RECENTLY PATENTED INVENTIONS.

Of Interest to Farmers.

GRAIN TRANSFERRING DEVICE.—B. B. STAUFFER, Wichita, Kan. The improvement relates to self-feeders for threshing-machines. The object is to provide a transferring device or power-pitcher for carrying grain in the straw from a stack or the like to the self-feeder of the threshing-machine in such manner that the grain passes in even uniform layer to the self-feeder to insure a continuous and proper feeding of the grain without the aid of manual labor.

CUSHION FOR BALL-AND-SOCKET JOINTS.—C. B. PINCKNEY, Brunswick, Ga. In this patent the invention is an improvement in cushions for ball-and-socket joints, and is especially designed for use in mowing-machines and harvesters, having for an object the avoidance of the extreme wear ordinarily experienced in the use of ball-and-socket joints.

Of General Interest.

OIL-SHELL.—C. A. GLOVER, Bellport, N. Y. The shell is adapted to contain oil and to be fired from a cannon or mortar over a body of water to distribute oil thereupon at a point distant from the shore and is so constructed that during the major portion of its flight the outlet for the oil will be closed but automatically opened at or about the time the shell strikes the water, thereby permitting the oil to spread upon the rough element and quiet it.

POLE-SPLICING DEVICE.—F. N. DRANE, Corsicana, Texas. The device is for use in splicing telegraph or other poles to timbers, concrete, or the like. Clamping means are provided by which the main pole may be firmly secured to a new butt, replacing the original butt that may have become rotted in the ground, thus obviating the expense of a new complete pole. Means are provided by which new poles too short but otherwise good may be spliced to useful lengths.

CALCULATOR.—K. H. J. MARCKWORDT, Guatemala, Guatemala. The invention pertains to calculators, such as shown and described in the application for Letters Patent of the United States formerly filed by Mr. Marckwordt. The object of the present invention is to provide a calculator designed for quickly and accurately carrying out a large number of arithmetical calculations, such as calculating wages, volumes, multiplication, degrees of alcohol, lumber measurements, degrees of sugar pulverization, and the like.

FOLDING SHAVING-BRUSH.—H. M. RYNEHART, New York, N. Y. The purpose of the invention is to provide a construction of shaving-brush wherein while the handle remains attached to the body of the brush at all times the handle may be closed around the body of the brush when the brush is not in use to shorten the brush and protect the bristles.

HORSESHOE.—J. F. ROBINSON, Rockaway, N. J. One purpose here is to provide a construction of horseshoe of rubber having a metal skeleton core of horseshoe-shape, the ends of the core being connected by a bar member, so as to strengthen the shoe at its heel-section, the core being made of malleable or soft iron, so that after the rubber is cast upon the iron the shoe may be contracted or expanded to neatly fit the shape of the foot to which it is to be applied.

INSECT-TRAP.—Q. R. JONES, Yosemite, Ky. This invention pertains to improvements in devices adapted to attract and destroy insects—such as mosquitos, moths, and the like—the object being to provide a device of this character which will be simple in construction, and convenient for use in sleeping-rooms and the like. It can be readily cleaned.

Hardware.

HINGE.—S. N. STEVENS, North Chelmsford, and E. P. FLANDERS, Lowell, Mass. The invention is particularly applicable to those used for the support of blinds or shutters. Its principal object is to provide a hinge embodying means for securing the blind at various angles. The improvement renders it difficult to raise or open the blind from outside.

Heating and Lighting.

AIR-HEATER.—E. T. SLAUGHTER, Kansas City, Mo. The invention is an improvement in air-heaters in which cold or relatively cool air is passed over or through a drum or other form of casing heated by a gas or other burner, the air escaping in a heated condition into the room in which the heater is located or into a pipe leading therefrom to another room. Greater efficiency in the utilization of heat and economy of construction of the heater are obtained.

Machines and Mechanical Devices.

GAS-GENERATING RETORT. — T. L. STEWART, Oakland, Cal. The device is especially adapted for use in connection with gas-engines, heating, lighting, or other uses for which gas may be applied. When used to produce gas for use in gas-engines, the heat in the waste gases drawn off through the exhaust-pipe may be used to convert the gasoline, distillate, crude or other hydrocarbon oils into gas for such use and for any other purpose for which gas is desired.

