is rigidly clamped to a support and said support may be moved toward and from the drills and also in the direction of the length of the row of drills.

MACHINE FOR MAKING CELLULAR BOARDS.—S. M. Langston, Camden, N. J. The invention pertains to improvements in machines for making cellular board or double-faced corrugated paper, and relates more particularly to a machine for applying the second facing sheet to the single faced corrugated paper and subdividing the resulting product into sections.

APPARATUS FOR LAUNCHING TORPEDOES UNDER WATER. A. E. Jones, Fiume, Austria-Hungary. The improvements are in movable shutter apparatus for use in launching torpedoes beneath the level of the water through the sides of a vessel in movement, and it relates more particularly to the arrangement of the shutters forming the torpedo support, their locking, opening, and closing mechanism.

Pertaining to Recreation.

TOY PISTOL.—J. Darling, Chicora, Pa. The improvement is in toy pistols and has for an object the provision of a novel construction of pistol adapted for shooting marbles or similar spherical missiles. Ratchet teeth pressed by a spring engage with the hammer which latter when released by the trigger projects the missiles which may be of different sizes.

Prime Movers and Their Accessories.

STARTING DEVICE FOR INTERNAL-COMBUSTION ENGINES.—A. C. Wells, Amityville, N. Y. This invention refers to certain improvements in devices for use in controlling the starting crank of an internal combustion engine and for detaching the crank from the engine in case of a "back fire." The device is made up primarily of two main members, one non-rotatably mounted, the other rotatable with the starting frame.

Pertaining to Vehicles.

FENDER FOR ELECTRIC CARS AND OTHER MOTOR-DRIVEN VEHICLES.—A. Flandes, Mexico, Mexico. The objects of the invention are: to obtain a safety device that will prevent any obstruction passing under the wheels of the vehicle, thus removing all danger, and, to obtain by the means of the same mechanism, a brake which will act effectively as an auxiliary brake to the vehicle so as to stop the same in the shortest possible time without causing shock.

LOCKING DEVICE FOR SEAT-GUARDS.—S. E. Jackman, New York, N. Y. The invention relates to locking devices for seat-guards used on cars, boats, and like vehicles, such as are run on inclined pleasure railways and such as shown and described in Letters Patent of the U. S., formerly granted to Mr. Jackman. The object is to provide a device, arranged to prevent passengers in a vehicle from tampering with the guard thereof during the ride.

ROAD-DRAG.—E. J. Mills, Webb, Iowa. The purpose of the inventor is to provide an economic machine of light draft that will effectually gather the earth from the sides of the road and distribute it at and in the direction of the crown or center of the road, thus building the road up in the most approved manner.

TIRE-BOLT.—J. M. Fellows, Burlington, Ind. An object here is to provide a bolt which has a recess therein to contain substances such as oil, grease, or the like, and which is formed to permit these substances to come into contact with the wood of the felly. Also to provide a bolt for securing a metal tire on a felly, the end of the bolt engaging a recess in the tire and thus obviating the necessity of providing an opening through the tire and a bolt head countersunk therein.

TRUCK.—W. E. Kastendike, New Market, N. J. The invention comprises means for raising a load directly from the ground, by aid of a windlass, and then drawing the weight up an incline carried by a vehicle, so as to facilitate the storing of the load within the vehicle body, and further comprises a carriage movable relatively to the vehicle, and means for locking the carriage relatively to the vehicle body, and also locking the cord for raising the weight firmly in relation to the carriage.

VEHICLE-TIRE.—B. Ross, Buffalo, N. Y. This invention provides details of construction for a vehicle tire whereby great resilience is had by the tire, due to the joint employment of a hoop of suitable material, and novel reinforced means coacting therewith, which adapt the improved tire to have superior elasticity, uniform expansion, and great durability.

Designs.

DESIGN FOR A SHAVING BRUSH.—J. L. Erskine, New York, N. Y. In this ornamental design for a shaving brush, the upper part of the handle slopes to the middle part which includes a bird claw grasping the round part of the remainder of the handle which holds the bristles. Mr. Erskine has also invented another design of a shaving brush which comprises an ornamental handle, the tapered end of which ends in an ornamental fan shaped design.

