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 next issue.

NEW BOOKS AND PUBLICATIONS.

ANWENDUNGEN DER MECHANISCHEN WÄRME-THEORIE AUF KOSMOLOGISCHE PROBLEME. Professor August Ritter, Ph.D. Hannover: Carl Rumpler, 1879. (The Applications of the "Theory of the Mechanical Equivalents of Heat" to Cosmological Problems.)

The object of the author is to deduce from the laws of the "Theory of the mechanical equivalents of heat," the properties of a heavenly body, floating in space and acted upon only by its gravity, the whole mass of the body being in a gaseous aggregate state. He also discusses the question: How would the present condition of the existing heavenly bodies harmonize with a gaseous aggregate state of the same; Also, the unstable equilibrium of the atmosphere, the temperature of an assumed atmosphere in the interior of the earth, the gaseous heavenly bodies, the relation of the mechanical action of gravity to the quantity of heat produced, the changes of the sun, the annual diminution of its radius, and numerous similar hypothetical subjects, are carefully and attentively discussed in six dissertations. These dissertations appeared in "Wiedemann's Annalen der Physik und Chemie;" the author has had them published as a separate work in order to induce others to interest themselves in these subjects and to examine and develop them. The author is Professor of Mechanics at the Technical High School at Aachen (Aix la Chapelle), and has a high standing in the scientific world.

THE MAGAZINE OF ART.

The Magazine of Art for September (Cassell, Petter, Galpin & Co., 596 Broadway, New York) is an unusually fine number. Lovers of art will appreciate the excellent illustrations and valuable information which this beautiful periodical supplies.

FORESTS AND FORESTRY. By S. V. Dorrien. New York. Paper, pp. 46.

This is a letter addressed to Verplanck Colvin, Esq., Superintendent of the Adirondack Surveys, on the importance of forests and their management in Germany, with a short review of the historical development of forestry.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

(1) J. W. C. asks how to measure a building or rooms to heat them with steam. A. According to Haswell, one square foot of plate or pipe surface will heat from 40 to 100 cubic feet of inclosed space to 75° in a latitude where the temperature ranges from —10°. As a general rule 1 square foot of heating surface will heat 100 cubic feet in an inner room, and 75 in an exposed room.

(2) R. C asks for the rules for heating of buildings by steam and hot water; or quote the best authority. A. See reply to J. W. C. on this page, also consult "Box on Heat."

(3) H. B. asks: 1. Which slides of a vertical and which of a horizontal engine wear the fastest, also the reason, practically? A. It depends upon which way the engine runs. A moment's observation should satisfy you which slide receives the most pressure. 2. Why do locomotive cylinders wear most at the ends? A. Do they wear most at the ends? If so they wear differently from all other steam cylinders. 3. Where can I obtain information about cycloids? A. In any good geometrical work. 4. What is the best works on locomotives for a young mechanic to study? A. "Forney's Catechism of the Locomotive" and "Clark on Locomotives." 5. What course of draughting would you advise a young mechanic to go through? A. If without a teacher, study MacCord's drawing in SCIENTIFIC AMERICAN SUPPLEMENT.

(4) C. B. writes: 1. I have had a practical optician experimenting the "new camera lucida," as described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158, and he can make nothing of it. Please give me the address where they may be had. A. As some of the draughtsmen in this office have made cameras from the directions given in the SUPPLEMENT, we conclude that you have not followed directions carefully. The address of the inventor of this form of camera lucida is given in the article referred to. 2. Also, is there a way to cast under pressure, and how? A. Pour your metal into the mould through a tube and leave a column of metal standing in the tube. If the metal melts at a high temperature the tube should be lined with clay or moulding sand. 3. What is the composition of oreide, that watch cases are formed of sometimes, and in what proportions are the metals mixed? A. Oreide: copper, 73; zinc, 12·3; manganese, 4·4; cream of tartar, 6·5; sal ammoniac, 2·5, quicklime, 1·3.

