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land (Pa.) Gas Light Co.; Philadelphia & Reading RR. Co., Reading, Pa.; Bloomsburg (Pa.) Gas Light Co.; Shamokin (Pa.) Gas Light Co.; Shenandoah (Pa.) Gas Light Co.; Col. W. R. Murphy, Trenton, N. J.

little buttons on the desks of the managers signals are sent to persons in the various departments of the establish-ment. Cheap and effective. Splendid for shops, offices, dwellings. Works for any distance. Price \$6, with good Battery. F. C. Beach & Co., 263 Broadway, New York, Makers. Send for free illustrated Catalogue

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L. D. will find a recipe for polishing furniture on p. 11, vol. 31.-C. T. R. will find directions for coating iron with black enamel on p. 208, vol. 26.-W. H. and O. R. should consult a physician. D. can utilise the tin on tinned plate scrap by the process described on p. 319, vol. 31.—A. M. C. can temper gun springs by the method detailed on p. 10, vol. 25.-C. P. McE. will find a recipe for japanning on tin on p. 75, vol. 32.-W. D. G. will find a recipe for bronze on iron on p. 283, vol. 31.--C. H. S. can whiten ivory by the process detailed on p. 10, vol. 32. The theory of power by the crank is explained on p. 112, vol. 31.-W. S. will find an explanation of two lines approaching each other and never meeting on p. 138, vol. 31.-H. W. M. can make composition molds by following the directions on p. 58, vol. 24. Cement for cracks in cast iron is described on p. 409, vol. 31.-B. will find a description of the manufacture of sulphurous and 11 feet pitch. Boiler (locomotive) is to be 4 feet acid on p. 111. vol. 29.—B. McD. will find a recipe 6 inches diameter, with a fire box 4 feet 4 inches by for indelible ink on p. 129, vol. 28.-F. J. H. will find 3 feet 10 inches, with 55 tubes, 3 inches diameter directions for stuffing animals on p. 350, vol. 30.-W. H. will find directions for silvering glass by Draper's process on p. 267, vol. 31.-C. A. G. will find an explanation of sailing faster than the wind on p. 132, vol. 29.-J. C. C. will find directions for putting a black finish on gun work on p. 208, vol. 26.-C. E. D. G. will find a description of a gaslight machine on p. 379, vol. 30.-W. N. H. will find a recipe for a cement for rubber on p. 203, vol. 30.-W. H. S. will find a formula for a red indelible ink on p. 129, vol. 28, and for a black, on p. 112, vol. 27.-Q. R. N. will find directions for etching on glass on p. 409, vol. 31.-J. H. will find directions for bronzing cast iron on p. 283, vol. 41.

(1) O. S. asks: Will sawdust, placed under a printing press or other machinery, absorb the waste oil, produce combustion ? A. There will be some danger of such a result: but the occurrence is notvery frequent, and can be prevented by ordinary care.

(2) J. W. W. asks: Does the hydraulic or water ram waste more water with a fall of three or four feet than it will elevate to a hight of 12 feet? A. Generally, yes.

1. Can the blaze from a kerosene, alcohol, or common oil lamp exist in a receiver of compressed air of 30 lbs. per square inch, the air escaping and fresh air being supplied all the time? A. Yes. 2. How much will air expand by heating? A. About $\frac{1}{493}$ of its volume at 32° Fah. for each degree Fah. that its temperature is increased.

