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## 

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Dara. $\mathbf{W}$. P. Harvey, Port Jackson, Mont. Co., N. $\mathbf{Y}$. New American Edition of the Catechism, and Hand
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chinery. Atlantic Steam Engine Worts, Brooklyn, N. Y Steel Castings true to pattern, of superior strength
and durabilty. Geartas of all tides. Hdaraulc collineras, crank shafte, crogs heads, connecting rods. an


For Sale Cheap.-Second-band 8 foot Boring and Turalng Mill, Lathes, Planers, Drills, Bolt Catte
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D. Frisble $\&$ Co., New Haven, Conn.
Elevators, Freight and Passenger, Shafting, Pulley and Hangers. L. S. Graves \& Son, Rochester, N.
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Hydraulic Cylinders, Wheels, and Pinions, Machinery
Castings ; all kinds ; strong and durable; and easily worked. Tensile atrengtb not less than 65,000 1bs. to equare in. Pitteburgh Steel Casting Co., Pittsburgh, Pa.
Hand Fire Engines, Lift and Force Pumps, for Are nd all other purposes. Address Rumsey \& CO., Senee
Falls, N.Y., and 93 Lberty St., N. Y. ctts, U.S.A. For Shafts, Pulleys, or Hangers, call and see stock
ept at 79 Liberty St., N.Y. Wm. Sellers \& Co. Wm. Sellers \& Co., Phila., have introduced

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bellew zUr Begtimauna Der Miner
alum nach ausaeben Kennzeichen.
Herausgegeben von Dr. Albin Weisbach. Herausgegeben von Dr.
Leipzig: Arthur Felix.
Contains in clear, concise terms the chemical composition, outward appearance, and other properties neces with such remarks as may be of special interest. Only one feature diminishes the value of the book for practica parpoese-the minerals are arranged in groups solety according to the similarity of their outward appearance. To determine a specimen the stadent must, therefore, se lect one of the numerous tables and hunt up among ita members one the properties and behavior of which wil
exactly correspond with those of the specimen, at the cost of much time. Had the reverse order been chosen, as by Fresenius inhis "Qualitative Chemical Analysis," the practical value of the book would have been much of the work render it valuable as a book of reference to thechemist, miner, and mineralogist.


No attention will be paid to communications unless
accompanied with the full name and address of the accompan
writer.
Names

to former answerg or articles, will be kind enough to
name the date of the paper and the page, or the number
of the question. Correspondon. ${ }^{\text {ate }}$ whose inquiries do not appear after
reasonable time should repeat them.


