may be folded flat against each other, placing portion of the depth of the heel. the table in compact form for stowing away.

in cop-tubes of that class which are used to porting plastic material, such as mortar of cevantage in holding the windings of other material. It consists of a paper cop-tube having series of conical portions separated by annu- becomes rigid. lar shoulders, against which the winding is adapted to lodge in a way to wholly overcome slipping along the tube.

BUCKET .- G. McElhany, Watertown, S. D. elevating grain where it is desired to raise a twine-holder of simple construction designed becomes desirable in such connection to provide in which the twine will not become snarled a bucket of large capacity which will be of or twisted. sufficient strength to sustain the weight and stand hard usage and which will be provided 'TREES.—P. RUMMELIN, Portland, Ore. In carwith a dumping-door arranged to be released discharged by the operator standing at a distance.

METALLIC HORSE - COLLAR. — D. this improvement the object in view of the the like dripping from the candle. inventor is the provision of a horse-collar same time of such perfect fit that scalds, gall, bruises, sores, etc., on the horse's neck and shoulders are obviated.

DISTANCE OR RANGE FINDER.—E. NICHolson, Cleveland, Ohio. The aim of this improvement is to provide a range finder, more otherwise objectionable. The inventors have especially designed for use on marine vessels produced a neat simple article of manufacture and the like to readily ascertain the distance the vessel is from a distant object—say a capable of being cheaply made. lighthouse—how far the vessel has to sail before it is abreast of the lighthouse, and the dis- nolia, Ark. This invention comprises a new tance between the vessel and the lighthouse when abreast, all without requiring any mathematical calculations.

SHELL.-L. G. ROACH. Fredericksburg. Va. The prime feature of the invention lies in the combination of an exploding means and a cen- for either domestic or manufacturer's uses. trifugally-releasable restraining device for the addition it can be used for cooking the cream exploding means. This restraining device is in the holder and as a milk-cooler, etc. normally active; but when the projectile begins its rotary flight the centrifugal force attending such rotation renders the restraining device inoperative, and then as the shell strikes the target the exploding device is operated by the impact of the blow.

COLLAPSIBLE CABINET OR DARK more especially for use as a dark room for seasickness. amateur and professional photographers; and one of the principal objects is to provide a E. NAHR, New Orleans, La. The figure in this suitable structure of this kind which is coldesign is a full-face view of a smoke-ring maker, lapsible into small compass, for storage or transportation, besides being light in weight and simple in construction.

HEAVY FIELD ARTILLERY.—T. SMYTHE, Santiago, Chile. The object in this an end of the mustache. case is to provide certain new and useful improvements in artillery whereby field-guns of Mich. One object of this invention, which great length, large caliber, and heavy weight relates to improvements in harness-traces of can be readily transported from place to place that class which employ leather and metallic and brought quickly into action with great precision and steadiness and without unduly exposing the gun and gunners to the fire of the enemy or rendering necessary a heavy shield.

NUT-LOCK .- N. D. ASDELL, Lakeview, Ore. The purpose of this invention is to provide means for securely locking a nut to a bolt at any desired point thereon. The improvement consists of novel means, employing a wedge improvements in sealing devices for envelops, seated in the nut and adapted for engagement particularly envelops for expressing money or with the bolt thread, a key whereby the wedge is forced into locking position, special means provide a simple device for this purpose that for securing the key, and a nut of peculiar con-

LAMP-HANGER .- D. McEachern, Rossland locking engagement with the segment block and vention is an improvement on a prior patent be released by drawing upon the swinging arm, of Mr. McRuer. so it can be adjusted to hold the lamp in any position.

WASHBURN, New York, N. Y. In the present pulleys on their shafts. The invention is espepatent the invention relates to hooks and eyes, cially applicable to that class of pulleys in and the more particular object is the production of an exceedingly flat hook and eye capable or clevises passing through the pulley-sections of general use, affording a secure grip and admitting of a cheap and simple construction. The hooks and eyes are paired in the usual manner, and each one is made of a thin plate of metal, and preferably by stamping.