Note.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

Notes and Queries.

Kindly write queries on separate sheets when writing about other matters, such as patents, subscriptions, books, etc. This will facilitate answering your questions. Be sure and give full name and address on every sheet.

Full hints to correspondents were printed at the head of this column in the issue of March 13th or will be sent by mail on request.

(12058) W. H. S. asks: A says that the outside rail of a railroad curve is not any longer than the inside rail. He claims that the wheel of a car strikes the inside first and leaves it last, making no difference in the length of the two rails. B says there is a difference. Who is right? A. There is no doubt at all that the outer wheels of a railroad car or any other vehicle travel a greater distance than the inner wheels in rounding any curve. It is for this reason that automobile rear axles have to be provided with a differential gear for turning much sharper corners than those of railroads at a high rate of speed. The difference between the distance traveled by inner and outer wheels on railroad cars is much smaller, and is provided for by slip, but on any curve the outer rail can be shown by measurement to be longer than the inner.

(12059) O. B. asks: Suppose that some salt whose temperature is 0 deg. C. or lower were mixed with some broken ice or snow whose temperature is 0 deg. C. or lower when nothing near by has a temperature higher than 0 deg. C., would this mixture then act as a freezing mixture, i. e., could the salt melt the ice and the resulting water dissolve the salt, thus making the finish temperature lower than at the beginning? A. Salt and ice will melt each other at any temperature above —22 deg. C., but ice lying in air will not melt at any temperature below 0 deg. C. This answers your question as to ice melting salt below 0 deg. C. You have yourself doubtless seen salt put upon icy sidewalks to melt ice in weather when the thermometer was many degrees below freezing in the air above the walk, and ice all about was dry and solid. The temperature —22 deg C. is the lowest possible temperature to be obtained with a freezing mixture of ice and salt. For the discussion of this point see Watson's "Text Book of Physics," under Freezing Mixtures. We send the book for $3.50. 2. Is there any reason for the early electricians or scientists having called the electrification on glass, caused by rubbing it with silk, positive instead of negative? A. The name vitreous was originally applied to the electricity with which glass was charged after rubbing it with silk, and resinous was applied to the electricity with which sealing wax was charged when it was rubbed with woolen. These names were based upon the theory that there were two kinds of electricity. Franklin proposed the theory that there was but one kind of electricity, which either was in excess or was deficient in a charged body. These states he called positive and negative, and as a result we have the names to-day, although the one-fluid theory is no longer held by scientists. Why he designated vitreous electricity as plus we do not know. The names could have been oppositely applied just as well. 3. How can I measure the hot resistance of a 110-volt incandescent lamp without using the voltmeter-ammeter method? How can I measure it with the Wheatstone bridge, for instance? A. We do not know any way to measure the resistance of an electric lamp while hot by using the Wheatstone's bridge. You do not, however, r uire an ammeter to make the measurement. A voltmeter alone will suffice. The method is known as the Fall of Potential Method. Place a known resistance, say one ohm, in series with the lamp. Measure the drop of potential across the terminals of the one-ohm coil and also across the terminals of the lamp with the voltmeter. The resistances will be proportional to the drops of potential; or V of coil : V of lamp = R of coil : R of lamp. 4. Ordinary charcoal sticks are such poor conductors that they cannot be used for an arc light. How can I treat them so that I can use them for that purpose? Is there any special kind of charcoal sticks that will serve the purpose? A. Sir Humphry Davy first formed the electric arc by using sticks of dense charcoal, and before the days of arc lighting the editor performed the experiment for his classes in the same way. Last year he used his old apparatus to show what an advance had been made. Hardwood or even fine willow charcoal may be used for the arc. A piece a half inch through will answer perfectly. 5. A direct current of from 400 to 500 volts may be used for the so-called water-pail forge, also for the purpose of arc welding. What other interesting experiments can be performed by means of such a current? A. The water-pail forge does not require 400 to 500 volts. We frequently use it at the usual voltage of the outside wires of the Edison circuits, 220 to 230 volts. We do not know any experiments for so high a voltage especially. We should not bring so high a voltage to the lecture table. 6. A double convex lens has a radius of curvature of 2 inches, is ¼ inch thick, and has an index of refraction of 3/2. The principal focus of such a lens is said to coincide with the center of curvature. In constructing a diagram to represent the section of this lens I use radii of 2 inches, letting them overlap ¼ inch, and I wish to locate, in the diagram, an object, say an arrow, at twice the focal distance from the lens and then determine in the usual manner, by construction, the position, size, etc., of its image which, I understand, should be real, of the same size as object, inverted and at twice the focal distance from the lens. Should I place the object 4 inches from the farthest face, 4 inches from the nearest face, or 4 inches from the optical center of the lens? If the object is properly placed and the construction correctly done, should the object and image be four times the focal distance apart, or more, or less? A. The image of an arrow which is placed at twice the focal distance from a double convex lens of 2 inches focus will be at 4 inches from the optical center of the lens and on the side remote from the arrow. The distances for both the arrow and its image are to be measured from the center of the thickness of the lens, that is, from the optical center, and not from the surface of the lens. In your case the object and its image will be 8 inches apart, four times the focal length of the lens. 7. Please give dates or number of papers or Supplements in which I can find designs of transformers which may be used to step down 110-volt a. c. I wish to make such a transformer of 150-watt capacity, more or less, and so arranged that I can get different pressures, as 100, 90, 80, 70, 60, etc. A. You will find the plans for a step-down transformer, from 110 volts to 10 volts, in Supplement No. 1572, price ten cents. You can take out loops from the secondary so as to get any intermediate voltages you may desire.

