—E. Z. SMITHPETER, Bogard, Mo. The usual means for attaching harness with the neck-yoke of a [illegible] wagon is a breast-strap which passes through a ring on the yoke, its ends being attached to the collar hames, the strap being thus bent at an acute angle where it passes through the yoke ring, so that it is subject to great strain and rapid wear at that point. Advantages are obtained in respect to wear and ease and rapidity of hitching and unhitching the team.

POLISHING COMPOUND.—G. SHAMBECK, Salt Lake City, Utah. The object of this invention is to provide a polish for use on any article of furniture, vehicles, and woodwork in general, whether previously varnished or not, the polish imparting a bright and fresh appearance, so that the article treated will look as though it had recently been renovated or was entirely a new article. The compound acts the same either on a wet or dry surface.

HOSE-COUPLING.—H. E. SMITH, Roslyn, Wash. The purpose of this improvement is to provide details of construction for hose-couplings which are simple and practical, affording means for connecting two sections of the hose-coupling in a reliable manner and permitting the sections to be manually disconnected with ease, and which may be employed to couple onto a fire-hydrant as well as an ordinary hose.

TRUSS-PAD.—I. B. SEELEY, New York, N. Y. In this case the invention refers to improvements in support and retention hernial pads, the object being to provide a pad adapted to the various constructions of hernia-trusses for the requisite mechanical support, and designed more especially for use in the mechanical treatment of inguinal hernia as located at the lower abdominal body-section.

COMBINED ASH-RECEIVER AND PAPER-WEIGHT.—P. A. ROBSON, Westminster, S. W., London, England. This article serves both as an ash-receiver and as a paper-weight, and is so constructed that it may be used as a pipe-cleaner. It has extending centrally upward from the ash-receiving well a tapered spike, which may be used as a means for cleaning or removing burned particles of tobacco or ashes which cling to the interior wall of the bowl of the pipe.

GAME-BOARD.—H. A. ROAT, JR., Harrisburg, Pa. The principal object in this instance is to provide a board which may be readily manipulated by one person, acting as a scorer, to present certain apertures or orifices therein to one of the players, so that should such player shoot or send a marble through one of the apertures he will receive credit for a certain number of points, indicated by numerals placed over or adjacent to the apertures.

GARMENT-SUPPORTER.—FRANCES C. MCDONALD, P. O. Box 399, Chicago, Ill. The present invention is in the nature of an improvement upon the device forming the subject matter of a former patent granted to this inventor. The purpose of the present improvement is to devise a supporter particularly designed for use in retaining and securing hosiery and the like, which will embody the features of durability, simplicity, and convenience. Means are so adjusted that a stud or similar article may be locked by the supporter, the button being adapted to engage with articles of clothing.

HORSESHOEING-STOCK.—M. M. MAY, Rulo, Neb. Among other things this invention has for its object the provision of a stock which may be readily opened for the introduction of the animal and easily and securely closed, to provide means for securing either foot in a raised position convenient for the operator, and to provide means for sustaining a part of the animal's weight when standing on three of its feet during the shoeing operation.

PROTECTING HEAD-GEAR OR HAT.—ANNA MIEROSLAWSKI, New York, N. Y. The object of the invention is to provide a head-gear protector, more especially designed for protecting ladies' hats and other head-gear against rain, dust, and the like, to prevent the hat from being injured, the protector being very simple in construction, and easily applied to properly fit the hat without danger of injuring the trimmings thereof.

CARD GAME.—H. E. GAVITT, Topeka, Kan. The cards used in this game bear indicia of different money values. The cards of a pack are divided into groups of eight, all of one group being alike in name of stock and its assumed money value per share, also in the amount of the capital stock. A telegram-card is used on occasions. Cards are dealt equally, and players attempt to fill their broken groups by trading with neighbors a number of cards exchanged for a like number. The cards and manner of playing illustrate the transactions of the world's great stock-exchanges.

CESSPOOL.—H. D. GARDNER, New York, N. Y. This cesspool is constructed of cement, or the like, and is adapted for draining surface water. Its shape is the frustum of a cone. The sides are provided with a series of slots wider at the outer than inner end portions, so that solid dirt packed against the cesspool's exterior will enter the outer portions of the openings, so as to prevent mud being driven into openings from the interior, while means are provided to prevent the earth around the cesspool falling into it, yet permitting drainage of water from the earth into the cesspool's interior.

CONDUIT FOR HOSE, CABLES, ELECTRIC WIRES, OR THE LIKE.—J. BURNSEN, West Superior, Wis. The invention pertains to improvements to be placed across a street below the surface, so that fire-hose may be passed through it and not interfere with traffic and not be damaged by vehicles. The conduit may also be placed on the bed of a body of water, through which electric wires or other devices may be carried across the water.

FISH-HOOK.—W. E. KOCH, Whitehall, N. Y. In this patent the invention has reference to improvements in fish-hooks, an object being to provide a hook with a sliding weight whereby the weight will not only serve as a sinker, but will serve to hold live bait in natural position—that is, with back up.