SHOE-HEEL.-G. F. FISCHER, Rochester, N. Y. The purpose of the invention is to provide a shoe-heel of the cushion type and means for attaching the heel to the insole of a shoe, and, further, to so mount the thread-section of the the forward sections, which are comparatively unworn, to take the place of the rear section of reuse. the heel, which has become unduly worn, and to vertically adjust such thread-section, so that Coon Rapids, Iowa. The purpose in this case is

present an even table-surface, so that they the latter can be worn throughout the major

BOX-PLATE AND ATTACHMENT THERE COP-TUBE.—E. H. THORNE, Fall River, FOR.—H. McCann, Hamilton, Canada. This Mass. The invention refers to improvements invention relates to means for shaping and supcontain the winding of yarn in weaving ma- ment or hot concrete, in the erection of buildchinery, although the tube may be used to ad- ing or other walls from such material, and the object is to provide novel box-plates and novel means for assembling and holding such plates a frictional holding-surface produced thereon in box form for the reception of the plastic maby compressing the tube externally to form a terial and retaining it in proper shape until it

TWINE-HOLDER.-C. L. PETERSON and M. O. THOMPSON, Shux Falls, S. D. In the present patent the invention has reference to new and useful improvements in twine-holders, and This bucket is especially designed for use in the object of the inventors is the provision of grain for filling bins from an upper floor. It to be suspended over a counter or the like and

CANDLE-HOLDER FOR rying out the present invention Mr. Rummelin by a tripping-rope, so that its contents can be has particularly in view the provision of a device which will combine the functions and features of a holder for sustaining the candle in a vertical position when on the tree and a O'LOUGHLIN, Moorhead, Minn. In carrying out receptacle for containing the grease, wax, or

DRAWERS.-T. F. TRIMBLE, Valatie, N. Y., which shall be neat and durable and at the and W. A. HARDER, Hudson, N. Y. The present improvement relates to drawers used more particularly as clothing for gentlemen. garment is comfortable and to a great extent self-adjusting. The seams are so located as to have no tendency to produce chafing or to be having the advantages mentioned above and

> ICE-CREAM FREEZER.—C. E. TAYLOR, Magcombination of parts of a construction capable of freezing the cream in a minimum amount of time and labor, which can be readily repaired by an ordinary tinner, and in which the parts have such correlation that they can be used

SUSPENSION-SEAT.—H. G. GROTE, 5-7 Doventhorsteinweg, Bremen, Germany. This invention is a suspension-seat, with or without support for the feet, for the use of passengers on the railroad or other means of transportation; for soldiers, even if transported in freight cars; for the transportation of the wounded in ROOM.—L. F. WILSON, Gerrardstown, W. Va. war, and in case of accidents or wherever it Though applicable to other purposes in the can add to the comfort of travelers. If used arts, Mr. Wilson's improvements are intended on shipboard, it affords a protection against

> DESIGN FOR A SMOKE-RING MAKER. with the mouth in formative position for ejecting smoke-rings, the rings floating about the head, the fingers of one hand holding up a smoking cigar and the fingers of the other twisting

> HARNESS-TRACE .- D. K. BELLIS, Manton, chains in their construction, is to overcome stretching of the leather by a composite trace embodying a metallic chain as an integral part thereof, the leather and the chain being so combined as to retain the desirable pliability or flexibility of the trace.

> ENVELOP-SEALER.-W. McD. HENRY, Kesley, Iowa. Mr. Henry's invention refers to other valuables, the object in view being to may be quickly sealed and the use of wax and tape or ribbon be dispensed with.

