ficially, in which Moissan has been the chief experimenter and the most successful one. It
may be that Mr. Edisen has taken a hand in this line of work, since he has done so in
almost every line, but his name has not been almost every line, but his name has not been
publicly associated with the artificial producpublicly associated with the artificial produc tion of diamonds. Your sources of informa tion in the matter may be better than ours. Mr. E. G. Acheson in 1893. Moissan, "Electric Furnace," page 264, says: "I had occasion to find, in 1891, . . small crystals of a silicide of carbon publish anything on this subject at the time, and the discovery of the crystallized carbon silicide really belongs to Acheson." It since the diamond is simply crystallized carbon, while carlorundum is a compound of silicale of hardness. Being harder than emery t is a better abrasive, although emery is still by sue.
(9745) M. H. asks: 1. What is a range-finder, such as are used on warships? A. A range the distance and direction of any object. We can send you eleven SuPplements kinds of range finders, at ten cents each. 2. Is it
identical with a distance indicator? A. There are many forms of this instrument, seme of which
may be called distance indicators. 3 . About how may be called distance indicators. 3. About how
leng, or how much time is usually consumed long, or how much time is usually consumed
in finding the range with such an instrument? las any instrument yet been invented or de object in from five to fifteen secends of time? A. We do not know how quickly an experienced
person could plot the result after the observations are taken. 4. Can a wind gage be made by an amateur mechanic which will record anewhat accurately the velocity of the wind
A. The velocity of the wind is usually measured y revolving cups placed upon arms. The re volving parts actuate gears which communicate
motion to hands êpon a dial. A skillfu amateur could copy surch an instrument if he had one at his disposal.
(9746) A. G. says: I think your explanation of the cause of a ball's curving in
Question 9680 , erroneous. You say: "The roation of a ball is such that the air pressure otates, pushing the ball in the opposite bal rection. Now, while without doubt the ball curves in the opposite direction from its re tation, I don't think you have stated the true cause of its curving. It seems to me that the
greater air pressure is not due to the rotation greater air pressure is not due to the rotation
of the ball but to its flight, hence it is always on the same side, namely the front, hence the ball must act upon it, not it upon the ball, to
produce a variety of curves. In a word, the - circumvent, as it were, the resistance the air, and so force itself more and more curving effect upon a ball's flight is that which has its plane parallel to the plane of the re-
sistance such is is given the rifle prejectile. A. We regret that you should not be able to agree with our statement of the curving of a
ball, since it is not ours simply, but the conclusion of the highest authorities in mathe matical and Reach, "General Physics," page 135, wher
(9747) M. W. S. asks: Is there any difference between a foot square and a square
oot? Alse, is there any difference between an inch square and a square inch? The last one was answered in a certain paper as follows : here claim there is ne difference. A. There is no difference in area of surface between a
square inch and an inch square, between a square foot and a foot square. There is a difference in meaning, however, between the
two expressions, which we will illustrate. A two expressions, which we will illustrate. A
piece of paper is an inch square when its all one inch in length. Similarly a board is one foot square when its sides are all equal and exactly one foot long and its corners are
all square or right angles. A foot square implies a square whose surface is one foot. On
the other hand a board may be of any shape the other hand a board may be of any shape
whatever and be a square foot, if its area is one square foot or 144 square inches. A strip
one inch wide and 12 feet long would be such a board. It might be irregular in shape and then be a square foot. The answer you quote (9748) A. W. P. writes: 1. What is noise? Is it simply the vibrations caused by
moving ©bject, or is it the action of the ib ations on the ear drum? For instance, supnear t hear it. Would there be a noise? Psychology teachers claim there would not. A. The word "noise" is used in two senses: in
one sense it is the sensation which the mind perceives, in the other it is the physical cause
of that sensation. If there were no persen of that sensation. If there were no persen
present the fall of a tree would not produce any sensation in any one's mind. It would, as if some one were present to hear it. The psychologist would say there was no sound,
is simply a difference in definition of a word. this statement of the case. Text books of science and psychology usually contain it. What is the complementary color of purple
violet? Is it green or yellow? A. The complementary color of purple is green. 3. Con"the receiving antennaphy, I have read that fourth the length of a wave." How may the length of the wave be determined? A. The
length of electrical waves is dependent upon the number of oscillations per second of the
discharge. With $300,600,000$ oscillations the waves are about 3 feet long, since the speed of the waves is about the same as that of
light. The mode of securing waves of a particular length is discussed in the several sys-
tems in Mayer's "Wireless Telegraphy," price $\$ 2$. 4. Which is the best battery to use with $\$ 2$. 4. Whil indion coil (spark) for experimental purposes-one that will give a steady current
and net annoy one by polarizing every few minutes? A. For experimental purposes you will find the plunging bichromate battery as
satisfactory as any. A good form is described satisfactory as any. A good form is describe
in our Supplement No. 792, price 10 cents.
(9749) G. R. M. asks: Will you kindnower the following through the column and oblige a faithful reader: 1. What causes the changes of the moon? A. The phases of around the earth. The sun shines upon the moon all the time. When the moon in its motion around the earth comes between the sun
and the earth, the sun is shining upon the side and the earth, the sun is shining upon the side
of the moon which is farthest frem the earth. The dark half of the moon is toward the earth. weeks later the meon has traveled around se that it is farther from the sun than the earth sun. The lighted side of the moon is towar the earth. That is full moon. As the moon
has changed from showing ne lighted surface to the earth to showing the entire lighted surface to the earth, there was a time when sh Showed half her lighted surface to the earth,
That was first quarter. Similarly there will be a time between full and new moon, when she will show half her lighted surface to the
earth. That is last, or third quarter. If you will look up this matter in astronomies in see the illustrations of it in the books, which will give you a much better idea than mere
description in words. Ask the librarian about description in words. Ask the librarian about
it. 2. Why does the mercury in the barometer stay higher when storms come from an easterfrom any other direction? I have noticed this time and again and seme of our largest and worst storms come from the east, and still
the mercury will stay a way up. I have wonder if the ocean hanything to with it. A regards the power of a télescope, what is
meant when manufacturers say they magnify 20,33 , or 50 diameters, A. We were not aware that a storm coming with an easterly wind was
characterized by a higher baremeter than one which comes with the wind from a southerly quarter. Storms always travel from west country the paths curve considerably because of the mountain ranges, plains, and rivers. In the storm the wind blows inward toward the
center, and the storm as a whole rotates from east to north, west and south, as we say, opposite t. the hands of a clock in the northern
hemisphere. This causes the northeast winds in hemisphere. This causes the northeast winds in the northern front quarter of such a storm. as far west as Ohie. The storm does not come and the wind in its whirling in the storm blows from an easterly quarter in the front, and from a westerly quarter in the rear of the :
storm as it goes away. It clears off with a
westerly wind, as you have olserved.
$\begin{aligned} & 9750)\end{aligned}$ E. C. asks: If the following problem can be solved, please give the solution
in your inquiry column of the Sciencrific ambicas. You will note that no rate of speed or length of time is given. A column of
soldiers twenty-five miles long are on the soldiers twenty-five miles long are on the
march. A courier is dispatched from the rear - deliver a message at the head of the column. He delivers the message and returns to
the rear, when he notices that the rear of the column is at the same point at which the Hew far did he ride? A. The problem is possible of solution without having the rate of
speed of either the soldiers or couriers given and without having the time known. The solution is as follows: Let $Y=$ the number of
miles traveled per hour by the courier. Let $X=$ the number of miles traveled per hour the soldiers. Then $\frac{-y}{y-X}=$ the time required to reach the front, and $\frac{25}{Y+X}=$ the time reqi ired for the courier to reach the rear of the
column again. The sum of the two above column again. The sum of the twe above
quantities equals the time required for the soldiers to march 25 miles; therefore
$\overline{Y-X} \frac{25}{Y+X}=\frac{25}{X}$
Solving this equation we
$0.41 Y$ or $Y$ equals 2.41 .

