Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of price.
☞ **Minerals** sent for examination should be distinctly marked or labeled.

INDEX OF NOTES AND QUERIES.

(4086) B. C. J. asks: 1. Would you kindly answer in your paper the following question: Do you know of any practical dry storage battery, for closed circuit work? A. We know of no practical dry storage battery. 2. Can a storage battery be charged by an alternating current? A. No.

(4087) R. H. T. writes: 1. I have built a motor similar to that described in SUPPLEMENT, No. 641. Forged iron magnet with 5 lb. No. 18 wire on it. armature 14 coils No. 20 wire, 4 layers, 8 convolutions. Would I burn out No. 12 plug if I were to attach it to our circuit of 110 volts, Edison system, or would I in any way destroy motor? A. The motor referred to is not suited to the Edison circuit. If placed in the circuit without using rheostat, the fuse would melt. The resistance of the machine should be increased many times to adapt it to the Edison circuit. 2. Can I charge storage battery from our system above mentioned, 110 volts? How many cells, and what size would I have to use, in order to obtain a proper supply for motor? A. You can charge a storage battery with the Edison current, but resistance will be required to prevent an excess of current from passing through the cells. About two cells will be required for the motor. 3. What is the voltage of motor? A. 6 to 10. 4. Suppose one foot of No. 18 copper wire will carry 44 amperes, will 10 feet carry 440? A. No. 5. I am a subscriber to both SCIENTIFIC AMERICAN and SUPPLEMENT. What is my best way to get them bound? Would I have to pay a duty on the price of the bound book if I sent them to you? A. We think you could make arrangements with the customs officers so that you would be obliged to pay duty only on the binding. Possibly you can find a book bindery in your vicinity.

(4088) D. B. T. says: Pressure, volume and temperature are the three elements entering into all heat motors. I should be pleased to have a few questions answered concerning these elements and their variations and the natural laws governing them. Suppose we have a quantity of air in a cylinder whose piston moves air tight, and without friction. Say one cubic foot at a temperature of 490° F., and a pressure of 120 lb. per square inch above the atmosphere. If we allow this air to expand (performing work) four volumes, that is to 4 cubic feet, what will be its pressure and temperature? Next, suppose we now force the piston back to its original position, what will be the temperature, and pressure? Supposing in each case there be no loss of heat by absorption or radiation. Can any one of the elements, volume, pressure, and temperature, be varied while the other two remain constant? A. In the movement of the piston as described, the temperature, volume, and pressure are all changed in terms of the absolute temperature and absolute pressure. No one can be changed without a corresponding change in both the other elements, although not always in the same direction; decreasing the volume increases the pressure and temperature and the reverse. With a volume fixed by the piston, change of temperature changes the pressure only, while with a free piston the volume is also changed. The details of these changes are complex, and require more study than comes within the scope of Notes and Queries. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 279, for a valuable table of the conditions of pressure, temperature and volume of compressed air for each pound of pressure up to 100 pounds. Also No. 799 for a valuable illustrated lecture on compressed air and its properties; 10 cents each mailed.

(4089) E. A. K. writes: 1. I have ten 6 by 8 glass jars and ten 3 by 8 porous cups. Now, can you tell me how I can make ten batteries or cells, using the above and sheet zinc and electric light carbons for elements? I want to construct them so as to get the most possible current. A. Paraffine the ends (only) of the carbon rods by heating them and rubbing on paraffine, allowing it to soak in. Arrange two or three rows of the rods in a mould, and cast lead around the paraffined ends. Connect the wire with the lead by means of a screw or solder. Probably you will find it both cheaper and better to use carbon plates. The sheet zinc should be from ⅛ to ¼ inch thick, and well amalgamated. 2. How many hours would such a battery run? A. With constant use it would probably run four days with fair usage. 3. How much current does the sewing machine motor require which is described in "Experimental Science"? A. 10 or 12 amperes. 4. Would the above batteries run it? A. Yes; connected 2 series of 5 each in parallel.