(5) M. & L. ask: 1. Is the electric light more injurious to the eyes than the ordinary coal oil lamp? A. The light is not injurious, but to view the source of light is. 2. Is the electric light, described in SUPPLEMENT, No. 149, sufficient to light a room, 7 feet x 10 feet x 11 feet? A. The electric light referred to is designed merely for experimental purposes and not for continued use. 3. Will it answer to make the battery jars of the ordinary household bowls? A. Yes. 4. Are the zincs of the ordinary thickness as that used by the tinsmiths? A. No; the zinc must be at least ⅛ inch thick, and it should be thicker. 5. Are the carbon holders made of brass? A. Yes.

(6) P. S. writes: 1. I have some cotton covered copper wire; would it not be best to varnish it, to make the cotton stick to the wire better? A. Yes. 2. How many feet is 1 lb. No. 24 wire? A. About 800 feet. 3. Are the coils for an electric bell and an electro-magnetic machine wound opposite to each other, that is, one right and the other left handed? A. They may be wound in opposite directions, or in the same direction, provided they are connected so that the current traverses them in opposite directions. 4. Is it best to wind the wire directly on the soft iron core, or on a thin wooden spool? A. Wind on the core after wrapping it with paper. 5. How are spools wound to give shocks, and with what No. wire? A. See SCIENTIFIC AMERICAN, Vol. 39, p. 203 (14). 6. Is a Leclanche battery for an electricity machine good to give shocks? A. It will answer for temporary use, but is not suited for long continued use, as it quickly polarizes. You should use some form of constant battery. 7. What does cotton covered copper wire No. 24 cost a pound? A. $1.10. 8. Where are the ends of the wire from the coils of an electro-magnetic machine fastened? A. To the commutator cylinder. 9. Is it best to put a strip of paper under each layer of wire in the coils? A. Yes.

(7) H. N. C. asks: How many cells of the gravity battery will be necessary to beat a piece of platinum sufficiently to light the gas with? A. About 25.

(8) H. M. P writes: In the plan of the induction coil in No. 162, SCIENTIFIC AMERICAN SUPPLEMENT, the secondary coil seems to be wound in two sections. Is it necessary? Would it not be as well to wind it right across, and put a layer of shellac and thin paper between each layer? A. Many coils have been made in the manner proposed by you, but the plan given in the SUPPLEMENT is cheaper, and the coil made in that way is less liable to injury by internal discharges.

(9) O. E. P. writes: 1. I wish to transfer upon black painted work a large number of ornaments, borders, etc., in gold bronze, and propose to have them engraved and then printed and bronzed on paper, somewhat like the transfer ornaments used on carriage work. What preparation shall I use on the press in printing? Will the gold size usually used by printers answer? A. As we understand you, the printer's gold size will answer. 2. What kind of paper should be used? A. Use a heavily sized lithographic transfer paper.

(10) M. J. W. asks: Can animal fat be thoroughly incorporated with common clay? And can the whole be aerated? A. If we understand you, no.

(11) H. S. asks: What substance is put in safes to make them fireproof? A. The composition of 19 different fillings is given on p. 218 (17), Vol. 40 of SCIENTIFIC AMERICAN.

(12) "Reader" asks how to write or engrave in relief on zinc plates, for printing, as is done by zincographers. A. Use good lithographic ink, and etch with very dilute sulphuric or nitric acid.

(13) H. C. H. asks: Has there ever been a book of instruction published on lithography or photolithography or both; if so, where can they be obtained? A. Consult Vogel's "Chemistry of Light and Photography." See advertising columns for address of booksellers.

(14) S. E. T.—The wheel question, "How many times does a wheel revolve on its own axis, in traveling once around the periphery of a fixed wheel, both wheels being of the same diameter?" was so fully discussed a few years ago in the SCIENTIFIC AMERICAN, that we cannot again revive it. Many columns, for several weeks, were devoted to the discussion. The lunar motion argument which you now suggest was then presented. A pamphlet of over a hundred pages, called "The Wheel," was printed, containing the discussion. By a little perseverance and care in observation you can probably satisfy yourself by trial with a pair of wheels, that the moving wheel makes one revolution on its own axis and one revolution around the axis of the fixed wheel.