oftce. Price 10 cents each.
(1) H. C. R. asks: What kind of varnish
is used to obtain the fine finish on flsh rode, and how is it applieds A Try a mixture of alcoholic shellac varnish 2 parts, boiled linseed oil 1 part, shake thoronghly
before using. and apply with a cloth pad, rubbing the article to which the polish is applied, until the varnis is dry and hard
(2) H. A. M. asks: Will you inform me
there is aus difference between a foot square and a
square foot. A. Ae surfaces, no. In terms, yes.
" foot squan "foot equare "is a square 12 inches on a side ( -144 sq.
in.) $A$ " square foot" is 144 sq , in. in any shape. (3) B. asks: What is the lifting power of street gas per cubic foot? A. The average when petro
leum is not employed for "enriching," is about 35 lbs leum is not employe
(4) "Science" writes. My intention is to carn the engiueering profession, but Ihave a liking to ither steamship, locomotive, or steamboat engineering. Which, in yoar opinion, is the best and most skille ocomotive engineering offers the best fleld. 2. Wh s the salary of locomotive engineers on our Western oadss A. We do not think there is any standard; the
(5) A. T. T. asks: Will a crank give the meme motion as a
(6) R. C. L. asks: How can I obtain a high smooth with porns? A. $a$, scrape the horn carefully withrotten stone and oil.
(7) H. S. C. writes: A portable 2 horse power steam engine can be purchased for two hundred hinists and sleam men awake to the fact thot our ma undreds of men waiting for a steam road wagon whic we know can be got up for less money than to pur horse engine would cost nearer $\$ 40$ i than $\$ 200$. Have you considered the expense of a skilled engineer, the (8) J. D. H. writes: If J. A. F. (43) " Notes uce the blast nozzle to seven eighthe inch, he will have all the power he wants.
(9) G. M. D. asks: 1. What is waterglass? . A variety of glase (silicate of soda or potash) contain ing excess of the alkaline base, soluble in water. 2.
How are agates polished? A. Usually horizoncal disks of iron, pewter (or copper), wood, and leather covere with moistened emery of different grades of fineness, sand, rol
tively.
(10) J. F. \& J. H. W. write: We saw in Scr sntiryc, February 22, an alloy of tin and phosphorus.
Isphosphoras a metal, and how is it mised with tin copper! A. Phosphorus is non-metallic; it may be orcedbeneath melted metalby means of a rod of baked clay having a small bell-shaped cavily at the lower end.
(11) J. M. asks if hair can be produced on he face by artificial means, and if so, how. A. See Antrican.
(12) W. C. writes: 1. A train is traveling at a speed of 50 miles an hour. A cannon placed on one of the cars is fired off at a given point in the same
direction as the train; the projectile from cannon has ame velocity as train. How far will projectile be car ried in an hoars A. Add the uniform speed of the
train to the range of the projectile. 2. Reverse the cannon and shoot in opposite direction. How fare will it
carry? A. If the ball leaves the gunat same velocity a train is ranning it will fallnearly vertically to the ground
(13) H. C. R. asks: How long bas the engine in the United States Mint at Philadelphia been in
use? A. The horizontal engine, built under the directiou of Franklin Peale, Esqq., was erected in 1897, and removed in the end of 1877 , after 40 years' service. The
"Steeple " engine was erected in 1850 ,and is still in use.
(14) S. M. D. asks: Is there any process by which iron can be prevented trom rusting, when not
painted; if so what is it? A. See articles on Professor Barfis's procebs, No. 126, scientific american Suppliz agnt, and pp. 827 and 367 , vol. 89, Scientifyc Ameri-
(15) V. writes: I propose to lay an inch or one and a ball inch iron pipe from this office to
another office, 260 feet distant, and the pipe is to lie
mostly undergound and to be need It will have three turns or elbows in it. Could conve sation at one end be heard distinctly at the other? A. Yes, if the corners turned are not too sharp. Make the curves of your elbows of large radius, say 12 or 18
(16) T. D. H. asks: What will set the colors in new calico or gingham that are likely to fade, without injury to the goodsp A. The mrordant will depend altogether apon the character of the dye or color ased on the goods. Many dyes (such as the coal tar or aninine series) become bleached by prolonged
(17) O. S. W. asks: Is ozone produced during the process of ironing cotton clothing? I have frequently noticed the odor of ozone on going into th
vitchen where the girl was ironing. A. Probably no the odor of hypochlorous acid and of nitrous vapors is often mistaken for ozone.
(18) L. L. W. asks: 1 . Why is the prestors to any other mode of ascertaining the speed of vessel? A. Because of cheapness and simplicity; further, "old salte" understand it. 2. Is there anyrea-
son why the teleghone should not in time carry the voice an whoss the ocean through the cables A. The electrical current works so slowlythrough a long submerged cable
as to render the use of a telephone in connection with it
(19) A. P. S. asks how to polish pearl shell mother of pearl for umbrella handles). A. a. Smooth b. Applypowdered pumice stone and water with a buff wheel. c. Finish with rotten stone moistened with sulpharic acid a little diluted with water.
(20) O. W. F. writes: If three men have a carry with a lever (and the other man at one end) where will they place the lever so as to carry two
of the shaft? A. Three feet from end of shaft.
(21) E. S. C. writes: My engine is horigontal, 6 inches stroke, 3 inches diameter; what size size of paddle wheels and how it run with ease; what minute, when the engine runs at 800 strukes A. Your engine would probably drive a light skifi about 5 to 6 niles per hour in still water, it would, however, depend nuch on your b iler, and whether the engine is geared
or works direct on paddle wheel shaft. Paddle wheels
bout 4/8 feet diameter by 15 inches face would suit.
(22) J. R. F. writes: We have a 75 horse igh preseure engine which exhanata byway of a Berry-
nan heater up through pipe 80 feet high. We have a nan heater up through pipe 80 feet high. We have raning to waste. Can I utilize this water by pumping it back into the boilers, or would the grease from the cylinder prevent my using it? A. As the Berryman heater heats all the feed water you require, the gain by return-
(23) H. L. V. asks: 1. What is " manifold" papery A. The white paper is only very fine thin writing paper. The black is soft paper, prepared by being smeared with a composition of grease and plumbago or
lampblack; this mixture is allowed to remain on for 12 hours, and the paper then wiped with a piece of wool or cotton waste. Place white paper over black, and write with a blunt point. 2. What was the size and capacity of the Mary Bell, said to have been the largest steamboat on the Misisisippif A. We do not know; will some correspondent at the West inform us? 3. Our canarychews the quill end of suchof his feathers as rall
out. What does it needs A. Cutcle fish. 4. What are out. What does it need? A. Cuttle fish. 4. What are
some good works on spectrum analysis? A. Spectrum Analysis, by H. E. Roscoe; Spectrum Analysis,by H. Schellen, and Spectrum Analysis, by Professor Red-
oood, No. 79 Scientific Amgrican Suprement.
(24) F. G. writes: In reply to B. S. S. April 12, you say it is known in practice that higher results are obtained by throttling. Do you mean by that
that it is advisable in an automatic cut-off engine folthat it is advisable in an automatic cut-off engine fol-
lowing far enough to show a terminal pressure of say 17 bs. absolute, to throttle the steam and allow it to folow enough further to make the average pressure the greatest when cases: A. The gain by throttling is Axed expansion. We think thereis gaiu in all cases in carrying a greater pressure in the boiler than is requircd or the engine.
(25) J. S. P. asks how a soft solder for tin vessels can be made, which is used by heating from the
lame of a candle. There is such a solder sold on our streets, which so far has given satisfaction. A. Melt together 2 parts of block tin and 1 part of lead. Take a ade havigg a smail hole in the botom, and hold it over the stream of melted solder is cooled by the water it forms a sort of wire.