(4090) W. F. W. writes: 1. I notice that Remsen's late Chemistry and other recent works of that kind give the following reaction when hydrogen is evolved: $Zn + H_2SO_4 = ZnSO_4 + 2H$. And in all other equations showing two atoms of free hydrogen, they appear as 2H instead of H_2 as the earlier chemistries give. Prof. Remsen does not believe the hydrogen atom and molecule to be identical, for he gives the hydrogen molecule as H_2 in another place. Unless the first is an allotropic modification, I cannot see why it should be given 2H. Please explain. A. In writing formulas as a rule no attempt is made to indicate molecules of elements. Thus in the formulas you quote 2H is no more incorrect than Zn. The hydrogen molecule must be at least H_2, possibly much more, and the zinc molecule must be Zn_2 and possibly much more. 2. Is the space above the mercury in a thermometer a vacuum? If not, does it contain air or mercury vapor? A. It contains a trace of vapor of mercury.

(4091) T. S. asks for a simple way of giving small articles of lead a coating with copper; the covering required to be only of the thickness of tissue paper. A. You will require a battery of one or two cells with a sulphate of copper bath.

(4092) W. M. B. says: Please inform me as to the cause of black specks appearing on silver prints. The bath which I use is very clear and the paper of good quality. Please state cause and how it may be overcome. A. The specks are caused by the bath being too acid. Neutralize the acid with a small amount of ammonia. Consult a professional photographer in your vicinity.

(4093) J. M. McI. asks: What progress is being made in the Nova Scotia ship railway? Also are they still at work on the tunnel they were cutting under the Hudson? Also give a constant elastic force of 8,000 lb. pressing on a radius of 7 in. What horse power will it produce? These are the figures approximately. I especially want to get the most convenient formula where just these data are known? A. Work on the Chignecto ship railway has been suspended, wanting funds. Ditto work on the Hudson River tunnel. Both expected to resume soon. A constant pressure, as stated, has no significance in horse power without motion. If the circumference of your radius moves under the constant stated pressure at 200 feet per minute, you will have $\frac{8{,}000 \text{ lb.} \times 200}{33{,}000} = 48{\cdot}4$ actual horse power.

(4094) T. M. says: In blowing out a boiler, does the water pass through the blow-off pipe with more or less force than there is in the boilers? With a 2 in. blow-off pipe 18 in. down from bottom of boiler, then connect with 2 in. feed pipe 10 ft. from check valve, 5 ft. from blow-off valve, 6 in. from blow-off turn, with elbow 2 ft. to sewer, what is the force or pressure at elbow, and at the sewer, 40 to 50 lb. pressure on boilers? A. The only additional pressure at the end of the blow-off pipe is due to the hydrostatic head of water or 0·43 of a pound for every foot height between the water level in the boiler and the end of the blow-off pipe. This is more than counteracted by the friction of the water in the pipe while blowing off, the open end and freedom of exit making the pressure in the pipe much less than the boiler pressure.

(4095) C. L. asks: Is there any solution placed upon the inside of a mould in which plaster of Paris may be cast to prevent it from adhering to the mould when cast? A. Use olive oil or soapsuds.

(4096) D. B. T. writes: You have, no doubt, noticed watches oscillating while hanging on the file at jewelers'. Why do these watches oscillate? They seem to be an anomaly. Motion is usually communicated from a stationary base, but these watches seem to have their base of motion within themselves. Please explain their *modus operandi*. A. The slight change in the center of gravity, due to the motion of the escapement, tends to set the watch in vibration. One movement of the escapement does not produce any visible effect. The action is cumulative, like that of destroying a bridge by the march of soldiers. The first impulse produces little effect. The effect of the second is added to the first, that of the third to the second, and so on until the maximum is reached. It is essential that the watch be very delicately suspended.

(4097) T. H. asks: 1. Where Zwicker's "Engineer's Companion" is published. It treats of setting of valves of engines, etc. A. We can supply Zwicker's "Instructor for Machinists, Firemen, and Steam Engineers." Price $1, by mail. 2. Which is the proper way to set a globe valve, and reason for so doing? My method is having the pressure against the seat, but have been told different. A. Always set a globe or angle valve to shut against the source of the steam. This always allows of packing the spindle when steam is on. 3. Is there any good book published on setting the valves of the Corliss engine? If so, where, and what price? A. We can supply "The Corliss Engine," by Henthorn and Thurber. Price, $1 by mail. Also Halsey's "Slide Valve Gears," price $1.50. 4. What is the cause of having a T. H. alternator spark? It seems as though fire was coming out of the armature (inside), and has a strong smell of burned rubber. Would the dampness of the room after being mopped cause it? A. You have a short circuit, we presume, somewhere. Investigation only could show where. The dampness of the room has nothing to do with it. You should have it attended to at once, as you are spoiling the insulation evidently.