GAME APPARATUS .- D. MCRUER, Pauls Canada. This device may be readily applied Valley, Ind. Ter. Among other things this over any ordinary ceiling-block by means of invention has for its object to provide means the bracket, the hanger-bar being secured to and for automatically rotating a central object or depending from the bracket and supporting the turret, to provide an improved group of emtoothed segment, so the latter can be rotated blematical figures in the central rotary object to bring it to any position, and a fork is so or turret, to employ a movable or shiftable im-connected with the block of the toothed seg-pelling device and to provide means which enment that it may be swung thereon to any ad-justment and its locking-block be moved into case a light shot is to be discharged. The in-Inquiry No. 4618.—For

PULLEY-FASTENING.—A. W. HIGHT, Ballard, Wash. The purpose in this case is to pro-HOOK AND EYE.—A. W. HERBERT and W. F. vide means for preventing the slipping of split which the sections are held up by U-bolts and encircling the shaft. The invention involves certain improvements in the key for engaging the U-bolt with the shaft.

NON-REFILLABLE BOTTLE.—W. E. JOHN son, Spokane, Wash. It is the object of this contrivance to effect an improvement in that class of non-refillable bottles which are provided with a stopper or plug having a valve adapted to open for discharge of contents of bottle when the latter is held in the required heel that it may be shifted to bring to the rear position. The stopper with its attachments may be returned to the maker or jobber for

ADVERTISING DEVICE.-L. R. GAYNOR

to display an advertisement at a desired point by its flexible connection with a movable door and attract attention by joining the placard on which the advertisement is placed with a grotesque figure that will be fully exposed. along with the advertisement, when the door is moved in the act of opening it, the closing per mitting a return movement of the advertisement and a merging of the grotesque figure into an unrecognizable form.

FILTER.-J. P. RUMMEL, Sioux Falls, S. D. One of the principal objects of this inventor is to provide a filter which shall separate and purify the water passing through the same of all animal matter, sediment, or the like. A further object is to construct a filter which may be easily and quickly attached to a faucet, hydrant, or spout, or the like, and which shall perform its proper function without requiring further attention.

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. MUNN & CO.

Marine Iron Works. Chicago. Catalogue free. Inquiry No. 4603.—For machinery for making uitted goods

Autos.—Duryea Power Co., Reading, Pa.

Inquiry No. 4604.—For a machine for sharpen ing toilet clipper blades.

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

Inquiry No. 4605.—For direct-current dynamos for supplying about 50 incandescent lamps.

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

Inquiry No. 4606.—For a machine for perforating hard-drawn copper 31 B.W. with round holes. Also for dealers in such copper.

Mechanics' Toolsand materials. Netprice catalogue. Geo. S. Comstock, Mechanicsburg, Pa.

Inquiry No. 4607.—For makers of pianos, furniture and carriages, having export trade.

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

Inquiry No. 4608.—For machines for shrinking and measuring cloth.

Metal Stamping Co., Niagara Falls, N. Y., cuts and forms sheet, bar, rod, or wire any shape.

Inquiry No. 4609.—For a quick-speed tool steel loy containing tungsten, molybdenum and chro-

Novelty makers should write sending lists to Howie & Co., general importers, Auckland, New Zealand.

luquiry No. 4610. For a pencil-making machine worked by a lor 2 h. p. engine. Let me sell your patent. I have buyers waiting.

Charles A. Scott, Granite Building, Rochester, N. Y. Inquiry No. 4611.—Wanted, an oil burner suitable or use under a small, horizontal boiler for steam-heat-

Gear Cutting of every description accurately done,

The Garvin Machine Co., 149 Varick, cor. Spring Sts., N.Y. Inquiry No. 4612.—For the present address of the Massey Harris Co., Lta., of Canada.

Party desires to purchase either entire or half interest in small manufacturing plant. Must be desirable. Geo. F. Russel, 2944 Vernon Ave., Chicago, Ill.

Inquiry No. 4613.—For makers of electric automatic registers to register the number of times the circuit of an electric battery is closed.

