Special.

THE OLDEST METHODIST MINISTER IN PHILADELPHIA.

"I am the youngest old man in New York," said the Hon. William E. Dodge, a short time before he died. Mr. Dodge was indeed one of the sprightliest of old gen tlemen. He was as active as most men of fifty, although he was about seventy-five. Up to the time of his death, which came very suddenly, he was able to accomplish more work in a day than almost any of his partners or clerks could get through with. In Philadelphia lives another "young old man," one

of the most venerable of Methodist ministers. He is as active, as hearty, and as cheery as was Mr. Dodge. He is the Rev. Anthony Atwood, honored and beloved not solly by Methodists, but by good people of every per-suasion. Mr. Atwood might pass for a man of about sixty, but he is eighty-five. About fifteen years ago he told the writer that he hardly expected to do much more work, and that he thought a man of seventy might be considered to have rendered all the effective service he would be capable of. Yet, since that time, Mr. Atwood has done more ministerial work than many a younger man has accomplished. Some years ago he had a par-tial stroke of paralysis, which for a while disturbed his general health. He also suffered from a bronchial diffi-culty which threatened to be serious. From both of these disabilities he has now entirely recovered. With his snow-white hair in its ample fullness, and his clear and ruddy complexion, he is the picture of a model patriarch, both in health and good nature. Although it is some time since Mr. Atwood has been in pastoral charge of a church, he preaches frequently, and is regularly at the Green Street Methodist Episcopal Church on Com munion Sundays, taking part in the sacramental serv ice

The writer recently called on this venerable clergyman at his home, No. 809 North Seventeenth Street, Philadelphia, and found him as cheerful and vivacious as in former years.

"Well, Mr. Atwood, it looks like old times to see you looking so vigorous and hearty; but years do not seem to make you an old man, and you appear to enjoy quite as good health as most of the younger men."

"My health," said Mr. Atwood, "is all I can expect, considering my age, which is now close to eighty-five. since the stroke of paralysis which I had several years ago, I have not been able to preach with my former vigor. I'find that I am not capable of a prolonged pulpit effort as of old. , Words do not follow my thoughts as quickly as they used to. But with this exception I am about as well as I have been for many years." "When I had that stroke of paralysis," continued Mr

Atwood, "I resorted to a treatment which I found had been of great value to many others who were similarly affected. I had for many years known Dr. Palen, of Messrs. Starkey & Palen, who have done so much good with their Compound Oxygen, and I consulted him in reference to my case. I took the treatment at the office, which was then in Girard Street. At once I began to re-ceive benefit. For some time I visited the office regularly and frequently. I took inhalations of the Oxygen until my health was so fully restored that I was in no further need. It gave me a new vitality, restored my general health, and put my whole system in renewed good order."

"You had some bronchial difficulty, did you not, Mr Atwood?" "Yes; I had an irritation in my throat which was quite

troublesome, and threatened to be more so. I tried Compound Oxygen for this also, and was surprised not only to find the completeness of the relief it afforded me, but the readiness with which it acted. I procured a "Home Treatment" in order to cure this bronchial trouble at my leisure; supposing the irritation would be slow to go away, as it is in the case of many clergymen, who, after long years of pulpit service, are attacked with soreness of the vocal organs. But I had occasion to use only a small portion of what was contained in the "Treatment." My throat became so much better that I had no occasion again to resort to the use of Oxygen."

"And have you, since your recovery, had much occa-sion to use this remedy, Mr. Atwood?" "Not a regular thing, at all; only at long intervals. Once in a while, if I need a general toning up of my system, I call at the new office of Drs. Starkey & Palen which, by the way, is an exceedingly beautiful and con-venient place—and I take a few inhalations. From this I alwaysreceive benefit and strength."

"You are, then, a firm believer in this method of

Yes, very, very firm. You may say that I most heart ily and thoroughly approve the treatment, and indorse Drs. Starkey & Palen as gentlemen whom I have known for years, physicians of repute and ability, in whom I have entire confidence. They have done incalculable good with Compound Oxygen. I am glad that so many invalids have been brought to health by this means. I am glad, too, that people are becoming more generally acquainted with it."

The experience of Mr. Atwood is an evidence that the virtues of Compound Oxygen are not only for the advantage of the young and those in middle life. There are many other instances on record in which persons advanced in years have received, by means of this great vitalizer, renewal of health and prolongation of life. For further reference to these and for better acquaint ance with the merits of Compound Oxygen write to Drs. STARKEY & PALEN, 1529 Arch Street, Philadelphia, Pa., for their pamphlet treatise, which will be freely mailed to any address.

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Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 46. Hercules Lacing and Superior Leather Belting made by Page Belting Co., Concord, N. H. See adv. page 238. Planing and Matching Machines. All kinds Wood Working Machinery. C. B. Rogers & Co., Norwich, Conn. Iron and Steel Wire, Wire Rope, Wire Rope Tramways. Trenton Iron Company, Trenton, N. J.

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HINTS TO CORRESPONDENTS.

MATES 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 number of question.
In quiries 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.
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Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of all price.

Minerals sent for examination should be distinctly marked or labeled.

