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Wheels and Pinions, heavy and light, remarkably strong and durable. Especially suited for sugar mills and similar work. Pittsburgh Steel Casting Company,

The Lawrence Engine is the best. See ad. page 237.

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Notice.-Charles N. Elliott, of N. Y., is no longer connected officially with the Ingersoll Rock Drill Company, and is not authorized to collect moneys or transact any business whatever for the same.

Exhibition Magic Lantern and 60 Views, only \$25. Catalogue free. Outfits wanted. Theo. J. Harback, Importer and Manufacturer, 809 Filbert St., Phila., Pa.

The improved Gatling Guns fire over 1,000 shots per minute, and are the most destructive war weapons ever invented. Gatling Gun Co., Hartford, Conn., U.S. A.

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Twenty-five per cent saved by use of H. W. Johns'

The only Engine in the market attached to boiler

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Alcott's Turbine received the Centennial Medal.

Mill Stone Dressing Diamonds. Simple, effective, and durable. J. Dickinson, 64 Nassau St., N. Y.

Safety Linen Hose and Rubber Hose for all purpose at the best rates. Greene Tweed & Co., 18 Park Pl., N. Y.

Presses. Dies. and Tools for working Sheet Metals, etc. Fruit and other Can Tools. Bliss & Williams, Brooklyn, N. Y., and Paris Exposition, 1878.

Pulverizing Mills for all hard substance and grinding purposes. Walker Bros. & Co., 23d and Wood St., Phila.

The Cameron Steam Pump mounted in Phosphor Bronze is an indestructible machine. See advertisement.

Solid Emery Vulcanite Wheels-The Solid Original Emery Wheel—other kinds imitations and inferior. Caution.—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, N. Y.

For Solid Wrought Iron Beams, etc., see advertiseup a lucrative foreign trade, will do well to insert a well ment. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Dead Pulleys, that stop the running of Loose Pulleys

Greene, Tweed & Co., 18 Park Place, N. Y.



(1) II. J. asks: Could telegraph wires run through the oil pipes in the Pennsylvania oil regions be worked successfully, and without igniting the oil? A

(2) C. A. W. asks: 1. Has a person the right to manufacture a phonograph as described in Scr-ENTIFIC AMERICAN SUPPLEMENT No. 133, or is it natented? Also, has a person the right to manufacture a telephone, using a box like Bell's and the ferrotype current volume of Scientific American. 2. I made one exactly like the one described in said SUPPLEMENT, figures 3 to 7 inclusive, and it does not reproduce. What can be the matter with it? A. If you have carefully followed the directions, it should work. We think the trouble is in the damping of the diaphragm.

(3) M. G. writes: I wish to make an apparatus to compress oxygen gas in tanks without the aid of pumps. The following is the description of my arrangement: I have a tank capable of holding 30 feet of gas under a pressure of 600 lbs.; attached to its stopcock is a retort, standing the same pressure, filled with chemicals. I heat the retort, and the gas by its own pressure is forced from the retort into the tank. Now I would like you to inform me if this arrangement would fulfill its purpose, and if the gas in the retort would force its way into the tank. A. There are similar devices for generating oxygen under pressure in the marnearly or quite to redness, the experiment is not a very Oxygen derived from potassium chlorate should be thoroughly washed before storing it in either iron or copper tanks. With a good head of water the gas may be readily compressed several atmospheres by hydrostatic pressure.

I would like toknow if there is any means to find focus of a reflector (concave mirror) aside from practice, as I have practiced for several months and never found it. A. If the reflecting surface is a portion of a sphere, the principal focus will be found at a point on the axis midway between the surface of the mirror and the center of the sphere which the mirror would form if it were extended with uniform curvature.

(4) D. G. writes: I would like to know the proportion of power required to move the valve compared with same power to do the necessary work of engine; thus, if 20 horse power is required for engine work, how much additional is needed to shift valve for feed? A. It is ordinarily considered that the friction of valve, etc., is equivalent to a pressure of from 1 to 2 lbs. per square inch of piston area. This, of course, is only approximate, as the exact amount in any particuse must be determined by experiment,

(5) N. M. D. asks: What will purify cisternwater that is stagnant? A. The well should be pumped dry and thoroughly cleaned. Under the circumstances it would not be safe to attempt the purification of the water.