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

Inquiry No. 4614.-For a shooting gallery outfit. The largest manufacturer in the world of merry-gorounds, shooting galleries and hand organs. For prices and terms write to C. W. Parker, Abilene, Kan.

Inquiry No. 4615.—For machines for spinning piano bass strings, also moulding machines for piano frames and general small work.

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. 4616.—For makers of tubular smoke stacks.

Contract manufacturers of hardware specialties, machinery, stampings, dies, tools, etc. Excellent :narketing connections. Edmonds-Metzel Mfg. Co., Chicago.

Inquiry No. 4617.-For makers of telephone sys-

Manufacturers of patent articles, dies, metal stamping, screw machine work, hardware specialties, machin ery and tools. Quadriga Manufacturing Company, 18

Inquiry No. 4618.—For dealers in platinum wire or sparking points for gas engines.

ANTED.—New novelties that are ready for the mar-

Inquiry No. 4619.—For parties to finish and make small, light castings.

A large casualty company desires to obtain the services of three or four high-class men with good experience to inspect boilers and elevators. Please reply stating age, weight, qualifications and references. Address Inspector, Box 773, New York.

Inquiry No. 4620.-For makersof tack machines. WANTED .- A number of good instrument and tool makers at Edison Laboratory, Orange, N. J. Wages \$3.25. Call or address Thomas A. Edison, Orange, N. J. Inquiry No. 4621.-For makers of different novel-

Young man studying mechanical engineering desires position with reputable house. Experience more of an object than salary. H. A. Klein, 1250 Degraw Street,

Inquiry No. 4622.—For plans and specifications for a fifty-foot pleasure launch. WANTED.-A solution to impregnate and harden articles made of paper.

Douglas Mig. Company, Fall River, Mass. one mile. For two miles it is very nearly 32



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.

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.

tne 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

price.

Minerals sent for examination should be distinctly marked or labeled.

(9179) E. C. H. says: We desire to nstall a pumping engine to raise 150,000 gallons of water in a run of 24 hours. Our boiler pressure is 110 pounds, discharge pressure 80 pounds, in case of a fire we would want to raise it to 100 pounds. Suction 15 to 20 feet. Supply of water to pump is ample. We have studied slide valves, balanced valves, semi-rotative valves, etc., and find it hard to decide which is most suitable. Will you please inform us as to the proper proportions, cylinders, stroke, etc., for a compound engine to meet our needs; also which style steam valve is the most economical? A. Without knowing all of the details of the character of the pump which you are designing, it is impossible for us to give you any information in regard to proportion of the cylinders, stroke, and valves needed for a pump to do the work which you describe. The valve which is most generally used and which gives the best satisfaction for cold water pumping, is a hard rubber disk held by means of a spiral spring on a bronze seat. Where the quantity of water to be pumped is large, a number of these valves are arranged close together. The same type of valve is usually used for the inlet as for the discharge. Much practical experience is necessary in order to build a satisfactory and efficient pump. We would advise you to write to some of the wellknown pump manufacturers, and ask them if one of their regular pumps will not meet your requirements. If not, they can doubtless build you a special pump that will.

(9180) J. J. G. asks: Please answer hrough your paper which is the most elastic, such as glass and ivory or india rubber, and why and oblige. A. Glass, steel, and ivory are the most elastic substances known, if by "most elastic" is meant the ability to restore their form after distortion and the retaining of that power for an indefinite time. India rubber has far less elasticity of this sort. It quickly gives out and will not come completely back after distortion. India rubber has a great range of elasticity and can be bent or stretched much farther than most other substances. In range it is far more elastic than glass, steel, or ivory.