(1) J. W. asks: 1. Will a brass pipe expand in length as a pressure of steam is gradually let into it ? A. Yes. 2. How much in length will a brass pipe 4 feet long by 1 inch inside diameter expand as steam pressure in it rises from 0 to 30 pounds, also 60 pounds ? A. 0.1 inch and 0.114 inch respectively. 3. Is there any metal, as a rod 1/2 inch diameter, which, if placed within the pipe, will contract or remain sta-tionary, or nearly so, as the pressure rises ? A. None. 4. Will a large brass pipe expand more or less than a small one? A. The same.

(2) H. C. M. asks: What will harden soft spots in a grindstone and leave it so it will wear away evenly? A. We know of nothing that will pene trate and harden the spots.

(3) F. A. W. says: I have made a Voss-Holtz electrical machine with a revolving plate 8 inches in diameter. It will when in good working

order give a 2 inch spark, but is constantly changing or rather reversing its poles. I had the same experi ence with a simple Holtz and also with a Wimshurst machine. Kindly give reason and remedy through your paper. A. Sometimes this happens owing to a slight displacement of the armature or stationary plate. See that it is free from liability to move.

(4)-J. P. A.-The extreme depth of water in the Mersey River over the tunnel is, at high tide, 90 feet. The average thickness of solid rock be-nearly so? The coating desired should be waterproof, tween the bed of the river and crown of the tunnel is and not dissolve at a test of 110° Fah. Should be tasteless. 30 feet, and nowhere less than 25. The height of the A. Try gum sandarac 1 pound, clear turpentine 6 ounces, tunnel is 21 feet. The Nicaragua Canal would pass rectified spirit (65 overproof) 3 pints; dissolve. India tunnel is 21 feet. The Nicaragua Canal would pass rectified spirit (65 overproof) 3 pints; dissolve. India through a much healthier climate than the Panama rubber cut in fine shreds and dissolved in carbon di-Canal; the obstacles would not be so stupendous; the line to be cut would be less, as Lake Nicaragua would be utilized; it would present a shorter line from the North Atlantic to the North Pacific ; but it would have to employ locks. The cost would be less both in men and money.

(5) "Inquirer" asks the method of finding the height of a conical frustum containing 20 ponnds of lead, the diameters of its faces being 3 inches and 1% inches respectively. A. The volume of 20 pounds of lead must first be found. The specific gravity of the metal being 11.363, and the weight of a cubic foot of distilled water at 0° C. being 62:418 pounds, it is a simple calculation to find the number of cubic inches of lead which will weigh the required number of pounds. This must then be put equal to the volume of a conical frustum which is given by the following formula:

$v = \frac{1}{3} h \left(a^{1} + \sqrt{a^{1} a^{3} + a^{3}} \right)$

height. The area of a circle being πr^2 , we have all the data in the above equation except h. But we have found the value of v by the previous calculation. The equation may therefore be solved for h, giving us the result desired. Or, the formula may be stated as follows, omitting the separate calculation of the areas of the two circles :

$v = \frac{1}{3} \pi h (r^2 + r R + R^2)$

in which **r=1**½ inches and R=% inches

(6) R. M. C. asks for details of a 14 inch hollow wall, designed to keep out the damp. A. Such a wall is formed of two casings with a space 2 inches wide between them, the outside casing being one brick, or 8 inches, in thickness and the inside casing half brick, or 4 inches. The bricks of each casing are laid in the ordinary manner, either in the usual running bond or, if it is preferred, in Flemish bond. The two casings are connected together by the insertion of galvanized iron or other ties in every fourth course in height and at distances apart of about 30 inches. Ties are manufactured for the purpose in various designs. The base of the wall is built solid ticulars of the prosecution of the work thus far. With up from the footings to just above the ground line, where it is covered on top with a damp course of asphalt or some other suitable material, impervious to

if the nail be too long, cut -away some of the middle part of the edge only. By these means the nail is rendered elastic and yielding, and the corners are relieved from the pressure that caused the pain and infiammation.

(9) A. B. asks what to wash lamp chimneys in so they will not crack. A. Place the chimneys in cold water, and then gradually heat until the boiling point is reached, then allow them to cool slowly. By repeating this operation several times, the glass will' become thoroughly annealed, and no fear of cracking need be had.

(10) G. S. asks: 1. What will stick sheet lead to cardboard ? A. See list of "Cements" given in Scientific American Supplement, No. 158. 2. Is thereany way to cure dreaming? A. Do not lie on your back, and be careful to keep your stomach in good condition. Children sometimes have articles tied to them, so they will not turn over on their backs while asleep, as a preventive of disturbing dreams. 3. In what proportions is tincture of cantharides used for the hair, and how is it to be applied ? A. Scald black tea, 2 ounces, with 1 gallon of boiling water, strain, and add 3ounces glycerine, tincture of cantharides 16 ounce, bay rum 1 quart. Mix well, and perfume. Apply by rubbing on the head.

(11) W. W. N. asks for the component parts of Leclanche battery porous cup and prism. A. Manganese dioxide and carbon (graphite or powdered coke) with dust sifted out, are used about half and half for porous cup. For prisms, a paste of 40 parts manganese dioxide, 52 of carbon, 5 of gum lac, and 3 of bisulphate of potash, is compressed by a pressure of 300 atmospheres, at 100° C.

(12) J. H.-Alum gives excellent results when it has been found desirable to clarify muddy or turbid waters. Ammonia water will precipitate all iron in solution, but is not likely to be as successful a clarifying agent.