(15) W. F. asks: Is there a company making hydrogen gas out of water, on a large paying scale; if so, what is the process? A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 42, p. 654, Lowe Gas Process.

(16) E. B. T. C. asks: What medicine or combination will relieve me from the fatty substance, commonly called "black heads," which accumulates in the face? A. A very moderate diet and frequent bathing are among the best remedies.

(17) G. W. M. asks for the best varnish or preparation for the iron cover of a cistern to preserve it from rusting. A harmless substance is desired, as some slight portion of the rain water that falls on the flat cover is liable to enter the cistern. The water is used for domestic purposes. A. You may use genuine asphaltum varnish.

(18) E. J. S. desires information in regard to boring cylinder with boring bar, with the cylinder clamped on the carriage and the centers set out of line. Will the hole bored be round or oblong? A. Oblong or elliptical.

(19) G. W. L. writes: 1. I have a clock of the old kind, generally denominated "grandfather's clock," with a good walnut case, which is painted red. What process shall I take to remove red paint? I am desirous of having it painted with some other paint. I would therefore like to remove old paint without injury to the case. A. Warm the paint with a hot shovel held near it, or with the flame of an alcohol lamp, then remove the paint with a wide scraper. 2. I am running an engine 14x20, 120 revolutions per minute; the opening to admit steam to steam chest is 4 inches x 1¼ inches: is there area enough to feed cylinder of the above named size? A. It is about one half as large as it should be. 3. What should be the size of openings or induction ports of cylinder 14x20, making 120 revolutions per minute? A. About 9 inches x 1¼ inch. 4. Should like to know what examination a man must go through to be hired as railroad engineer, that is, to run locomotive? A. We do not know the character of the examination required on railroads; it is probably different on different roads.

(20) B. C. C. writes: Our engine started to cut in the steam chest, so that we had to get in a false face. This face is just large enough to hold all the parts; and then lead was run in at each end of the face to make it steam tight. Every six months the cylinder has to be taken off and the lead run in again to keep the face steam tight. Is there anything better than lead that will do to put in its place that will answer the purpose and will not have to be renewed, as it is a great deal of trouble to take off the cylinder every time it needs fixing? A. Type metal would be much better than lead. Use Babbitt metal if you cannot procure type metal.

(21) "Subscriber" asks: What is the ratio of iron and lime (as a flux) to the silica in the ore, and upon what does such ratio depend? Also, what is the simplest and best work published on lead smelting, and the reduction of argentiferous lead ores? A. The iron desulphurizes the galena, and the lime appropriates the silica which would otherwise combine with the lead. 100 lb. galena (clear) requires about 23 lb. iron (or its equivalent in iron ore), and the quartz sand in the neighborhood of equal parts of limestone. Consult parts 4 and 5, Percy's "Metallurgy." Your ore will be noticed under "minerals."

(22) J. S. T. writes: 1. I am experimenting with a new propeller. The model is 6 inches in diameter, and I would like to make models of the best that are in use to work against it. Please give the proportions. A. You should learn how to draw a propeller by studying "MacCord's Mechanical Drawing," in the SCIENTIFIC AMERICAN SUPPLEMENT; you will then be able to draw all the different forms. 2. If there is any treatise on the subject you would advise me to peruse, please state where I can find it. A. There is no one work published that would meet your wants; information on the subject is scattered through various books and periodicals.

(23) H. A. W. asks: 1. Would the easily made chromic acid batteries do for magnetizing a rattail file? A. Yes. 2. How many cells would it take to destroy life? A. With a suitable induction coil, 18 or 20 cells. 3. Where can I get the carbon pencils? A. From dealers in electrical supplies who advertise in our columns. 4. What size wire do I need for covering the file and how much? A. Use about 50 feet of No. 16 cotton covered wire.