(6) H. L. asks (1) for a recipe for keeping work, warm it, and while warm apply a uniform film of hole in the rubber. Best Turbine Water Wheel, Alcott's, Mt. Holly, N. J. one of the following lacquers: 1. Shellac, 3 ozs.; tur-Sheet Metal Presses, Ferracute Co, Bridgeton, N. J. meric, 1 oz.; dragon's blood, ¾ oz.; alcohol, 1 pint. Di-Use the Patent Improved Sheet Iron Roofing and Drip gest for week, with occasional stirring, decant and filter. Crimped Siding made by A. Northrup & Co., Pittsburg, 2. Digest in separate portions of wood naphtha or wine spirits an excess of turmeric and dragon's blood; dissolve shellac in 5 parts of alcohol or wood naphtha (methylic alcohol), and color with the above tinctures (filtered) to suit. 3. Dissolve in about 12 ozs. alcohol 16 oz. shellac, 1 drachm dragon's blood, and 14 drachm turmeric root. It is sometimes necessary to filter the varnish. It is applied as usual. At first the varnish will seem to be a failure, but in a short time it will have a beautiful gold color. 2. Will chloride of calcium in the box absorb the moisture and keep it bright? A. A small vessel of quicklime will answer better.

> (7) C. G. L. & C. C. ask: 1. Are the railroad cars on any of the roads lighted with gas? A. Yes. 2. If so, is the gas taken on at towns on the road, or is it manufactured on the car? A. A sufficient quantity of gas for a trip is forced into an iron cylinder suspended underneath the car, and it is supplied to the burnersthrough a pressure regulator.

(8) W. H. R. writes: Some time since, hav-

took place: The leak being on the side rather than on the bottom of boiler; after knocking a hole some 12 inches in diameter inside of boiler, allowing water to run out (the water being cold, having been standing for 3 days and nights with no fire under boiler). We then proceeded to take the "man head" out, so as to make an examination of flues and interior of boiler. At least boiler, and when a lighted torch was presented to the man hole an explosion took place of some kind of gas contained in boiler. There was quite a rush of air or gas outward, very much like retorts at gas works when they are opened and touched off with hot iron, or like blast from a pressure blower. The flame was of a bluish white color and lasted about 5 or 6 seconds. The water used in boiler was very strongly impregnated with sulphur, being the water pumped from the mine. A. Hydrogen sulphide mixed with air explodes upon ignition. The light gas dissolved in water is eliminated therefrom on boiling, and collects at the highest points in the boiler.

Dead Pulleys, that stop the running of Loose I alleys and Belts, taking the strain from Line Shaft when Maand Belts, taking the strain from Line Shaft when Machine is not in use. Taper Sleeve Pulley Works, Erie, Pa. for. A. Fuse silica (by heat) with twice its weight of to take up the carbonic acid exhaled? A. Caustic lime, The glassilica regular to take up the carbonic acid exhaled? A bout 54 lbs. Return Steam Trap, now in the narket. Patent for anhydrous sodium carbonate. The glasslike product sale. Send for circulars. Engineer, 555 Broadway, N.Y. dissolves in boiling water. Used for rendering wood Emery, Glue, Vienna Lime, and all polishing goods. and fabrics less combustible; for making artificial stone, various cements, fireproof varnishes, paints, etc.

> (10) C. N. S. asks: In a storage warehouse will it take more ice to keep the temperature at 40° Fah, than it will 50°? If so, why? A. Yes. Bodies radiate their heat in all directions, and receive the heat radiations of surrounding bodies. If the latter absorb more heat than they radiate in return, the bodies from which they receive it are proportionately impoverished or refrigerated, so that a body surrounded by ice will be colder than one only partially surrounded thereby, you be goodenough to tell me how the dye is made, the other things being equal.

(11) S. D. M. asks: Do freezing mixtures in which ice is not used reduce the temperature by evaporation? A. No; in such cases the substances are frozen in consequence of their own uncompensated radiation, 1. For the same increment of heat, is not the vapor of alcohol more elastic than steam? A. Above the point disk? A.See "Rights of Investigators" in No. 7 of of maximum density, no. 2. Is it condensed as readily as steam? A. Yes.

