowledge required in the textile industries may be co-ordinated into a truly educational discipline. The numerous plates and design sheets are admirably engraved and printed and the diagrams showing the principles upon which textile machinery is based are the best we have ever seen. The chapter on the Science of Cloth Construction is particularly valuable. It is a book which should be in the hands of all those connected with mills.

THE PRINCIPAL SPECIES OF WOOD. Their Characteristic Properties. By Charles Henry Snow, C.E., Sc.D. New York: John Wiley & Sons. 1903. 8vo. Pp. 203. Price, $3.50.

An excellent book, admirably illustrated by thirty-nine full-page plates and many figures in the text. It is intended for those who are not foresters or botanists, but who use woods or desire knowledge of their distinguishing properties, therefore it will appeal especially to engineers, but all who have occasion to use woods will find it of great value. Under "Live Oak," for instance, we find that the author deals with Nomenclature, Locality, Features of Tree, Color, Appearance or Grain of Wood, Structural Qualities of Wood, Representative Uses of Wood, Weight of Seasoned Wood in Pounds per Cubic Foot, Modulus of Elasticity, Modulus of Rupture, Remarks. Other woods are treated in a similar manner.

FOREIGN TRADE REQUIREMENTS. New York: Lewis, Scribner & Co. 1903. 4to. Pp. 532. Price, $10.

This reference volume, which is published annually, contains complete information concerning the commercial countries of the world as to trade conditions, traveling salesmen, agencies, and advertising, credit customs, commercial, trade-mark, and patent laws, transportation facilities, principal cities, postal regulations, coins and currencies, weights and measures, and cable rates. While the book was issued primarily for the benefit of the American exporter, the demand for it from England and Germany has been large, and this proves that the manufacturers of these countries are keenly alive to the necessity of utilizing every possible aid for the extension of their foreign business. The work has been conscientiously done, and the book cannot but prove of great value.

THE IMPROVEMENTS OF RIVERS. By B. F. Thomas and B. A. Watt. New York: John Wiley & Sons. 1903. 4to. Pp. 356. 92 full-page and folding plates. Cloth, $6.

The second title is "A Treatise on the Methods Employed for Improving Streams for Open Navigation and for Navigation by Means of Locks and Dams." This is the first work of its kind published in the English language, although engineers have long recognized the value it would be to the profession to have a treatise covering the principal features of that branch of enginering pertaining to the improvements of rivers. This branch comprises a great variety of works: Locks and Dams for Canalization, Dikes and Jetties for Concentrating and Controlling Streams and Bank Protection in Regularization, Levee Building and Storage Reservoirs for the Prevention of Inundations, and Dredging and Snagging for Keeping Channels during Times of Low Water. The object of the work is to provide in concise form a description of the various systems employed for bettering the condition of navigable streams, together with the methods usually adopted for their design and execution. It is an admirable contribution to engineering literature.

STORAGE BATTERY ENGINEERING. By Lamar Lyndon, B.E., M.E. New York: McGraw Publishing Company. 1903. 8vo. Pp. 382. Price, $3.

The evident and long unfulfilled need of a practical work on the storage battery, particularly adapted for electrical engineers who are not chemists, and on the details of its engineering applications, has induced the preparation of this work which is intended to assist the practising engineer in designing, installing, and maintaining battery equipments and to guide him in the selection of types of batteries and auxiliary apparatus best suited to the service which they are to perform and at the same time to impress on the technical public both the advantages and limitation of the storage battery in practice. The author has performed an extremely difficult task in a most acceptable manner.

FIRE INSURANCE AND HOW TO BUILD. By Francis C. Moore. New York: The Baker & Taylor Company. 1903. 8vo. Pp. 860. Price, $5.