(4098) W. E. T. asks: 1. What effect would dipping or saturating oak posts in lime water or a strong brine have on them in the way of preserving them from rotting after being put in the ground? A. The cheapest process for preserving posts, and probably the best, is to soak the ends in a nearly saturated solution of sulphate of iron (1¼ lb. of the crystal sulphate to 1 gallon of water) for 24 hours. 2. Which would be the best, lime water or brine? A. The most convenient arrangement for this work is to use a tight hogshead with one head out, set it on end and pour the solution in about 6 inches deep; then fill the hogshead with the posts. Repeat the operation each day, until the required number of posts are treated. The setting can commence at once. Oak timber treated in this manner is known to have lasted 30 years in damp mines, where 2 years is its life without treatment. 3. What strength of each solution, and how long should the posts stand in the solution to insure the best results? A. If the posts are pointed, the solution should be made deeper than 6 inches, so that when the hogshead is filled with posts the solution will rise to 2 feet in depth. 4. Do you know of a cheap way to preserve oak posts from rotting? I have charred them and dipped in coal tar, but it is too expensive.

(4099) E. F. H. asks: Is a vacuum power? What is its chief advantage when used in connection with the steam engine? A. A vacuum is power when applied against atmospheric pressure. It adds about 13 lb. per square inch to the work of the piston, and in proportion to the mean engine pressure on the steam side is the measure of economy.

(4100) E. W. asks: 1. How long will a Bunsen cell, 1 pint, last, run steady on a motor for 13 hours at a time for 6 days out of every week? A. If the motor has a high resistance, the cell might operate for a week with the renewal of the electropoin fluid at the end of the third day. If the resistance is small, the cell might fail in ten hours, or it might run forty hours, all depending on the amount of current used. 2. Will a 1-16 h. p. motor run a canoe? A. It might at a very slow speed. You cannot expect much from a motor of less than ⅛ to ¼ h. p. 3. What is the voltage of a 1 pint Bunsen? A. Two volts. 4. I have an Edison lamp, 4 candle power. How many ½ pint Bunsen cells will be required to run it? A. Three to four.

(4101) T. B. P., Jr., asks: 1. I have just made a spark coil. My method was as follows: The inside of a bamboo rod, 7-16 inch in diameter, I filled with No. 16 soft iron wire. The rod is 8½ inches long. On this I wound five layers of double covered No. 16 copper wire. The terminals of the wire I connected with binding screws on the end pieces. On putting the coil in circuit with a ratchet burner and four cells of Leclanche, it was found that there was scarcely spark enough to light the gas; so the spark coil was removed, and in its place an iron bolt, 5½ inches long, wound with 16 layers of same wire, was substituted. This arrangement produced a spark fully twice the size of the other. What is the matter with the first spark coil? I had always understood that a core of iron wires was preferable to a simple bolt. A. In the first instance your wire was too far from the iron core. 2. Would it be possible to converse by means of two telephone receivers if the binding posts were connected each to each, or would it be necessary to introduce a cell or more of battery? Please let me know if communication between two rooms in the same house could be had in that way. Also if the steam pipes would answer as one conductor? A. The receivers can be used in the manner proposed. The sound will be weaker than when a transmitter is used. 3. How many cells of open circuit battery are required to successfully operate an automatic gas lighting burner? A. Four or six.

