Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

Notes & Queries

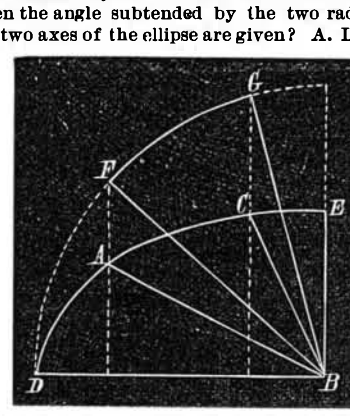
W. W. W.'s queries would, with the answers, occupy too much of our space. Consult a papermaker.—J. F. D. will find that the polishing material described on p. 57, vol. 34, will do well for cleaning silver.—H. J. P. will find an illustrated description of a freezing process on p. 82, vol. 33. We have never heard of one being used for condensing in a steam engine.—R. and others will find an illustrated description of Gramme's electric machine on p. 351, vol. 29.—M. L. H. will find directions for cleaning nickel-plated surfaces and brass on p. 57, vol. 34.—W. F. W. will find directions for tanning sheepskins with the wool on on p. 233, vol. 26.—J. H. can fasten metals to wood with the preparation described on p. 287, vol. 34. See answer to W. F. W., above, as to swan skins.—G. P. A. can calculate the speed of pulleys by the rule given on pp. 26, 73, vol. 25.—R. G. O. will find a recipe for liquid glue on p. 90, vol. 32.—L. J. C. is informed that his method of lacing belts is very old.—C. H. will find good directions for browning gun barrels on p. 11, vol. 32. Directions for casehardening gun work are given in this issue.—D. H. will find on p. 234, vol. 30, full directions for making fulminate for percussion caps.—H. W. will find a recipe for a cement for glass on p. 379, vol. 31.—G. P. will find a description of phosphor bronze on p. 315, vol. 30.—C. E. F. will find directions for annealing lamp chimneys on p. 42, vol. 26.—E. L. will find directions for making erasive soap on p. 181, vol. 31.—R. will find full information as to burning coal dust on p. 379, vol. 31.—E. C. W. will find directions for setting the eccentrics of a locomotive on p. 212, vol. 32.—P. T. N. will find directions for making vinegar on p. 68, vol. 29.—T. E. M. will find a good recipe for aquarium cement on p. 43, vol. 33.—C. W. J. will find directions for making patent leather on p. 122, vol. 27.—J. W. T. will find an answer to his query as to a ball dropping through the earth on pp. 158, 250, vol. 31.—C. B. will find directions for making phosphor bronze on p. 315, vol. 30.—H. E. B. will find directions for soldering cast iron on p. 251, vol. 28.—R. T. will find directions for polishing marble on p. 283, vol. 30.—H. B. Jr. will find a recipe for artificial meerschaum on p. 193, vol. 26.—H. F. W. will find directions for removing tattoo marks from the skin on p. 331, vol. 30.—J. E. M. will find an explanation of his difficulty as to the distance at which an object is visible on p. 20, vol. 34.—M. T. will find, on p. 119, vol. 30, a recipe for restoring rancid butter.—A. F. will find directions for polishing precious stones on p. 138, vol. 30.—E. B. A. will find directions for soldering of all kinds on p. 251, vol. 28.—R. J. will find a description of mica on p. 88, vol. 25.—J. C. W. will find a recipe for indelible ink on p. 112, vol. 27.—F. C. will find particulars of the New York State canal boat award on p. 81, vol. 30.—J. C. will find directions for washing flannel and other woolen fabrics on p. 267, vol. 30.—F. W. will find a recipe for harness blacking on p. 218, vol. 28.—R. J. C. will find a description of M. Coignet's artificial stone on p. 124, vol. 22.—R. T. can coat his pills with sugar by the process described on p. 59, vol. 32.—W. W. will find details of the manufacture of plaster of Paris on p. 399, vol. 29.—J. N. will find particulars as to the lifting power of hydrogen on p. 74, vol. 31.—F. O. can cement whalebone to wood with the preparation described on p. 90, vol. 30.—R. F. will find a formula for the proportions of a safety valve on p. 107, vol. 31.—W. T. will find directions for stuffing and mounting birds and other small animals on p. 350, vol. 30.—M. N. will find a recipe for preparing muriate of ammonia for inhalation on p. 315, vol. 31.—S. T. will find a description of the process for condensing milk on p. 343, vol. 30.—N. J. will find formulæ relating to the strength and thickness of boilers on p. 155, vol. 32.—N. K.R. will find directions for making an æolian harp on p. 330, vol. 26. Imitation meerschaum is described on p. 193, vol. 26.—M. B. T. and others are informed that the pretensions of the mineral rod men are humbug.