(12060) W. J. M. asks: We are having a good deal of trouble in this immediate vicinity getting water. It seems as though the water is hard to find at a reasonable depth, say below 100 feet, and from that depth on we strike what is called "shale," that is supposed to vary in thickness from 200 to 1,500 feet in thickness. I was referred to you by the American Carpenter and Builder, of Chicago, Ill. They spoke as though you could give some information as to what I would like to know. They spoke as though there were German scientists that had some method of locating water underground. I would like to know whether there are, and where the instruments could be got, if they are to be got. I wish you would give me full particulars in regard to the matter as soon as you possibly can. A. We do not know of any instruments for detecting the presence of underground water, except one of the nature of a microphone, by means of which the flow of underground streams may be heard, but not, we should say, at such a depth as you mention. There are many professional water finders who profess to be able to detect the presence of water underground by means of witch-hazel or other divining rods; and in the course of the centuries in which they have operated, their successes have been too numerous to be explicable altogether by coincidence. There is, however, no scientific explanation of their methods or results, and it is our opinion that any success they may achieve is due more to some capacity in the man—some sort of sixth sense less developed in the rest of us—than to either the instrument or the method. We know nothing of the company you mention, but there is no reason at all why a magnetic needle, either compass or declination, should be affected by underground water, except where the latter occurred with mineral. Large bodies of iron ore affect the compass needle, but the most that can be said is that they render its movements erratic; it is quite unreliable in accurately locating them.

(12061) O. J. W. asks: What is there actually known about the moon? Have any of the powerful telescopes that are used to explore the mysteries of distant stars been turned upon our satellite, and with what result? Is there a late scientific work on the subject? A. Much is known about the moon, more than is known of any other heavenly body. It used to be said that we knew the moon's surface, the heights of the mountains there, better than we knew any country on the earth. But we think this is somewhat of an exaggeration. Any book of astronomy will give many of the facts known about the moon. Pickering's "The Moon," price $10, is the latest book on the subject. It appeared very recently.

(12062) G. B. T. asks: Is ¼-inch copper wire with three groundings large enough for lightning rods on a barn 80 x 40 feet? A. We should not advise the use of copper as a lightning rod on any other ground that that it will not rust out so rapidly. A No. 4 galvanized-iron wire will act just as well or better, electrically, and cost very much less. You would do well to send 10 cents to the Weather Bureau, Washington, D. C., and get the publication, "Recent Practice in the Erection of Lightning Rods," in which you will find much of interest.