BOAT-PROPELLING MECHANISM. — R. RUTHERFORD, Montaville, Ore. An operator seated on the stern-sheets of a boat or, if desired, two operators, one seated on the stern-sheets and one on the after-thwart, may, through means of a transverse handle and its connections, rock the walking-beam, imparting a rotary movement to a crank-shaft and to a propelling-shaft, coupled thereto. In this manner the propeller may be rapidly driven.

SAWING-MACHINE.—B. E. HARRELD, Eldon, Iowa. In this instance the invention is an improvement in machines in which the saw is reciprocated horizontally by cranks and means are provided for raising and lowering the saws to allow the insertion of a log or stick beneath them and to place them in working position thereon.

MACHINE FOR MAKING FENCE-POSTS.—R. L. DENNISON, Kansas City, Mo. In the present patent the invention is an improvement in machines for making concrete articles, and is especially designed for the manufacture of fence-posts from shale and other plastic material. The interiors of the mold-boxes are conformed to the post produced, and taper from end to end.

Prime Movers and Their Accessories.

ROTARY ENGINE.—F. NELSON, Driscoll, N. Dak. The construction of this rotary engine comprises two cylinders communicating with each other, in which two rotators are mounted. These rotators are formed with teeth which intermesh so that the rotators rotate in opposite directions. Each rotator is formed with projecting piston heads at diametrically opposed points on its face, also midway between these heads with grooves adapted to receive the piston heads of its fellow rotator. Steam may be admitted either above or below the point of engagement of the rotators, thus governing their direction of rotation. Spring-pressed packing plates are provided between the ends of the cylinder and the rotators.

CURRENT-MOTOR.—J. W. LAURENT, Spokane, Wash. The invention refers to improvements in motors operated by the water of flowing streams, the motor being especially adapted for elevating water for irrigating purposes, the object being to provide a current-motor that will be self-regulated to the rise and fall of the water and that may be operated by a comparatively light current.

Railways and Their Accessories.

RAIL-JOINT.—ANNA E. BOMAN, Fargo, N. D. In the present patent the invention has reference to railways; and its object is to provide a rail-joint arranged to allow ready expansion and contraction of the adjacent rails and to prevent the undesirable clicking when the car-wheels pass over the joint. The joint is practically sufficiently flexible to accommodate the usual movement of the rails.

AUTOMATIC AIR-BRAKE FOR CARS.—W. J. DANKEL, Pittsburg, Kan. The inventor improves upon that form of air-brake in which the piston-rod which actuates the brake-lever carries a piston, which plays between two air-chambers one on one side containing compressed air, which in expanding applies the brake, and the one on the other side of the piston being connected through a valve with the train-pipe, so th t when the pressure within the latter is reduced by the engineer, the pressure within the communicating air-chamber will be reduced and will allow the preponderating pressure in the chamber on the other side to expand and by advancing the piston apply the brakes.

Pertaining to Recreation.

MERRY-GO-ROUND. — G. B. MCKINNEY, Barry, Ill. In this instance the object of the invention is the provision of a new and improved merry-go-round arranged to allow one or more of the passengers to readily propel the merry-go-round without requiring undue physical exertion on the part of the operators.

ARTIFICIAL BAIT.—L. P. GIBSON, Little Rock, Ark. In the present invention the improvement has reference to fishing; and its object is to provide a new and improved artificial bait arranged to readily spin or revolve around the hook whenever the device is drawn through the water as in ordinary fly-casting.

Pertaining to Vehicles.

TRACTION DEVICE FOR VEHICLE-WHEELS. — H. S. WEAVER, Butler, Pa. Though applicable to vehicle-wheels generally this invention has reference more especially to wheels for automobiles and the like, involving the use of cushioning or pneumatic tires; and one of the principal objects of the invention is to provide means for preventing slipping of the wheel when the vehicle or machine is being propelled over soft or muddy ground.

Designs.

DESIGN FOR A HAMMOCK-VALANCE.—D. W. SHOYER, New York, N. Y. This designer has produced a ruffle for a hammock, and on the cotton-corded material are woven a continuous line of dancing bears in grotesque habiliments. A fringe is added to the valance and it gives a graceful finish to the design.

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.

Inquiry No. 8557.—Wanted, to purchase live silk worm or other larvæ in cocoons, in small quantities.

Inquiry No. 8558.—Wanted, manufacturers of dishwashers for family use.