(4102) J. G. K. asks: 1. The height of a column of water to equal one pound pressure per square inch at sea level. A. 2·3093 feet. 2. The height of a column of mercury to equal one pound pressure per square inch at sea level? A. 2·0408 inches. 3. The mean pressure of the atmosphere at sea level, and the height of column of water it will support. I find different authorities do not agree on this subject, and would like to get, in your opinion, the nearest correct. A. The pressure of the atmosphere when the barometer is at 30 in. is 14·7 lb. per square inch. The height of a column of water at 14·7 lb. pressure and 30 in. of the barometer is 33·947 ft. 4. What would be the cubical volume of a tetrahedron or four-sided body with all sides equilateral triangles, whose edges are 2 in. long, and the formula for working it arithmetically? A. For the volume of a tetrahedron multiply the linear edge of one side by 0·11785 for the volume or contents. The formula is a mathematical one. You will find a table of all the conditions for computing the elements of polygons in Haswell's "Pocket Book," $4 mailed.

(4103) D. L. asks: What materials give best results for insulating heat and cold in refrigerators. Which is preferable—charcoal or mineral wool? I am about to make a refrigerator, and I have very little experience along this line. I will also be very much obliged for any suggestion in regard to construction to attain the best result? A. In large refrigerators and cold storage rooms, the best practice is to line the space with paraffined building paper and fill in with dry sawdust. For house refrigerators pulverized and mineral wool are both used. The mineral wool if properly packed is the best non-conductor, but charcoal makes the sweetest refrigerator, as it absorbs any odors from dampness that may accidentally get into the insulating space. In large refrigerating rooms the insulating space should be 6 in. thick. In household refrigerators 2½ to 3½ in. space, according to size. The method of construction you will readily understand by examining the refrigerators in use.

(4104) J. P. asks: 1. I have a C. & C. one-eighth horse power electric motor to be run in connection with a plunge battery. The carbons and zinc were allowed to remain in the solution for some length of time, and have become covered with a thick coating, so that they are in one solid mass. How can I get the carbons and zinc clean again? A. Soak them in hot water for a few hours. 2. If I run the motor by a pulley from a water motor, how many lamps of 16 candle power would the motor light? A. The voltage of motor would probably be too low for anything but small lamps. 3. Could I connect the electric motor with the wires of Edison's system of incandescent lighting for houses, so as to run a lathe or sewing machine, and if so would I have to reduce the power in any way, and how? A. No. The motor must be differently wound for the Edison circuit.

(4105) J. H. G. asks for the cheapest and best method to extract the metal from the scum and skimmings from spelter, used to galvanize steel wire; it looks like dark yellowish ashes and is very heavy. A. It will not pay. The substance is principally oxide of zinc. Distillation with charcoal in a retort is the method of reduction.

(4106) N. B. R. writes: 1. I am building the dynamo described in SUPPLEMENT, No. 161. I have No. 16 B and S gauge single-wound cotton-covered copper wire for the field magnets. Is the insulation complete enough, or would it be better to paint each layer of wire with shellac before winding the next layer? A. The insulation will be sufficient if thin paper is placed between the layers. 2. Would No. 16 wire be as good as No. 14 for connecting the commutator springs with the binding posts? A. Yes.

(4107) R. L. W. asks for a good ink eraser. A. Try a saturated solution of oxalic acid in water. The red inks are made of various bases; for the color, as Brazil wood, cochineal, and aniline red. The aniline red may be removed by alcohol acidulated with nitric acid. Javelle water is good for many colored inks. —From the "Scientific American Cyclopedia of Receipts."

(4108) C. E. A. asks: Can you give me any plan for the cheap production of cyanide of ammonium? Have tried the passing of the ammonia gas over heated charcoal, which does not seem to give the desired result. A. Heat sal ammoniac (ammonium chloride) and dry potassium ferrocyanide together in a loosely closed flask or retort. The ammonium cyanide volatilizes and condenses in crystals. The work is very dangerous on account of the poisonous nature of the compounds.

(4109) A. W. B. asks: Is it practicable to have a dynamo (one to furnish eight 16 candle power incandescent lights) run by a windmill? If so, how large would the windmill have to be, and what size dynamo would be necessary? As the wind might not furnish power enough at all times, how many storage cells would be necessary to store enough electricity to run the lights four hours, etc.? A. It requires a full horse power to run the dynamo. You would need from 8 to 12 storage cells.