(9181) W. J. H. says: Can you tell me whether practical use is being made of gravity motors at the present time? Would it be feasible to construct a motor of this kind to generate about one-fourth of a horse power for a period of ten hours, using a steam engine or wind mill for winding the heavy weight up and then utilizing the gravity motor for power at such times when the engine or windmill was idle? What would be the best plan for the construction of such a motor? A. We know of no gravity motor on the market which would furnish a fourth of a horse power for ten hours. A clock with weights is a gravity motor, and anything which requires more power than could be run by well-constructed clock work could not be satisfactorily run in this way. A motor to furnish a fourth of a horse power for ten hours would require a weight of 33 tons lifted to a height of 150 feet, provided the efficiency of such a gravity motor were 50 per cent.

(9182) F. B. D. says: Please inform me which are the warmest, for the sides of a house, shingles or clapboards? A. If shingles are laid on building paper, or on any surface which is practically air-tight, they will probket. Must possess merit to justify extensive advertising ably keep a house warmer than clapboards. in this and Foreign Countries. What have you? Wizard ably, on the sheathing which usually contains the country of the sheathing which usually contains the sheathing which usually contains rectly on the sheathing, which usually contains a large number of cracks and openings which would admit air, the shingles will probably not keep the house so warm as the clapboards, because they will admit more air into the walls from the outside.

> (9183) R. W. G. says: I am sincerely interested in knowing the shape and motions of the earth. Please answer the following questions in Notes and Queries: 1. Have any surveys ever been made to determine whether the known curvature of the earth's surface is convex or concave? A. All surveys of any extended portion of the surface of the earth demonstrate that the surface of the earth is convex. No line a mile long run for a canal in which water is to flow can be run without taking into the measurement the convexity of the earth, which is almost exactly 8 inches in

detic surveying for the mathematics of this. never been isolated. Oh looking through The fact that the surface of still water is a Merck's Index, 1896, a catalogue of nearly convex surface shows that the surface of the every chemical known, I find it thus: "Erbium earth is convex, since water covers about three- (E) metal, dark gray powder." Also tell me quarters of the earth's surface. It is said that an Englishman a few years ago wagered that been split into different elements? A. Cæsium no one could prove that the surface of the earth was convex, and put the money in the hands of the editor of a sporting paper. A surveyor took up the wager and set stakes of the same height in a lake a mile apart, and proved that the middle of three stakes was eight inches above the two on either side of it. The editor decided that this was proof and paid over the money. 2. If so, who made the survey and when? A. Every survey which runs a level for any number of miles demonstrates the convexity of the earth's surface. The survey to establish the length of the meter in France about 1780 is such a survey. All the work of the United States Coast and Geodetic Survey is such work. The laying out of the great irrigation canals in the West and the surveying of public lands of the United States are also examples. The pendulum method is also complete as a demonstration of the shape of the earth. 3. Are there any demonstrable proofs of the earth's rotation upon its axis? A. The terrestrial proofs of the earth's rotation upon its axis are equally conclusive. The principal ones are the eastward deviation of bodies dropped from a great height, the Foucault experiment with a long pendulum, and the gyroscope. Besides these may be mentioned the deviation of projectiles to the height in the northern hemisphere, the trade winds, and the rotation of cyclones. All these are discussed at considerable length in the work of Young referred to above. If our correspondent is not convinced by these demonstrations he would hardly be convinced "though one rose from the 4. Are there any demonstrable proofs that the earth moves around the sun? All the proofs given in Young's, Newcomb's, or Proc- me with formulas for both the solution and tor's works are astronomical that must depend the for their truth on something that is assumed, and as a proof founded on an assumption is no proof until the assumption is proven, I want a pose: White wax, 200 grammes; spermaceti, demonstrable proof that is not founded on an 30 grammes; stearine, 250 grammes; plumbic assumption, if there be such an one. A. From carbonate, 30 grammes. the nature of the case, there can be no terrestrial proofs of the earth's revolution around the sun. This is an astronomical fact. The aberration of light and the parallax of the stars are explicable only by the earth's revolu- canal 16 feet wide with a fall of two feet to tion around the sun. These have satisfied astronomers for nearly a century and will still be deemed satisfactory. They may be "sounded on an assumption," but an assumption is entirely legitimate, and proof for the assumption will establish its truth as certainly as proof of fact from which a law may be deduced, will place in the ditch we have four of these establish that law.