the coal that is called sometimes candle coal and sometimes canal coal? A. The coal was originally Every Metal Worker should have a Universal Hand called candle coal, and cannel coal and canal coal Planer. Address J. E. Suitterlin, 60 Duane St., New York. are corruptions of this name. The term cannel Petroleum Gas Works-J. D. Patton, Trevorton, has obtained such general currency that it would Northumberland County, ra. References: Sunbury (Pa.) be thought singular to speak of candle coal, and Gas Light Co.; Mahanoy City (Pa.) Gas Light Co.; Ash- yet that this is the proper name is evident from the has obtained such general currency that it would yet that this is the proper name is evident from the fact that it was first so called because the coal burnt with a clear, long. yellow flame, like a candle. It is a very compact coal, with an even texture and a smooth, clean, and nearly dull surface and con-Engines, 2 to 8 H.P. N. Twiss, New Haven, Ct. | choidal fracture. The dull luster gives it the as- on is always large, generally 200 cwts, to cause Baltimore Steel Hoe Works, Manufacturers of pect often of being impure, when not so. The pro-the "Lockwood Hoe." Send for Sample and Price List. portion of bitumen is large, as may be seen from practised at Swansea in Wales a secret, or is it Peck's Patent Drop Press. Still the best in use. the following analyses: The cannel coal of Bog-Address Milo Peck. New Haven, Conn. For small size Screw Cutting Engine Lathes and Drill Lathes, address Star Tool Co., Providence, R. I. of Breckenridge, Ky., has from 56 to 72 per cent bituminous matters, 28 to 44 per cent fixed carbon, and 7 to 12 per cent ash. Ultimate analyses, to determine the proportion of the elements, the ashes excluded, have given, for the Boghead cannel coal, carbon 8049 per cent, hydrogen 11-24 per cent, oxygen 6.73 per cent, nitrogen 0.87 per cent; for the Breckenridge, carbon 82.36, hydrogen 7.84, oxygen 7.05, and nitrogen 2.75 per cent. (4) R. H. H. says: I am building a jig saw to run by footpower. Can I use a cylinder with a piston and piston head above the saw to lift it, using air for a spring in the cylinder? I want to run the saw at 600 116 inch strokes per minute. A. You can run it in the way you propose. It is doubtful whether you will be able to attain that A. Physicians frequently recommend the left side, being mixed with water? A. Use a strong solution speed by force applied to a treadle. We shall be glad to hear from you again when you have completed the machine.

The "Scientific American" Office, New York, is varies from 15 to 200, according to the kind of en-tted with the Miniature Electric Telegraph. By touching gine. 2. Would thick glass be strong enough to gine. 2. Would thick glass be strong enough to make a small steam cylinder, to see how it oper ates? A. Yes.

(6) B. H. R. asks: Is there any difficulty in putting a circular one horse power upon the ground, and running into a second story to turn a printing press? A. Ordinarily, no.

(7) W. F. S. says: I use steam heating and water pipes. My boiler has not been running or had a fire under it for some two or three weeks, and the shop has had no fire in it for several days of severe cold weather. The water in the pipes was frozen, but did not burst a pipe or start a leak anywhere until I had steam around the shop long enough to materially affect the temperature. Why should the pipes not burst till the room became warm? I supposed that 1 square inch of water, if it were frozen, would require considerably more room. Is this so? A. This is a very common occurrence. There is often air in the pipe, that allows the water to expand in freezing. When heat is applied, how-ever, some of the ice melts, and the water, expanding rapidly as its temperature is raised, encounters resistance from the ice, and so bursts the pipe. More frequently, however, the pipes do burst during the cold weather, and are held together, or prevented from leaking, by the ice that is formed. When the latter melts, however, the leaks are at once disclosed.

(8) J. H. W. asks: 1. What is your opinion in regard to blast pipes under boiler furnaces? Do they materially affect the burning out of the boilers? A. No. 2. Would their use result in a saving of fuel? A. Generally, no; except that, by the useof the blast, an inferior quality of coal can often be employed.

(9) W. H. asks: How can Tremove dirt and rease from my hands without injuring the flesh ? A. Oil answers in many cases, supplemented by a vigorous application of soap and water, and, in some cases, sand or corn meal; but there are doubtless peculiarities of flesh that render it impossible to give a method which is generally applicable. We do not doubt, however, that we have many readers who can furnish valuable information or this subject, and we hope to hear from them.

(10) J. W. F. savs: I am thinking of build ing a boat 63 feet long with 15 feet beam, to draw from 5 feetlight to 61/2 feet loaded. I was think ing of putting in an engine 18 inches diameter by 15 inches stroke, with a screw of 66 inches diameter and 10 feet long, using steam at 80 lbs. The boat's lines are pretty tine. What speed will this engine drive her? A. If the boiler steams well, the boat should go from 15 to 16 miles an hour. For a speed of 10 or 12 miles an hour, use an engine 12x12.