(1) W. S. asks: How can I gild white metal without a battery? A. Take 8 parts gold and 1 part mercury; make the gold into thin plates and put them in the mercury while the latter is boiling. Dissolve ½ oz. of this mixture in 1 oz. nitro-muriatic acid. Add 2 ozs. alcohol, and apply the mixture, when the article is clean, with a soft brush. Rinse and dry in sawdust, and polish with chamois leather.

(2) F. H. D. asks: Why is it that a steel shod sled will draw harder on bare ground than a sled shod with iron? A. Some kinds of cast iron become, by friction and wear, casehardened to a high degree: and sled shoes made of it acquire smoother surfaces than those made of steel.

(3) H. M. asks: In plating small articles, does the current of electricity need to be strong enough to give a shock? A. No. A single cell is sufficient.

(4) L. M. asks: How can I find the area of a sector of an ellipse, namely, that part of an ellipse inclosed by the arc and two radius vectors, when the angle subtended by the two radii and the two axes of the ellipse are given? A. Let B D



and B E be the semi-axes of the ellipse, and B A C the sector. Draw an arc, D F G, with B D as a radius, and through A and C draw lines parallel to B E. Join the points, F and G, in which these lines cut the circular arc, with the center, B. Then

$$BD : BE :: \left\{ \begin{matrix} \text{area of} \\ \text{circular} \\ \text{sector BFG} \end{matrix} \right\} : \left\{ \begin{matrix} \text{area of} \\ \text{elliptical} \\ \text{sector BAC.} \end{matrix} \right\}$$

(5) W. E. P. asks: 1. Upon what does the stability of magnetism in a horseshoe magnet depend? A. The purity of the steel. 2. How should a magnet be tempered? A. As hard as possible. 3. Is the power of a compound magnet of 4 parts, each of equal magnetic strength when separate, equal to four times the power of one part? A. Yes.

(6) H. K. F. says: I am trying to heat a wire of about the size of Stubs' No. 70 by electricity, but so far have not succeeded. I have an ordinary Smee battery, but the zinc is not amalgamated, and so far I have only used copper wire. Will you be kind enough to tell me how to proceed? A. Use the large sized Bunsen battery.

(7) E. K. M. says: 1. Please give me directions for putting up an electric bell, to be operated by an ordinary eight day clock, that the bell may sound the hours to correspond with the striking of the clock. The bell is to be placed about 100 feet distant from the clock. Will the Meidinger battery answer my purpose? A. The Meidinger, Daniel, gravity, or Léclanché battery will answer. 2. Will a copper wire, wound closely with cotton yarn and then coated with beeswax, be an insulated wire suitable for the apparatus? A. No. 24 copper wire 100 feet long would answer. It is not necessary to cover it with beeswax. A covering of cotton thread is sufficient.

(8) G. C. H. says: I intend to put up a telegraph line of about one half mile in length, and would like to know how much battery (Daniell cells) it would take with one wire and a ground return. A. Twelve cells.

(9) C. F. S. says: I do not think I have a correct conception of the meaning of the expression "electromotive force." Is it the chemical energy at the surface of the negative metal, or is it the power of the battery to overcome resistance? Are the numbers used, in connection with it, proportional or comparative values; or can the force be definitely and independently expressed in ohms? A. The electromotive force of a galvanic element is the power it possesses of overcoming resistance. This force is proportional to the number of cells in a battery connected up in series + — + — + —, etc. The unit of electromotive force is called a volt, after Volta, while the unit of resistance is called an ohm after the German scientist Ohm. The electromotive force of a Daniell cell is about equal to a volt, and may be practically regarded as a unit of force.