(13) L. D. P. asks what to add to nickel solution of double sulphate and ammonia to throw down any copper or iron that may be in it. Also, what will throw down the nickel itself? A. If the solution is acid, any copper present will be precipitated by hydrogen sulphide. Ammonia sulphide will precipitate nickel. See any work on qualitative analysis.

(14) J. L. D. asks: What will take the sulphide or chloroform forms an excellent water proof varnish.

(15) N. L. S. writes : How do minstrels use cork to blacken their faces and hands, and what makes it shine ?

- A. Take best lampblack..... 1 grain. Cacao butter..... 6 grains.
- Oil of neroli...... 5 drops. Melt the cacao butter, add the lampblack, and while cooling make an intimate mixture, adding the perfume oward the last.

(16) F. B. writes: In refinishing furniture, I know of no way to remove ink stains. Can you give me a simple method ? A. Mix 6 ounces of spirit of salt and 1/2 ounce of powdered salt of lemons. Drop a little of this mixture on the stains, and rub well with a cork until they disappear, then wash off with cold water.

(17) Information desires the composiin which a^1 and a^3 are the respective bases and h the tion used for making silicate slates. A. We should think they could be made with pulverized slate or quartz moistened to the consistency of a thick fluid with water glass, and colored with powdered charcoal or boneblack. Then apply with a brush like a paint to the required surface

> (18) A. L. Z. asks: What is the best method of collecting very fine, fiat, scaly gold from an auriferous sandbank ? A. Wash it through sluice ways or troughs over mercury, and then distill the mer-cury, leaving the gold behind. Simple pan washing will answer if the gold is in small quantities.

> (19) W. H. T.-The removal of superfuous hair from skin is possible both by means of depilatories and by electricity. The former are mostly preparations of sulphide of barium or sulphide of calcium, and the process by electricity is very slow, each hair root having to be killed separately.

> (20) J. W. asks (1) whether the smoke of tobacco which has been filtered through cotton batting is rendered comparatively harmless. A. It is cer-tainly rendered less poisonous, but the "comparative harmlessness" depends upon the individual. 2. How many candle power lamp of an incandescent electric lamp will be equal to a common gas fiame ? A. An ordinary burner consuming 5 feet of the New York Gas



The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

For Sale Cheap-State rights for patent Nail Holder, to hold in the left hand. Address A. L. Wheebock, Buffalo, Erie County, N. Y.

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Billings' Patent Adjustable Tap and Reamer Wrenches. Billings & Spencer Co., Hartford, Conn.

Cushman's Chucks can be found in stock in all large cities. Sen ford, Conn. Send for catalogue. Cushman Chuck Co., Hart-its results. By dynastets,

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Astronomical Telescopes, from 6" to largest size. Observatory Domes, all sizes. Warner & Swasey, Cleveland, O.

The Windmill as a Prime Mover. Comprehending everything of value relating to windmills, their use, de sign, construction, etc. By A. R. Wolff. With many fine illustrations. (Shortly.) 8vo. cloth. Price. \$5.00. For sale by Munn & Co., 361 Broadway, New York.

Our Millionaires

do not find all their investments golden, by any means. But an investment in Dr. Pierce's "Golden Medical Discovery" is certain to prove a good one. It cures cough consumption, bronchitis, sick headache, skin diseases, dyspepsia, costiveness, scrofulons diseases, chills and fever, and dumb ague. It reaches the blood, and through,

moisture. The casings are then built upon the asphalt Company's gas per hour gives a light equal to 23 canwith the two inch space between them, forming a dles, while the ordinary Edison incandescent lamp burns gutter to receive and carry away any water that may get in. This gutter is constructed with a slight fall and is connected with the drains. Care must be taken to place over every window and door frame a strip of sheet lead or zinc of a width a little greater than that of the frame, so that any water which may fall upon it shall drip off into the gutter below. A house built with hollow walls, properly constructed of good materials, will be perfectly dry.

(7) G. W. asks what it is that is put on paper, so, when you breathe on it, it will in a few seconds blaze up in a fiame. A. Perhaps it may be phosphorus. Whatever it may be, our advice is to leave it alone. It cannot be a desirable article to have around.

with a brilliancy equal only to 16 candles.

(21) J. F. writes : I have in use porcelain enameled jacket kettles for melting beeswax from which the enamel has come off partly: how can I repair the kettles ? A. It is not likely that the defective portions can be repaired. The enameling is baked on the iron, and so when broken cannot well be replaced unless the entire enamel is removed.

(22) E. F. S. writes : I wish to obtain information on bluing irm so it will be durable : some riding bridle bits that are inlaid with silver. What process must Luse ? A. We know of nothing but heat for bluing that will be permanent. The heat will also tarnish the silver inlaying. We can only recommend you to polish the whole bit.

(8) E. C. M. says : In your issue of (23) B. E. T. B. asks (1) for the best March 6, query No. 32, W. T. W. A. asks for a rerecipe for stereotyper's paste. A paste for paper that is highly adhesive, and that will stand considerable nædy for ingrown nails. An excellent one, affording almost immediate relief, is the following, viz.: With heat. A. We are advised by one of the large stereoa piece of glass or a file scrape along the top of the (type makers that the paste is composed of the folnail until it is very thin in a line with the toe; then, lowing ingredients: Water, flour, starch, gum arabic,

alum, and whiting. The best of flour and starch are SUPPLEMENT, Nos. 87 and 125, for spongy iron. 2. A. About 1 to 10. 4. Is it necessary that the mixtur to be used. These foregoing articles, excepting the whiting, are thoroughly mixed, and heated by steam. When the mass is thoroughly homogeneous, sufficient whiting is added to give stiffness. 2. Some preparation that will fasten celluloid to iron or wood. A. Take of:

Gum shellac 1 ounce Camphor..... 1 Alcohol...... 4 " Dissolve and filter.