BOTTLE-CLOSURE.—J. F. PERRY, Dec'd, Chicago, Ill. In this patent the invention is an improvement in that class of bottle-closures in which a seal of some form engages a fillet or shoulder of a bottle-neck, so that its dislodgement is prevented, save by the use of a tool suitable for the purpose.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

Business and Personal Wants.

READ THIS COLUMN CAREFULLY.—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. **In every case it is necessary to give the number of the inquiry.**

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Marine Iron Works. Chicago. Catalogue free.

Inquiry No. 4925.—For parties to manufacture, in quantities, a flat, indelible pencil about 3¼ inches long when inclosed in a nickel-plated metal case, and having an imprint stamped on this case.

"U. S." Metal Polish. Indianapolis. Samples free.

Inquiry No. 4926.—For parties engaged in raising skunks.

AUTOS.—Duryea Power Co., Reading, Pa.

Inquiry No. 4927.—For manufacturers of small leather washers ⅜ inch inside and 9-16 outside.

Handle & Spoke Mchy. Ober Mfg. Co., 10 Bell St., Chagrin Falls, O.

Inquiry No. 4928.—For manufacturers of chain adders.

Sawmill machinery and outfits manufactured by the Lane Mfg. Co., Box 13, Montpelier, Vt.

Inquiry No. 4929.—Wanted, oboe and bassoon gouging machines and tools for making the reeds for same. Also for makers of brass stuples for the oboe.

American inventions negotiated in Europe, Felix Hamburger, Equitable Building, Berlin, Germany.

Inquiry No. 4930.—For manufacturers of a movable drag saw operated by horse power, with hollow shaft, made in several sections and telescopes, so that the saw can make several cuts from a tree or log at one setting.

Gear Cutting of every description accurately done. The Garvin Machine Co., 149 Varick, cor. Spring Sts., N. Y.

Inquiry No. 4931.—For makers of gage wire stitching or stapling machines.

I would like to furnish new and interesting games to some company to make a place on the market. Wm Eick, Franklin, Neb.

Inquiry No. 4932.—For makers of machines for making shot.

Edmonds-Met el Mfg. Co., Chicago. Contract manufacturers of hardware specialties, dies, stampings, patented devices, etc.

Inquiry No. 4933.—For a machine for making cement bricks, of capacity of 5,000 bricks daily.

☞ Send for new and complete catalogue of Scientific and other Books for sale by Munn & Co., 361 Broadway New York. Free on application

Inquiry No. 4934.—For makers of drop forgings for dental forceps.

The largest manufacturer in the world of merry-go-rounds, shooting galleries and band organs. For prices and terms write to C. W. Parker, Abilene, Kan.

Inquiry No. 4935.—For dealers in Indian seed beads, and all classes of fancy olive, spar, jet, pearl and Venetian beads, at wholesale.

We manufacture anything in metal. Patented articles, metal stamping, dies, screw mach. work, etc., Metal Novelty Works, 43 Canal Street, Chicago.

Inquiry No. 4936.—For makers of 2, 3 and 4 inch terra cotta drain and water pipe and fittings for same, also plumbers' tools, books and material.

Empire Brass Works, 106 E. 129th Street, New York. N. Y., have exceptional facilities for manufacuring any article requiring machine shop and plating room.

Inquiry No. 4937.—For manufacturers of laundry machinery.

The celebrated "Hornsby-Akroyd" Patent Safety Oil Engine is built by the De La Vergne Refrigerating Machine Company. Foot of East 138th Street, New York.

Inquiry No. 4938.—For manufacturers of watchman clocks.

Manufacturers of patent articles, dies, metal stamping, screw machine work, hardware specialties, machinery and tools. Quadriga Manufacturing Company, 18 South Canal Street, Chicago.

Inquiry No. 4939.—For makers of steam log skidders.

$12,000 will buy controlling interest in foundry and machine business in Los Angeles, Cal. Paying, and can be worked up without limit. About $35,000 per year business. Foundry, Box 773, New York.

Inquiry No. 4940.—For machinery for stamping metal souvenirs of soft metal.

Inquiry No. 4941.—For manufacturers of farm and dairy machinery.

Inquiry No. 4942.—For machines for threading cast iron pipe fittings.

Inquiry No. 4943.—For machines for cutting sheet iron washers of special dimensions of No. 12 gage iron and lighter.

Inquiry No. 4944.—For makers of novelties suitable for the mail order business.

Inquiry No. 4945.—For machinery for making lead pipe for plumbers' use, from ⅜ in size upward.

Inquiry No. 4946.—For manufacturers of painting and whitewashing machinery.

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.