(9184) S. R. says: Referring to your note No. 9036, A. W., June 6, and note No. 9086, A. M. W., July 11, regarding the coloration of glass as observed at high altitudes, and your request that some reader might throw some light on the subject. I have to say that at this place, which is an old mining camp, situated at an elevation above tide of 5,200 feet, it would be an impossibility anywhere in as not to diminish the quantity of water in the neighborhood to find a piece of what was originally white glass that is not now of a to raise many times the water in this ditch. violet tint, ranging according to length of exposure from a light amethystine tint to a very deep purple, excepting only such fragments as have recently been thrown out. In your answer am I to account for the discrepancy? to 9036 you say, "We should look for the this out before laying it aside. We could cause of the discoloration. [It is rather a coloration. S. R.] "of the glass to some substance in the region rather than the altitude."

They would raise 7500 gallons of water 25 feet high, which would be 90,000 gallons 2 feet high, which would the fall of the ditch in the submitted some samples of the glass to a Washmile). This would be accomplished in one a complete survey of the world's literary
ington scientist, with the suggestion that as
radium has the property of coloring glass a purfor the same quantity of water to pass through
brief notice to indicate the remarkable scope
for the same quantity of water to pass through
brief notice to indicate the remarkable scope
of the Warner Library. But, if the inquiry or uranium in this section. He thought, however, that the coloration was due to something used in the manufacture of the cheaper kinds of glass, such as a mineral of some kind. As the subject appears to have excited some in- irrigation season and is not attracting terest, I take the liberty of sending you by much attention. No matter what our books mail a small box of fragments of glass, showing the various purple tints to which the glass in streams, there is a matter here worthy has been colored by exposure. I might state further that there is but little soil, so little that there is only a very sparse grass to be seen you give in your recent inquiry is very simafter heavy rains, which quickly dies out. It ple; you have undershot wheels 16 feet long is all rock, rock, principally porphyry. There are found here gold, silver, copper, zinc, and I believe also bismuth, with some other do not, apparently, affect the level of the waminerals. Bismuth is, I believe, possessed of ter in the ditch in which they are running. know that I have thrown any light on the subject, but I hope others may, as it has excited much curiosity here.

(9185) A. C. J. says: In Supplement No. 1440, of August 8, 1903, in the article "The Size of Atoms," at the end is mentioned Prof. Osborne Reynolds' Rede lecture on a new theory of gravity. Will you please tell where this lecture may be found published? A. The matter in question was quoted from the Engineer, London, to which we shall be obliged to refer our correspondent for information regarding Prof. Reynolds' Rede lecture, on a new theory of gravity.

(9186) P. E. J. asks: When the elements cæsium and rubidium are placed in water they decompose it with the liberation of H. which takes fire, but does Cs give the flame a

if this element is not like didymium, which has was named from the blue lines which its flame gives in the spectrum, of which there are two. The word cæsium means sky blue. Rubidium in a similar way gives two dark red lines. The word rubidium means dark red. Both are from the Latin. With reference to erbium, Remsen's "College Chemistry" says: "A final statement cannot be made as yet. It is even questionable whether it is an element."

(9187) L. F. B., Jr., says: Would you kindly tell me where I can get data and formulas for small plunger pumps for circulating water in small quantities? What is the allowance of efficiency, and what is good practice for relation of stroke to bore? A. A good practice does not allow the speed of a plunger pump to exceed 100 feet per minute. For very small pumps the speed should be considerably less than this if smooth action is desired. The relation between the stroke and the bore of the pump is immaterial, provided the displacement of the plunger per stroke is kept constant. Ordinarily the stroke is determined by the requirements given above regarding the speed, or the diameter is determined by the pressure requirements. For a steam pump the diameter of the steam cylinder and the steam pressure control this. The efficiency of a small plunger pump is seldom over 50 per cent, and in case of a very small pump would be considerably under this figure. Without knowing the exact size and character of the pump, it is impossible for us to give you more exact information on this point.