It will prove a convenient book for architects, builders, and property owners who contemplate erecting buildings, enabling them to make inexpensive structural alterations which would secure lower insurance rates and save the burden of a lifelong insurance tax. The idea and plan of this book are excellent. The systems in use by the Fire Underwriters for determining rates are very complicated and are puzzling to the lay mind, but with the aid of this book the principles which underlie the formation of a rate will be understood. The work also deals with fire prevention and extinction, special features of manufacturing risks, the writing of policies, the adjustment of losses, etc.

MODERN MEXICO'S STANDARD GUIDE TO THE CITY OF MEXICO AND VICINITY. By Robert S. Barrett. Published by "Modern Mexico," the City of Mexico and New York. 1902-3. 8vo. Pp. 186, profusely illustrated. Price, 50 cents.

An admirable guide which should prove indispensable to all tourists. The illustrations are happily chosen, the plates have been well executed, and the printing is excellent. There is not a feature of the city, important or unimportant, which is not properly dealt with.

TREATISE ON HYDRAULICS. By Mansfield Merriman. New York: J. Wiley & Sons. 1903. 8vo. Pp. 585. 192 illustrations. Price, $5.

The eighth edition has been rewritten and enlarged, which was rendered necessary by the many advances which have been made in hydraulics since 1889, when the first edition of this treatise was issued. Too much cannot be said in praise of this admirable book which is a standard text book for engineers and engineering students. It deals with the entire range of hydraulics, taking in the flow of waters through orifices, tubes, pipes, and over weirs. It also deals with the flow of rivers, water supply and water power, water wheels, turbines, naval hydromechanics, and pumps and pumping.

EXPERIMENTS ON THE FLEXURE OF BEAMS. Resulting in the Discovery of New Laws of Failure by Buckling. By Albert E. Guy. New York: D. Van Nostrand Company. 1902. 12mo. Pp. 122. Price, $1.25.

The study of the failure of beams by the buckling of the compression side has been strangely neglected and now that it has been taken up it proves to be the central fact and key to the entire subject when looked at in the broadest sense. The analogy of the failure of the compression side of a beam by buckling to the method of failure of a long column was, of course, long ago remarked, but we believe that there has been no previous attempt to connect the two by a formula. Mr. Guy's experiments have been very successful in connecting them and in showing that Euler's formula for long columns is, in fact, the fundamental formula which lies at the base of the whole subject.

HAND BOOK OF CLIMATOLOGY. By Dr. Julius Hann. Part I. General Climatology. New York: The Macmillan Company. 1903. 8vo. Pp. 437. Price, $3.

Dr. Hann's book has been translated by Prof. Robert de Courcey Ward, of Columbia University. The writer undertook the work primarily in order that it might serve as a textbook in the course in general climatology in Harvard University. At the same time the publication of a standard work on climate will, he hopes, lead to the extension and improvement of the teaching of scientific climatology in English-speaking countries. The work is a very important one, and this new edition is an excellent contribution to the literature of meteorology.

THE NEW ONION CULTURE. By T. Greinier. New York: Orange Judd Company. 1903. 16mo. Pp. 114. Price, 50 cents.

A complete guide in growing onions with the greatest profit, explaining the whys and wherefores. Clear and minute directions are given of how the plants are grown; the cold frame; seed bed; planting; fire hotbed, hotbeds heated by steam; cheap greenhouse for market gardeners; greenhouse heated by hot water; quantity of seed required; time of sowing; varieties; what soil to select; how to manure and prepare it; onions on muck soil; clean soil essential; how the plants are set in the ground; tillage as moisture preserver and weed killer; tools of tillage; when and how to harvest the crop; danger in delay; signs of maturity; curing the crop; curing sheds; weight of crop; wintering onions; advantages and profits of the new way; estimation of cost and returns.

THE RESISTANCE AND POWER OF STEAMSHIPS. By W. H. Atherton, M.Sc., and A. L. Mellanby, M.Sc. Manchester: The Technical Publishing Company, Ltd. 1903. 16mo. Pp. 200. Price, $2.