Inquiry No. 8559.—Wanted, makers of outfits for the distilling of water for drinking purposes, with capacity of about 50 gallons per hour.

Inquiry No. 8560.—Wanted, machinery for the manufacture of alcohol from molasses, sugar and apples.

Inquiry No. 8561.—Wanted, a machine for making emblems from pennies.

Inquiry No. 8562.—Wanted, names and addresses of auction grocery firms.

Inquiry No. 8563.—Wanted, a machine for cutting canvas.

Inquiry No. 8564.—Wanted, the name and address of the manufacturers of "The People's Typewriter."

Inquiry No. 8565.—Wanted, name and address of manufacturers os miniature lead castings representing animals, charms, shoes, etc.

Inquiry No. 8566.—Wanted, names and addresses of firms manufacturing cheap premiums for putting in prizes for popcorn, etc.

Inquiry No. 8567.—Wanted, the name and address of the manufacturer of the Commonsense Sash Pulley.

Inquiry No. 8568.—Wanted, manufacturers of meerschaum and French briar pipes fitted with amber stems.

Inquiry No. 8569.—Wanted, a machine for filling tin cans, holding about 10 ounces, 8 inches high, having screw cap over a nozzle about ¾ inch in diameter.

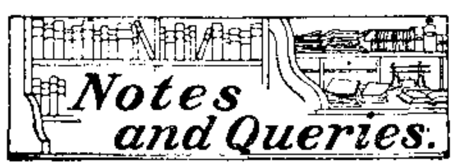
Inquiry No. 8570.—Wanted, an apparatus for stamping designs on leather, wood, plush, paper, etc.

Inquiry No. 8571.—Wanted, manufacturers of a feather renovator.

Inquiry No. 8572.—Wanted, parties engaged in operating plants for the reduction of old tin, such as cans, for the purpose of separating tin and solder.

Inquiry No. 8573.—Wanted, manufacturers of the following: The Magic Flute, The Humanotone, Peerless Sharpener and Can Opener, Moving Picture Top Phantasmagoria.

Inquiry No. 8574.—Wanted, the address of parties or firm making or prepared to make moulds for school crayons, soaps, etc.



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.

(10357) A. M. asks: 1. I have made motor described in SUPPLEMENT No. 641 and it runs perfectly as a motor, but will not generate any current when driven as a dynamo. It is series wound. Please let me know the remedy. A. Small motors very often are not wound so that they will excite their own fields and they cannot be used as dynamos, except by disconnecting the field and using a battery to excite the field. 2. Would there be any practical way to run it on 110-volt alternating lighting circuit? A. No.

(10358) H. M. W writes: We understand there is an easily prepared paper which may be used for the finding of the negative and positive poles of an electric wire. Will you kindly inform us how to make this paper and whether it will keep? We only wish for a small quantity. A. We give below two methods for this purpose, both of which are easy. First method: Dissolve sodium sulphate, a teaspoonful, in a half pint of water, in which also dissolve about the same quantity of potassium iodide and of starch. To dissolve the starch the water must be heated. Soak white blotting paper in this solution and dry it. Cut it into strips of any convenient size; a half inch by two inches is suitable. Keep the paper in a dry place such as a tin box or a glass bottle. To use, moisten a strip and place the two poles upon it, nearer together or farther part, according to the voltage of the current. A dark spot will appear at the *positive* pole. Second method: Dissolve 15 grains of phenol-phthalein in a half ounce of common alcohol. Dissolve also 20 grains of sodium sulphate in 4 ounces of water. Soak blotting paper in the first solution and drain off the superfluous liquid. Then soak it in the second solution and dry it. Afterward treat it in the same manner as in the first method. A red spot appears at the *negative* pole.