The soldiers traveled 25 miles. The courie Went 2.41 times as fast and traveled for th same length of time, therefore he traveled
$2.41 \times 25$ miles or about 60.25 miles. Thi
solution is based on the assumption that bot solution is based
the seldiers and
(9751) A. W. asks: 1. What is meant "polyphase" as applied to electric engines and by "cycle", as applied to gas engines? A A cycle is a series of changes through which
a varying quantity passes, inclu ing all its varying quantity passes, including all it
ralues, and it fluctuates through these changes peri-dically. Thus a cycle of an alternating electricity is the successive value from zer t its highest value, and down through zero to the lowest and back again to zero. This succession of values the current will have as many times per second as there
are cycles. ordinarily 30,60 , or 120 . Poly are cycles. ordinarily 30,60 , or 12n. Poly-
phase currents are those whose E. M. F.'s $\begin{aligned} & \text { iffer }\end{aligned}$ from each other by a fraction of a phase Thus three currents a third of a cycle apar
will furnish a three-phase current in the line with which it is connected See Sloane, "Electrician's Handy Book," price $\$ 3.5$ cycle is like a complete succession of the the seashore. A phase is any single value or
height of the water. If two or three tides height of the water. If two or three tides
come together by different channels in the same place or bay we have a two-phase or threephase current of the tide. ${ }^{2}$. What is meant tacked when in changing from one course the wind to another it presents its bow to the wind; it is jibed when it is turned in the oppo the wind. In a high wind the latter is always
thention the a difficult and sometimes a dangerous epera
tion. 3 . Is a catbeat so called because the mast stands straight up at one end of the boat
like a cat's tail from its body? A. We are certain that a catboat is not se called because The mast is at the front end of the boat, and - far as we have observed cats have their tails set at the stern end. We de not know
the derivation of the name catboat, but think it far more likely that it was given because
of the quickness with which these boats will come about. 4. Does an electric motor differ
in structure from a dynam $\bullet$ Can they be interchanged? A. There is ne theoretical dif ference between a dynamo and a motor. In gen-
eral, each may be used for either service. eral, each may be used for either service.
There are, however, many structural differences can be easily told to which class any particular machine belongs. 5. How can a steady, effective current proceed from a dynamo giv
ing an alternating current? The current ng an alternating current? The curren
changes pelarity each instant, as understood A. A steady current is not produced by an alternator. An alternating current can, how-
ever, be changed to a steady direct current by means of a rotary converter. 6. What light ing a dirigible balloon? A. Probably some form of gasoline moto
in a dirigible balloon.
(9752) O. E. G. asks: 1. Is the speed i radiant heat (whose medium is the same as ght) the same as light and electricity? A. The latest science does not make any such distinc etc. They are all the same radiation. If the
waves are of a length to affect the preper nerves we feel them as heat; if they can af
fect the eye we see light. 2. Is the difference between light, electricity, and radiant heat due
t the ifference in wave-length? A. The sole to the difference in wave-length? A. The sole
difference between the several effects is due to wave-length. See the "New Knowledge," by
Prof. Duncan, price $\$ 2.3$. If light moves in transversal waves, how can it move forward? form simply which travels. A wind moving -ver a field of grain is the very best illustraocean. of this one can have remote from the
Water waves on the ocean are good illustrations of a transverse wave with an onward motion of the wave form. It is not ight which moves, but a wave form. The mat adver which vibrates moves to and fre, the
ad Please explain wave-length.
Wave-length is the Wave-length is the distance from a particle
moving in a certain direction to the next parti cle in exactly the same condition of motion. In a water wave, the wave-length is from a drop on the crest, for example, to the next
drop exactly on the crest, also. 5. What is drop exactly on the crest, also. 5. What is
the wave-length of electricity, and does it vary the wave-length of electricity, and does it vary
with the amperage? A. There are all sorts short waves; but not se short as those which produce light. Those used in wireless telegraphy with a single wire as an aerial are very
closely four times as long as the height of aerial wire from which they are radiated int space. When a capacity is in the circuit this
affects the wave-length. The wave-length affects the wave-length. The wave-length
ries with the rapidity of the oscillations ries with the rapidity of the oscillations of
the discharge. 6. Does a heate conductor of electricity retard the current? A. A hot metal temperature, and so reduces the current which greater electrical resistance when cold than
(9753) F. W. M. says: I have a house to wire for burglar alarms, closed-cir
cuit system. Kindly tell me where I can get a cheap book or instruction paper on the subject,
to how to connect up the battery (bluestone) and run the wires from windows to battery
and then to annunciator. A. We recommend and can supply you with $\mathbf{L}$.urstmann and Tous ley's "Mथdern Wiring Diagrams," price $\$ 1.50$,
which gives a good variety of modes of wiring which gives a good variety of modes of wiring
for burglar alarms, showing all connections.