(24) G. O. asks whether there is any difference in the pressure on the slides of an engine whether "the engine runs over or under. A. When the engine runs over (as it is called), or the upper half crank stroke is from the cylinder, the whole pressure is down. while in the opposite direction it is upward. If the slides are over and under the rod as in a locomotive. the pressure is against the upper slide in running ahead, and vice versa.

(25) F. A. G. asks the most practical way of driving a countershaft at right angle with main line, and on same level. A. Use a belt held at hen bird while she is sitting. There are several books the desired angle by two idler pulleys on vertical shaft. They are sold by machinery dealers. Bevel friction pulleys are not reliable.

(26) E. E. R.—There is no blacking you can put on a stove to keep it blacked that will not burn off if the stove gets red hot.

(27) J. D. B.-Therefractive index of a few liquids is as follows: Water 1336, alcohol 1372, muriatic acid 1'410, nitric acid 1'410, sulphuric acid ounces mercury in 3½ ounces nitric acid. Stir till 1'434, olive oil 1'470, oil of turpentine 1'475, cajeput effervescence ceases. Heat 16½ ounces lard to 200° oil 1483, castor oil 1490, beech nut oil 1500, balsam copivi 1.528, Canada balsam 1.549, oil of cloves 1.535, ring constantly until thoroughly amalgamated. oil of aniseseed 1.601, balsam of tolu 1.628, oil of cassia 1.641, sulphuret of carbon 1.768.

(28) H. E. H. asks: 1. Can a spring motor like those described in SCIENTIFIC AMERICAN SUP-PLEMENT, Nos. 142, 146, 147, 148, and 150, be made to propel a small boat (a Barnegat sneak boat about 10 or 12 feet long)? A. Probably a spring motor could be arranged to drive a small boat for a short distauce; but we think it would be easier to row the boat than to wind the motor. 2. Can you give me the address of any one that could make them for me? A. We do not know of any one regularly engaged in the manufacture of spring motors. 3. Do you think the motor advertised by the Electro-Dynamic Company of Philadelphia in SCIENTIFIC AMERICAN EXPORT EDITION for September, 1885, page 206, would do ? I want to use this boat for fishing and hunting. A. It is hardly large enough for your purpose, but possibly the same company can provide you with an electric motor which would answer.

(29) E. G. H. asks: 1. What will be the result if a rubber balloon is partly filled with air, existence did the glacial period begin? A. Several and a vacuum produced around it ? A. The air in million years ago. 4. Was it a sudden transition from the bag will expand. 2. A recipe for a good liquid heat to cold? A. Probably not. 5. What is supposed glue for small woodwork, inlaid work, etc. A. See to have been the cause? A. Possibly and probably a glue for small woodwork, inlaid work, etc. A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 14.

(30) J. G. writes: 1. Can you give me usual proportions of each article used in compounding benzine drier, also of turpentine drier? A. The addition of certain chemical substances rich in oxygen, such as borate of manganese, litharge, minium, etc. with turpentine constitutes driers. The benzine is said to be used in partially replacing the turpentine when the so-called benzine drier is made. The proportions vary with different manufacturers, and it is impossible to obtain exact formulas. See Condit's Painting and Painters' Materials. 2. What is the simplest and cheapest method you know of for lighting gas by electricity for family use on small scale, say 4 to 8 burners ? What appliances do you know of for facilitating use of personal electricity in lighting gas with the finger after collecting electricity by friction of feet on a carpet? A. We know of no simple electric lighter as asked for ; the ordinary electric lighter is covered by numerous patents. No appliances are used for facili. mirror so that the edge of the mouth of the tube will tating use of personal electricity; shuffling the feet correspond with the edge of the mirror and the field over a woolen carpet will enable any one to thus light a gas burner.

(31) P. H.-Chimneys with draught elbow on top draw only when the wind blows; at other times the draught elbow is of no value. Chimnevs may be in height from 20 to 100 times their interior diameter, and should ordinarily be of equal interior size throughout.

(32) G. B. C. asks the best way to harden large steel plates, so as to keep them from springing. A. We know of no way of hardening large plates without warping. The usual way is to draw the temper and straighten with the hammer.

(33) C. E. K. writes: Can telegraph operator's paralysis, in any stage, be remedied or permanently cured by any doctor, or can it be done with gymnastic exercises in any form ? A. What your arm needs is rest of its muscles. There is an incipient gasoline This almost surely will increase if the same use is continued. Medicine can be of but little service. Your right hand and arm must have rest. You can do this by learning to use the left; it takes time and patience, but it can be done, and is well worth the doing, for it will free you from your trouble. (34) C. R. W. asks information with regard to the curing of hickory, oak, and ash timber, to keepit free from the worms. A. Your cheapest method is to saturate the timber with a solution of bichloride of mercury (corrosive sublimate). Make a tight box of sufficient size, pack in the timber, and pour in the solution so as to cover all several inches deep. Let it re main twenty-four hours, and remove it. You will find that no worms will touch it. The expense is not great, for one part of the hichloride in a thousand of water is sufficient. The solution is of course poisonous, and must be kept with care, but the timber when dried is not in any way injurious to workmen or others.

What is the temperature at which water dissociates in iron pipes ? A. Water does not dissociate in this way, but is chemically decomposed, giving up its oxygen mixture of gas and air exploded without compressing to the iron at a red heat. The temperature at which water can be dissociated has been variously placed at between 4,000° and 7,000° Fah.

(36) L. J. P. asks: 1. How many pounds and how many layers of wire will make the stronge will one gallon of air sustain in water? A. About 814 electro magnet, using six or eight cells Bunsen ba pounds, or the weight of a gallon of water less the weight of a gallon of air. 2. Can a cord belt be manufactured so that it will be endless and have no lumps, where it is connected, to throb in passing over small pulleys ? A. There are no such cords in market, but the splicing should, be done so neatly that there is no perceptible throb.

(37) K. F. writes: 1. Can you tell me how to raise Canary birds ? Should the male bird be kept in the same cage until the young birds are

ready to fly, or should it be separated when the female is ready to sit? A. It is not necessary to separate the birds. The male generally waits on the on the care of Canary birds, such as "Canary Birds; a Manual of Useful and Practical Information for Bird Fanciers," price \$1.00.

(38) G. H. C. desires a positive cure for 'Fetter's salt rheum." A. Wash the parts affected with Castile soap and water; dry with a soft cloth; then wet with tincture of iodine, and let it dry; after which apply citrine ointment, made by dissolving 11/2 Fah. in an earthen vessel, and add the solution, stir

(39) C. E. M. asks : 1. Is there any rule for finding the proportion between the pressure re quired to crush or collapse a boiler and the pressure required to burst it ? A. No. The form, size, and thickness of metal determine this. 2. Has there been an engine made using the electric magnet as a motive power f A. Yes; many. 3. What is the general plan of compressed air engines, and what pressure is usually used t A. Similar to steam engines. See SCIENTIFIC AMERI-CAN SUPPLEMENT, NO. 309. 4. What is the condition of the United States navy now ? A. A great many officers, but a very poor show of vessels. See report of Secretary of the Navy. Your question on bookkeeping is too vague for answer.

(40) M. A. M. asks: 1. Why does the water of Lake Geneva, Switzerland, rise and fall so suddenly? A. From unequal barometric pressure and local winds. 2. If a piece of ice containing a large air bubble be allowed to thaw rapidly, will it thaw a particle inside so long as the walls remain intact ? A. It will not. 3. At about what date in the earth's change in the position of the earth's axis. 6. Has there been more than one such period? A. Supposed to have been two. 7. What book will give me the most information on the formation, changes, etc., of the earth up to the present time, in simple language, easily understood? "The whole thing in a nutshell." A. The whole thing cannot be put in a nutshell. See Dana's Geology, which we can send for \$5.00, and SCIENTIFIC AMERICAN SUF PLEMENT, Nos. 1, 268, 427, 400, 419, 398, on glacial period

(41) H. C. F. desires a method of preserving natural flowers. See answer to query 32 in SCIENTIFIC AMERICAN for October 24, 1885.

(42) C. W. McC. asks rules for centering the large speculum of a Newtonian reflector on a star. A. For centering the large mirror, remove the eyepiece, and look into the small mirror with the telescope turned to the light of the sky. Adjust the appears round, with the small mirror in the center. 2. Do you know of any substance except selenium which, when placed in the sunlight, the light will be changed to electricity? A. Selenium does not change sunlight into electricity. Sunlight simply affects its conductivity for electricity. A thermo-electric pile, described in any work on physics, converts radiant heat, of which light is probably a modification, into electricity. It is constructed of various substances, sometimes of alternate bars of bismuth and antimony.

(43) A. B. C.—The same weight of metal forms a stronger column when hollow than when solid. If of the same diameter, the solid is the stronger under all conditions. The thinner metal of a hollow column would be more quickly affected by direct exposure to a high heat.

(44) W. D. V. B. asks: How many feet of arcoupling, T. P. Evans. 339.35 Car coupling, R. D. Giles. 339,54 s is equal to 1 ton of coal for cooking purparalysis, caused by long and over-fatiguing use. poses? A. It is very hard to get at any practical ratio, Ca as the economy of gas in cooking arises from the Ca ease of extinguishing it when not being used. With Ca coal gas for each pot hole, allow eight feet per hour in Ca burning; for each oven, double the amount. Pure gasoline gas would be consumed in smaller quantities, Ся about one-eighth to one-tenth the above amount.

of gas and air should be compressed before it is e ploded? A. No. 5. Will not a gas engine work wi A. Yes ; but not so well in engines of the present con struction

(47) H. B. N. asks: What wire and core tery ? Also, how many feet of wire it will take ? A. I general terms, the larger the core, with wire corr spondingly heavy, the greater would be its powe The wire should be of length sufficient to produc three or four ohms resistance. Hence its size an length would depend on the core.

MINERALS, ETC.-Specimens have been received from the following correspondents, and es amined with the results stated.

B. B.-The specimen appears to be a piece of mice ceous iron ore. The value of the ore can only be dete mined by an assay, costing from \$12.00 upward a cording to number of constituents determined.

INDEX OF INVENTIONS

For which Letters Patent of the **United States were Granted**

April 6, 1886,

AND EACH BEARING THAT DATE

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

Acids, apparatus for concentrating, J. Hughes Alarm. See Water alarm.	339,552
Arches, forming artificial stone or concrete, P.	
H. Jackson	
Automatic gate, T. E. Wilson	
Axle box, car, G. Condery <i>et al.</i> Bagasse furnace, R. Marsa.	339,209
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Basting machine, W. Duchemin	
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Blackboard walls, composition for, J. A. Ditch	
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ıg?	Chuck, drill, C. E. Stone Churn, C. A. Lorenz	
n-	Churn, J. L. Taylor	339,495
	Churn, I. W. Walter	339,505
\mathbf{es}	Churn, R. A. Wooldridge Clamp, J. K. Bittenbender	
est	Cleaner. See Cotton cleaner.	389 ,99 7
at-	Clock, night, C. H. Shaw	
In	Clocks, step-by-step mechanism for electric, J. E.	
re- er.	Carey Clod crusher and pulverizer, T. F. Emans	
ce	Closet. See Water closet.	003,031
nd	Clothes line fastener, J. J. Hughes	
	Clutch, E. D. Mackintosh.	
\mathbf{n}	Clutch, friction, J. W. Blodgett Cocoa, preparation of extract of, G. Brownen	
ex-	Cock, stop and waste, Murphy & Low	
	Coffee huller, J. Guardiola	339,288
ea-	Collar and saddle, combined breast, C. G. Calo Collar, stock, J. H. Roberts	
er-	Comb, See Curry comb.	007414
1C-	Comb and comb cleaner, combined, E. H.	
_	Cochen	339,380
_	Combustion and preventing the formation of smoke, forming a perfect, J. A. Treacy	220 600
S	Compound engine, reversible single-acting, J. H.	000,000
	Eickershoff	
	Compound engine, single-acting, J. H. Eickers-	
į	hoff Copying device, W. Griffith	
	Corset, J. R. Rheubottom	
	Corset waist, C. A. McGee	339,313
i	Cot and seat, convertible, L. Banks	
	Cotton cleaner, J. H. Poston Counterborers, reamers, and countersinks, ma-	339,46 4
E. :	chine for forming, A. Latham	339,197
;	Coupling. See Cable coupling. Car coupling.	
-1	Thill coupling. Wagon coupling.	920.004
552	Coupling, B. F. Nichols Cover. See Vault cover.	339.204
	Crib or cradle, child's, C. F. Hopf	3 3 9,413
	Crusher. See Clod crusher.	000 5-0
296 249	Cultivator, corn, J. Pritchard Cultivator, listed corn, A. I. McCandless	
269	Cup. See Oil cup.	000,404
311 :	Curry comb, W. E. Lawrence	
228 178	Cut-out and lightning arrester, automatic, P. P. Belt	
110	Cutter. See Sod cutter.	008,0 0 0
36	Cutter head knife, J. H. Wells	
86	Damper regulator, T. Walker	
14 139	Dashboard rail, R. W. Logan Dash rail, J. N. Smith	
283		
342	Ditching machine, railway, G. W. Dye	
602	Door check, J. & I. Roshong	
289 166	Drawer fastening or lock, gang, S. Shaw Drawer fitting machine, L. C. Cron	
55	Drawer handle, G. P. Rush	339,587
93	Dress shields, dies for making seamless, A. J.	
826 165	Hiscott Drier. See Fruit drier.	339,294
1	Drill. See Grain drill.	
	Drill, A. Miller	
98	Drill hoe, A. Dillard Edge trimmer for walks and beds, T. Akins	
143	Electric lights, cap iron for poles for suspending,	000,000
44	T. H. Brady	339,371
202	Electric signal recorder, A. J. Coffee	
196 [:]	Electrical distribution, system of, T. A. Edison Electrical switch, F. H. Johnson	
554	Electrotyping, apparatus for, W. J. Ladd	
	Elevator. See Hay elevator.	
86 95	Elevator safety attachment, L. Senior	
.95 644	End gate fastener, J. M. Reams	
92	Engine. See Gas engine. Pressure engine. Sin-	0,00,000
	gle-acting engine. Steam engine. Traction	0,00,000
38	gle-acting engine. Steam engine. Traction engine.	
	gle-acting engine. Steam engine. Traction engine. Engine, A. Bown	859136
	gle-acting engine. Steam engine. Traction engine. Engine, A. Bown Engines, cut-off device for, J. H. Eickershoff Evaporating apparatus, A. A. Denton	859136 339,282
38 607	gle-acting engine. Steam engine. Traction engine. Engine, A. Bown Engines, cut-off device for, J. H. Eickershoff Evaporating apparatus, A. A. Denton Evaporating liquid by air, apparatus for, A. A.	859136 339,282 339,389
38 607 174	gle-acting engine. Steam engine. Traction engine. Engine, A. Bown	859136 339,282 339,389
38 607	gle-acting engine. Steam engine. Traction engine. Engine, A. Bown Engines, cut-off device for, J. H. Eickershoff Evaporating apparatus, A. A. Denton Evaporating liquid by air, apparatus for, A. A.	859136 339,282 339,389 339,388
38 607 174	gle-acting engine. Steam engine. Traction engine. Engine, A. Bown	859136 339,282 339,389 339,388 339,201 339,492
38 507 174 585 137	gle-acting engine. Steam engine. Traction engine. Engines, att-off device for, J. H. Eickershoff Evaporating apparatus, A. A. Denton Evaporating liquid by air, apparatus for, A. A. Denton Extractor. See Stump extractor. Extractor. See Stump extractor. Extracts, apparatus for making, J. Merz Eye bars, making steel, R. W. Smith Eyeglass case, P. Closs	859,136 839,282 389,389 389,388 339,201 339,492 339,267
607 174 185 137	gle-acting engine. Steam engine. Traction engine. Engines, A. Bown	\$59,136 339,282 339,389 339,388 339,201 339,492 339,267 339,370
507 507 585 377 528 334	gle-acting engine. Steam engine. Traction engine. Engines, A. Bown	\$59,136 339,282 339,389 339,388 339,201 339,492 339,267 339,370 339,459
338 507 174 585 374 374 328 234 234 226	gle-acting engine. Steam engine. Traction engine. Engines, cut-off device for, J. H. Eickershoff Evaporating apparatus, A. A. Denton Evaporating liquid by air, apparatus for, A. A. Denton Extractor. See Stump extractor. Extractor. See Stump extractor. Extractor. See Stump extractor. Eye bars, making steel, R. W. Smith Eyeglass case, P. Closs Eyeglass suspender, F. C. Bowen. Farm gate, E. H. Penfield Fancet, J. F. Bogan Faucet and beer pump, combined, E. M. Hugen-	\$59,136 339,282 339,389 339,388 339,201 339,492 339,267 339,370 339,459 339,133
38 607 74 585 374 528 234 234 234 11	gle-acting engine. Steam engine. Traction engine. Engines, A. Bown	\$59,136 339,282 389,389 389,388 339,201 339,492 339,267 339,459 339,459 339,133 339,295
338 507 174 585 374 374 328 234 234 226	gle-acting engine. Steam engine. Traction engine. Engine, A. Bown	\$59,136 339,252 339,389 339,388 339,201 339,402 339,267 339,370 339,459 339,133 339,255
388 607 174 585 337 374 328 334 234 234 326 111 137 555	gle-acting engine. Steam engine. Traction engine. Engines, att-off device for, J. H. Elckershoff Evaporating apparatus, A. A. Denton Evaporating liquid by air, apparatus for, A. A. Denton Extractor. See Stump extractor. Extractor. See Stump extractor. Extractor. See Stump extractor. Eyeplass case, P. Closs Eyeglass suspender, F. C. Bowen Farm gate, E. H. Penfield Fancet, J. F. Bogan Faucet and beer pump, combined, E. M. Hugen- tobler Faucet and bear pump, combined, E. M. Hugen- tobler Faucet and bear, F. Anthony Feather renovator, C. Moritz Feed water heater, Fairbanks & Magoon	\$59,136 339,282 339,389 339,388 339,201 339,492 339,492 339,459 339,153 339,255 339,255 339,255 339,255 339,255 339,315 \$39,315
338 507 174 585 337 374 328 334 328 334 328 334 328 334 337 1 555 55 55	gle-acting engine. Steam engine. Traction engine. Engine, A. Bown	\$59,136 339,282 339,389 339,388 339,201 339,429 339,459 339,459 339,133 339,252 339,252 339,252 339,252 339,315 339,368
338 607 174 585 374 528 234 226 111 555 667 555 67	gle-acting engine. Steam engine. Traction engine. Engine, A. Bown	859136 339,282 339,389 339,388 339,201 339,402 339,402 339,402 339,415 339,459 339,113 339,252 339,252 339,252 339,315 339,252 339,315
338 507 174 585 337 374 328 334 328 334 328 334 328 334 337 1 555 55 55	gle-acting engine. Steam engine. Traction engine. Engine, A. Bown	\$59,136 339,282 339,389 339,388 339,201 339,422 339,267 339,459 339,459 339,133 339,255 339,255 339,255 339,255 339,368 339,368 339,434
38 607 174 585 374 528 374 528 374 528 374 528 537 555 557 551 559 999 41	gle-acting engine. Steam engine. Traction engine. Engine, A. Bown Engines, cut-off device for, J. H. Eickershoff Evaporating apparatus, A. A. Denton Evaporating liquid by air, apparatus for, A. A. Denton Extractor. See Stump extractor. Extractor. See Stump extractor. Extracts, apparatus for making, J. Merz Eye bars, making steel, R. W. Smith Eyeglass case, P. Closs Eyeglass suspender, F. C. Bowen Farne gate, E. H. Penfield Fancet, J. F. Bogan Faucet and beer pump, combined, E. M. Hugen- tobler Faucet and bushing, M. Anthony Feather renovator, C. Moritz Fence, Black & Strachan Fence, J. W. Clark Fence, I. Landis Fence, W. & W. Pearson Fence, W. & W. Pearson	\$59,136 \$39,282 \$39,389 \$39,388 \$39,201 \$39,492 \$39,267 \$39,370 \$39,133 \$39,255 \$39,255 \$39,255 \$39,255 \$39,315 \$39,355 \$39,388 \$39,266 \$39,434 \$39,459
338 607 174 585 374 374 374 374 374 374 374 375 376 377 374 375 376 377 378 379 371 372 374 375 371 372 374 374 374 374 374 374 374 374 374 374 375 376 377 378 379 371 371 372 373 374 375 376 377 376 377 376 377 3	gle-acting engine. Steam engine. Traction engine. Engines, att-off device for, J. H. Eickershoff Evaporating apparatus, A. A. Denton Evaporating liquid by air, apparatus for, A. A. Denton Extractor. See Stump extractor. Extractor. See Stump extractor. Extractor. See Stump extractor. Extracts, apparatus for making, J. Merz Eye bars, making steel, R. W. Smith Eyeglass case, P. Closs Eyeglass case, P. Closs Eyeglass suspender, F. C. Bowen Farmet, J. F. Bogan Faucet J. F. Bogan Faucet and beer pump, combined, E. M. Hugen- tobler Feather renovator, C. Moritz Feed water heater, Fairbanks & Magoon Fence, J. W. Clark Fence, J. W. Clark Fence, U. W. Clark Fence, M. & W. Pearson Fence, M. & W. Pearson Fence, M. & W. Pearson Fence machine, wire, B. L. Fletcher Fence Machine, wire, W. J. Raymond	\$59,136 \$39,282 \$39,389 \$39,388 \$39,201 \$39,492 \$39,459 \$39,459 \$39,459 \$39,252 \$39,252 \$39,252 \$39,368 \$39,285 \$39,388 \$39,285 \$39,388 \$39,285 \$39,388 \$39,434 \$39,457 \$39,459 \$30,459 \$30
338 607 174 585 374 374 374 374 374 374 374 375 374 375 376 377 378 379 374 375 376 377 378 379 374 375 374 374 374 374 374 374 374 374 375 376 377 378 379 371 371 372 374 375 376 377 376 376 377 376 377 376 377 3	gle-acting engine. Steam engine. Traction engine. Engine, A. Bown	\$59,136 \$39,282 \$39,389 \$39,388 \$39,201 \$39,492 \$39,459 \$39,459 \$39,459 \$39,252 \$39,252 \$39,252 \$39,368 \$39,285 \$39,388 \$39,285 \$39,388 \$39,285 \$39,388 \$39,434 \$39,457 \$39,459 \$30,459 \$30
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(35) J. R. asks: 1. What is iron sponge, and how is it made ? A. See SCIENTIFIC AMERICAN is the proportion of air and gas used in gas engines ?

(45) T. R. G. asks: Does the stern or bow swing around when a sail boat is brought about ? A. Both swing around, the boat going in a curve, and its keel keeping pretty closely to the series of chords of the curve,

(46) S. J. asks : 1. How many volumes Ca of air are required for the complete combustion of one Ca volume of illuminating gas in an inclosed chamber? A. It depends on the composition of the gas. For pure hydrogen, two and a half volumes: from that up to Ca ten or fifteen for a pretty wide range of illuminating Ся power may be taken. Ten volumes would be a good basis for coal gas. 2. What is the increased volume of air for every degree of heat added ? A. None. 3. What Ch Che

1	Car coupling, T. F. Evans	Flour minis, mgnt extractor for screw conveyers
	Car coupling, R. D. Giles 339,543	for, C. H. Stevenson 339,591
	Car coupling, McAleer & Johnston 339,568	Fracture apparatus, W. W. Galt 339,160
	Car coupling, Myers & Morrison 339,575	Fruit drier, H. S. Jorry
:	Car coupling, T. L. Rivers 339,475	Fruit picker, C. S. Hill
ł	Car coupling, J. W. Thomason 339,498	Fur for felting, preparing, E. Tweedy et al.
	Car coupling, F. Yeiser	3 39,348 to 3 3 9,351
:	Car coupling links, manufacture of, C. W. Hod-	Fur, to prepare it for felting, treating, E. Tweedy
	getts	et al
	Car platform, safety door for railway, F. Lap-	Fur with prepared oxidizing vapors, treating. E.
	pin (r) 10,709	
	Cars, platform gate for railway, J. P. Harrison 339,171	Furnace. See Bagasse furnace. Boiler furnace.
Í	Carburetor, natural gas, W. Herlehy et al 339,177	Furnaces and stoves, fire grate for, J. M.
1	Carding engines, card clothing for, J. T. Fallows 339,394	Thatcher 339,235
	Carding machines, doffer comb head for, Proctor	Furnaces, basic lining for open-hearth steel and
	& Knowles 339,581	iron, W. F. Batho 339,360
	Carriage, child's, P. Gallagher 339,400	Gauge. See Pressure gauge.
	Cartridge shell, H. W. Libbey 339,306	Garment, combination, A. W. Mensor
	Cartridge shell holder, W. H. Fisher	Garment lock, A. Ponten
:	Carving machine, R. 1'. Markee	Gas engine, C. Sintz 339,225
	Case. See Banker's note case. Eyeglass case.	Gas for lighting and heating purposes, process of
.	File case. Watch case.	and apparatus for producing, Hembert &
1	Cash box, Hubbard & Brownell	Henry
	Caster, Carroll & Creighton 339,373	Gas pressure governor, T. C. Hopper 359,415
	Casting medallions, tiles, picture frames, mould-	Gas, process of and apparatus for manufacturing,
	ings, etc., composition of matter suitable for,	H. C. Rew
	Barnes & Emack 339,519	Gate. See Automatic gate. Farm gate. Lock
	Chair. See Hammock chair. Reclining chair.	
	Check ease, R. G. Hanford, Jr	Gate, G. P. Price