(10) G. H. C. says: I have made a magnet, and put upon it 1,050 feet of cotton-covered magnet wire No. 32. I connected it with a battery that is used to run a telegraph with fewer coils and coarser wire than mine. My magnet will not lift a shingle nail. What is the cause? A. For lifting purposes, you should have used thick copper wire about 100 feet in length.

(11) J. W. C. asks: What are the lowest, mean, and greatest velocities of electricity through a suspended copper wire? What is the mean velocity of electricity through a buried wire, an overhead telegraph wire, and the Atlantic cable, respectively? A. Electricity has no defined velocity, but differs with the circumstances under which it travels, the size of the wire, length of the wire, and distance of the wire from the ground. The velocity of the current on the Western Union telegraph wires varies from 15,060 to 75,000 miles per second. On the Atlantic cable, for about two tenths of a second after contact is made with the battery, no effect is perceptible on the opposite side of the ocean. After four tenths of a second the received current is about 7 per cent of the maximum current. One second after contact the current will reach about half its final strength, and after about three seconds its full strength.

(12) E. T. D. asks: How many cells would it take to heat an iron wire of the size of common thread, hot enough to light a lamp? A. A dozen Grove cells would heat such a wire red hot. 2. How would I make an electric lamp lighter? A. You cannot light lamps with electricity unless the wick is surrounded with gas.

(13) E. W. P. says: 1. I wish to make a very small telegraph sounder to put into a watch case. The coils cannot be over an inch long nor more than ⅜ in diameter; with what size of wire shall I wind them? A. No. 28. 2. On an open circuit telegraph line, can an operator at one of the middle stations work all the instruments on the line, as in the closed circuit plan? A. Yes. 3. In running a small electro-motor, wound with coarse wire, which will work best, a quantity or intensity battery? A. A quantity battery. 4. What is the effect if the zinc plate in a Callaud battery becomes partly coated with a copper deposit? A. The current is weakened. 5. Is there any way that a house telegraph, having 5 or 6 instruments in the circuit, could be worked on the open circuit with one battery? A. Yes.

(14) A. S. G. asks: On p. 19 of your current volume is an extract from the *Journal of the Telegraph*, headed "The New Force." In the second paragraph occurs the following: "Upon an insulated table, place an ordinary Morse key and an electro-magnet, the coils of which are so wound that no magnetism is produced in its cores by the passage of an electric current." How an electro-magnet can be such without magnetism is beyond my comprehension, and how coils can be wound so as to neutralize each other I do not know. Can you explain? A. If the two helices are so joined that the current traverses one in an opposite direction from the other, no magnetism will be developed. 2. Is the cadmium armature attracted by the peculiar magnet, and what office does the armature fill in the experiment, as nothing more is said of it? A. The so-called etheric force accumulates upon the cadmium. A soft iron armature upon an ordinary sounder is as good as anything else to observe this extra current, or "etheric force," with.

(15) L. F. A. asks: What is the best method of constructing a meat cooler, large enough to put in two oxen in warm weather? A. Make a frame of 1½ by 4 inches uprights, set edgewise; cover it on the exterior with narrow tongued and grooved boards, and in the interior with narrow rough boards with the edges neatly fitted together; line the interior with sheet zinc, and fill in the frame with dry sawdust. A covered top is better than doors on the side; have the doors double in thickness and also filled in with sawdust. Have a slight opening for ventilation, protected with fine gauze wire cloth, and a small pipe for drainage. If your meat box had been placed under your ice house, it would have been better.