(9188) H. H. says: Can you furnish wax used by electrotypers? A. Gutta percha, or impermeable plaster, or one of the following mixtures may be used for the pur-

(9189) B. W. R. says: I want to call your attention to a little matter here with wheels and irrigation canals. We have a the mile. We run 7,000 miner's inches of water therein, which makes it about four feet deep. We have undershot wheel in the ditch. Any one of these wheels, 16 feet long and 16 feet in diameter, is raising 25 inches, 250 gallons per minute, 25 feet high. In one wheels working close together, that is, just barely working clear of each other. There is no difference between the speed and power There of either of these four. The water in the ditch is not raised, that is, not booked up above the first wheel. Now, then, if we were to put 16-foot wheels all the way along the ditch, and each one of them were to do as well as either one of the four mentioned, and let them all raise water from a side ditch so the power ditch, we should have power enough I know something about what theory claims will be done with these wheels, and yet we all know what they are really doing. Figure feet high (or the fall of the ditch in the the ditch. In other words, the ditch at the side which carries the water to be raised would have to be many times larger than the power canal. I am telling you what is actually taking place here every day in the may say about power generated by water some properties similar to uranium. I do not These wheels get their power from the water because of its velocity as it flows to the ditch. This velocity is gradually acquired as it falls, and after the water has reached a given ve locity, you may place in your ditch enough wheels to absorb the power equivalent to the energy of the water due to this velocity. If you add more wheels than this, you will get no additional power, but will simply reduce the velocity of the water in the ditch. If you were to put in 300 wheels, as you suggest, the velocity of each wheel would be so much less than the velocity of your present wheels that you would not be able to generate anything like as much power per wheel as you are do ing now, and the sum of all the nower gener-

me what kind of a preparation to use to cover of society. The characters are of the type with

ated from the entire 300 wheels would not

exceed the energy in your stream.

inches. See any book upon leveling or geo on chemistry I find that the element erbium has rust from coming through the white paint? I familiar—Westerners, whose ignorance of the want something to use in boat work around salt water. A. If you were to cover your iron to live is exceeded only by their intense amwork, nail heads, bolts, etc., with the black bition. The situations suggested would have asphaltum varnish that is ordinarily used for iron work aboard ship, and cover this with white lead paint, we believe that you would have less trouble from the rust coming through. Rust will not so readily penetrate a paint which contains varnish as it will the ordinary lead in linseed oil paint. There is, however, nothing that we know of that will absolutely prevent the trouble you speak of.

## NEW BOOKS, ETC.

GERMINATION DE L'ASCOSPORE DE LA TRUFFE. Par M. Emile Boulanger, Pharmacien Licensié ès Sciences. Rennes-Paris: Imprimerie Oberthur. 1903.

RADIUM AND OTHER RADIO-ACTIVE SUB-STANCES. Polonium, Actinium, and Thorium, with a Consideration of Phosphorescent and Fluorescent Substances, the Properties and Applications of Selenium and the Treatment of Disease by the Ultraviolet Light. By Wm. J. Hammer. New York: D. Van Nostrand Company. 1903.

Readers of the SCIENTIFIC AMERICAN SUP-PLEMENT will doubtless recall the admirable series of papers by Mr. William J. Hammer, on the radio-active substance, and on selenium and the Finssen light. In this comprehensive paper Mr. Hammer presented all that is now positively known of radium, the practical utilization which has thus far been made of selenium especially by Ruhmer, and the remarkable re sults obtained by Finssen of Copenhagen, with the ultraviolet rays in the cure of skin diseases. Mr. Hammer's book is noteworthy for its compactness as well as for its comprehensive-

THE FIGHTING CHANCE. By Gertrude Lynch. New York: Smart Set Pub-lishing Company. 1903. 12mo. Price **\$**1.25.