Almost all the recognized methods of determining the engine power required to propel steamships are discussed in considerable detail, and examples of their application given. The subject of the fouling of ships has also been dealt with fully, because of its important influence on the actual resistance of seagoing ships. The book will appeal to marine engineers and shipbuilders, and, in fact, to all who are interested in watching the development of steamships.

A HAND BOOK ON THE STEAM ENGINE. With Special Reference to Small and Medium-Sized Engines. By Herman Haeder, C.E. Translated by H. J. P. Powles. London: Crosby Lockwood & Co. New York: D. Van Nostrand Company. 12mo. Pp. 458. 1,085 illustrations. Price, $3.

The present volume is profusely illustrated by very helpful engravings, and the number of tables is surprisingly large. The best Continental practice is given. The book shows the results of practical experience of engineers.

TECHNICAL MYCOLOGY. The Utilization of Micro-organisms in the Arts and Manufactures. By Dr. Franz Lafar. Vol. II. Eumycetic Fermentation. Part I. London: Charles Griffin & Co., Ltd. Philadelphia: J. B. Lippincott Company. 1903. 8vo. Pp. 189. Price, $4.

A practical handbook on fermentation and fermented process for the use of brewers and distillers, analysts, technical and agricultural chemists, pharmacists, and all interested in the industries dependent on fermentation. The first volume dealt with Schizomycetic Fermentation.

THE UTILITY OF AN ACADEMIC OR CLASSICAL EDUCATION FOR YOUNG MEN WHO HAVE TO EARN THEIR OWN LIVING AND WHO EXPECT TO PURSUE A COMMERCIAL LIFE. An Investigation. By R. T. Crane. Chicago. 1903. 16mo. Pp. 109.

SIMPLE SCIENTIFIC EXPERIMENTS. By Aurel de Ratti. London: Dawbarn & Ward, Ltd. 1903. 16mo. Pp. 69. Price, 20 cents.

INFORTUNI SUL LAVORO. MEZZI TECNICI PER PREVENIRLI. By Effren Magrini. Milan: Ulrico Hoepli. 1903. 16mo. Pp. 251. Price, 75 cents.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending

July 28, 1903,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Abrading material, tool for holding, M. E. McAfee 734,927
Acid, making sulfuric, G. Gin 734,849
Advertising device, J. D. Smith 734,982
Air compressors, controller for hydraulic, W. J. Linton 734,904
Air inlet, fresh, R. S. Watson 735,007
Air to buildings, apparatus for supplying cool, A. Siebert 734,975
Alkaline earth dioxids, making hydrates of, G. F. Jaubert 734,713
Amalgamator, G. C. Scott 734,618
Amalagamator, T. H. Hicks 734,867
Angle bar and rail shoe combined, graduated reinforced, G. H. Williams 735,025
Axle, J. E. Spencer 734,629
Axles, machine for turning down spindles for wagon, P. Wallenstein 734,639
Baby walker, J. L. Phillips 734,940
Bag fastener, W. H. Slattery 734,980
Bait, spoon, J. R. Harlow 734,703
Balls, making playing, C. T. Kingzett 734,888
Band fastening, J. H. Christopher 734,512
Bank, coin registering, J. F. Healy 734,705
Bark from standing trees, apparatus for removing, W. P. Kidder 734,565
Bark splitting machine, multiple, H. L. Staley 734,768
Basket for holding tin scraps, Laernoes & Dunn 734,894
Bathometer or ship's log, E. S. Wheeler 734,785
Bearing, roller side, A. G. Steinbrenner 734,990
Bearing, side, G. L. Harvey 734,862
Bearing, side, A. G. Steinbrenner 734 989
Bed or couch bed, extension, A. de Piniec-Mallet 734,726
Beer, apparatus for converting wort into, C. Spindler 734,985
Berth, sleeping, E. Dawe 734,519
Bicyclist's strength testing machine, R. W. Blaisdell 734,662
Bit. See Drill bit.
Boiler tube cleaner, C. B. Risley 734,613
Bolting or other machines, feeding device for, R. A. Stubbs 734,631
Book trimming machine, Lowell & Williamson 734,907
Bookcase, sectional, A. J. Gilmour 734,537
Boring machine, F. & R. Croft, Jr 734,825
Bottle, A. Boisclaire 734,804
Bottle attachment, C. J. Rowe 734,754
Bottle cap, H. D. Jones 734,561
Bottle closure, R. A. Hall 734,545
Bottle filling machine, W. E. Brown 734,809
Bottle, non-refillable, F. Jost 734,881
Bottle, non-refillable, I. Morgenroth 734,924
Bottle unstoppering device, aerated water, R. W. McGowan 734,929
Box, A. Bauer 735,013
Bracket, H. G. Voight 734,780
Bracket holder, G. F. Price 734,948
Brake head, J. J. Kinzer 734,568
Brake retainer, automatic driver, Hamilton & Holmes 734,859
Brake shoe, J. J. Kinzer 734,566, 734,567
Brake shoe, J. B. Perry 734,745
Brick or article, refractory, F. J. Tone 735,022
Broom attachment, I. P. Kilgore 734,887
Brush backs, machine for placing material in, C. W. Smith 734,625
Brush, fountain, G. C. Madison 734,910
Buckle, H. Engelman 734,686
Burglar alarm, electric, S. Schwarzschild 734,967
Burner globe holder, G. F. Klemm 734,569
Butter molding machine, A. C. Dodge 734,680
Buttonhole cutting and stitching machine, E. B. Allen 734,495
Cable laying device, submarine, B. Roberts 734,615
Call, carriage, T. J. Gorman 734,538
Camera stand, J. H. Smith 734,763
Camera stand, J. H. & J. A. Smith 734,764
Can body making machine, E. Zeh 734,648
Cannon, W. H. Vivian 734,779
Cap, bathing, H. Lemmermann 734,578
Car and car truck bolster, Bush & McCormick 734,665
Car and car truck bolster, S. P. Bush 734,814
Car, burglar proof mail and express, C. Zimmerman 734,650
Car cinder guard, Maxson & Denison 734,583
Car coupling, J. Timms 734,776
Car coupling, S. P. Bush 734,813
Car coupling, S. K. Dunkle 734,835
Car coupling, W. A. Palmer 734,935
Car coupling, J. Timms 734,999
Car, dumping box, G. E. Simonton 734,977
Car fender, A. Miesse 734,587
Car fender, D. B. Dibble 734,830
Car grain doors, device for fastening, F. H. Bennett 734,801
Car, mine, W. H. Roach 734,958
Car record device, Cavanagh, Hannan & Clarke 734,817
Car replacer, W. H. Pritchard 734,611
Car seat, J. S. Johnston 734,560
Car spring bumper, draw bar, and automatic coupling, mine, R. S. Weitzell 734,640
Car wheel fender, railway, F. Schwinger, Jr. 734,968
Carbureter, explosive engine, W. A. Gill 734,848
Carbureting apparatus, air, Avery & Smith 735,011