(26) C. L. asks: If in a room 50 feet long here is a mirror at one end, will the reflection of an obas one 50 feet from the observer standing at the mirror, or will il appear the same as one 100 feet from the per50 A. To a person standing at the mirror it appeara or it wonld poa person standing so feet from the mir-
(27) W. G. H. asks: 1. Can an ice boat run deadahead of the wind at a speed greater than the ve-
locity of the wind? A. No. 2. Do the Gatling guns when fired at an object send the successive shots to the same point if the aim of the gun is not altered, or do the
shots spread or scatter? A. We think thes do not ecat-
(28) C. P. T. asks: 1. Is there any back movement in the current of a stream of water in a hose pipe when the stream from any cause is suddenly
checked, so as tooccasion bursting of the hose? A. Yes. 2. If oo, does it extend back to the engine or hydrant throwing the streamp A. Yes. 3. Would the pressure or strain on the hose be less after the stream was closed,
or greater than while the stream was in motions $\mathbf{A}$
(29) J. H. asks what kind of oil is the best to use in boilers to keep them free from scaless also the
best oil for cylinders; also what effect has tallow and lard oil on piston valve,rods, etc.? What effect has peroleum? A. Mineral oil can be used in boilers. Special
cylinder oils are prepared for cylinders, though good mineral oil answera very well when properly applied. Pu e tallow and lard on can be used without injurious
(30) J. B. M. writes: 1 have a vertical boller ( 20 H. P.) without fues or tubes; it is 10 feet high: walls with a shell within a shell, 4 inches between the walls, with 4 apertures equidistant for the escape of the flrebox is 5 feet high; from the crown sheet upwet; is the steam chamber or dome; the boiler stands on a cast ring, some 6 inches larger than the boiler; and around the boiler there is a sheet iron jacket, the size of cap of same at the top. Now, the questions I wish you
the o answer are these. 1 . I want to put a brick wall in place of the iron jacket. Is it essential that I should run the wall the entire length of boiler, or would it do as
well if I were to draw in the wall ( say 12 inches above the usual water line in boiler) until the bricktouchedthe boiler, and continue to the top; or had I better keep the wall the same distance from boler all the way up? A. The latter way would be the best. 2. Could I put in a heater made of ordinary wrought iron piping (say 1 inch diameter), placing it between the wall and boiler, where fuel by it, having the same connected directly to feed pump? A. It would be better to use cast iron pipes. 3. use strong lime water, and it forms scale. Would not A. You should arrange the pipes so that they could readny be cleaned.
(31) J. B. asks: Is there any rule for finding the diameters, focal lengths, and distasces apart of piece of any power; also the diaphragm aperture and
distance of same from either lens?
of the lenses are as 1 to3，and their distance apart is＇ri
equal to half the sum of their focaldistances．The lens tio equal to half the sum of their focal distances．The lens hould be placed about midway between the lenses，and its aperture should be as small as possible without cut－ ing down the field．Eye－pieces of different focal lengths may be used with the same objective．
（32）L．－．asks what to apply to old plaster Paris busts，that have become dirty，that will make them look like new．Dust has settled in the pores and I can
no remove it．A．Give themadead coat of caina white， or you may varnish them and apply a coating of silver， old，or bronze colored bronze powder
（33）W．D．S．writes：1．I have a vertical boiler， 4 feet high， 27 inches diameter（including furnace，
which is internal and 18 inches high）；boiler has nine－ which is internal and 18 inches high）；boiler has nine－ 3 inch bore， 7 inch stroke，running 350 ．We have not nough power to run a small planer；we use from 60 to his pressure；the boiler has been in use only 2 years； could we run a larger engine with the same boiler，sa $41 / 2 \times 41 / 2$ ？A．If your boiler is five sixteenths inch thick， of good iron，and well made，you may carry 120 lb ．with－
out hesitation． 2 ．I noticed in a recent number of the out hesitation．2．I noticed in a recent number of the
Scientific American a correspondent wants to know if Scientific Americin a correspondent wants to know if
oil will stop priming．I frequently use the common black lubricating oil，feeding it with feed W
（34）G．H．P．asks：1．What is the expan sion of glass between $32^{\circ}$ and $212^{\circ}$ Fah？A．Glass which
$32^{\circ} \mathrm{F}$ ．is $1,000,000$ ，at $212^{\circ}$ becomes $1,000,861$ ．2．How to sodder brass on to a valve seat of a steam cylinder．A． Clean the valve seat，coat it with solder by means of a heavy soldering iron．Tin the brass plate，heatit quite
hot，and put its tinned side downward on the valve seat． ir the brass plate has not sufficient thickness to admit
（35）S．A．B．asks：1．How can I put a very high polish on steel？A．The steps inthe process are as
follows： 1 st，Coarse wet stone；2d，fine wet stone；3d， buffwheel having fine emery applied；4th，crocus，different degrees of fineness．2．On brass？A．Finish as finely inally，with the files，then with Scotch gray stone，and with rotten stone and oil．3．How is the so－called powdered pumice stone and water．Finish with rotten one and water or oil
（36）S．F．writes：I have an induction coil， of Ladd＇s make（London），of the following dimensions： Length of coil proper， $11 \nless \mathcal{i n c h e s ;}$ diameter of coil
proper， 5 inches；diameter of core， $11 / 2$ inch；base board containing condenser， $193 / 4$ by 9 inches；condenser plates， ength of primary wire，estimated forets，unknown econdary wire， 3 miles（ 16.000 feet）．This coil was sol位sing to give a spark in air of 4 inches，but Inever realized morethan 3 inchex，and thena feeble gpark．The attery which I employed with this coil consists of fou gallon jars，in each of which there are immersed a zin ize．Hincher of the battery iatesof the sam位e．The construction of the battery is that of Grenet olurion of bichromate of potash and sulphuric acid． he battery not strong enough to give the desired result or can you suggest any other reason？A．Your batter n internal discharge，or it may be that the interrupte not properly adjusted．If the spark from the primary the condenser
（3＇7）C．H．M．asks：1．For a method of pro uacing ininh resembiling diamonds．A．Pure caustio potash， $16 \frac{1}{2}$ parts；white lead， 85 ；boracic acid， $4 \not 2$ ；a carefully selected，are round together，placed in lass pots（the French clay pots will answer if the firs charge is discarded afterseveralhours firing）and heated o quiet fusion in a suitable furnace for about 24 hours ing the diamong andually and cut．The art of imitat great perfection in Eryprecious stones las attaine to great perfection in Egypt and Greece，as well as in
France．The following analysis by Sonault gives th mposition of the colorless French Pierres de Stras 9 ；borgx and arsenious acid traces－ 100 ． 2 Give simple method of qualitative test for the presence of
siver in ores．A．Reduce the ore to an impalpable pow－ silver in ores．A．Reduce the ore to an impalpable pow our or more，with constant stirring；boil with pur nd add a few drops of hydrochloric acid－a white pre－ ipitate which does not dissolve in boiling water and ackens on exposure to sunlight indicates silver．Gold any，remains in the powdered ore．If the ore contain解 timer to proceed as follows：Mix the ore with 10 or rom silver－and 2 or 3 pieces of borax glass the size of eas，in a small scorifier，and expose in a nearly white fused metal cisappears beneath the liquid slag of lith rge．Then remove cool，break，hammer and clean the lead button；place it in a dry bone ash cupel of equa weight，and expose in the muffle until all the lead is lagged and absorbed by the porous bone ash，leavin解 siver，together with gold，if any，as a bright， mall quantities of sllver botom of the cupel．Ver etected
（38）J．A．writes：In my last Scientific merican，April 5，No．14，I notice in answer to L．B
ou say that 8 inch cylinder， 12 inch stroke， 150 revol tions per minute， 60 lbs steam， 20 horse power；by m ule I only make $13 \cdot 7$ horse power．My figures are