(16) J. S. M. asks: What size of opening does it require to keep life in 100 men, supposing them to be shut up in a close room? A. Supposing the room to be large, a much greater opening would be required at the top than if placed at the bottom, as the carbonic acid gas, which would accumulate by being thrown from the lungs of the occupants of the room, is heavier than the atmosphere, and would rest upon the floor. The most favorable arrangement to ventilate the room would be that in which an opening would be provided at the floor and another at the ceiling, and in this case the size of the openings might be at the minimum, the fresh air entering at top and being discharged at the bottom, except where the temperature may be so much increased as to induce a current in the contrary direction. An authority says: "The proportion of oxygen gas in the atmosphere is about 22 per cent, but after it has visited the lungs it is reduced to 16 per cent." There is, therefore, a loss of about 30 per cent of the oxygen of the air at each respiration; and the opening should be large enough to renew about ⅛ of the air contained in the room in every 5 seconds. How large such an opening, or openings, should be will depend upon the velocity of the current entering, whether forced by mechanical power or not, and should be determined by experiment.

(17) E. B. G. asks: How much water should be evaporated in a room 14 feet square, to keep it in a healthy condition? A. It is not desirable that the air should be entirely saturated with water. Fevers are sometimes generated in consequence of a too humid state of the atmosphere. An English admiral once banished the yellow fever from his fleet on a West Indian station by keeping his lower decks dry with stoves in the summer season. A vessel holding about 2 gallons of water placed in the air chamber of the furnace would give you all the moisture you want for the whole house.

(18) A. B. asks: Is there any kind of acid or salts that I can put in a sulphate of coppertele-graph battery to keep it from freezing? A. No, not without impairing it.

(19) T. W. C. asks: 1. For two engines 7 by 12 inches, and an upright boiler 8 feet high by 5 feet diameter, which you recommend for a boat 50 feet long by 18 feet wide by 3½ feet deep, what steam and water pipes do I require? The inspectors do not allow upright boilers on steamboats here, as the law forbids them. Will a boiler 3½ feet in diameter and 10 feet long, with return flue, do instead of the one you recommend? A. Make the steam pipe 2½ or 3 inches in diameter, and the feed pipe from 1¼ to 1½ inches. We think the boiler will answer. We would like to see the section of the law that forbids the use of vertical boilers. The only thing that we can find in the revised regulations, bearing on the subject, is the following paragraph: "Inspectors shall not hereafter allow the use of donkey boilers of the vertical tubular kind on steamers navigating the waters flowing into the Gulf of Mexico." It is possible that we may have overlooked some other paragraph in relation to the matter; and if so, we would be glad to have our attention directed to it.

(20) W. E. S. says: I have been trying an experiment in burning coal dust. The first week in October I carefully weighed all the coal burnt in 62 hours, when using only the natural draft. I used no steam whatever for heating purposes. The amount used was 3,118 lbs. of Lehigh nut coal, which, at $7 per tun, would cost about $9.75; steam averaged 45 lbs. to the inch. The second week in December I weighed the coal dust used, and then I used plenty of live steam for 26 hours out of 61 hours to heat 4 stories of the shop with 1,000 feet of 3 inch pipe. I used the exhaust all the time for heating. The amount of dust burned was 5,236 lbs. at $2 per tun. Steam pressure averaged 50 lbs.

to the inch. The boiler is horizontal, with 24 three inch iron tubes; and it is 10 feet in length by 3 feet in diameter, and well bricked up. Steam pipes, etc., are well covered with asbestos. When burning coal dust, I use a blower running about 3,000 revolutions per minute. About half an hour before shutting down (at 4 o'clock in the afternoon) I rake over my fire and get a good solid bed of fire on the grate: when I stop, I cover lightly with fresh dust, and shut all drafts, and at 6 o'clock the next morning I have from 30 to 40 lbs. steam; and then all I have to do is start the blower, and in half an hour I can have a good fire and plenty of steam. A. You make a very favorable showing. If you can contrive to measure the amount of water evaporated in a given time with each kind of fuel, you will be able to make an accurate comparison. If you do this, we would be glad to know the result.