(11) T. D. says: I have a steam pump with a hole cut in the piston rod a quarter of an inch deep; the hole was cut in by the cataract. The rod is of brass. When that hole passes through the stuffing box, the steam comes out Can you tell me what I can fill the hole up with? A. Screw in a plug, and finish off the surface.

(12) F. H. D. asks: 1. Why is it that small drive wheels are used for climbing steep grades or drawing heavy loads, and what advantage has a small wheel over a large one? A. With a small wheel the tractile force is greater, for the same pressure on the piston; but the locomotive does not move as fast for same piston speed as the one with larger driving wheels. 2. Is a wheel more liable to slip when the crank goes under the axle than when it goes over the axle. A. No.

(13) W. H. S. asks: In your reply to W. B. C. you say "the silver being extracted from the pig lead and not from the ore." By what process is this accomplished without burning the lead, as some do, since both have very nearly the same specific gravity? A. This method essentially consists in a concentration process, based upon the phenomenon that, when a certain quantity of lead

that contains silver is melted in iron cauldrons, (3) C. asks: 1. Which is the right name for and the fluid is allowed to cool uniformly, there ensues a formation of small octahedral crystals, which are a great deal poorer in silver than the metal originally taken; while the portion of the metal remaining fluid is found to contain an increased quantity of silver. It is clear, therefore, that, if the crystals first obtained are again melted and cooled uniformly, another concentration will be obtained, and that the operation can be repeated until a lead is obtained rich enough in silver to admit of undergoing a refining process. In all cases, however, the quantity of lead operated up-

unite them with glue. Cannot a strong acid or alkali, being first applied to the wood or united with the glue, be made to destroy the effect of the oil and cause the wood to unite more readily? А. Try the action of a warm solution of potash, applied for a short time and carefully wiped off.

The water in my well has a singular effect on tea, causing it to turn to a wine red color shortly after steeping. It first turns in streaks or clouds of red: and before the meal is finished the beverage "giveth its color in the cup" and causes a lack of relishfor it. Our pump has a cucumber wood pipe. Can you gratify our curiosity by an explanation? A. We cannot give you any satisfactory answer without having first made an examination of the water. Send us a quantity of your water and a sample of the tea, and we will endeavor to solve the problem for you.

(17) E. L. asks: What do licenses for steamboats and their engineers cost, and how long do they last? A. The license for the boat costs \$25, license for engineer \$5; they are renewable once a year.

(18) M. T. K. asks: How can I make petroleum and gas tar unite? A. Try dissolving the tar in the petroleum with the aid of benzole and moderate heating.

(19) H. A. S. asks: 1. At what speed should a $\frac{5}{4}$ inch band saw on 16 inch pulleys run, using two horse power? A. It is quite common to run such saws at a speed of 5,000 feet a minute. 2 Would it be safe to run this saw on such small pulleys? A. Your pulleys are too small.

(20) A. R. asks: Is mica, as used for stove lights, found in its natural state in sheets? A. Mica is found in large crystals, made up of a great number of fine sheets. The stove mica is made by simply dividing the crystals so as to obtain the sheets of the required thickness.

(21) W. J. C. asks: 1. Will a properly contructed thermometer inserted in the steam dome of a boiler indicate whether the steam is dry? The vapor evolved from a fluid being always of the emperature of the fluid itself, so long as it remainsin contact with it, I am led to doubt whether a thermometer would show any difference between steam dry and steam containing particles of water in mechanical suspension. A. The thermometer would not show any difference unless the steam were superheated. 2. If the dryness of steam cannot be thus indicated, how can it be determined? A. For a method of determining the amount of water in the steam, see p. 257, vol. 31.

(22) J.P.E. asks: LCan a silver plate be set in a man's skull where there is a hole broken in it: A. Yes. 2. Can a silver bridge be put in a man's broken nose ? A. Yes

(23) A. M. asks: 1. Where is ice formed, at bottom or on top of water? A. On top. 2. Will ice under any natural circumstances sink to bottom, in water? A. No.