| Piston $50 \cdot 2656$ square inch |
| :--- |
| $\frac{6015}{601560} 16$. steam． |
| 100 |

h．p．$\frac{1000}{}$
If I am wrong，please tell me where I make my mistake I amonly an novice any way．A． 150 revolutions per
minute is 300 feet；double your resultand you will be then
（39）W．A．J．asks：What chemical action akes place when sulphuric acid is applied to commo
 When strongly heated on the hearth of a reverberatory urnace the reaction is completed，resulting in the $\mathrm{NaSO}_{4}$ ）and hydrochloric（muriatic）acid．
（40）H．S．asks how to arrange an earth attery for nickel plating．A．We could not advise the use of an earth battery for this purpose．You should use a Smee or a Da
（41）A．E．asks how o make a drill poin hat will enable him to drill through glass，porcelain， ransparent china pictures．A．Make the drill of the
 n mercury，hold the extreme end in a pair of cold rotected by the pliers．Wet the glass or porcelain add ed．
（42）H．L．asks what size of engine and of engine and on，at the rate of a＇oout 6 or 8 miles an hour．A．Per haps some of our readers will furnish this informa－ haps
tion．
（43）
（43）S．R．E．asks whether or not honey will keep in glass cans．A．Yes，if the jars are we filled and sealed air tight．2．What is the best noted
cure for bee stings？A．Dissolve 3 parts of pure car－ olic acid in 5 parts of good glycerine．
（44）J．M．asks：1．How long will the car on remain good in a Fuller bichromate battery？A． tt will last for a number of years．2．I am running burglar alarm in my house，with a Fuller bichromat batery， 4 one gallon cells，and No． 32 wire．Please tell 4 cells．2．You cannot make an electric light with four
（45）A．B．P．asks：Would it not be much
（45）A．B．P．asks．Would it not be much illustrated in Supplement No．161，to make the electro magnets of malleable iron，and have them permane magnets，orcan common cast iron be permanently mag－ tains the magnetic charge to any very greatextent．You will get the best results by using the electro－magnet．
（46）J．P．B．asks：If a telegraph line of
o． 14 galvanized wire be used，how small a piece of oiler iron could be used in damp earth as a ground plate，to give the electricity as free a pass to the groun r 12 square feet．A thin copper plate would answer etterthan the boiler iron．
Minerals，etc．－Specimens have been re－ eived from the following correspondents，and examived，with the results stated ：
A．－It is a variety or syenite or hornblende schist－it races of silver．－J．H．G．－It is mica schist－of