## NEW BOOKS, ETC.

Suction Gas. By Oswald H. Haenssgen. Company, 1905. 16mo.; pp. 88. Price, $\$ 1$.
The economy of the gas producer for furnishing fuel for a gas engine has led to its
rapid introduction and adoption in this country or many large installations. That a gas proply fuel gas almost as economically for y fuel gas almost as economically for a for a much larger plant, will perhaps be surrising to our readers. Such a producer, howver, is described in this little volume, which ase gives considerable useful information, t. gether with numerous valuable figures upon suction gas.
Wheel Gearing. With Tables of PitchLine Diameters of Wheels, ProporAlfred Wildgoose and Andrew J. lain, 1904. Pocket size; pp. 175. Price, \$1.
This small handbook should save engineers, draftsmen, and others engaged in making calculations relating to gear wheels, much valu-
able time. It contains a large number of tables giving the pitch-line diameters, of of gears of different sizes. The pitch-line ificient are given with a degree eters being expressed in inches and decimals and fractiens of an inch. The proportions of wheel teeth given are those generally adopted engineers, and the various dimensions for each pitch wil
venient form.

## Report of Pregress of Stream Measure

 for the Calendar Year 1903. By John C. Hoyt. Washington: Government Printing Office, 1904.This book, which forms Paper No. 100 on
Water Supply and Irrigation, is issued under the auspices of the United States Geolegical has to do with interior basin, Pacific and Hudson Bay drainage. Besides the regular measurement of the flow of streams made during the year 1903, and reported herein, a con-
siderable amount of other special information that will be of use in general hydrographic studies has been included. Reconnaissances of of the cour important ivers in different parts resulted in a collcetion made, and these have with regar to flood, water-powers, river pro-
files, etc. The number of regular stations for stream measurements is steadily increasing and at present systematic measurements are taken at over 500 stations, distributed se as and Territories. The expansion of the wor is the result of the greatly increasing demand from the general and engineering
stream data collected by the Survey.

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## Nut lock, J. F. Fish... Nut lock, E. M. Marx. Obstetrical

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