(24) A. G. S. asks how to make the preparation that is put on cards which turn a different color when there is a change of weather. It is of a pale blue color when fair weather, but in damp and rainy weather turns a pale pink. A. Use a dilute solution of chloride of cobalt in soft water.

(25) A. J. H. asks (1) how to find the area of a piston. A. Multiply the square of the diameter by the decimal 0·7854; all engineers' pocket books have tables giving the area of circles. 2. The way to find the travel of piston in feet per minute? A. Multiply the number of revolutions per minute by twice the length of stroke.

(26) S. L. J. asks for the best recipe for making a strong quick drying paste or preparation of which flour is the base, similar to that used on envelopes or postage stamps. A. The mucilage is prepared from gum dextrine (British gum), 2 parts; water, 5 parts; acetic acid, 1 part; dissolve by aid of heat. Strain, and add 1 part 80 per cent alcohol.

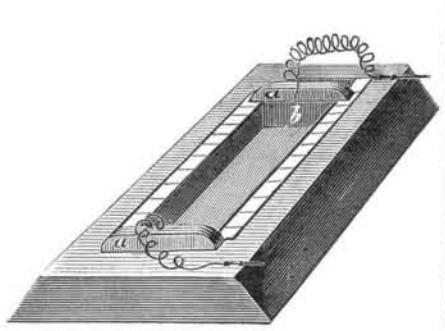
(27) H. G. A. asks: Can you give me a rule by which I can calculate the velocity of steam at different pressures through pipes of different sizes, and how much to deduct for friction on straight pipes and angles of 90°? A. A formula for the flow of steam and gases, which is generally accepted as correct, is still wanted. You can find rules and formulæ in Clark's Manual for Engineers," page 893 and onward.

(28) H. von S. asks: 1. Where and by whom are steam engines manufactured to burn petroleum oils in place of coal or wood? A. We know of no one who makes boilers specially for petroleum, though there are many boilers in the oil regions in which oil is used as a substitute for other fuel. 2. What would be a suitable size of such engine to give a boat, 30 feet long by 8 feet beam, a speed of 10miles an hour? A. The engine for such a boat should be about 6 inch cylinder by 8 inches stroke, with tubular boiler about 40 inches diameter by 5 feet high.

(29) W. R. J writes: There is a blast furnace located about 1,200 feet from a water power. It has been proposed to convey the power by wire ropes to the blowing machinery located at the furnace. I suggest that the machinery be located at the power and the air conveyed to the furnace. The furnace will require about 1,300 cubic feet of air per minute, at an average pressure of 2½ lb. per square inch. I propose to use a 15 inch pipe. Which plan do you think best, and what would be the loss in friction through the pipe? A. Locate your blast machinery near the power, and convey the air in a large pipe; the pipe, if large, will be a substitute for a receiver or reservoir.

(30) W W. S. asks (1) if it is necessary that the "air chamber" (that is, any part of it) in a force pump should be higher than the discharge snout. A. Yes, to prevent the air passing away with the water. 2. When an air chamber is used, does any of the water pass into it and by so doing compress the air? A. Yes, sufficient to compress the air to the pressure required for delivery of the water. 3. Should an air chamber be perfectly air tight? A. Yes. 4. What are the advantages to be derived from using an air chamber? A. More uniform delivery of water and relief to the valves

(31) G. M. asks how to determine the conducting power of liquids. A. To measure the resistance of liquids make a wooden trough, 4 or 5 inches long, and cement it with sealing wax. In this trough place two



movable blocks, *a a*, the edges of which, extending over the sides, will serve as indices to the scale. To each of these blocks is attached a platina plate, soldered to a spiral copper wire, the ends of which are fastened to the trough. The liquid is placed in the trough, and the plates placed at any convenient distance from each other. After observing the galvanometer placed in the same circuit with this apparatus, a rheostat is substituted for the liquid and adjusted until the same deflection is produced. Since Ohm's law holds good for liquids as well as solids, the resistance of a stratum of liquid can be calculated from the length, breadth, and thickness when the resistance for the unit of section and length is known.