Card punching machine, Jacquard, M. Mertens 734,729
Carpet cleaner, E. B. Ferris 734,841
Carrier. See Hay carrier.
Cartridge, safety blasting, T. F. Durham 734,684
Cast off, C. R. Harris 734,861
Cement molding apparatus, L. G. Haase 734,854
Cement plaster, composition of matter for, A. De Monco 734,678, 734,679
Change feed mechanism, J. Edgar 734,837, 734,838
Check protector, E. Ocumpaugh 734,932
Chimney cap, J. L. Woodside 734,790
Christmas tree, A. H. Zahl 735,010
Churn, J. G. Frederick 734,535
Cigar cutter and mirror, Farley & Ballasch 734,688
Circuit closer, Long & Cofran 734,905
Circuit controller, W. W. Alexander 734,793
Clamp, E. J. Herbert 734,553, 734,554
Clasp, W. T. Spillane 734,984
Clock, self winding electric, C. M. Crook 734,674
Clothes dricr, R. Shull 734,622
Clothes pin machinery, R. Richardi 734,957
Clothes pounder, S. Harper 734,860
Cluster switch, H. Hubbell 734,876
Clutch, J. H. Moss 734,733
Clutch, cone, A. C. Krebs 734,893
Clutch, planter, W. L. Beall 734,502
Cock, gas, G. A. Brachhausen 734,505
Coin holder, A. G. Bowen 734,806
Coke receiver and loader, J. M. McClellon 734,592
Collar turning and dampening device, C. C. Gridley 734,542
Combing machine, C. F. Ainsworth and S. Anderton 734,652
Composing or like machines, machine for producing perforated strips for, J. Lagarde 734,576
Compressing material into form, machine for, H. J. Flood 734,531
Concrete mixer, D. Erter 734,687
Condensing apparatus, steam, C. V. A. Eley 734,525
Confection making apparatus, J. Friend 734,536
Cord making apparatus, covered, A. C. Buschner 734,508
Cord tip, J. R. Barrett 734,500
Cork, H. Helbing 734,551
Corn shocker, J. M. Shively 734,973
Corset, J. Siegel 734,623
Cotton press, J. T. Fuller 734,695
Couch box, H. M. Bedell 734,659
Coupling, E. O. Warner 734,782
Coupling pivot pin, C. A. Tower 735,000
Crank and yoke connection, F. C. Olin 734,595
Cuff, C. H. Knapp 734,570
Cultivator, garden, D. H. Moore 735,038
Cultivator, riding or walking, W. L. Beall 734,657
Cuspidor, sanitary pocket, J. Tobin 735,043
Dam, N. F. Amburgen 734,796
Dental crown slitter, G. K. Heist 734,865
Die, F. E. Smith 734,762
Digging machine, H. Sorensen 734,766
Dilating bougie, F. R. Bachler 734,498
Disinfection apparatus, A. Ghirelli 734,698
Display rack, D. Sullivan 734,995
Display table, C. W. Winfield 734,645
Door check and spring, Beauregard & Gooding 734,658
Doubletree clip, C. W. McGlashan 734,736
Dough, raising, J. W. Garrick 734,847
Drawer support, A. A. Anderson 734,497
Drill bit, rock, H. Collins 734,515
Dust collector, R. W. Sutherland 734,627
Dwelling block, M. F. Peirce 734,938
Dye and making same, blue anthraquinone, E. Hepp and C. Hartmann 734,866
Edge setter, E. I. Williamson 734,789
Egg tester, F. W. Wilson 735,027
Electric accumulator, portable, L. A. Lammerts 734,896
Electric battery, H. Halsey ..... 734,547 to 734,549
Electric battery, H. Csanyi 734,826
Electric battery, H. Halsey 734,857, 734,858
Electric circuit breaker, M. Skinner 734,624
Electric motor controlling means, R. Lundell 734,724
Elevator indicating mechanism, F. S. Payne 734,744
Elevators, stairways, etc., casing or housing for, J. J. Plucker 734,606
Engine igniter, explosive, W. H. Jones 735,036
Engines, electric igniter for explosion, G. A. Goodson 734,852
Engines, electric igniter for explosive, G. A. Goodson 734,851
Engraving or carving machine, H. M. Albee 734,792
Extension table, G. R. Roughley 734,961
Extension table, L. Welker, Sr 735,008
Eyeglass guard, W. E. Cawood, Sr 734,667
Eyeglasses, W. C. Newman 734,739
Fabric pin, G. W. McGill 734,735
Fan or blower, centrifugal, J. Verner 735,001
Fanning mill, W. Sperry 735,041, 735,042
Fastener, metal, A. Raper 734,951
Fat separating machine, P. Feiten 734,840
Feed table, universal, H. P. Elwell 734,685
Feed trough, animal, F. H. Hayes 734,550
Fence brace, E. G. Horne 734,873
Fence post, S. Fielder 734,690

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