(9259) A. S. says: Kindly inform me of the best place to take a mechanical engineering course in the city of New York; and also where the State University is situated, and whether they have a course like the above. A. The course in mechanical engineering at Columbia University, New York city, is one of the best in the country. The requirements for admission to this course are high. The Pratt Institute, of Brooklyn, N. Y., has a two years' course in steam and machine design, which is an excellent mechanical course, with lower requirements for admission than the one referred to above. The State University of New York is Cornell University, situated at Ithaca, N. Y., in the central part of the State. This is one of the best engineering schools in the country.

(9260) G. E. P. says: Is Manhattan Island sinking? A and B both claim that it is. I claim that it is not. A says it is sinking from the great weight of buildings, etc. B says it is because it is being undermined by the sea, East River and North River. A. Geologists think the seashore in the vicinity of New York city and along the New Jersey coast is sinking slowly. The rate is believed to be a few feet in a century. The weight of buildings in the city has no influence in the matter, as that is as nothing in comparison with the weight of the earth on which the buildings stand. These buildings have their foundations upon the solid rock below, and are as firm as the earth itself. The sinking is due to motions in the crust of the earth itself. Such motions are known to exist in many parts of the earth. 2. I have a sal-ammoniac battery, the carbon of which became covered with crystals of sal-ammoniac. I burnt the carbon, and then paraffined the top and put it back. In a little while the crystals came on top, but did not collect on the carbon below the paraffine. How can I fix it? I also noticed a thick layer of carbon in the bottom of the jar. A. When the liquid in a sal-ammoniac cell becomes too strong, a crystal forms. It is not sal-ammoniac, but a more complicated substance, which can be dissolved with difficulty in water, and this has made the trouble for you. The burning which you gave the carbon caused some of the carbon to become powdery and fall off in the water. It should not have been done. The carbons are not as good for it. 3. Please send directions for making blue vitriol battery. A. You require for a gravity battery a star-shaped arrangement of thin sheet copper to be placed in the bottom of the glass jar. In the top of the jar is hung a star, or crowfoot-shaped piece of zinc, weighing 3 to 4 pounds. These you should buy from some dealer. Put in copper sulphate enough nearly to cover the copper. Then fill the jar with water to cover the zinc. Connect the wire from the copper to the zinc, and let the cell stand for several hours till the liquid at the top becomes clear like water. The cell is then ready for use.

(9261) M. & M. say: We are in need of a paper, white preferably, which will after being dampened with water or some other fluid, turn color when an electric current is passed through it. Any information that you can give us on this subject will be gladly paid for and appreciated. A. There are several ways to prepare a paper which changes color when an electric current is passed through it. The simplest is to make a solution of potassium iodide in water and boil some starch in this solution. With the liquid wet some paper. When the wet paper comes into an electric circuit the paper turns dark blue around the positive pole. Another mode of preparing paper is to make two solutions, one of sodium sulphate in water and of phenolphthalein in alcohol. The latter solution may be very weak. Mix them together and wet paper with the liquid. In this case the negative pole turns the paper pink.

(9262) T. C. R. says: This town (Russell) of 1,200 inhabitants is situated high and dry on the watershed between two rivers (Smoky Hill and Saline), each of which is about 200 to 250 feet lower than the town. The Smoky is 7 miles distant, and the Saline 4 miles, at nearest point. Water is not accessible in wells in towns nearer than about 250 to 400 feet in depth, except surface wells in some parts at 20 to 30 feet, which will not furnish large enough supply for any but limited domestic use. The deep wells are practically useless, because of the great amount of salt and other minerals in the water. No one here seems to be informed on the subject, and least of all the workmen who make cisterns. Are there back numbers of the SCIENTIFIC AMERICAN or SUPPLEMENT on this? Can you give any suggestions that would be useful in establishing public municipal water supply for this town? Any literature to help, or any makers of machinery who would make useful suggestions, or any engineers who can be appealed to for preliminary ideas. Can you make any suggestions along the lines first indicated above? Some persons have made guesses that $35,000 to $50,000 would be necessary to install a plant with sufficient capacity for this town. A. In reply to your recent inquiry about the water supply of the town of Russell, we would say that good quality sand, of a sufficient depth, makes a most satisfactory filter. We cannot recommend any literature which would be useful in this matter to one not technically versed in the subject. The question of water supply is a most vital and important one. At the same time, it is an extremely difficult one, and without having thorough investigations made by a competent water-supply engineer, we are unwilling to make any suggestions. If your town has not a satisfactory supply, it would probably be the best investment it could make to get expert advice as to the best method of improving its supply, and then to follow this advice. If you wish us to recommend an expert for this purpose, we should be glad to do so.

(9263) W. H. says: I want to make a square glass fish aquarium. Will you please tell me how to make a cement to be watertight and stick to the glass? A. 1. Dissolve 1 part finely shredded India rubber in 64 parts of chloroform; then add 14 to 24 parts of powdered mastic and digest with frequent shaking until dissolved. 2. Melt together 2 parts of shellac and 1 part of Venice turpentine. Use warm.