(21) C. H. A. says: After reading Mr. Edison's experiments on the "etheric force," I tried his method of producing it with a printer: and found that, by forcing the press up against the type wheel (first cutting out the main battery) and breaking the circuit between the instrument and battery on the negative wire, it would cause a most beautiful and intense spark, and give a very heavy shock. I find that, on connecting it with the stove, as Mr. Edison did, it produces similar effects, giving off a spark when touched by a metallic substance. I am more interested in the phenomenon of the shock, as Mr. Edison says nothing about it. I am somewhat inclined to believe that, in this particular, it resembles inductive electricity; and it being somewhat new to me, I write to ask if this mode of producing electricity to give a shock is new to electricians? A. The so-called "etheric force" is nothing more than the extra or induced currents which are produced when the battery circuit is opened and closed; some facts connected with it, however, led to doubts on the subject at first. Electricians are well acquainted with this method of producing shocks.

(22) A. F. O. asks: What must I do with the fluid of the Grenet battery after it is played out? Can it by dilution, or by the addition of more of the salts, be restored, or must it be thrown away? A. Throw it away.

(23) R. asks: 1. I have a pair of polished skates, recently nickel plated, and I find on using them that the nickel begins to flake off. Can I prevent this in any way? Can I have the plating removed from the whole skate or any part of it? A. Yes; have the nickel removed and the skates replated with more care.

(24) C. H. N. says: You state that the earth received its motion during its formation, and you compared it to the velocity of a railroad train running half a mile after the steam is shut off. That being true, is it not the cause of the remarkable difference between the age of man in the days of the deluge and at the present time? The earth must in olden times have revolved faster and made the days and nights shorter. A. The period of 4,000 years is nothing when compared with the age of the earth. Millions upon millions of centuries ago, she obtained her motion; untold centuries went on during the different periods of change, as revealed by geological researches, until at last, some 150,000 or 200,000 years ago, man appeared. The oldest records of man go only back some 4,000 to 6,000 years; but we know that during this time the velocity of the earth's rotation has not changed an appreciable fraction of a second. In regard to the reported age of the patriarchs, we must consider that, at a time when people had no chronology nor almanacs, they did not count the years as correctly as we do, and could not know themselves how old they were. We may add to this the veneration in which the oldest people were held, which led every old man to boast of his great age, and so they probably made themselves out to be older than they really were.

(25) B. B. asks: Will it damage flax straw for manufacturing purposes to thrash it with a common spiked cylinder thrashing machine? A. Yes, it very nearly spoils it. Treading out the seed with animals is better, but the rollers are the best.

(26) A. D. says: It is generally conceded that the orbit of the earth is not necessarily a fixed pathway, and that the plane of the orbit, which has an obliquity of 23° 28′ to the plane of the sun's equator, probably at one period had a still greater obliquity, which would extend the warmer zones into higher latitudes. And again, the orbit of the earth will eventually become circular, and the earth will revolve on the plane of the sun's equator; and the intimation that the orbit of the earth is gradually assuming a circular form, if true, would be the best evidence that this change is now in progress. Then the poles of the earth will be perpendicular to the plane of the orbit, with the sun vertical over the equator only, and there would be no change of seasons. Are these suppositions probable? A. You confound the pathway of the earth in her yearly revolution with the inclination of her axis on the ecliptic; this inclination may change, while the pathway or plane in which she moves remains essentially the same. Some astronomers have supposed that, at some time in the far future, the inclination will become less and the intensity of the seasons diminish, and at last disappear. But this time is so remote that the earth will then have cooled, and the internal heat have become so dissipated that the interior of the earth's crust will no more possess heat appreciable on the surface, and the latter will be unfit for vegetation, and consequently also for animal life. The earth will then be as the moon is now—dead.

(27) W. H. S. says: You state that the moon rotates on its axis and in its orbit in the same time. What is that time? A. 27 days, 7 hours, 43 minutes, 42 seconds.

(28) T. P. M. asks: 1. Will zinc do instead of copper as a plate for a ground wire connection of a telegraph? A. Yes, but it will not last nearly so long. 2. What size of plate is necessary for a line one quarter of a mile long? A. For a line of that length you will get better results by using a return wire. Plates four or five feet square will answer if it is not desirable to run an additional wire.

(29) M. M. asks: How many feet of common illuminating gas made from coal can I compress in an iron tank or gas holder of 50 cubic feet capacity, carrying the compression to 100 lbs. to the inch? A. About 333 feet.