(4110) C. A. G. writes: 1. Take an electric current: A man could readily see that the deflections of a galvanometer were not in proportion to the current. So who made it, and how was the discovery made that the currents were proportional to the tangents? A. In the tangent galvanometer the needle is so far removed from the coil that the lines of force passing through it are virtually parallel. The earth's directive action on the needle varies with the sine of the angle it makes with the magnetic meridian, the action of the lines of force due to the current is proportional to the cosine of the angle. The intensity of the current producing a given deflection under both forces varies with the sine divided by the cosine or with the tangent of the angle. 2. Taking the law that the current is equal in all parts of the circuit (which I suppose means that it is equal in voltage and amperage), how can there be any difference of potential in any part of the circuit? A. Voltage is not an attribute but a cause of current; therefore your supposition is wrong. As it is the cause of current, any two points on a circuit in action include between them a fall of potential, as the cause of or force producing the current in such part. 3. Given a current: Now, on one galvanometer say it registers 5°, on another 8°, must there not be a standard method of conveying the current around the needle so as to make the deflections equal for equal currents, on different gal-

vanometers? A. There is nothing absolute about a galvanometer, except those of special construction. Generally they have to be calibrated before their readings can be interpreted directly. Galvanometers can be and frequently are (as in ammeters and voltmeters) constructed for uniform readings for given currents. 4. About how many heat units are there in a cubic centimeter of zinc? A. In conversion into oxide it will liberate 121 kilogramme calories. 5. I have made the motor described in SUPPLEMENT, No. 783, and it works to perfection, going so fast it hums. Now, as I understand it, the centers of greatest attraction on the field magnets are right next to the coils; therefore, the armature revolves, being attracted on one side and repelled on the other. Am I right? A. Yes. 6. On the motor referred to, one side of the armature is positively and the other side negatively magnetized, is it not? A. Yes.

(4111) W. H. W. asks: 1. Will you please inform me through your paper what is the difference between nitrate of silver and oxide of silver, and how each are formed and what are their characteristics? A. Silver nitrate is a compound of the nitric acid radical and silver, and is made by treating silver with nitric acid. It is a white solid, fusible and known often as lunar caustic. Silver monoxide is a brown powder formed by precipitating the above in solution with caustic alkali. 2. What is the substance called salicylic acid and how formed, and in what way is salacine connected with it? A. It is ortho-oxybenzoic acid, $C_6H_4(OH)CO_2H$. It is made by heating sodium phenate in a stream of carbon dioxide. It occurs free in the flowers of *Spiræa ulmaria*, and as a methyl ether in oil of wintergreen. Salicin is a glucoside, $C_{13}H_{18}O_7$, not directly related to salicylic acid. It is contained in the leaves and young bark of the willow, poplar, and other trees. Your other questions we cannot undertake to answer.

(4112) A. C. writes: 1. Last year bought Hopkins' "Experimental Science." Constructed motor as therein described, page 497, etc., using cast iron magnet; did not double number of coils and convolutions; used field magnet just as it came to me from foundry. Should four volts make such motor move sufficiently to test accuracy of winding and connections? A. The voltage should be sufficient to overcome the resistance of the machine. The amperage must be great enough to produce the power. With an E. M. F. of 4 volts and 4 or 5 amperes the motor should work very well. 2. With what degree of accuracy should halves of magnet be fitted together, and if inaccurately fitted, can failure to respond to four volts be attributed to that cause? A. The joints of the magnet should be as perfect as possible. Your trouble was probably due to insufficient current. 3. What is the difference if, in winding armature, the terminal end of each of the twelve coils comes from the inside (or under) of core in place of from outside, as in illustration, page 500? A. No difference.

(4113) T. D. W., Jr., asks: 1. What kind of battery is required to run the electric tray illuminator as described in the SCIENTIFIC AMERICAN, vol. lxv., No. 21, page 329? I wish to construct one of one or two candle power incandescent lamps. What kind of battery and how much would it cost to run the same for a year? I would not use it every day, but only once every now and then. Sometimes it is a month before I will take a picture. A. Use 4 or 6 cells of Leclanche battery or 3 or 4 cells of Fuller. The cost is very small when the battery is used only occasionally. It would not cost more than 50 cents per year after the batteries are provided. 2. Is the flash made by the flash light (described on the same page as above) instantaneous or does it require a time exposure? Is the lens left uncapped and the flash made, or is the flash made and the exposure made a time one? Also what number of Seed's or Cramer's plates should be used? A. The flash is instantaneous. Use the quickest plates. The lens may be left uncovered. 3. Will beeswax do as well for lining a tray for silvering paper as paraffin? A. Yes.