Just to prove that prefaces are sometimes read not only by the public to whom they are addressed, but even by book-reviewers, let it be said here that Miss Lynch's preface is an admirably studied bit of irony that cleverly hits the average reader in his most vulnerable spot—his careful disregard of the introductions to the books he reads. Miss Lynch's novel itself tells in a sparkling, epigrammatic style the story of a house party composed of men and women, all bent upon attaining a certain object. Starting with the catch-physics that each one has a fighting chance in reaching the goal, the book tells how that fightingchance is utilized. In the end a clever ingenue, after having succeeded in accomplishing the very task which she had set for herself, is undermined by her own cleverness, and does what every woman eventually does-falls in love with the man who is least able to gratify her amibitions.

The Warner Library of the World's Best Literature is at last within easy reach of every American home. This enterprise was effected by the "Public Opinion Club." The first edition, published a few years ago, was offered only at subscription rates, and at a high price. The New Memorial Edition contains many beautiful illustrations in color, a course of systematic reading, and other new features have been added. The present Warner Library is an improvement in every respect over the earliest. It is a spiendid array of de luxe books, taking note of every author and every worthy literary production from the earliest days of writing up to the present time. Nowhere else can

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ways of the world in which they would like lent themselves admirably to satirical treatment. Yet Mr. Fawcett has contented himself with telling his story in a matter-of-fact way, that smacks more of some dull English weekly than of the "Smart Set."

A PRACTICAL TREATISE OF THE STEEL SQUARE AND ITS APPLICATION IN EVERY DAY USE. By Fred T. Hodgson. 2 vols. Chicago: T. J. Drake & Co. 1903. 16mo. Pp. 242, 230. Price \$2.00.

Mr. Hodgson's remarkable work is the outcome of papers written in 1872 on "The Use of the Carpenter's Steel Square." These were among the first that were ever issued devoted entirely to describing the uses and applications of the square, and so well did they meet with the appreciation of workmen who were interested in the steel square, that the author was urged to put the papers in book form and several hundred thousand copies have been sold. indeed it is doubtful if any other technical book ever had the same sale. Now nearly everything that is known about the steel square is embodied in the two handsome volumes. The most intricate problems are solved with the aid of the steel square. It is not too much to say that a carpenter who does not possess these volumes has one of the most valuable tools left out of his kit.

THE NEW INTERNATIONAL ENCYCLOPEDIA. Edited by Profs. Gilman, Peck, and Colby. New York: Dodd, Mead & Co. 1903. Vols. VIII. and IX. 4to. Pp. 955, 953. Published by subscription.

It is very gratifying to note that in this excellent compendium the treatment as well as the authorship is almost purely American. which is rather essential in a work of this kind, which is intended for American readers. The condensation of subjects is admirable, and typographically it is excellent. The maps and plates are excellent and the illustrations are numerous. Many subjects are treated for which we have looked in vain in other works of a similar nature. The inclusion of biographies of living persons is most helpful. The farmer will find authoritative articles on agriculture, and will learn of the interesting experiments that have been conducted during recent years by the Department of Agriculture, and every profession and walk of life is similarly treated. The two volumes before us reach down the alphabet as far as "Infant Phenomenon," which is interesting, showing the remarkable scope of this encyclopedla, for it is unusual to include characters from works of fiction in a work of this kind. It will be remembered that the "Infant Phenomenon" was Ninetta Crummles, a character in Dickens's "Nicholas Nickleby."

KALEIDOSCOPE. Vol. XI. Published by the Students of Hampden-Sidney College, Va. 4to. Pp. 170. Price **\$**2.00.

A very well-gotten-up college annual. An appreciative notice of ex-Judge Roger A. Pryor, LL.D., is included.

## INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending September 15, 1903.

AND BACH BEARING THAT DATE. . [See note at end of list about copies of these patents.]

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