(10359) B. S. writes: Our church steeple of Hillcrest is about 160 feet high, is slate roofed or covered and the top consists of a sheet iron ornament some 12 or 15 feet; the church is of brick. The steeple has been struck and badly damaged by lightning within 3 years, although it stood for 20 odd years before it was first struck. It is thought by some that the large number of overhead telephone wires that go right by the church and the telephone station just across the street tend to attract lightning, which strikes the steeple first, it being a considerably higher point. Some contend that proper lightning rods would prevent damage, while others claim that lightning rods are incapable of carrying the great amount of electricity forming such a bolt of lightning. A. 1. We should not dare to have a building with an iron top disconnected with the earth metallically, as is this church spire. It is an invitation to a visit of the lightning. The lofty Washington Monument, in Washington, was struck and damaged till its metal tip was grounded by a lightning rod, since which it has been repeatedly struck, but without damage. Suitable lightning rods certainly are of service in protecting a building. We should suppose that the telephone wires were a partial protection to a neighborhood. 2. Is it a fact that no suction pump will pump or draw a greater height than 33½ feet before entering the pump, or in other words, before passing through the valves? If water can be raised a greater height by such a pump before it passes through the pump valves can you tell what distance it can be drawn and what causes the limit if there is any? A. A lifting, or as it is sometimes called, a suction pump, can raise water no more than 28 to 30 feet. Theoretically 34 feet is the limit to which the pressure of the atmosphere can push water up a tube with a vacuum above the water. No pump can exhaust the air above the water perfectly, hence no pump can get water 34 feet above the level of the water below. The pump lifts the air off the water in the pipe; the air outside the pipe pushes on the water in the well and pushes it up into the partial vacuum in the pipe below the valve of the pump. For this see any text-book of physics under pumps in pneumatics.

(10360) C. E. T. asks: 1. I am thinking of making a small direct-current dynamo, and would like to know the formula and meaning of the symbols for wrapping and determining the size of wire to be used in order to get a given voltage and current. A. Perhaps the simplest book for calculating the parts of a dynamo is given in "Practical Electricity," price $2 by mail. There is, however, no easy road to designing dynamos and motors. The best way for the amateur to go about the building of a dynamo is to select the size of machine he requires and buy plans for it all worked out. Many such designs have been published in the SCIENTIFIC AMERICAN and other periodicals and in books. We have frequent occasion to recommend such to our correspondents. They can be had very cheap. 2. I would also like to know the name of a good reliable varnish or lacquer for using on articles of steel or iron so they will stand a good deal of handling and to be kept in a damp place so as they will not rust. A. A good lacquer for rough ironwork is made with 6 parts asphaltum dissolved in turpentine, 1 part shellac dissolved in wood alcohol; mix and thin with turpentine or wood alcohol. For bright steel or iron, a shellac and mastic varnish is much used; 10 parts shellac, 1 part mastic dissolved in wood alcohol. Color with any of the aniline dyes. Blue is much in use.

(10361) G. P. M. asks: What are the true primary colors? A. Primary colors are the colors into which white light is separated by the dispersion of a prism. Those named by Newton are red, orange, yellow, green, blue, indigo, and violet. Artists reduce these to three—red, yellow, and blue. Scientists generally consider red, green, and blue to represent the primary color sensations, and in one theory there are supposed to be three sets of nerves in the retina which can respond to these three colors. The idea of three primary colors is that from the combination of these three all hues may be produced which are to be found in white light.

(10362) E. A. writes: Please give me an explanation of the following phenomenon: During a rainstorm a click or brief ring of the telephone bell is frequently audible. It is evidently due to the lightning being coincident with it. But how does the lightning produce the effect? Also, why may a spark often be seen shooting from five to twenty feet from the 'phone? Is it harmful? Please answer the following questions: What chemicals are used in the makeup of a Mesco dry battery cell? Please explain the chemical action. Is the cell affected by heat or cold? Are the chemicals injurious to the body if handled? A. The clicking of electrical apparatus during thunderstorms is due to the action of the lightning flashes upon the lines. When they are struck there will frequently be a flash from the wires, even though the lightning arresters do their work properly. The lightning produces the effect because it is an electric discharge, the same a he usual current, only much more intense. It is not entirely safe to handle electrical apparatus during a thunderstorm, when the wires are strung upon poles, though the lightning arresters usually protect the instruments. We have not the formula for the composition of the Mesco dry cell. It probably contains the same materials as the Leclanche cell, since all dry cells are modifications of this form of cell. These cells are very little affected by heat and cold, cannot be frozen by winter temperature even on mountain tops, and the chemicals are not poisonous. The general chemical action is that the ammonic chloride acts upon the zinc chloride. The hydrogen goes to the manganese dioxide and forms water with its oxygen. This is only general, since other substances may be used and other and more complicated reactions take place.