(12) R. V. G. asks: 1. What is the most powerful spring that can be made? A. We do not know that there is a limit to the power. 2. What springs compress or expand the most in proportion to their load and power? A. Tempered steel springs. 3. In "Science ecord" for 1875, p. 219, I find that springs can be made that will exert a pressure of 800 or 900 lbs. Has there been any improvement since then? A. We think not. 4. What is the distance that the periphery of the spring barrel will travel in this spring? A. This can be arranged as desired. 5. What is this 800 or 900 lbs., the greatest pressure exerted, or the medium? The mean. 6. What was M. Lereaux's success with his spring propelled cars? A.The cars have not become commercially successful. 7. Can a rubber spring, or a combination of rubber springs, be made that will compress two or more feet, and what is the rule for computing distance from C to D? Is there ket, but owing to the necessity of heating the retort the load that they will sustain and their compression? A. Yes. The load must be determined by experiment, any dimensions? A. The dis-8. What is the strongest cylinder coiled wire spring that can be made, and what would be its expansion? A. A spring can be made as strong as desired by increasing remember having seen such a book as you require. its size, and the expansion can be varied in the same manuer. 9. What is the rule for computing the load a cylinder coiled spring will sustain, and its expansion? A. Such data are usually obtained by experiment, as there are many elements which cannot be accurately introduced into a general formula.

> to wood. A. Melt together in a suitable iron vessel, phuric and nitric acids (nitric acid—specific gravity 1.5 over a gentle fire, equal parts of pitch and gutta percha. Use warm. 2. Is saltpeter or sugar injurious to rubber? A. If the rubber is vulcanized they will have little or no effect at ordinary temperatures.

(14) W. A. P.—See recipes given W. H. S. and others, on this page.

(15) C. F. P. writes: With reference to acoustic telephone figured and described in a late issue, please answer several inquiries: 1. What should be the size of rubber bands used at the turns? A. The smallest size. 2. How many turns may be made in a line of 100 feet, without injuring its efficiency? A. We think 4 or 5. 3. Is a small wire as good or better than a string, and does it need as much tension? A. No. 4. What is the proper mode of hanging and making turns when a wire is used? A. Hang the wire on short strings. 5. How can the inconvenience of a hole for wind and storm to enter the room be got over, in using this kind brass clean. I have a microscope, and I wipe it every of a telephone? A. By covering the hole with very North's Lathe Dog. 347 N. 4th St., Philadelphia, Pa. time I use it, butit gets rusty. A. Clean and polish the thin rubber and running the thread through a needle

(16) J. L. S.—See p. 107 (12), vol. 37, Sci-

(17) G. F. P. writes: During the eclipse of last month, which was only partial with us, I noticed that the light that passed through the tree tops to the ground were all of a crescent shape, with the points of the crescent pointing north without any exception. A. A beam of light from the sun falling through a small aperture of any shape forms on the object upon which itrests a luminous disk, which is the image of the sun. its weight of caustic potash in 3 or 4 volumes of water, The tree was virtually a screen with a number of small apertures, and the crescent shaped images were so many pictures of the sun. Diminished light during the eclipse Softened by heat is favorable to the formation of these images, and an (32) H D M image of the sun's full disk is best projected on a hazy

(18) O. H.—See reply to (25), "Notes and Queries," in No. 7 of current volume.

(19) C. W. R.—See reply to (18), "Notes and Queries," in No. 9 of current volume.

(8) W. H. R. writes: Some time since, hav-rode iron so as to injure pipes? If so, can it be counsilk covered copper wire must I use? A. Use 1 oz. of ing occasion to make some repairs on a two flued boiler teracted by washing with any other mixture, and what wire. 8. How large shall I make the disphragma? A.

at a coal mine at Cadiz, O., the following occurrence isit? A. Yes. Strong, cold sulphuric acid does not corrode dry iron surfaces rapidly: it is advisable, however, not to let it remain in contact therewith more than a few minutes. It may be removed by washing with plenty of water, and the last traces neutralized by dilute solution of alkali or sal soda. 2. If washing after using the sulphuric acid is not needed for the safety of the pipes, would any vapor arising from them when one hour had elapsed since breaking hole in side of | heated be injurious to plants? A. It would be requisite to wash the pipes thoroughly and dry them after such treatment.

What effect, if any, has carbolic acid on plants or on nsects injurious to them? A. If used in sufficient quantity, it would prove destructive to both.