(9264) J. E. D. says: To what height will a siphon pull water? Please answer this and put several hundred people at ease in our town. A. A siphon would lift water to a height equal to the height of a water column exerting the same pressure as the atmospheric pressure (which would be for the standard pressure of the atmosphere 33.9 feet), if it were not for the fact that water contains some air in solution, and at ordinary temperatures gives off enough vapor to make a perfect vacuum above a water column impossible. The amount that this action will decrease the height to which a siphon can lift water will depend upon the temperature of the water. If the water is at 212 deg. F., the siphon will not lift it at all; if it is at 700 deg. F., it will lift it 33 feet.

(9265) W. G. asks: Would you kindly inform me how many cubic feet of air one cubic foot of kerosene oil requires for complete combustion? A. One pound of kerosene oil requires for its combustion about 17 pounds of air, or approximately 225 cubic feet of air. The specific gravity of kerosene is about 0.75; therefore one cubic foot of kerosene would require approximately 10,500 cubic feet for its perfect combustion. From 30 per cent to 50 per cent excess air is usually allowed, however.

(9266) C. K. T. says: I desire to learn how carmine is manufactured. A. The preparation of carmine is little understood, but success in its manufacture depends less on any mystery connected with the process than on the employment of the purest water and the best materials, and the exercise of moderate care, dexterity, and patience. The following formula will produce carmine of the richest hues down to ordinary and common, according to the skill possessed by the manipulator: Madame Cenette's process. Cochineal (in powder), 2 pounds, is boiled in pure river water, 15 gallons, for 2 hours, when refined saltpeter (bruised), 3 ounces, is added to the decoction, and the whole boiled for 3 or 4 minutes longer: oxalic acid, 4 ounces, is next added, and the boiling again renewed for 10 or 12 minutes; the heat is now removed, and the liquid allowed to settle for about 4 hours, after which time it is decanted with a siphon into shallow plate-like vessels, and set aside for three weeks. At the end of this time the film of mold which has formed on the surface is dexterously and carefully removed, without breaking it or disturbing the liquid beneath it. The remaining fluid is next very carefully removed with a siphon, and the adhering moisture, as far as possible, drained off, or sucked up with a pipette. The residuum, which is the carmine, is dried in the shade, and possesses extraordinary luster and beauty.

(9267) A. H. F. says: 1. I would like to know the height of a locomotive from rails to top of cab roof. Of course I know that there is a great deal of difference in the different locomotives, but what I would like to know is of the average locomotive built at present. A. The height of locomotive cab roofs varies with the size of wheels, between 10 and 12 feet. 2. I would also like to know the side motion of the cab top from one side to the other while at its full working capacity

at about 40 to 50 mile rate over an average good track, and up-and-down motion if there is any. A. We have no data in regard to the amount of rocking of the cab top. 3. What is the specified side clearance of tracks of our present steam railroads, and also top clearance? A. The clearance between rail and wheel flange is from ¼ to ⅝ of an inch, increased by wear to a ½ inch or more. 4. I would like to know the name of the best railroad block signal system in existence in the United States at present, and about the cost of construction per mile and maintenance. A. We cannot designate the best block signal system in use. Both pneumatic and electric systems are in use by different railroads.

(9268) E. F. S. asks: Kindly inform me how to figure wave lengths of different tones, and where I can find a list of lengths of sound waves, and number of vibrators necessary to produce different tones. A. The wave length of a tone is found by dividing the velocity of sound by the number of vibrations required to procure that tone. The number of vibrations for an octave is usually given in any textbook of physics. They are relatively, taking the fundamental as 1, or unity, 1, 9-8, 5-4, 4-3, 3-2, 5-3, 15-8, 2. Each octave requires double the number of vibrations of the next above it. The standard for "international pitch" has 435 vibrations for A, the sixth of the middle octave of the piano. Taking 3-5 of this number of vibrations, we have for C, as fundamental, 258.6 vibrations. From this the series of tones in the untempered scale can be calculated by the ratios given above. For the scale of equal temperament, which is used in pianos, organs, etc., use 258.6 for C as fundamental, and use as a multiplier 1.05946, to obtain the number of vibrations in the tones of the chromatic scale, with sharps and flats. The results are for the middle octave with A in second space treble clef:

C	258.6	G	387.5	
C♯	274.0	G♯	410.6	
D	290.3	A	435.	Standard
D♯	307.5	A♯	460.9	
E	325.8	B	488.3	
F	345.2	C	517.3	
F♯	365.8			

If now 1120 be taken as the velocity of sound in a warm room, you can by dividing find the wave length for all tones. These are not of practical consequence, since we tune pipes and strings to tones, and not to wave lengths. The diameter of a pipe affects the length required to produce a tone, and wave length alone is not enough for tuning a pipe. The whole matter is exhaustively treated in Helmholtz's "Sensations of Tone," which we can supply for $9.50.

NEW BOOKS, ETC.

INDUSTRIAL USES OF WATER. By H. De la Coux. Translated from the French and revised by Arthur Morris. London: Scott, Greenwood & Co. New York: D. Van Nostrand Company. 1903. 8vo. Pp. 354. Price $4.50 net.

