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tricity is " Experimental Science," by Geo. M. Hopkins. By mail, st; Munn a Co., publiers, 361 Broadway, N. Y
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gle, check, radiator,and safety valves, 52 Cliff St., N. Y. Competent persons who desire agencles for a new popular book, of ready sale, with handsome proftt, may
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marked or labeled.
(4645) F. D. B. asks : How many ele mentsare known to chemists at the present day? Wha light years of a few of the stars that have had their parallax measured. A; There are about 70 elements recognized by chemists at the present time. Lithium,
potassinm and sodium are lighter than water. Distance in light years

| $\boldsymbol{a}$ Aurigx (Capella). | 70 |
| :---: | :---: |
| $a$ Canis Major (Sirins). | 11 to 16 |
| $a$ Canis Minor (Procyon) | 26 |
| $\boldsymbol{a}$ Bootes (Arcturas) | 23 to 25 |
| $a$ Lyræ (Vega). |  |

A light year is 63,000 times the distance of the earth from the san. The donble numbers refer to the work
of different astronomers.
(4646) G. C. M. asks: What size wire ehallI ase to convey a current of electricity. E. M. F.
9 to 12 volts, 1 to 1.50 amperes, a distance of 25 to 30 feet? A. No. 20 Am . W. G. will carry the curren
(4647) H. \& T. ask : Is there a pneu matic tabe between Paris and Berlin, and if so, for
what purpose is it used, and with wbat speed does the what purvose 18 it used, and with wbat speed does the carrying letters, also in Berlin; but none between the
two cities. The speed is aboat 20 miles per hour. Siz
of tabe $21 / 2$ inches.
(4648) J. O. and others ask how to ink ypewriter ribbons. A. Take vaseline (petrolatam) of high boiling point, mett it on a water bath or slow fire and incorporate by constant stirring as mach laum
black or powdered drop black as it will take up with ont becoming granular. If the fat remains in excess the print is liable to have a greasy ontline; if the colo is in excess, the print will not be clear. Remove th mixture from the fire, and while it is cooling mix equa parts of petroleum, benzine and rectifed oil of tarpen tine, in which dissolve the fatty ink, introdaced in small portions by constant agitation. The volatile solvents should be in such quantity that the fluid ink
is of the consistence of fresh oil paint. Onc secret snccess lies in the proper application of the ink to the ribbon. Wind the ribbon on a piece cardboard spread on a tabte several layers of newspaper, then un
wind the ribbon in such lengths as may be most convenient, and lay it flat on the paper. Apply the ink after agitation, by means of a soft brash, and rab it well into the interstices of the ribbon with a tooth brush Hardly any ink should remain visible on the surface For colored inks use Prassian blue, red lead, etc., an Aniline black. colors.
Aniline black
Pure alcohol.
${ }_{15}^{3 / 202}$
Concentrated glycerine.
.15
Dissolve the aniline black in the alcohol and add the glycerine. Ink as before. From the "Scientiff
American Cyclopedia of Receipts, Notes and Queries."
(4649) J. P. B. asks : How narrow belt will a four horse power engine run and develop al the power there is in the engine (steam or gasoline) siso what number horse power steam orgasolineengin would be equal to three good (true palling) horse
in a sweep or lever power? A. The power a sweep or lever power? A. The power trans
mitted by a belt depende apon its speed as well as width. A 2 inch belt ranning 1,700 feet per minate will transmit 4 horse power. A 3 inch belt for the same power should ran 1,100 feet per minte. As the actua horse power of steam and other engines, or prime movers, is based on the actual mean pulling power
of fairly strong horses, 3 horse power actual of a steam or gas engine shonld be equal to the pall of 3 good horsee. The nominal horse power of a steam engine is only a partial indication of its actual or indicated horse
power, which depends upon the steam pressire and point of cut-off. In a gas engine the nominal horse power is not far from the indicated horse power, as the explosive pressures in a gas engine do not vary as muc s the steam pressures in the steam engine.
(4650) M. S. K. writes : A friend says tbat a man weighs more at the equator than at the equator is approac ed. I say that the weight wonld be less at the equator, owing to the centrifagal force or
 what the variation per pound would be.