(30) R. K. asks: How can I tell how many lbs. weight are necessary to produce a given velocity, as described in Z. D.'s query as to the tension of a cord over a pulley? A. To calculate the weight required to produce this velocity, assume a time or distance in which it is to be attained, and make the proper substitutions in the formulas below. It will be easy for any one to see what assumption is necessary for the tension of 1,550 lbs., and the formulas also show how different values can be obtained, and yet be correct. Our readers will doubtless observe, further, that these formulas are the same that are employed for calculations connected with the use of Atwood's machine, and that the case proposed by Z. D. is similar to problems that are solved with the above apparatus. Let x=weight required to give the weight of 1,000 lbs. a velocity of 10 feet per second. S=distance in feet in which this velocity is acquired. t=time in seconds in which this velocity is acquired. g= acceleration due to gravity. f=acceleration due to the weight. Then $f=g\times\frac{x-1000}{x+1000}$; $S=\frac{50}{f}$; and $f\times t=10$. This also answers M. B.

(31) A. H. T. asks: 1. How is the heat calculated which is generated by compressing air? A. See p. 123 (14), vol. 33. 2. Why is it that there is such a great loss of power by compressing air to high densities? A. The principal source of loss, in general, is due to the fact that the power required to compress the air is not afterwards given out by allowing the air to expand as much as it was formerly compressed. 3. Do hyperbolic logarithms hold good in calculating the mean pressure in an air cylinder, or would it be correct to represent the initial and terminal pressures as a right-angled triangle, and calculate the area of it? A. The formula with hyperbolic logarithms is only applicable in case the temperature of the air in the cylinder is constant throughout the stroke.

(32) J. G. B. asks: At what rate is the water falling over Niagara Falls wearing the rock away yearly? A. The action is not uniform, the rock being detached in large masses from time to time. It is estimated, however, that, for long periods, the average wearing away has been about a foot a year.

(33) Z. D. says: In reply to my query as to tension of a cord over a pulley, you give the answer 1,550 lbs. A mathematician answers me that the tension of the cord is exactly the same, namely, 4,000 lbs., whether the weight is raised at the uniform velocity of 10 feet per second or whether it is motionless. He acknowledges that the tension is above 1,000 lbs. when the first pull is given, before the weight attains its uniform speed. Another gives as his answer a number somewhat over 1,300 lbs. By what method did you find that 1,550 lbs.? A. Our answer was possibly misleading, from the fact that all the data upon which it depended were not stated. Really, the tension of the cord, required to give the weight a velocity of 10 feet a second, can have an infinite number of values, subject to the following conditions: 1. It must be greater than 1,000 lbs. 2. The time and distance in which the weight attains the required velocity must be less and greater, respectively, than the time and distance in which a heavy body falling freely under the influence of gravity would acquire the same velocity. As soon as the weight acquires the given velocity, it will continue to move uniformly with that velocity, under a tension of 1,000 lbs., if there is no friction or other prejudicial resistance. See answer to R. K., on this page.

(34) G. B. K. says, in reply to T. D., who asks how to obtain the index of an engine lathe: If you will note what thread the lathe will cut when two given gears are in place, you can easily construct a table that will show you just what thread any two gears will cause the lathe to cut. Suppose that two 63's cause 12 threads to the inch. Then place 12 in the space, A, in the diagram below:

Stud.

Screw.	28	33	35	42	49	56	63	70	77	84	91	98	105	112
28														
33														
35														
42														
49					*b*									
56						*a*	C							
63						B	A	D						
70							E	*c*						
77									*d*					
84														
91														
98														
105														
112														

Now, 63 : 56 :: A : C, 63 : 70 :: A : E (direct proportion).
Also, 56 : 63 :: A : B, 70 : 63 :: A : D (inverse proportion).

The spaces may all be filled except a, b, c, d, etc., which it is useless to fill, as only your 63 gear is duplicated. A half day's time will be sufficient for a good mathematician to fill out the table.