(10363) A. H. H. writes: A. C.'s land problem in SCIENTIFIC AMERICAN of December 22, Query 10271, can be solved by arithmetic in the following manner: $20 : 1.34 :: x : 10$. $20 \times 10 = 200$. $200 \div 1.34 = 149.253+$ rods = one side of field. And $149.253+ \times 149.253+$ = 22276.458+ square rods in field. Now 22276.458+ divided by 160 = 139.222 acres. Explanation: Assume a field 20 rods square. It would of course equal a field of 400 square rods. ¼ being plowed away, leaving 300 square rods, each side of which is 17.32+ rods. From center of this unplowed plat to its edge equals ½ of 17.32+ = 8.66+ rods. Now, 10 rods, half of this assumed field, — 8.66+ rods = 1.34+ rods, which is ¼ of assumed field plowed. Then by proportion: If by plowing 1.34+ rods from a field of 20 rods square, ¼ of the field is plowed; how many acres in a field if an outside strip 10 rods wide is ¼ of it? A. Although no letters are used in the solution above, the genius of it is algebraic as much as if all the quantities were represented by letters. Algebra is a branch of mathematics in which the relations of the quantities are assumed, and upon these assumed quantities, usually letters, the operations are performed till the proper values in numbers are discovered, or till the relations of the letters in the problem are determined in the simplest manner possible in the case. In this problem the number 20 is used as if it were a letter, and operations are performed upon 20 till its relation to the correct number appears. Thus it is seen that the solution is algebraic in essential character, although no letters are employed. Our algebraic solution was simpler than this so-called arithmetical solution.

(10364) G. H. H. asks: 1. Where lay the path of totality of the total eclipse of 1868 or 1869, which was visible, I think, in Iowa, etc.? Duration of eclipse? Width of path? A. We have not the path of the eclipse of 1868 or 1869 in Iowa at hand. You may be able to get it from the U. S. Naval Observatory, Washington, D. C. 2. How must I understand the magnitude of stars given in Standard Dictionary, where Sirius is given as 1.4 and Arcturus 0.3, when Sirius is said to be the brightest fixed star? A. The magnitudes of stars are now given in magnitudes and tenths, based upon the fact that a first-magnitude star is about 100 times as bright as one of the sixth magnitude. Each magnitude is therefore as many times as bright as the one next below it, as starting with 1 and multiplying by the same number will give 100 after five multiplications. This number is the fifth root of 100, or 2.512. Upon this basis an average first-magnitude star is of the brightness of Aldebaran and Altair. The Pole star is of the second magnitude. Stars brighter than the first-magnitude stars must be expressed by a number indicating that fact. Sirius is —1.4 magnitude. See Young's "Elements of Astronomy," which we send for $2.

(10365) C. B. asks: 1. Can stains on the finger nails caused by pyrogallic acid in a photographic developer be removed, and how? A. Cyanide of potassium will remove most stains produced by photographic chemicals. It should be used with extreme care. It is better to have the stain than to be poisoned. 2. Can you give me a developer for films which will not stain fingers and does not contain bromide of potassium? A. There is no developer which will not stain, and none in use at present which do not require bromide of potassium as a restrainer. 3. Can a 110-volt alternating current be transformed to a 10-volt direct current without using a rotary transformer, and how? A. It is necessary to use a rotary transformer to convert an alternating current into a direct current. 4. How much water should be added to c. p. sulphuric acid to make the so-called H_2SO_4 dilute? A. Dilute sulphuric acid is a somewhat indefinite term. When a concentrated acid shows 1.84 on the hydrometer, it will show 1.07 hydrometer if made a 10 per cent solution, and 1.14 hydrometer if made a 20 per cent solution. Both these percentages are used, and are called dilute acid.

