



Minerice. sent for examination should be distinctly
marked or labeled.
(9865) W. S. asks: 1. Why is twi-
light so much longer in England than in Spain
or North Africa? Is it true that the periol
of twilight increases as we approach the poles,
and if so, what is the cause of the increase? A. Twilight lasts till the sun is about 18 deg .
below the horizon in the evening at any place. The sun in the torrid zone descends vertically
in setting, and the duration of twilight is
least in this region of the earth. The sun traverses 18 deg. in 1 hour and 12 minutes,
which consequently is the shortest duration of twilight in the torrid zone all the year. The
path of the sun makes the least angle with the horizon in the northern hemisphere in the
summer, and hence a longer time is required to bring the sun 18 deg. below the horizon. Twilight then lasts about 2 hours in latitude
40 deg. north. On the Arctic circle the sun at the summer solstice just touches the northern
horizon, and daylight lasts through the 24 hours. There is no night. At the north pole twilight is about $21 / 2$ months, or from the gins. Duration of twilight can be calculated
for any latitude at the sea level by trigonometry. At high altitudes above the sea twilight
is said to be of shorter duration than at lower altitudes, due probably to the clearness of th is not more than twenty minutes at Quito age and amperage of a current after passing through a Ruhmkorff's coil? Could you give
appreximately an idea of the voltage and amperage of a current which has passed through a coil that yields a spark of six inches,
that is worked by seven Grove cells (ordinary size)? A. The voltage required to force an
electric discharge through air has been determined for various conditions. It is found it is between balls. It varies also with the
size of the balls. Between sharp points about inch long, while for six inches about 72,000 determined by experiments with alternating currents.
have been made, using batteries giving enor-
mous pressures. 3. When lamps are lighted by electricity from alternate-current dynamos,
how is it that the light appears constant and does not seem to flicker? I suppose commu-
tators cannot be used with continuous-current dynamos. In the alternate-current machine does not the current enter the lamp andite wires? An alternating current is the result of an alternating electromo zero and rise to its highest point of voltage, below zero as it rose above zero, after which
it returns to zero, thus making a cycle of changes. The polarity of the current is re versed while the E. M. F. is below zero. The
fluctuation of lamps is not visible under such a current, because the changes are more rapid interval of time the eye can note is about a rent passes through 30 to 60 cycles per se
ond. A commutator can be used with a co tinuous-current dynamo whose voltage is nat
too high and current is low enough. The trans formation of a direct to an alternating curren is usually made by a rotary converter or
motor dynamo. We furnish Sloane's "E motor, trician's Handy Book," which such matters, for $\$ 3.50$ by mail.
(9866) C. O. B. writes: I send you this letter with inclosed salt formation, in the
hope that I may get some explanation, published or otherwise, as to its cause. A. You which is known crystal of common sait, chloride. If you will dissolve some table salt in water and set the dish in a quiet place, such solution becomes saturated by the evaporation of water. The crystal of common salt is a
cube when it is formed without interference. Sometimes little baskets of crystals form, and very beautiful when seen under a magnifying very instructive and entertaining to the young people of a family.


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(9867) J. E. W. asks: 1. If at the
equator a bole 2 feet wide pierced the earth equator a ande 2 feet wide piereed the earth
throush its center, and a ball a half inch in diameter were dropped into the hole, I figure
that in about nine and one half seconds, and that in about nine and one half seconds, and
at a depth of about 1,440 feet the ball would impinge against the east side of the hole, be
cause at that depth the earth would be re casse at that deptrt the earth would be re
volving a ilttle over one.tenth of an inch
sion slower than at the surface; and from that
point down to the center the continually de
 tis interior surface could not fall at all. attracted in all direetions and han no weight
This is usually demonstrated in text books of This is usually demonstrated in text books on
mechanics
a
In such a sphere a a ball falling from either pole would go to the center direct and rise again to the opposite pole ; but if at a had a slight rotatory motion in space, would
not the ball be gradually deflected into a cir cular orbit? A. A ball falling along the polar
axis of the earth would not be deviated at all in the time required to fall from the surface to the center of the earth, since the deviation of
the pole is very slow and very small.
 tical textbook, but is intended as a practica handbook for electrical engineers and artisans The dia
clarity.
The Temperature-Entropy Diagram. By
Charles W. Berry New York.
Chales \& Sons, $1905 . \quad 12 \mathrm{mo}$; pp. pry 134 Price, \$1.25.
Students of thermodynamics will value thi treatise by an instructor in mechanical engi
neering at the Massachusetts Institute of Technology. The subject is dealt with mathe
matically with the aid of diagrams It will

Concrete. Edited by John Black. Lon don: John Dicks. New York: Indus $16 \mathrm{mo} . ;$ pp. 94. Price, 20 cents.
Artificial Stone, Etc. Edited by John Black. London: John Dicks. New
York: Industrial Publication Company. N. D. 16mo.; pp. 92. Price, 20
he Deluge and its Cause. By Isaac Newton Vail. Pasadena, Cal. N. D. 16 mo. ; pp. 133
etallurgia dele' Oro. By Emilio Cor
tese. Milan: Ulrico Hoepli, 1904 $32 \mathrm{mo} . ;$ pp. 262.
Milan: pp. 315
INDEX OF INVENTIONS
For which Letters Patent of the United States were Issued for the Week Ending December 26, 1905