The chemical action of water in nature and the phenomena of hydrochemical activity observed in a large number of industrial operations are so closely related that their study will help to determine the cause of difficulties with water, and assist at the same time in discovering the necessary remedies. If water were actually what its chemical formula represents it to be, simply a compound of hydrogen and oxygen, the difficulties and troubles which arise when it is put to industrial uses would not be possible. The present volume is an exhaustive treatise on water and its uses in the arts. The question of the solubility of salts, feed water for boilers, water in dye works, print works, and bleach works, water in soap works, laundries, canning, paper making, photography, artificial ice, beverages, distilling, are all adequately considered. Special attention is also given to the filtration, distillation, and sterilization of water. It is an admirable treatise, which will be warmly welcomed by the chemist and technologist.

TUBE, TRAIN, TRAM AND CAR; OR, UP-TO-DATE LOCOMOTION. By Arthur H. Beavens. With an Introduction by Llewellyn Preece, M.I.E.E. London: George Routledge & Sons, Ltd. 1903. 12mo. Pp. 291. Price $2.50.

Mr. Beavens has presented a popular account of electric locomotion, in which he has discussed not only subways and tunnels, and their relation to urban transportation, but also the tram car and the motor car. This is not a book which the mechanical engineer is likely to read with any profit; but which the man in the street, who wishes to know something of the great civil engineering feats by which it is possible to transport masses of people safely from place to place, will read with profit. The work commends itself to those who want an untechnical book.

THE MOTH BOOK. A Popular Guide to a Knowledge of the Moth of North America. By W. J. Holland, D.D., Ph.D., Sc.D., LL.D. New York: Doubleday, Page & Co. 1903. 8vo. Pp. 479. Price $4.

There are 48 plates in color photography containing 1,500 figures, and there are 300 text cuts illustrating a majority of the large species of the moths of North America.

The author will be best remembered when his butterfly book is cited. This work practically revolutionized the study of insects, and added greatly to the popularity of the science. The moths of North America are remarkably beautiful, and far exceed butterflies in interest, from the standpoint of form and color. Such subjects as the method of collecting specimens, the history of silk culture, the economic importance of insect life, are fully treated.

LIQUID FUEL AND ITS COMBUSTION. By William H. Booth. New York: E. P. Dutton & Co. 1903. Quarto. Pp. 411. Price $8 net.

The subject of liquid fuel has been agitated by engineers for the last twenty-five years. The author has endeavored to put together what has been done in the burning of liquid fuel since its first introduction. The discovery of Texas oil has put an entirely new aspect upon the whole question of liquid fuel. The work is one which will greatly interest all mechanical engineers and those who are concerned with steam raising.

KNOWLEDGE DIARY AND SCIENTIFIC HAND BOOK FOR 1904. London: Knowledge Office, 326 High Holborn. 1903. 8vo. Price $1.

The Diary comes to us this year with the usual number of good descriptive articles. Among these may be mentioned those on the "Camera Applied to Science in Natural History," "Practical Meteorology," "Physics," "Practical Work with a Small Telescope," "Full and Complete Astronomical Summary and Account of Terrestrial Phenomena for the Year," "Some Uses of the Microscope and Variable Stars."

HARPER'S COOKBOOK ENCYCLOPEDIA. Arranged like a dictionary and compiled under the direction of the Editor of Harper's Bazar. With Contributions by Famous Authorities on Cooking. New York: Harper & Bros. 1903. 12mo. Pp. 443. Price $1.50.

For the purpose of enabling the housekeeper to find at once exactly what she wants, the recipes of this book have been alphabetically arranged. An elaborate system of cross references facilitates the looking up of any recipe. The arrangement not only gives direct reference to particular subjects, but by grouping together recipes on the same subject, suggests new possibilities. A few practical hints regarding some of the simple principles of cooking, recipes for the chafing dish, cooking for invalids, kitchen time tables, tables of weights and measures, proportions, cooking utensils, etc., will be found of help.

THE ENGINEER IN SOUTH AFRICA. By Stafford Ransome, M.I.C.E. New York: E. P. Dutton & Co. 1903. 12mo. Pp. 319. Price $2.50.

Mr. Ransome has written a review of the industry of South Africa, and has given some idea of the region's present engineering position, and has endeavored to present a proper conception of its future possibilities. The study here presented is the result of a ten months' visit to the British possessions south of the Zambesi River, a visit made at the request of the London Engineer for the purpose of giving to British readers a frank and full account of the various problems that have been evolved by recent events. In Mr. Ransome's opinion the war has had the effect of clearing the political atmosphere of South Africa, except in Cape Colony. But here the growing strength of the industrial centers is slowly but surely effecting a change for the better. The industrial prospects of South Africa, he believes, are brilliant, but they must be developed slowly, because the country must have time to recover from the effects of a long and devastating war. On the whole, it must be confessed that Mr. Ransome has done his work with thoroughness and impartiality.