(35) J. H. says, in reply to D. C. B.'s query as to his hydraulic ram difficulty: The air, becoming exhausted in the air chamber, prevents the water from entering the chamber, when the impetus valve closes, and the result of the working is only the dead beat of the valve in closing. All well regulated rams have inserted in the lower casting (a head of the opening to the air chamber) a small screw, called the sniffle. It is made taper, and a small groove is filed lengthwise in it; and it is so adjusted as, when put in, to allow of water escaping when the impetus valve closes. Upon the reaction of said valve, a portion of air is drawn in through the screw, which passes upward to the disk valve, opening to the air chamber; and at the next pulsation of the ram the air is passed to the chamber, thus keeping the chamber fully replenished with air, during which time the valve gives the lively click, which he describes, when working well. Care must be taken not to allow the water to back upon the sniffle, or the ram will again cease to work well.

(36) J. W. writes us from Switzerland that he has tried to produce electricity there by shuffling the feet over the carpet, but without success; he has often done it in this country, but it will not work there. He wants to learn the reason; also wants us to corroborate the fact that electrical sparks can be produced as mentioned, in this country. In reply we state that in this city, in winter, in well warmed, dry houses, strong electrical sparks may be produced by walking on or rubbing the feet on the carpet. Loud snaps are produced by touching another person with the finger: while a common home amusement for the young folks is to light the gas by electricity, by rubbing the feet on carpet and then touching the open gas burner with the finger. In Europe the climate is more moist, and hence probably the phenomenon is unknown there. Possibly in a well warmed house on a very cold day, upon a rug in front of a good coal fire, our correspondent could produce the electrical sparks in Switzerland.

(37) J. B. J. says, in answer to C. E. B.'s query as to a force on an inclined plane: Let W=weight (=112 lbs. in this case), A=angle between plane and horizon (=30°—), w=force with which W presses against the plane, L=force pressing in the direction of the plane. Then F= W $sin.$ A=112×0·5=56 lbs. w=W $cos.$ A=112×0·86602 =97 lbs.

(38) J. B. J. says, in answer to J. A. R., who desires to know the contents of a cylinder with hemispherical ends: l=length of cylindrical part, r=radius of hemispherical ends, h=hight or depth of liquid, x=area of immersed cross section of cylinder, C=contents of cylindrical part, and c=contents of hemispherical ends. π=3·1416. Then C=$x\times l=l\,x$. Then $c=\pi h^2\,(r-\frac{1}{3}h)$. C+$c$= content required. If the above dimensions are in feet, multiply the result by 7·4762, which will reduce it to gallons. Compute content for every foot (and fractional part) of depth, and arrange a table, when the contents will be seen at a glance. The computation may be made for half the tank or vessel, and doubled to find the whole contents.

(39) S. W. G. says, in reply to J. G. S.'s query for a remedy for cracked fingers: Into equal parts of glycerin and cologne spirits, put ten grains salicylic acid, shake until well mixed, and apply in the same manner as glycerin.

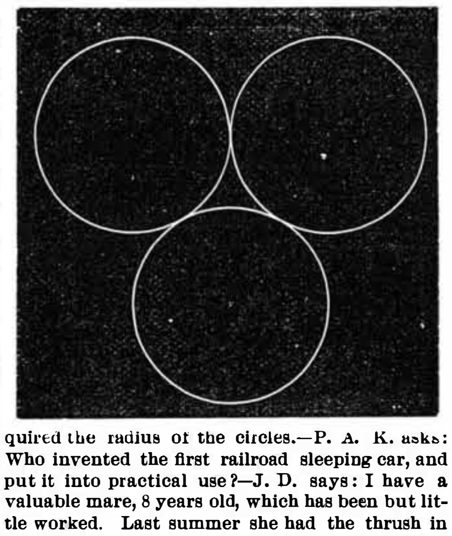
(40) C. C. says, in reply to W. T. W.'s query as to setting boilers: Take 6 or 8 inches of brick work away at sides and top, and 2 feet at back end, regardless of the water line. Do not let brick touch the boiler except at front and on dome. Excavate not less than four feet under the whole length, leaving the mud drum (if there be one) exposed to the heat. Set the grates 4 feet from the lowest part of the shells. Build a bridge wall 10 inches (just enough to hold the fuel) above the grates. With coal for fuel, you will sooner think of disposing of one boiler instead of adding to the three you now have. You can get all the steam you want without skillful firing, constant hard work, and waste of fuel, if you burn your fuel instead of sending it up chimney. The above described radical change in setting of steam boilers was made with excellent results. My boiler making and repair bills are beautifully less; and while I increased the production of the mills, the fuel bills are less than before.

