Pbusiness and Wersonal.
The charge for Insertion under this head is One Dollar a line for each insertion; about eioht words to a line. Advertisements must be received at publication office as early as
Thursday morning to appear in the following week's issue
U. s." metal polish. Indianapolis. Samples free. Cheap 2d-hand lathes \& planers. S. M. York, Clev'd, o. For Sale-Valuable patent. A. M, box 109, Buffalo, N. Y Universal and Centrifugal Grinding Machine
Pedrick \& Ayer, Philadelphia. Pa. Best Handle Machinery. Trevor Mfg. Co., Lockp . $\mathbf{~}$.
Fine manufacturing plant to let, sell, or invest in
promising business. Box 792 Ashtabula, Wanted-Catalogue and price list of Shell Button C. Reynolds, Prescott, Arizona

The Improved Hydraulic Jacks, Punches, and Tu
Expanders. R. Dudgeon, 24 Columbia St., New York.
Stow flexible shaft. Invented and manufactured by Scremochines, milling machines, and drill prese The Garvin Mach. Co., Laight and C̣a al Sts., New York. Centrifugal Pumps for paper and pulp mills. Irrigating
and sand pumping plants. Irvin Van Wie, Syracuse, N. Y. Port Portable engines and boilers. Yacht engines and
boilers. B. W. Payne \& Sons, Elmira, N. Y., and 41 Dey Street, New York.
Guild \& Garrison, Brooklyn, N. F., manufacture steam pumps, vacuum pumps, vacuum apparatus, air pumps, ,
Split Pulleys at Low prices, and of same strength and appearance as Whole Puileys. Yocom \& Son's Shafting
Machinist and engineer desiring a change will con-
sider proposals for taking charge of steam plant. Salary. sider proposals for taking charge of steam plant. Salary,
$\$ 3.00$ per day. "L. I. B.," Franklin, Delaware Co., N. Y.
Perforated Metals of all kinds and for all purposes, general or speciel. Address, stating require
Harrington \& King Perforating Co., Chicago
To Let-A suite of desirable offices, adjacent to the Apply to Munn \& Co., $\mathfrak{3}$ Broadway, New York.
Fine Castings in Brass, Bronze, Composition (Gun Metal), German silver. Unequaled facilities. Jas. J.
McKenna \& Bro., 424 and 428 East 23 St., New York.
Hydrocarbon Burner (Meyer's patent) for burning
crude petroleum under low pressure. See adv. crude petroleum under low pressure. See adv. ppat
331. Standard Oil Fuel Burner Co., Fort Plain, N. ₹.
The best book for electricians and beginners in elec
tricity is "Experimental Science," by Geo. M. Hopkins By mail, st; Munn a Co., publisers, 361 Broadway, N. Y
Kennedy Valve Mfg. Co., manuf'rs of brass, iron gate valves, patent indicator valves, fire hydrants, globe, an-
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 proft, may
apply to Munn \& apply to Munn \& Co.,
Wanted-Traveling man for forge. One who underon marine railroad, and machine foroings, Apply by etter, with references, box 1040, Pittsburg, Pa.
Pointer on Advert ising.-Manufacturers who would
advertise for proft in 1893 should write to the Manu adertise for proft in 1893 should write to the Manu
facturers' Advertising Bureau and Press Agency, 11 Liberty Street, New York, for points.
IFP Send for new and complete catalogne of Scientiff and other Books for sale by Munn \& Co., 361 Broadway New York. Free on applicatio

## 

hints to correspondents.
Names and A ddress munt sccompany all letters,
or no attention will be paid thereto. This is for our
information and not for pablication. References to former articles or
givences to former articles or answers should
give dateof paper and page or number or question.
Inquirien not answered in reasonable time shoul nquirsen not answered in reasonable time shonld be reveated; correspondents will bear in mind that
some answers require not a littele researh, and,
though we endeavorto reply to all either by letter or in this department, cach mast take his turn.
speclal W ritsen Information on matters
personal rather tban general interest cannot b personal rather tban general interest cannot be
expected without remneration.
sionilice Annerin Suplents referred
to may be had at the office. Price 10 cents each. Sctomay be had at the office. Price 10 cents each.
tooks referred to promptly supplied on receipt of Mincrias ent for examination should be distinctly
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 sun. 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 carren
(4647) H. \& T. ask : Is there a pneu matic tube between Paris and Berlin, and if so, for
what purpose is it ased, 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 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 of success lies in the proper application of the ink to the ribbon. Wind the ribbon on a piece ardoard 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 Eardly any ink should remain visible on the sarface For colored inks use Prassian blue, red lead, etc., an Aniline aniline colors.