PRINCIPLES AND PROBLEMS OF IMPERIAL DEFENCE. By Lieut.-Col. Edward S. May, C.M.G., R.A. London: Swan Sonnenschein & Co., Ltd. New York: E. P. Dutton & Co. 1903. 12mo. Pp. 332. Price $3.

This book has been written from a standpoint that is only too often lost sight of, the standpoint of the business man. Poets and generals, artists and admirals, have pretty well succeeded in diverting the popular attention from the prosaic side of war, and have done all they could to heighten what may be termed the chivalrous side. Lieut.-Col. May points out that the conduct of a war is essentially a business transaction. The health and lives of his men represent the capital of the general. Apathy in peace and panic in war are dangers that have to be avoided. To legislate in order to make the most of what we have, to employ it so that it may be productive and remunerative in the future, should be our aim, so that war can be conducted without a panic. Politics and strategy should go hand in hand. Co-operation of the services, too, is a most important feature in imperial defense—co-operation above all in the council chamber. For the earnestness of its tone and the fairness with which its information is presented, Lieut.-Col. May's book deserves to be commended.

INDEX OF INVENTIONS

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AND EACH BEARING THAT DATE

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

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Anchor, connection for uniting objects of every description, automatically acting, W. Requard 747,768
Anesthetics vaporizer, G. L. Bennett 747,364
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Boot or shoe welting, welt, G. E. Rollins 747,642
Bottle, non-refillable, Z. Wiseman 747,826
Bottle, self-sealing, W. E. Forster 747,402
Bottle stopper, T. R. Stetson 747,498
Brace, A. S. E. Metcalf 747,746
Brake, J. B. Gaston 747,410
Brake, G. E. Babcock 747,672
Brake apparatus, P. J. Conboy 747,378
Brake cylinder, compound, R. L. Rickman .. 747,772
Brake shoe, J. D. Gallagher 747,912
Brick making plant, R. Laughray 747,443
Brick or tile, building, J. Soss 747,495
Bridge construction, J. Tomlinson 747,511
Bridge, ferry, J. Anderson 747,836
Bristle combing machine, B. M. Schauman .. 747,650
Brush, W. H. Bennett 747,902, 747,903
Brush holder, H. Geisenhoner 747,696
Brush making, machine for preparing bristles for, B. M. Schauman 747,651
Bucket, G. H. Williams 747,818
Bucket, clam shell, G. H. Williams 747,819
Bucket, grab, J. W. Seaver 747,783
Buckle, J. A. Gavitt 747,693
Buffer, W. M. Fulton 747,409
Buffer wheel, J. Hormby 747,426
Building block mold, Dietz & Spalding 747,386
Building construction, L. N. Blydenburgh .. 747,579
Cabinet, kitchen, C. F. Boule 747,581
Cabinet, toilet, M. Wohl 747,527
Can body forming and seaming machine, H. C. Black 747,578
Can opening or closing implement, J. B. Aikin 747,831
Can or jar, W. A. Lorenz 747,451
Can or jar, C. W. Millett 747,461
Candelabrum, W. Schimpf 747,780
Cane stripper and header, H. H. Mohler 747,462
Cane, treating sugar, M. Weinrich 747,520
Car appliance, railway, A. J. Brislin 747,370
Car door reinforcing and locking means, W. W. Tobey 747,664
Car, dump, R. S. Cox 747,381
Car, dump, Ingoldsby & Bowling 747,431
Car, dump, G. L. Pratt 747,762
Car, electric, M. Rounds 747,489
Car replacer, E. Showalter 747,655
Card stamping machine, Jacquard, W. W. Hodgson 747,918
Cargoes, means for discharging, H. A. Middaugh 747,560
Carriage body corner, J. Ahr 747,572
Carrier. See Fruit carrier.
Cartridge loading device, C. B. Helm 747,422
Cash register and indicator, De Vilbiss & Hansen 747,597
Cash register and indicator, J. E. Kelly 747,613
Cement and making same, H. Passow 747,919
Cement and producing same, H. Passow, 747,920, 747,921
Cement, manufacture of, C. von Forell 747,882
Centrifugal machine, Guttner & Baeger .. 747,604
Chain guard, P. Mullen 747,563
Chalking line, self, F. J. Stanley 747,497
Chuck, rock drilling machine, F. Henderson 747,423
Cigar band, T. Englehardt 747,540
Cigar bunching and wrapping machine, J. A. Bach 747,353
Clock chimes, A. Fuhrer 747,408