(32) B. H. L. asks: 1. Is civil engineering a good, profitable, and healthy business? A. Yes, in ordinary times. 2. How and where is the preparation best obtained? A. At educational institutions where it is especially taught. 3. Is civil engineering as good a business as mechanical engineering, and where do you get the best preparation for a mechanical engineer? A. The difference will depend entirely on circumstances. For mechanical engineering, in a technical school and workshop.

(33) M. A. D. writes: Suppose I have a furnace and boiler for making steam to run a large air pump. I have this pump to force air into a large iron drum. I then use this compressed air to run an engine. What per cent of the steam power can I get out of the air engine? A. Probably from 30 to 55 per cent of the power expended, and by an exceptionally good arrangement, perhaps somewhat more.

(34) W. C. B. asks: Would a circular steam boiler, 10 inches in diameter by 12 inches long, with wrought iron sides 3-32 of an inch thick, and cast iron heads 5-16 of an inch thick, with 5 one inch flues, be perfectly safe at 50 lb. pressure? A. Yes, with the exception of the heads; if they are to be cast iron, make them ⅝ inch thick at least.

(35) G. H. B. asks: What will be the mean velocity of a stream of water running through a pipe 2½ feet diam , 1 mile long, grade of 1½ inch to 100 feet, and a mean head of 2 feet? A. Formulas given differ very much, but the average result is about 3·8 feet per second.

(36) G T asks if there is such a place on the American coast, north, south, east, or west, as Eddystone Lighthouse, or North and South Edisto, or Edisto Island? A. Edisto Island, in the southern part of South Carolina, is at the mouth of the Edisto River, and is formed by two tidal streams called North Edisto River and South Edisto River. Edisto Island post village is on Edisto Island.

(37) W. M. B. asks if a locomotive engine, same cylinder and same pressure of steam, is as effective as a stationary engine, and if not, why not? A. No, because the valve arrangement will not permit the working of the steam expansively to the same degree of efficiency.

(38) F. L. writes, I am troubled with salt in my boilers coming from the lower levels of the mine. I understand in ocean steamship practice, zinc is put in the boilers. What action has it on the salt? Is it used as a plain metal or a compound, and how, and in what quantity? A. Zinc is more electropositive than iron, and in virtue of this property it in a measure protects the boiler plates from corrosion. It is usually employed in the form of plates or scrap (spelter) in quantities of 5 or 10 lbs.

(39) F. R. R. asks: 1. Will the power or polarity of a permanent magnet be affected by constant use on an electro-magnet, to be attracted and repelled, and liable to be left in either position for a length of time? A. If the electro-magnet is strong, and the like poles of the two magnets are in contact with or near each other for a time, the polarity of the permanent magnet would be neutralized or reversed. 2. If an electro-magnet is more than twice as strong, as a permanent magnet, or *vice versa*, would not the attraction of the strong magnet for the metal of the other overcome the repelling force of its corresponding pole and attract instead of repel it? A. Yes. 3. Would it not be the same if both were permanent magnets, or both electro-magnets? A. Yes.

(40) W. A. A. writes: 1. I want to make an engine, 3½ inches stroke and 3½ inches diameter, how large should the ports and exhaust be? A. Steam ports ¾ inch x 2¾ inch. 2. How large a boiler and of what size copper should it be made of, so that it would stand 150 lb ? A. Exhaust ports ⅝ inch x 2¾ inch. The size of the boiler about 30 square feet heating surface, but will depend upon the speed of the engine and thickness of metal upon the design of the boiler. 3. How large a boat would be best adapted for this engine? A It would probably drive a good model boat, 21 feet in length, at a fair speed.

(41) W. H. G. asks: 1. If two or more small cubes of Indiarubber are clamped together in a certain machine, would the pressure cause all of the pieces of rubber to be equally reduced in the direction of the pressure, or would some of the pieces yield more than the others? A. As we understand you, if the cubes were taken from the same piece of rubber the elasticity would be about the same in all of the pieces. 2 How long would the elastic nature of rubber continue if subjected to such pressure at intervals, and where the degree of force applied sometimes varied? A. Your question will not admit of a definite reply; from one to five years, depending upon the conditions of strain, wear, and exposure. 3. In what way can rubber be made to resist the hurtful effect of linseed and other oils? A. If the rubber is to be subjected to varying compression, we know of no practical means of protecting it.