## COMMUNICATIONS RECEIVED

## On Binding．By E．C．

On Squaring the Circle．By C．P．K．
On a New Form of Telephone and Battery．By Horse Shoeing．By c． s ．
On a Rare Geological Specimen．By H． On Animal Intelligence．By H．D．O．
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A complete copy of any patent in the annexed list ncluding both the speciflcations and drawings，will be furnished from this office for one dollar．In ordering please state the number and date of the patent desired and remit to Munn \＆Co．， 37 Park Row，New York city

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|  | English Patents Issued to Americans． <br> From March 25 to March 28，inclusive． <br> Button fastening．G．Prentice，－，R．I． <br> Curtain fixture，G．M．\＆C．Cushman，Boston，Mass． <br> Cut－offfor steam engines．N．W．Twiss，New Haven，Ct． <br> Electric signaling apparatus，C．H．Pond et ait．N Y city． Fare register，W．R．Bacon，New York cil $g$ Horsesboes，manufacture of，J．L．Ewin，Wasbingten， <br> D．C． <br> Millstone dress，J．Thompson，Crestline，Ohio． Picture frame，A．W．Hall．New York city． Refrigerating apparatus，F．E Pinto et al．，Brooklyn，N．Y． ＇Sewing machine，S．Henshall，Philadelphia，Pa． |
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