(24) J. E. H. says : We have a double steam pump of the following dimensions: 7 inch plunger, 12 inch stroke, and 12 inch steam cylinders. It is used to pump water through a 4 inch pipe into a reservoir about 50 feet above the level of the pump. If a stopcock were put in the pipe near the reservoir, and near the stopcock a fire plug. would the pump force water through 1.000 feet of hose with sufficient force and to a sufficient hight to extinguish fires, part of our town being 100 feet above the level of the pump? A. It would probably be necessary to increase the steam pressure.

(25) C. C. W. says: 1. J understand that there is a train run from London to Liverpool, the card time of which is an average of 47 miles per hour, including stops. Is this practicable? A. It. may be practicable, but we do not think that it is done. 2. I understand that an English locomotive has made the extraordinary time of 82 miles per hour, drawing 5 coaches. Is that possible? A. There is such a report, but it is not well authenticated. 3. What is the best hour's run ever made by a locomotive? A. The best of which we have knowledge was about 63 miles an hour.

(26) W. McB. asks: 1. How many cubic feet of hydrogen gas (manufactured from zinc and acid or vitriol) are required to raise a weight of 1 lb. to a higat of 10 feet? A. You must first state whether you wish to know the ascensional force of a bulk of hydrogen, sufficient to raise the weight mentioned, or the mechanical force equivalent to the heat given out in burning a certain number of cubic feet. 2. What are the proportions of zinc and acid to make gas with, and what is the best way of generating the gas? A. The zinc is used in any quantity that is convenient, and a mixture of oil of vitriol 4 parts, water 4 parts. poured upon it, in a suitable bottle provided with a cork and a n exit tube.

(27) J. H. P. asks: I have air slaked lim and pure carbolic acid. How can I impregnate the lime with the acid so as to make an effective insect-repelling mixture for garden vegetables? A. This compound may be obtained by digesting your lime in the acid. It is a very unstable salt, easily decomposed.

Inventors of Electrical and Telegraphic arrangements are invited to communicate with the Electro-Magnetic M'f'g Co., 36 Broad St., P. O. Box 1804, New York. Genuine Concord Axlcs-Brown, Fisherville, N.H.

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Mechanical Expert in Patent Cases. T.D. Stetson, Murray St., New York.

All Fruit-can Tools, Ferracute, Bridgeton, N. J.

Hydraulic Presses and Jacks, new and second Lathes and Machinery for Polishing and Buffing Metals. E. Lyon, 470 Grand Street New York.

Fairy Electric Engines, with battery com-plete, \$6; without battery, \$4. Electro-Magnetic Manufacturing Co., 36 Broad St.--P.O. Box 1804, New York,

(5) E. M. asks: 1. How many pounds of (16) M. T. says: The natural oil in rose without first using a coppering solution? A. Iro steam will it take to make one horse power? A.It wood or satinwood often renders it difficult to and steel must first be electroplated with copper

adopted in this country? А. e are not familia with the process you speak of.

(14) G. W. B. says: In our coal stoves, there is a hard substance adhering to the firebrick, apparently the result of impurities in the coals. What is this substance, and can it be removed by any better method than by the use of the cold chisel? A. No doubt you are right as to its being composed of impurities. By cleaning it killed? A. Yes. 2. How long will the tooth last out at short intervals, so that the quantity will not be great at a time, it can readily be removed

(15) L. E. F. asks: What colors take best in photography? A. Blue takes very light, in some cases appearing as if, in the original object. the blue portions were really white. Yellows.reds. orange, and various shades of green take dark. What is the best position to lie in during sleep? as the position in which the organs of the body of alum instead of pure water. are least liable to cause discomfort by pressure upon one another.

(16) M. T. says: The natural oil in rose-

(28) N.Y.asks: 1.Can the nerve of a tooth be after the nerve is destroyed? A. If the tooth is properly filled after the operation, it will last. in most cases, a very long time.

(29) J. McL. asks: What acid will eat zinc the quickest and bite the sharpest? A. Sulphurie acid, diluted with from 3 to 5 pints of water.

(30) L. K. D. asks: Is there anything that will make plaster harder than it is when dry after

(31) H. B. P. asks: How can I plate with gold, silver, and nickel upon steel and nickel silver without first using a coppering solution? A. Iron