(10366) S. A. W. asks: An article on standard time on page 124 of Todd's "New Astronomy" contains the following: "The whole country is divided into four sections or meridian belts, approximately 15 deg. of longitude in width, so that each varies from those adjacent to it by exactly an hour. The time in the whole 'Eastern' section is that of the 75th meridian from Greenwich, making it five hours slower than Greenwich time. This standard meridian coincides almost exactly with the local time of Utica and Philadelphia and extends to Buffalo." One would infer from the above that Buffalo or the 79th meridian was the western boundary of the eastern standard or 75th meridian time belt. If each section or belt is 15 deg. wide and the 75th meridian is at the center of the 'Eastern' section, I cannot see why the western boundary of this section should not be 7½ deg. west of the 75th meridian or ½ degree west of the 82d meridian, which would be at a line drawn from Port Huron, Mich., to Tampa, Fla., which is as far west of Buffalo as Buffalo is west of the 75th meridian. Will you kindly explain this through the columns of your paper? A. The statement quoted from Todd's "New Astronomy" is correct. The inference made from the statement is not correct. The places at which the change shall be made from the time of one section to that of the next westerly section depends largely upon the convenience of the railroads and not upon the longitude. The system of standard time in America was adopted for the benefit of the traveling public and the railroads, and not to satisfy any sentiments of astronomers as to scientific fitness of things. It was a practical and not a scientific arrangement. So the roads centering in Buffalo make the change from Eastern to Central Meridian time at Buffalo, since the roads of several companies end at Buffalo. The change is made at Pittsburg for the Pennsylvania system. A comparison of the maps of the roads giving the points at which the changes of time are made will show some strange departures from the longitudinal belt of 15 degrees in width. At one place in the Southwest Pacific time meets Central time so that the Mountain division is quite eliminated at that point.

(10367) C. M. T. asks: 1. What is air, and how it is generated? A. Air is a mixture of nitrogen 4 parts, oxygen 1 part, with traces of some other gases. To these are added minute quantities of carbon dioxide and other products of animal life as impurities. Water vapor is also always present in the atmosphere. 2. Did it exist from the very birth of the earth or some time after? A. The atmosphere has been on the earth from the first, although its composition has changed as the earth has cooled. Once all the water of the earth was in the atmosphere, and remained there till the temperature fell below the boiling point of water. The water then came down in great rains. 3. Is the air destructible? Can it be destroyed or burnt out by fire? If it is not destroyed, you mean to say that the air which we breathe to-day is the same that was on the earth millions of years ago? A. The nitrogen of the atmosphere cannot be destroyed by any ordinary means. It is a most inert substance chemically. The oxygen is readily passed into combination with carbon by combustion, and with many other substances by chemical combinations as oxides. The most familiar example of this perhaps is iron rusting in the air. Plants and animals all live from the oxygen of the air. The animal world takes oxygen from the air to breathe and gives it out as carbon dioxide, which the plant takes up and separates for its food, giving off the oxygen again into the air. Thus oxygen is continually passing out of the air and back again into the air. In a sense the air we breathe to-day is the same as animals breathed at the first. But since that time it has been subject to numberless chemical changes, and has been perhaps in liquid and solid forms many times.

(10368) V. P. H. and others: We are receiving many queries regarding cannon, guns, balls, etc., shot from moving trains in every variety of ways which ingenuity can devise and describe. A recent correspondent states seven different propositions, all different conceptions of one and the same thing. We have not time or space to take up this matter. We have heard it discussed for a long lifetime, and apparently it will not down. The answer to all these conundrums is in the Second of Newton's Laws of Motion: "A given force produces the same effect whether it acts upon a body at rest or in motion; whether it acts alone or together with other forces." This has been accepted universally for centuries, and is an established fact. To apply this law to the case in question it is only necessary to say that the discharge of the powder produces the same effect upon the ball under all circumstances. It is also necessary to say that the motion of the train produces the same effect upon the ball as if the powder had not been exploded. The ball is at any time just where the two motions will together carry it. Calculate this and you have the answer. We do not desire communications upon this subject. Let our esteemed correspondents find something new to write about.