Clock and striking mechanism, F. G. Berling 747,676
Clock, watchman's, A. Huberty 747,608
Clod crusher, F. E. Caton 747,536
Closure, E. E. Chapman 747,373
Clothesline, traveling, S. A. Brown 747,586
Clover buncher, A. R. Nicholas 747,469
Clutch, magnetic, E. M. Hewlett 747,706
Coaster brake, G. F. Barton 747,576
Coffee pot, J. Heinrichs 747,705
Coil, spark, C. P. L. Noxon 747,755
Coils, forming, L. F. Fales 747,598
Collar or the like, horse, J. E. Chiloteguy .. 747,375
Column, metal, J. Lanz 747,441
Combustion regulating attachment, J. M. W. Kitchen 747,440
Commutator, H. F. T. Erben 747,873
Concrete block mold, H. H. Spears 747,496
Cone arbor, G. W. Foster 747,406
Connection terminal and plug, W. W. Dean .. 747,911
Conveyer, W. H. Garrett 747,546
Cooker, M. M. Archerd 747,838
Cooker lid, steam, C. F. Kaul 747,438
Copying ribbon, J. O. Deckert 747,861
Cord holding and serving device, A. A. Low 747,557
Corckscrew, H. D. Armstrong 747,351
Corn shock binding device, W. Battice 747,365
Cornet mouthpiece, C. G. Conn 747,591
Coupling device, J. Pellington 747,633
Coupling for textile roller sections, G. H. Milward 747,561
Cradle, L. Moody 747,562
Cruller frying frame, H. Grimm 747,700
Cultivator, F. Bateman 747,844
Cultivator, O. R. Baldwin, reissue 12,186
Cultivator harrow attachment, W. E. Maulding 747,744
Current and propulsion wheel, I. L. Roberts 747,775
Curtain, adjustable window, F. A. Frenzel .. 747,407
Curtain protector, C. Hoffmann 747,709
Cuspidor, S. Fisher 747,877
Cylinder perforating machine, Boyle & Brett 747,582
Cylindrical bodies, producing, Boyle & Brett 747,583
Decoy duck, A. Kremer 747,732
Dental dam-holder, E. S. Rinehart 747,484
Digging machine, S. B. Fleming 747,400
Display bracket for show cases, windows, etc., interchangeable and adjustable, C. E. Latshaw 747,442
Display stand, portable, J. A. Marsh 747,741
Door check and closer, F. H. Ogden 747,757
Dough to the form required for loaves, machine for automatically shaping, F. J. De Witt 747,901
Draft rigging, H. C. Priebe 747,637
Drawer, W. H. Coye 747,685
Dredge bucket, Hunt & Reiling 747,719
Drilling bit, R. C. Baker 747,575
Drowning, prevention from, Steenken & Schulz 747,793
Drying apparatus, J. J. Smith 747,788
Drying machine, E. G. Smith 747,787
Dyestuff and making same, blue sulfur, N. Rongger 747,643
Educational appliance, L. M. Hollingsworth 747,711
Egg case, E. F. Ward 747,518
Egg opener, W. R. Hartigan 747,549
Egg preserving compound, W. F. Brown 747,372
Elastic wheel, K. O. Ahlquist 747,343
Electric apparatus is attached, winding device for cables to which movable, Ackermann & Engisch 747,571
Electric circuit breakers, retarding device for, A. R. Cheyney 747,853
Electric circuit connector, W. H. Kelsey .. 747,553
Electric conductor, V. Lowendahl 747,454
Electric lighting system, J. F. McElroy 747,889
Electric machine, dynamo, H. Geisenhoner. 747,698
Electric switch, C. C. Badeau 747,673
Electrical conductor support, Orr & Morrison 747,470
Electrical machine brush holder, J. F. McElroy 747,890
Electrical machine coil, I. De Kaiser 747,595
Electrical regulation system, J. L. Creveling 747,686
Electrical switch, G. J. Crossland 747,537
Elevator, Hiss & MacKaye 747,707
Elevator safety cushion, W. D. Baker 747,357
Elevators, rotatable grain distributer for, J. C. Spangler 747,897
Emery wheels, disintegrating, J. Rice 747,483
Engine. See Explosive engine.
Engine tender, traction, T. H. Pitzer 747,635
Evaporating apparatus, brine, O. Sachse 747,645
Excavating apparatus, rock, C. T. Drake ... 747,867
Excavating bucket, H. L. Reynolds, 747,479 to 747,482
Excavating machine, C. T. Drake ... 747,868, 747,869
Explosive engine, B. Wright 747,828
Farm gate, C. Wilson 747,526
Feed trough, animal, E. B. French 747,543
Feeding trough, J. F. Putz 747,590
Feed water heater, W. Thurmond 747,509
Feed water regulator, C. C. Tozier 747,514
Feed water for steam boilers, apparatus for controlling the supply of, H. A. Fleuss. 747,908
Feeder, L. F. Fales 747,395
Fence, W. Jenkins 747,435
Fence post, D. Bice 747,361
Fences, device for preventing animals from breaching wire, D. C. Benjamin 747,577