## Aniline black.

$15^{3 / 202}$
Concentrated glycerine.
.15
Dissolve the aniline black in the alcohol and add the glycerine. Ink as before. From the "Scientific
American Cyclopedia of Receipts, Notes and Queries."
(4649) J. P. B. asks : How narrow a belt will a four horse power engine run and develop an
the power there is in the engine (steam or gasoline) the power there is in the engine (steam or gasoline)
also what number horse power steam orgasolineengine also what number horse power steam orgasolineengine
would be equal to three good (trae palling) horses in a sweep or lever power? A. The power trans width. A 2 inch belt ranning 1,700 feet per minute will transmit 4 horse power. A 3 inch belt for the same power should rau 1,100 feet per minnte. As the actual horse power of steam and other engines, or prime movers, is based on the actual mean palling power
of fairly strong horses, 3 horee 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 only a partial indication of its actual or indicated horse
power, which depends upon the steam pressure and point of cat-off. In a gas engine the nominal horse power is not far from the indicated horse power, as the explosive pressares in a gas engine do not varyasmach 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
north poie, owing to the increase of gravity as the equator is approac ed. I say that the weight would be less at the equator, owing to the centrifagal force of the earth. Please jet us know which is correct and
what the variation per pound would be. A. Yourfriend what the variation per pound would be.
ision the wrong side and yon are correct.
(4651) E. V. wishes to know the life nd how many sbots can be fired from the 124 ton gan o be exhibited by Krapp at the World's Fair. What is the canse of disablement of so large a gun as the
above after a number of rounds? A. The number of pending a upon the size of the 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 amonnt of work with the usual pieton, link and crank and with the power applied tangentially to a crank of air increase with compression? A. The crank value of the piston mean pressure is $621 / 3$ percent of the tangen orce of the crank pin periphery. Volumes $\times 15-15$ is the approximateequation for compressing air (isothermally) for pressare. Thas 3 cabic feet compressed to 1 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, volames and temperature, with the theory, may be oond in Scientific American Sppulement, No. 279, 10 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 July, 1306, were in a place where
the sun was shining both nights and days, and was "the sun was shining both nights and days, and was weet of their home," 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 ays A. The san in the northwest at $63^{\circ}$ of latitude at
he enmmer solstice was probably $5^{\circ}$ or $\mathrm{h}^{\circ}$ above the horizon. A midnight snn 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 pirit that by placing on ordinary glassware will soften Please give some directions for with a common aw $A$. No sabstance will soften glass. Heat. is the only means of softening. You can drill a hole with a diamond or with emery
(4656) P. G. asks : How fast can a man ing one per rengh row a sixteen foot boat containthe propeller of a sixteen foot boat be, and how many
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 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 t done, and what preparation is used for the parpose ? A. The ties or other lumber are placed in strong cyliners of ateel 6 leet diameter by about 50 feet in length. he cylinders being lined with coils of steam pive. The
cinders are then closed tight and air pamped in until clinders are then closed tight and air pamped in antil
pressare of aboat 150 pounds per square inch is obpressure of aboat 150 pounds per square inch is obressure per square inch and the heat due to this presare kept up for from 4 to 5 hours, when the steam is withed off, air pressure discharged and the ties or a . By the continned high heat ander a prea-
wit ure to prevent the sap boiling out of the wood the ap is thoroughly coagulated and the lumber dried. By this treatment lumber for interior work and furnitare, and many kinds of wood heretofore rejected on acconnt of llability to warp have become valuable for urriture and in decorative art work. The life of
railway ties is largely lengthened by this process.
(4658) C. S. K. asks if the tension in a spring in spring scales by palling. A. The action of spring in a clock increases its tension in winding the sameas the spring in a balance by pulling, only the lock spring has so much longer range, with only a part of
ing.
(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.

## O INVENTORS.

An exverience of forty years, and the preparation of more than one hundred thousand applications for pa ents at home and abroad, enable us to understand the
laws and practice on both continents, and to possess unequaled facilities for procuring patents everywhere. A fynopsis of the patent laws of the United States and all coreign countries may be had on application, and person contemplating the securing of patents, either at homeor
abroad, are invited to write to this office for prices which are low, in accordance with the times and our ex
ensive faclities for conducting the business. Address MUNN \& CO., office Scientific Amezican, 301 Broad ray, New York.

## INDEX OF INVENTIONS

For which Letters Patent of the United states were Granted

January 17, 1893,
AND EACH BEARING THAT DATE




sens



## TE.