ision the wrong side and you are correct.
(4651) E. V. wishes to know the life and how many sbots can be fired from the 124 ton gu to be exhibited by Krapp at the World's Fair. What is the canse of disablement of so large a gan as the
above after a number of rounds? A. The number of pending a that ton gan can be bore and the powder charge. About 95 shots is all a 110 ton gun can usually
(4652) O. D. R. asks: What is the difference in the power necessary to perform a certain amount of work with the usual pieton, link and crank and with the power applied tangentially to a crank of the same radins? In what ratio does the resistance of the piston mean pressure is $621 / 3 /$ percent of the tangen rorce of the crank pin periphery. Volnmes $\times 15-15$ is the approximateequation for compressing air (isothermally) for pressare. Thas 3 cabic feet compressed cabic foot is $3 \times 15-15=30$ pounds pressure. When preseion expands the air, and if confined reaches a higher pressare. which on cooling retnrns to the presare as above stated. Complete tables of pressures, volumes and temperature, with the theory, may be oond in Scientific American Sppulement, No. 279, 0 cents mailed.
(4653) C. A. G. writes: In a letter of the 13th century it is related that some Greenland fishrmen on the 25th of Jaly, 12066, were in a place where "the snn was shining both nights and days, and was weat of their home, "t the home being situated at $83^{\circ} 10^{\prime}$ N. lat., and the time for the observation there the sammer solstice. Is it possible to calculate the latitude
of the unknown place, where they wereon the above said day? A. The sun in the northwest at $63^{\circ}$ of latitude at ane anmer solstice was probably $5^{\circ}$ or $\mathbf{R}^{\circ}$ above the horizon. A midnight sun of that elevation on July 25 wonld require the fishing party to be in latitude $78^{\circ}$ or $79^{\circ}$. No exac
ment given.
(4654) G. H. asks: Which is the largest and best ehipyard where a man can get a job as carA. The largest and most active shipyards are at Newport News, Va., Philadelphia, Cheeter, Pa., Wilmingon, Del., and Bath, Maine. Ship carpenters' wages, 3 to $\$ 3.50$ for first class workmen
(4655) X. Y. asks: Is there an acid or apirit that by placing on ordinary glassware will soften Please give some directions for nase. A. No sabstance will soften glass. Heat. is the only means of softening. You can drill a hole with a diamo
(4656) P. G. asks: How fast can a man ing oneperthrow a sixteen foot boat contain he propeller of a sisteen foot boat be, and how many the propeller of a sixteen foot boat be, and how many
revolutions mast it make to drive the boat five miles an
hour? A. One man can row a light shell boat from 5 to
$53 / 2$ miles per hour. It will require a 12 inch diameter 2 miles per hour. It will require a 12 inch diameter
wheel, 2 feet pitch, 250 revolutions per minate to make miles per hoar.
(4657) Subscriber in Sweden asks What is it to vulcanize railway sleepers, what way is done, and what preparation is nsed for the parpose? A. The tiesor other lamber are placed in strong cyliners of steel 6 feet diameter by abont 50 feet in length he cylinders being lined with coils of steam pipe. The clinders are then closed tight and air pamped in ontil pressare of aboat 150 pounds persquare inch is obainec, when steam is turned into the coils at 200 pounds pressure per square inch and the heat due to thls pres torned off, ir pressure discharged and the ties or lomber withdraw. By the continned high heat onder a preaure to prevent the sap boiling ont of the wood the ap is thoroughly coagulated and the lumber dried. by this treatment lamber for interior work and furniare, and many kinds of wood heretofore rejected on cconnt of llability to warp have become valuable for urriture and in decorative art work. The life of
(4658) C. S. K. asks if the tension in lock spring increases by windiug the same amount as a spring in spring scales by palling. A. The action of spring in a clock increases its tension in wirding the cock spring has so much longer range, with only a part of
(4659) E. B.-Zinc has the greatest degree of expansion and contraction by changes in tem-
perature of the common metals. Mercary expands and ontracts more than any metal and is therefore generally sed in thermometers.
(4660) S. H. W.-Malleable iron can be ickel plated.

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