Fifth wheel, W. B. Fletcher 747,878
File, letter or bill, W. O. Gottwals 747,416
Filling machine, automatic, W. Koedding ... 747,729
Fire escape, S. M. Hunt 747,720
Fire kindler, G. H. Lotspike 747,452
Firearm, automatic, J. M. Browning 747,585
Firearm extractor, T. G. Bennett 747,675
Firearm magazine, C. H. A. F. L. Ross 747,777
Fireproof stairway, F. A. Winslow 747,825
Flash light apparatus, E. C. Dodge 747,388
Flat iron, A. B. Atkins ..... 74 ,340
Flue cutter, pneumatic, J. T. McGrath 747,565
Fluid compressor, F. M. Rites 747,773
Flushing apparatus, closet, P. F. King 747,439
Flushing tank, F. H. Lindenberg 747,447
Folding machine, Taylor & Shiley 747,803
Forging apparatus, D. J. Morgan 747,749
Foundation, E. C. Hodges 747,425
Fruit carrier, S. H. Wilson 747,822
Furnace, F. Alsip 747,346
Furnace, H. H. Huff 747,718
Furnace construction, J. M. Scanlan 747,648
Furnace fronts, protective apparatus for boiler, O. N. Morin 747,464
Furniture fastening, V. E. Clark 747,854
Furniture fastening, knockdown, V. E. Clark 747,683
Furrow opener, disk, F. R. Packham 747,759
Fuse and fuse magazine, Woodruff & McCarthy 747,528
Fuse, electric, H. Geisenhoner 747,697
Gaff or boom iron, Otto & Russell 747,471
Game apparatus, E. Sandstrom 747,646
Game apparatus, W. S. How 747,716
Garbage destructor, Rooke & Thrush 747,488
Garment fastener, F. Hussey 747,721
Garment hook, M. G. Roeder 747,486
Garment supporter, O. Kraus 747,555
Gas burner, incandescent, L. R. Hopton 747,550
Gas burning furnace, E. Bumford 747,533
Gas generator, acetylene, W. C. J. Guilford 747,417
Gas generator, acetylene, H. Symonds 747,502
Gasolene generating apparatus, B. C. Smith. 747,786
Gasket, L. J. Lomasney 747,448
Gate. See Farm gate.
Gear for presses or other machinery, driving, O. Spahr 747,792
Gilding machine, C. Raschig 747,639
Glass cutting machine, F. A. Hubbuch 747,428
Glass, making sheet, Harrison & Wharton. 747,913
Glass plates or sheets, manufacture of, W. L. Kann 747,437
Glass rolling machine, Harrison & Wharton. 747,914
Glove, R. Kommer 747,730
Governor, reversible shaft, C. R. Minor 747,626
Grain hulling and scouring machine, W. E. Larmon 747,556
Grease cup, automatic compression, D. B. Williams 747,524
Grinding mill, P. R. Janney 747,610
Grinding or other machine, cutlery, J. Oefinger 747,756
Grindstone dresser, M. Gair 747,883
Gun sight, H. B. Andrus 747,350
Guns, automatic or semi-automatic attachment for quick firing, Benet & Mercie .. 747,848
Hame and trace connector, F. E. Goodman .. 747,415
Hame fastener, G. B. Hoch 747,708
Hammer, pneumatic, A. C. Murphy. 747,751, 747,752
Hammers, etc., handle securing device for, M. F. Powers 747,636
Harrow, H. F. Allen 747,573
Harvester, corn, E. A. Johnston 747,611
Harvester, cotton, J. M. Philbrick 747,760
Harvester, pea, B. W. Thach 747,507
Harvester reel, T. H. Berg 747,362
Harvesting potatoes or similar root crops, machine for, R. Richter 747,771
Hat brim stretching machine, J. H. Tarbell 747,503
Hat or bonnet frames, clasp for shaping, A. Brodin 747,682
Hats, coats, etc., hanger for, A. L. Fields .. 747,398
Hay rake, horse, W. E. Burrows 747,535
Heater and stock feed cooker, combined, R. Braun 747,584
Hermetically sealed jar, W. A. Lorenz 747,450
Hide or skin treating machine, R. W. Strout 747,500
Hinge, spring, E. Bommer 747,680
Hinge stop, detachable spring, G. B. Pickop. 747,570
Hog catcher, L. D. Howell 747,717
Hoist, E. Y. Moore 747,463
Hoisting apparatus, O. F. Lidke 747,737
Hoisting machine, S. M. Foltz 747,401
Hose clamp, W. C. Walker 747,811
Hose coupling, H. G. Barry 747,380
Hose coupling, A. H. Getz 747,412
Hot air heater, R. H. Bradley 747,904
Hydrocarbon burner, L. Stockstrom 747,799
Ice cream freezer, D. Rugg 747,490
Incandescent mantle lighting apparatus, J. Tolson 747,805
Indexing device, G. H. Pollard 747,761
Inhaler, anesthetic, E. Marshall 747,742
Insulated electrical conductors, flexible metallic tubing for armoring, W. H. K. Bowley 747,367
Insulating wire, H. W. Fisher 747,876
Insulator, rail, L. M. Randolph 747,477
Ironing table, F. X. Krabach 747,615
Isodiametric bodies, holder for use in making, S. S. Eveland 747,641