(41) J. S. F. says, in reply to C. B. H.'s query as to how to give a locomotive her full speed: Unless she be drawing a heavy load or running with a very light pressure, she cannot attain her full speed with the throttle wide open and at full stroke, because of the contracted area of the exhaust nozzle and high state of expansion of the steam, which cause her to choke when more than a certain quantity of steam is admitted to the cylinder at each stroke of the piston. To prevent choking, the quantity of steam admitted to the cylinder should be regulated by the position of the reverse lever, or, to state it more properly, by the travel of the valve.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

J. S. B.—It is granular quartz.—D. R. McM.—The thickness can be told by examination of the outcrop at suitable points. In some localities, the thickness of these sandstone strata is several thousand feet. Your chance of getting water is slight. No. 1 is iron pyrites. No. 2 is steatite. No. 3 is indigo carmine.—A. M.—You are correct in taking it to be a sandstone containing a hydrocarbon of an asphaltic nature. The bituminous schists made use of in France are somewhat different.—S. N. F.—It consists chiefly of lead, with a small percentage of alloy.—P. L. S.—It is lead.—W. M. N.—It is one of the alloys of tin and lead, the former being in preponderance.—G. F. P.—It is a piece of furnace slag.—J. A. H.—It contains no uranium.—R. P.—The base of the composition is hard rubber.—J. H. E.—It is iron pyrites.—C. T. A.—It contains no silver, but scales of mica.—The specimen in box marked "Washburn" is graphite in quartz rock.—H. M.—No. 1 is mica in quartz. No. 2 is serpentine. No. 3 is iron pyrites.—S. W. M.—The good specimen contains the substances mentioned in the recipe, and there is no reason why it should not act well. Try again.

W. C. S. says: The following is a geometrical nut for some of your readers to crack: The space enclosed by 3 circles contains an acre. Required the radius of the circles.—P. A. K. asks: Who invented the first railroad sleeping car, and put it into practical use?—J. D. says: I have a valuable mare, 8 years old, which has been but little worked. Last summer she had the thrush in her fore feet, but was soon cured, and her feet looked well and were free from contraction. I commenced driving her this winter; and her feet were at once inflamed, and quite sore for a day or two. She flinches when she puts her frog on anything hard. What can I do for her?



COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On Working Men at the Centennial. By M. M.
On Spiritualism. By J. A. C.
On Pulling and Pushing. By R. B. S.
On the Moon. By C. J. L. C.
On Safe Savings. By ——.
On a Remarkable Machine. By C. E. F.
On Magnetic Attraction. By A. A. A.
On the Oldest Inhabitant. By N. V. C.
On the Universal Force. By J. E. H.
On Momentum. By J. A.
On the New Nebular Theory. By C. E. M.

Also inquiries and answers from the following:
I. H.—M. M.—P. S.—G. A. R.—T.—L. O.—W. Y. Jr.—H.—Y.—J. H. P.—G. P. B.—J. T. H.—R. S. M.—W. L.—C. H. P.—J. W. R.—S. T. W.—B. F. U.—D. B. K.—F. W. M.—A. D.—N. C. G.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who makes the best dynamometers? Where can three inch objectives for telescopes be obtained? Who makes electric belts for medical purposes? Where is there a firm that undertakes well-boring? Where are there any works where nickel ore can be smelted? Where can walrus leather be obtained? Who sells shoe peg machinery? Who sells machinery for making friction matches? Who sells alarm clocks? Who makes stocks, to secure the feet of restive horses, while being shod? Who makes diving apparatus?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

January 11, 1876.

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]