(21) G. H. asks how to make potato farina. A. Select fine potato starch and reduce it, by milling, to the condition of flour. Potato flour is a commercial article

(22) T. P. F. asks: 1. How many cubic feet of air at 200 lbs, pressure would it take to supply two men in a cylinder, 15 feet long and 5 feet diameter, for 24 hours? A. A man requires about 215 cubic feet (9) P. P. writes: I would like to know what of air, at ordinary pressure, per hour, or between 16 and ater glass is made of, how made, and what it is used 17 cubic feet at 200 lbs. pressure.

2. Is there any way potassa or soda absorbs carbonic acid. About 54 lbs. (in practice perhaps 5 times that amount) of caustic lime would be required to completely absorb the carbonic acid eliminated by two men per hour under such conditions. 3. Is there any way to manufacture air, so that a man could live in an airtight cylinder for a few days? If so, how? A. No. The quantity of oxygen (the nitrogen is not absorbed) required would beunder 200 lbs. pressure—nearly 7 cubic feet per hour.

> (23) J K. P. writes: Some time ago I saw in the Scientific American that an excellent and harmless hair dye could be made of green walnuts. Will ing, etc.? A. Use the expressed juice of the bark or hulls of the green walnut (Paulus ægineta). See p. 107 (19), vol. 38, Scientific American.

> (24) A. M. R. asks: Is there a metal that will melt at a heat low enough to form castings in iron moulds, the metal, alloy, or compound to be strong enough to make a strong nut for bolts, slightly or very elastic? A. As we understand you, no.

> (25) J. A. W. asks: Can you explain why steam from sea water will melt Babbitt metal when fresh water steam will not? I have a small steamboat (3 tons); the piston has a Babbitt ring, and twice salt water has been used in the boiler, and both times it has melted the ring. A. We think it probable that the trouble is caused by a higher temperature than is usual with fresh water, but cannot form any decided opinion from the data

(26) A. B. writes: Will you please inform me of the correct way to draw a true square for the

foundations of or for setting double engines? How can I determine when A is square with B, if C and D are each 10 feet from E? What should be the not a rule to determine that for tance from C to D is the square root of CE2+DE2. We do not

B

(27) H. D. O'B. asks: What will make kersene oil (crude or refined) thicker or heavier? Please state in the order of cheapness. A. Paraffin oil, lard oil, Venice turpentine, etc.

(28) R. H. W. and others.—Trinitrocellulose may be prepared by steeping clean dry cotton wool (13) W. H. S. asks (1) how to fasten rubber for a few minutes in a mixture of pure fuming sul--3 parts; sulphuric acid-specific gravity 1.84-6 parts, squeezing, thoroughly washing in running water, and carefully drying it at a very gentle heat. But to secure uniformity and render the produce less liable to spontaeous decomposition the following precautions are necessary: 1. The thorough cleaning and drying of the cotton previous to its immersion in the acids. 2. The steeping of the cotton in a fresh mixture of acids (the strongest procurable in commerce) after the first immersion for 24 hours or more. 3. The purification of the product by washing it in a stream of water for several days and subsequently, before finally drying it, in a weak (3 or 4 per cent) solution of alkali or sodium carbonate.

> (29) C. W. C. asks: What should be the speed of a saw in a scroll saw; sawing 1/4 inch walnut, stroke 11/4 inch? A. A good speed is 900 to 1,000 strokes per minute.

> What is putty powder? A. Ignited stannic oxide (oxide of tin).

(30) B. wants to know what will kill cockroaches and bed bugs. A. See pp. 171 (1), vol. 38, and 299 (25), and 69, vol. 37, Scientific American. A little turpentine or kerosene oil is among the best of exterminators for the latter.

(31) H. M. H. asks for a recipe for making an oil finish for walnut doors that will stand the weather. Also a recipe for a walnut stain. A. See pp. 59 (4), 172 (32), and 283 (14), Scientific American, vol. 38.

(32) C. E. G. asks for the simplest process of bleaching shellac. A. Boil the shellac with about & and when dissolved filter and pass chlorine through it in excess; wash and digest the precipitate with water.

(33) H. D. M. writes: I put a cask in the water, and make a mark on it, to show how far it sinks in the water. If I fill the cask with air compressed to 3 or 4 atmospheres and put it in the water again, will it rise or sink below the mark? A. It will sink.

(34) B. P. writes: 1. I have two bar magnets 34 by 4 inches. Can I use them to make some magnetic (20) M. C. asks: 1. Will sulphuric acid cor- telephones? A. Yes. 2. If so, how much of No. 40 silk covered copper wire must I use? A. Use 1 oz. of