(4114) J. B. M. asks: 1. I have some statuary made of composition (sample inclosed) having a similar appearance to Rogers groups in finish. The outer coating or finish is wearing off, giving them a soiled, spotted appearance. What can I use to restore this brownish, or drab finish? It is a dead color, not a gloss. A. Give it a coat of paint made of white lead, raw umber, a very little oil and turpentine. Tube colors such as are used by artists can be used after thinning with turpentine. 2. What will restore the gloss to frame work of a type writer that has become dull? A. A thin coat of hard drying japan varnish. A fine quality of furniture varnish with refined lamp black added is sometimes used.

(4115) J. A. P. writes: 1. I have a boat 12 feet long. What size motor would it require to run it 5 or 6 miles per hour? Would two simple motors like those described in Hopkins' "Experimental Science" answer? A. You will hardly get more than three miles an hour with the simple motor. 2. How many cells storage battery would it require? A. 12 cells. 3. How many square feet of positive plate would it require to each cell? A. 2 or 3 square feet. 4. How can I anneal cast iron? A. Imbed in blacksmith's cinder and oxide of iron and heat in closed iron boxes to redness for several days. 5. How much current does a storage battery receive in circuit with a 16 candle power 110 volt lamp? A. Half an ampere.

J. N. L. says: Kindly give me a receipt for an ink eraser in liquid form.—C. R. D. says: Will you please give me a good receipt for making soldering fluid to be used in jewelry?—F. C. A. says: Tell me of a cheap substance that can be melted and run into moulds and become hard like rubber when cold.—A. F. J. says: Will you please let me know how to dissolve amber in some quick drying solvent, so as to dry about as quick as shellac in alcohol?—G. B. B. asks for a copying paper.—J. H. says: I noticed the article on cement for metals made of zinc oxide and zinc chloride. Won't you kindly let me know how it is prepared?—W. W. G. says: Please inform me what is generally used in making plaster of Paris moulds, and how to mix it.—C. A. B. asks: Can you inform an old reader of what that compound is, and the manner of making it, that rubber hand stamp manufacturers use to take their impressions of the type in?—W. B. R. asks: Can you tell us in your paper the kind of rubber cement that is used on the back of felt letters by which they are stuck to cloth, simply by running a hot iron over them? What is the cement made of and how is it applied to the felt? —W. M. says: I should like to know of some washing preparation.—C. J. M. says: Please answer through your Notes and Query column how to make colored crayon for the purpose of rough sketching on paper.—A. D. says: If it is not outside your province, will you kindly give me the recipe for making koumiss out of cow's milk?—P. C. asks for a reliable washing compound.—G. W. S. asks for a formula for a benzine-resisting preparation to apply to corks.—F. C. & Co. ask for a burnishing ink for the use of shoemakers.—A. B. C. says: 1. Please inform me how carbon paper such as used with the typewriter in making transcripts is made. 2. How can typewriter ribbons be renewed or re-inked?

Answers to all of the above queries will be found in the "Scientific American Cyclopedia of Receipts, Notes and Queries," to which our correspondents are referred. The advertisement of this book is printed in another column. A new circular is now ready.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

March 1, 1892.

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

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Advertising puzzle, J. L. Leavitt 469,839
Advertising sign, J. O. Belknap 470,034
Aging whisky, apparatus for, J. H. Halligan 470,121
Altar for sacramental purposes, household, L. C. Beaudet 470,098
Annunciator, electro-magnetic, F. W. Dunbar 469,995
Armature winding for dynamo-electric machines, R. Eickemeyer 469,917
Asphaltum, etc., from natural asphalt, production and manufacture of pure, H. A. Diehl 469,777
Auger, earth, B. Lane 470,059
Auger, earth, C. A. Scott 470,168
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Baling press, A. A. Gamble 469,737
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