(12063) M. M. T. asks: An article was published in the Scientific American on September 22nd, 1906, that has only recently come to my attention. This article states it has been discovered that hair which has turned gray, after being exposed to the X-ray has been restored to its natural color. This interests me very much, and I am most anxious to learn more about the subject. Could you put me in communication with the writer of the article, or anyone else to whom I could write for information? A. The article to which you refer states that certain changes of color have been noted in persons' hair under the action of Roentgen rays. We do not know who wrote the article. It was reprinted in our columns from the French journal l'Illustration as a matter of news. The article concludes with a warning against the careless use of the rays for such a purpose. We must emphasize that warning, and say that any such use of the rays would be exceedingly dangerous and should not be undertaken. A prolonged exposure of the head to their action would very likely produce most serious consequences.

(12064) W. D. A. says: The explanation to question 12033 in March 27th issue of Scientific American does not seem correct. According to your explanation, the board would be placed so that its long edges would be parallel to the diagonal of the room, which would not give the longest length of board. I am interested in your explanation of the above problem, as I have been for some time looking for a solution to a similar one. The dimensions being a 10 x 5 foot room, to find the longest length of 3 feet width carpet with square ends. A. Your criticism of the answer to the problem in Query 12033 is well taken. The matter illustrates the difficulty of looking after the hundreds of questions which come to our desk each week. No one can remember or look after them all, and in going to different hands, different views may be taken by different persons. This problem of a board to be laid upon a floor comes up to us very frequently. It received an exhaustive answer in Query 10486, Vol. 96, No. 13. You will there find the general solution, in which any numbers whatever may be substituted, and the lengths of boards for any sized room whatever may be calculated. This will solve your problem for you. We thank you for calling our attention to the matter.

(12065) H. K. L. says: I have seen the statement that a room in which the air is fresh will heat much more quickly than one in which the air is bad. Will you kindly tell me if this is true, and if so, what the scientific reason is? I should also like to know if experiments have proven how much more quickly, proportionately to the size of the room, the fresh air will heat. A. Carbon dioxide, the commonest impurity in air, produced equally by respiration of human beings and animals and a combustion of a gas flame or other fire, has a slightly lower specific heat (or more accurately, co-efficient of thermal capacity) than pure air. That is to say, a given volume of it requires slightly less heat to raise its temperature by a given amount. Carbonic oxide, on the other hand, another impurity, has a slightly higher specific heat. Both are, however, much heavier than air, so much so that carbon dioxide may be poured from one vessel to another like water, and any considerable quantity of it present in the air entering, for instance, a hot-air heating furnace, would require more heat, or a longer time at the same temperature, to make the air containing it rise and heat the room. As, however, the sanitary limit is generally considered to be 6 parts of carbon dioxide in 10,000 parts of air, it is not conceivable that either of the foregoing considerations will affect the heating of a room either sensibly to the body or measurably by ordinary apparatus. If there is anything in the theory you propound, its explanation is more probably physiological than physical; an increase in the impurities in the air of a room would be felt by persons in the room immeasurably more rapidly than it could be indicated by a thermometer, even though it would not directly produce a temperature effect, and if their presence alone, breathing out heated gases, were not sufficient to maintain the temperature. Increase of carbon dioxide in the air would disproportionately decrease the oxidation of waste matter by each respiration, which would not only reduce the generation of heat in the system, but would decrease the activity of circulation of the blood, and might easily be "translated" by the brain into a sensation of cold. This is the only probable scientific explanation of your theory that occurs to us, and we hope it will be sufficient for your purpose.

(12066) F. A. G. asks: 1. I am interested in wireless telegraphy, and wish you would advise through your queries column what books or Supplements would give me information as to the different systems, and what instruments will give the greatest receiving distance. A. We can supply you with Collins's "Wireless Telegraphy," price $3, Maver's "Wireless Telegraphy," price $2, and we send you a catalogue of articles of value in our Supplement, from which you can make selection of those which pertain to your subject. 2. How far can I send with a 2-inch induction coil? A. The distance to which a coil will transmit varies greatly at different times. A 2-inch coil under favorable conditions of the atmosphere will send several miles, and at another time may not send even a mile. 3. Will a Sampson battery run a coil? A. The Sampson battery should run a coil. 4. In a store battery are the materials used up like other batteries? If so, how long will they last without renewal? A. The materials of a storage battery are not consumed by use. Recharging brings them back to their former condition and gives a renewed life to the battery.