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

C. P. T —No. 1 (quartzose), gold, 1 3-10 dwt.; silver, 255-100 oz; value $4.13 per ton. No. 2, gold, 1 3-5 dwt.; silver, 6 68-100 oz.; value per ton, $8.97. The others contain nothing.—J. S. R.—1. Pyrrhotine (magnetic pyrites, iron sulphide). 2. Zincite (red oxide of zinc). 3 and 4. Magnetite (magnetic iron ore).—R. H.—Quartz and magnetite an excellent iron ore.—J. W C.—It is mica scales, of little value.—W. E. K.—Fossiliferous limestone.—J. D. M.—Chrysolite (olivine) in basalt.—H. W. T.—Lime carbonate. We do not exchange specimens.—N. P. W.—They are impure hematites (iron ores). No. 1 contains much sulphur, and No. 2 manganese and probably titanium.—W. S. H.—Iron pyrite (sulphide of iron) —G. P.—It is graphite (plumbago). If found in sufficient quantities, of some value.—L. L. R. & B.—Fragments of quartz, valueless.

COMMUNICATIONS RECEIVED.

On Ellipses; also, on Preserving Cider. By A. C.
On the Magnetic Needle. By G. W. M.
On Boiler Explosions. By J. P. H.
Death in What We Eat. By T. B. M.

[OFFICIAL.]

INDEX OF INVENTIONS

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September 9, 1879,

AND EACH BEARING THAT DATE.

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Canned fruits, vegetables, and oysters, Mitchell, Fletcher & Co. 7,671
Canned oysters, The Union Oyster Company of Baltimore City 7,674
Canned oysters, fruits, and vegetables, J. S. Farren & Co 7,677
Cigars, Sanderson & Horn 7,664
Cigars, cigarettes, and chewing and smoking tobacco, L. Hirschhorn & Co 7,655
Cigars, cigarettes, and smoking and chewing tobacco, F. McCoy 7,657
Cigarettes, B. Leidersdorf & Co 7,656
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Hair dye, G. R. Finlay & Co 7,665
Kerosene wicks, E. W. Holbrook 7,669
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Perfumery, Young, Ladd & Coffin 7,678
Shirts, C. G. Meginniss ..... 7,658 to 7,663
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Washing compound, J. D. Larkin & Co 7,666
Yeast cakes and baking powders, J. N. Brady 7,675

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India-rubber overshoes, J. Pienovi 11,400
Inkstand holders, A. Patitz 11,406, 11,407
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From August 9 to September 2, inclusive.

Book stand, F. G. Johnson, Brooklyn, N. Y.
Buckles, W. J. Carnes, Gonzales, Texas.
Compound for protecting goods, D. W. Lamb, N. Y. city.
Grain elevator, J. B Stoner, Toledo, Ohio.
Guns, W. B. Farwell *et al.*, Brooklyn, N. Y.
Horseshoe machinery, J. R. Williams *et al.*, Johnstown, Pa.
Knitting machine, B. F. Shaw, Lowell, Mass.
Machine guns, D. C. Farrington, Lowell, Mass.
Mills for grinding corn, etc., A. L. & E. Lister, Newark, N. J.
Mowing machine, P. Mast *et al.*, Springfield, Ohio.
Puddling furnace, J. Luhens, Conshohocken, Pa.
Pressure regulator, G. Ross. Troy, N. Y.
Railway signaling apparatus, W. Robinson, Boston, Mass.
Sewing machines, Wilson Sewing Machine Company, Chicago, Ill.
Spinning machinery, J. Abbott, Philadelphia, Pa.
Telephone, S. H. Short, Franklin Co., Ohio.
Water supplying apparatus, N. W. Green, