(3991) G. M. W. says: 1. I want a metal that I can heat mercury or quicksilver in to about 500° or 600° F., that the mercury will not injure or that will not injure the mercury. Will steel do? Or is there any way of preparing steel so it will do? A. Steel or wrought iron tubing is the best to hold mercury, requiring no preparation. There is no reaction by either metal on the other. 2. How much pressure would a fine about three-eighths inchinside and five-eighths inch outside stand before it would collapse? The flue to be made of steel or whatever other metal you advise using. I want one that will standthe greatest possible pressure. A. Three-eighths inch gas pipe if properly welded, is good for pressures up to 3,000 pounds to the square inch, and three-eighths inch extra strong is good for 6,000 lb. per square inch. 3. How thick would I require the metal of a cylinder 6 inches diameter inside to be, to stand same pressure? A. Six inch wrought iron pipe should be equal to a work ing pressure of 1,500 lb., and extra strong 6 inch equal to 3,000 lb. For these working pressures, the pipe should be tested to 50 per cent higher pressure. Please tell me how much mercury expands with heat. Say 100 cubic inches at 0° F. How much would there be at 300° F., also at 600° F.? A. One volume of mercury at zero becomes 1.0256 at 300° F. and 1.0313 at

(3992) B. E. W., Antonio, Kans., writes: I want to make for my own use a four or five inch astronomical telescope, with eyepiece for terrestrial use. Have had over four years' experience as a mechanic on fine and close bench work; have good eyesight and very delicate sense of touch. If you think it possible for me to grind and polish the lens, would ask as follows: 1. Where can I get the roughly ground glass castings for same, and at what price (for achromatic lens)? 2. Where can I get the material and gauges for it be better to buy eyepieces (celestial and terrestrial) turpentine may be used. 2. How are face powders per already mounted in cell, or could I get separate ready fumed? A. Use a few drops of some essential oil, as ground lens and make them? 4. What standard work on the subject could I get that would aid me? A. There are large possibilities for amateurs with patience and perseverance. You can obtain the optical crown and flint glass from W. T. Gregg, optician, 122 Fulton Street, New York, cost about \$2.50 per pound. You must make your own gauges and laps. You can buy eveniecescheaperthan to make them. You will find full instructions for grinding and polishing lenses, with the curves and kind of glass for telescope object glasses, illustrated in Scientific American Supplement. Nos. 581, 582, 583. Also illustrations and construction of various eyepieces, in SCIENTIFIC AMERICAN SUPPLE-MENT, No. 399, 10 cents each mailed. Byrne's "Hand Book for the Mechanic and Artisan" contains much information on grinding and polishing lenses. mail, \$5.

(3993) S. E. asks: 1. Can you inform me what the capacity is of the largest air pumps, not fans, in actual operation, and where, and about the size of their cylinders? A. The largest air pumps are the blowing engines of blast furnaces, with cylinders 6 to 8 feet diameter and 10 feet stroke, used in Pennsylvania. 2. Also have we any examples of suspension bridges any), or has this plan never been agitated? A. The susare other suspension bridges of more than two suspending piers. We do not recall their names. There two piers, if proper trussing is used to prevent undula-

time for the wood to be thoroughly seasoned and set in the bend, would it be inclined to lose the shape or curve if exposed to damp? If so, do you know of any process of rendering the wood damp-proof? A. Bent wood tends to resume its original shape when exposed to damp or becomes wet. The only way to prevent it is to finish and oil or varnish the bent wood, so as to prevent changes in its hygrometric condition.

(3995) J. H. G. asks what to use to wash brass or copper to give it a silver coating. I used to use a wash composed of quicksilver, sulphuric acid and rain water, but have forgotten the proportions. A. The process is to dissolve a small quantity of mercury in a solution of one part nitric acid to four parts water until it is saturated. Pour off the saturated solution, and to an ounce of the solution add a few drops of hydrochloric acid diluted with four parts water until a bright piece of copper is whitened by being dipped. Then dip any article, or rub the solution on it and wash.

(3996) D. R. C. says: I wish to paint the brick walls of a composing room, used for setting type, and also the rough hemlock joists under the roof with some white substance that will not scale off and fall into the type. Please state in the SCIENTIFIC AMBRICAN what composition would be best for this purpose. Would like something not very expensive. A. We can recommend a whitewash made in the proportion of one-half a bushel of best lime slaked in hot water, eight quests salt dissolved in hot water, 21/2 lb. rice meal boiled to a passe, to which add one-half a pound, white glue previously dissolved and one-half a pound clear whiting. Add the salt brine to the slaked lime and ther the other ingredients. Keep it hot while using. Use a whitewash brush. Woodwork should be thoroughly cleaned from dust before applying this whitewash. It makes a bright surface like paint.

(3997) W. P. asks: How can I harden the tips or points of og wheels, say to a depth of not more than one sixteenth of an inch? Said wheels are about 4 inches in dismeter by half inch wide (or thick). The material is crucible cast steel. A. We suggest/placing the gear on a revolving spindle at the proper heat, and to quickly bring a jet of water to bear upon the teeth. Speed should be about 600 revolutions per minate. Have the jet half an inch diameter, and

in the year 1884? A. Address Superintendent of the Mint, Philadelphia, in regard to value and coinage.

only. Steel should be as low in carbon as is com-thoroughly in clear cold water, and wipe dry with Mint, Philadelphia, in regard to value and coinage. teeth.

> (3998) Reader asks: 1. In what Supple MENTS are the directions for making dynamos, motors, and telephones? A. We refer you to SUPPLEMENT, Nos. 161, 600, 720, 793, for dynamos; to Nos. 641, 759, 767, 783, for motors; and to Nos. 142, 163, 250, for telephones. 2. What are the formulas (chemical) for cutting copper and zinc? A. Use nitric acid for Sulphuric, hydrochloric or nitric acid will dissolve zinc. 3. Is there any way I can get a catalogue from electrical firms without asking each one directly? A. You might make known your wants by advertising. 4. In wrapping an induction coil 31/2 inch the primary layers are to the secondary as 3:10. is the ratio for coils increasing an inch each time using wire 18 and 32? A. The E.M.F. of the secondary is to that of the primary as the number of turns in the secondary is to the number of turns in the The advertisement of this book is printed in another primary, while the amperage in the secondary is in inverse proportion to the E.M.F. For an answer to your medical query we advise you to consult a physician.

(3999) J. M. M. asks: How much does a bar of railroad track expand and contract in length, and how much space ought to be between the ends or joints? A. Rails vary in length by the extreme temperatures in the United States, about one-quarter of an inch in 20 feet, and for 30 feet rails about 7-16 of an inch, so that rails laid at time of mean temperature in the Northern States should have half the above spaces between the ends; in the Southern States, one-quarter. Rail laid in summer in the Southern States may have an allowance of 1-16 inch in 20 feet rails, and 3-16 inch

(4000) M. C. A. C. asks: 1. How to keep linoleum bright. A. Wash with equal quantities of milk and water. Once in several months a little grinding and polishing, and at what price? 3. Would , linseed oil or a weak solution of beeswax in spirits of fumed? A. Use a few drops of some essential oil, as bergamot. Keep the powder in an air-tight jar.

> (4001) F. E. W. asks: 1. Of what material are graphite bearings made, so that they require no oil? A. Graphite freed from grit. 2. Which kind of a wind engine (or mill) is the most serviceable without cog gearing? A. Consult our advertising columns for a reply to this query.

> (4002) M. R. asks: Will you please tell me if a common battery of blue vitriol and water, with a copper and zinc, will light a two, three, or four incandescent lamp, and how many cells would it take, and where could I get the lamps, or what kind of a battery does it take? A. A gravity battery is of no use in electric lighting. It is sometimes employed for charging secondary batteries, and the latter are used for operating lamps. The secondary battery is the best for lighting purposes.

(4003) F. V. C. asks: 1. Is there any cheap substitute for the porous cups that come in batteries? A. Nothing very efficient. Try flower pots with the holes corked up. 2. What kind of battery is best for a motor? What for a storage battery? A. Storage battery for motors, and gravity batwhose suspending cables pass over more than two teries for charging the storage batteries. 3. Tell how piers; if not, what is the first most serious objection (if to make the principal parts of a storage battery, and its dimensions, when used for lighting. A. For this inpensionaqueduct at Pittsburg has seven spans. There | formation see Scientific American, vol. lxi., page 22. 4. Describe a small compressed air motor run by a power of 30 lb. per square inch from a small water pipe. is no objection where it is necessary to have more than A. A small compressed air motor is substantially the same as a steam engine. 5. What acid is used to reduce soft wood to pulp? Can it then be brought back (3994) A. M. says: Assuming that the to a hard substance? A. Nitric and sulphuric. By wood is steamed and bent when green, and allowed proper treatment the wood is converted into cellulose, which is explosive. It can be dissolved in a mixture of alcohol and ether, and will solidify on drying.

> (4004) W. T. says: Can you inform me about what per cent of heat contained in anthracite coal, burned in a stove made for heating only, can be liberated into a room, or can you tell me whether there is necessarily a loss of 50 per cent or over, under the most favorable conditions? A. The loss of heat in common stoves may be as great as 50 per cent, but with the best stoves, provided with large absorbing and radiating surface, the loss should not be greater than 25 per cent, and much of this might be saved by extending the stovepipe, so as to utilize all the heat, save enough to create draught. Much of the heat is also lost by opening stove doors for ventilation.

> (4005) W. L. J. asks: Would a 500 lb. ball, say, fired from a gun in a perpendicular position, with a charge of powder sufficient to throw it vertically say five miles, return to the earth with the same velocity with which it started? A. It would not. The friction of the air materially retards its velocity, due to gravity.

> (4006) H. H. S. says: 1. I have a 2 inch pipe, 1 foot under ground, 75 yards in length, which drains a creamer; am bothered with it becoming filled with something that obstructs the flow of water. me a solution to clean it. A. If the pipe is foul from the drainage matter, use a strong solution of caustic potash, not soda, in boiling hot water. If necessary, stop the end of the pipe while the hot lye is running, fill the pipe, and let it remain over night. 2. I want to know the proper side to run a leather belt, in regard to the splices, that is, ought the end of the splice or lap butt the face of the pulley? A. The belt ends should be butted together and laced to make a smooth surface. If put together with hooks, the butts should turn out. 3. Can a cell of Burnley dry battery receive a new life from a dynamo? A. A dry battery cannot be charged by a dynamo.

Replies to Enquiries.

The following replies relate to enquiries recently published in Scientific American, and to the number therein given:

(3842) Referring to Scientific Ameri-CAN of January 9, 1892, question 3842, C. B. can clean his brass rifle or shot shells by immersing them in strong

clean and will remain so. -G. E. K.

C. A. W. asks for a corn salve.-W. H. E. asks for a asks (1) for a receipt for making a cement which will stick leather to metal. 2. How to estimate horse power of an engine.-J. H. S. asks how to remove tattooing.

and Queries," to which our correspondents are referred. column. A new circular is now ready

tents at home and abroad, enable us to understand the practice on both continents, and to possess unequaled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., office Scientific American, 361 Broad-

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

January 26, 1892,

AND EACH BEARING THAT DATE. (See note at end of list about copies of these patents.) Abundi, R., T. El is, Jr., & J. T. Sackett, Kansas City, Mo., Suppository... Andrews, E. J., Hartford, C., type setting mach.
Andrews, E. J., Hartford, C., type setting mach.
Andrews, W. J., Kansas City, Mo., letter box.
Armenta, V. M., Santa Marta, Colombia, distance
measuring inst.
Ayres, Ruben B., New York, station indicator.
Ayres, Ruben B., New York, station indicator.
Baker, David H., Melrose, Mass., Jog horn.
Baker, Ilomer M., Hopkins, Mo., money drawers.
Barckdall, D., Indiauspolis, Ind., refrigerator.
Barnes, N. T., Buffalo, N. Y., paying blocks.
Baron, Peter, London, Eng., making screws.
Barnett, J. H., Grand Rapids, Mich., refrigerator.
Barnin, J. W. & W. J. McNabb, Blue Rapids,
McMarting, McMar Bate, J. H. Detroit, Mich. cutting excelsion.

Company of the Petroit Mich. cutti

cider vinegar, and heat to a boil. Then rinse them thoroughly in clear cold water, and wipe dry with woolen cloth. If the vinegar is good, the shells will be clean and will remain so.—G. E. K.

M. T. D. asks how to pickle beef, tongues, etc.—A.

P. S. asks how to make invisible or sympathetic ink.—C. A. W. asks for a corn salve.—W. H. E. asks for a shoe blacking or polish.—R. W. S. asks how to make a hektograph or copying pad.—E. R. T. asks how to tin iron.—J. A. B. asks (I) for a receipt for making a cement which will stick leather to metal. 2. How to estimate horse power of an engine.—J. H. S. asks how to make birdlime.—Y. M. C. A. asks (I) how to etch glass, (2) names of all known elements and metals.

Answers to all of the above queries will be found in the "Scientific American Cyclopedia of Receipts, Notes and Queries," to which our correspondents are referred. The advertisement of this book is printed in another column. A new circular is now ready.

TO INVENTORS,

An experience of forty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess untable to the laws and practice on both continents, and to possess untable to the laws and practice on both continents, and to possess untable to the family and practice on both continents, and to possess untable to family and practice on both continents, and to possess untable to family and practice on both continents, and to possess untable to, it is a family and practice on both continents, and to possess untable to, it is a family and practice on both continents, and to possess untable to, it is a family and practice on both continents, and to possess untable to, it is a family and practice on both continents, and to possess untable to, it is a family and practice on both continents, and to possess untable to, it is a family and practice on both continents, and to possess untable to, it is a family and practice on both continents, and

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A printed copy of the specification and drawing of any patent in the ioregoing list, or any patent in print issued since 1863, will be furnished from this office for 25 cents. In ordering please state the name and number of the patent desired, and remit to Munn & Co., 361 Broadway, New York.

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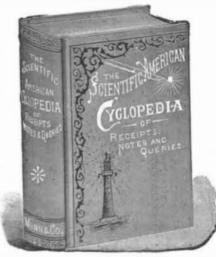


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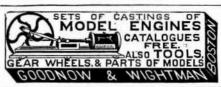
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