(10369) J. E. B. writes: In your issue of December 22, 1906, question 10271, a farmer having plowed a strip ten rods wide around a square field finds he has finished one-fourth of the field. How many acres? You say that this is not an arithmetical problem, but requires algebra for its solution. Fifty years ago a country school teacher in Iowa used to tell us that *all* problems could be solved by arithmetic. Perhaps he was right. Solution No. 2. Divide a square by diagonals into four triangles. Divide one triangle into two right-angle triangles by a perpendicular from the center of the square. Assume that the base of one of these triangles is any length, four rods long. Then, as base and perpendicular are equal, the area is one-half of the square of the base, viz., eight square rods. One-fourth of this triangle having been plowed, the base and perpendicular of the remaining similar triangle would be the square root of twelve, viz., 3.464. This subtracted from 4 leaves 0.536, the width of the plowed strip. Then, by proportion, $0.536 : 4 :: 10 : 74.6$. But the base of the triangle is one-half of the side of the square, viz., 149.2 rods, your answer by algebra. A. Your solution of the problem regarding the plowed field is quite correct. You assume a figure with a "base of any length, four rods long." Then from this you calculate the parts on the conditions of the original problem, and at last arrive at the proportion between your assumed figure and the figure given in the problem, from which the length of the side of the square field is found. Permit us to say that this process is not arithmetical, but algebraic. It is easier to use a letter to represent the side of the square and proceed with the calculation till the numerical value of the assumed letter is found than to do it as you did. To use only numbers does not make a process arithmetical. In an arithmetical process the numbers given in the problem are taken and the calculation is based upon those numbers and continued till the answer is found. In an algebraic solution the answer is assumed, usually as a letter, or else some quantity so related to the answer that the value of the answer can be computed from the assumed quantity, and the calculations are based upon the assumed number or quantity. This is what you did in solving the problem. Arithmetic has its place and uses. So has algebra. Many of the older arithmetics contained problems which were solved by assuming a quantity and working with it. This rendered the solution algebraic. It was by such processes that your old teacher justified his saying about solving all problems by arithmetic.

(10370) L. W. asks: In the year 1833, in the month of November (do not recall the day of the month; I would have been eight on 2d of March) I witnessed just at daybreak in the morning that great and notable event of the falling of the stars, or meteoric shower. It was a magnificent sight, and as vivid to my mental sight as at the time. It resembled and I thought it was large snowflakes, but disappeared as fast as they fell. Why I was out of my trundlebed at that time and looking out of the window, I do not recall. My parents or no one saw it but myself, as I was frightened and went back to bed. This was in Centreville, Allegany County, New York. From that time on I have never seen the like, neither any one who has. But I have talked with those who saw them at that time. Now they are said to be periodic, about the 14th of November. Now what I wish to know is, where are they perceived—in what localities? and why not universal? Are shooting stars classed as meteors? What is the cause of meteors? A. The meteoric shower which you so vividly remember occurs once in about 33¼ years, on the night of November 14. If it occurs when the sun is above the horizon of a place it is not seen at all. It occurs here in New York in the early morning hours. There were showers in 1833, 1866, 1898, and in 1901. None of these later showers were as brilliant as that of 1833. The earth crosses the orbit of the meteors each November 14, but the meteors are at the same place at the same time as the earth only once in 33¼ years.

(10371) W. B. C. says: Why is it that when water freezes bubbles are formed in the ice? I once left a tumbler of water outside on a cold night, and on finding it the next morning, I found the water frozen half way down the glass in a series of domes. Between the bottom of the ice and the unfrozen water was a bubble of air as big as a pea. I have always been curious to know how that air got there, as so far as I know the glass was absolutely undisturbed while the water was freezing. The solution of this problem would interest me very much. A. Bubbles of air appear in ice because the air was dissolved in the water before it was frozen. Upon freezing, the air separates from the water. Water in a natural condition always contains air, else it would be tasteless and fish could not live in it. If a glass of cold water is allowed to stand and grow warm, the air separates from the water in a similar manner and appears as bubbles on the sides of the glass.

(10372) S. M. D. asks: Is there any limit to the distance that a certain amount of electricity will travel over wire, that is, will a weak battery send electricity as far as a strong battery? A. There is a limit of distance to which a small amount of electric current can affect an instrument so that it can be perceived. This is at a less distance than a strong current can affect the same instrument. In this sense a weak current cannot travel as far as a strong one over a wire. A weak battery cannot produce the same effect through a mile of wire as a strong battery can; but if we had more delicate instruments we might still detect the weak current much farther than we can at present. It is not so much the defect of the current as of the instruments for observing it.

(10373) G. H. says: I would like to get or make a cold solution, say a few degrees above the freezing point, in small quantities. Could you advise me where I can obtain such a thing or what chemicals are needed to produce it? A. You may obtain a low temperature by the addition of hydrochloric acid to crystals of sodium sulphate. By using strong acid a fall of temperature to ten or more degrees below freezing can be had. Different proportions of acid and water will cause different temperatures. We have no tables giving the parts of each to be used, and you can determine by experiment the parts of each to be taken for the temperature you wish to obtain. Water alone poured upon the crystals will produce quite a fall of temperature.

NEW BOOKS, ETC.

INORGANIC QUALITATIVE CHEMICAL ANALYSIS. By William Stowell Leavenworth, M.Sc. Easton, Pa.: The Chemical Publishing Company, 1906. Pp. 153. Price, 1.50.

This book provides a manual holding an intermediate position between an elaborate treatise and a skeleton outline of the subject. The work is concise but clear throughout; it is hardly available for the elementary student, as a certain familiarity with general chemistry will be found necessary. The appendix contains a full and useful list of reagents, a list of suitable apparatus, and other convenient data, which will be found useful for supplementing the information contained in the body of the volume.

BUSINESS ORGANIZATION. By Samuel E. Sparling, Ph.D. New York: The Macmillan Company, 1906. 12mo.; pp. 374. Price, $1.25 net.

This volume is an outgrowth of a course of lectures on Business Organization and Management, delivered at the University of Wisconsin in connection with the courses in Commerce. The growth of the literature of commercial activity indicates the increasing interest manifested in the systematic study of business institutions and corporations. But as there have been few books fully covering modern business from the viewpoint of organization, Dr. Sparling's contribution will fill a decided want in this connection. The book is well written and covers the subject thoroughly, notwithstanding that the plan of treatment was necessarily somewhat arbitrary.

TASCHENBUCH DER KRIEGSFLOTTEN. VIII. Jahrgang, 1907. By B. Weyer, Kapitänleutnant a.D. Munich: J. F. Lehmann's Verlag, 1907. 12mo.; pp. 403.

Capt. Weyer's Annual may be considered a very compact and accurate review of the state of naval affairs in all countries down to the first of December, 1906. Following the plan which has been adopted in previous issues, he has endeavored to present a photograph of every type of ship, together with longitudinal and plan views, in which the armor and gun positions are clearly indicated. Constant use of the previous volumes that have appeared justify us in assuring for this book a well-deserved success.

A TECHNOLOGICAL AND SCIENTIFIC DICTIONARY. Edited by G. F. Goodchild and C. F. Tweney. Philadelphia: J. B. Lippincott Company, 1906. Large 8vo.; pp. 875. Price, $6.

The title of this useful book explains fully its object. The definitions are concise, brief, but nevertheless of sufficient length to be of value in almost every case. Chemical formulas are freely given. Illustrations are provided, supplementing the explanations of certain of the terms defined. Various important subjects are discussed at great length.

INTERNAL ENERGY. By John V. V. Booraem, M.E. New York: McGraw Publishing Company, 1906. 12mo.; pp. 144.

The author has undertaken a task in this book which at first glance would appear positively staggering. This is to suggest a simple working hypothesis whereby the amount of all chemical energy stored within a body may be estimated. The work is based upon familiar lines of experimental data, the idea originating from a mathematical study of the periodic curves of the atomic volumes and melting points. The hypothesis is based upon a mathematical method, and provides for expressing the relations of heat to mass through great ranges of temperature.

LE CANAL DE SUEZ. By Voisin Bey. In Seven Volumes. Paris: H. Dunod et E. Pinat, Editeurs, 1906.

SECOND REPORT OF THE WELLCOME RESEARCH LABORATORIES AT THE GORDON MEMORIAL COLLEGE, KHARTOUM. By Andrew Balfour, M.D., B.Sc., F.R.C.P. Edin., D.P.H. Camb. Khartoum: Department of Education, Sudan Government, 1906. 4to.; pp. 255.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending January 22, 1907.

AND EACH BEARING THAT DATE

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

Acid esters, boracic, H. Thron 841,738
Air brake, H. H. Westinghouse....841,750, 841,751
Air compressor, E. Hill, reissue 12,599
Alarm gage, Wall & Derby 841,743
Alkyl ethers of morphin, making, L. H. Reuter 842,011
Amalgamator, H. L. Lightner 841,990
Amusement apparatus, L. A. Jones 841,783
Amusement device, H. S. Bassett 842,058
Atomizer or pump sprayer, E. A. Jahn.... 842,097
Automatic brake, J. N. Lawrence.......... 841,698
Automobile drive wheel, J. C. Brennan... 842,069
Automobile dust guard, N. Leidgen 841,790
Awning for boats, collapsible, A. Ross.... 841,719
Axle, B. M. Crowley 841,941
Bag holder, J Brown 841,926
Baling press, H. A. Starr 841,735
Ball mill, tubular, M. F. Abbe.......... 841,841
Battery containing cell, G. H. Stout...... 842,123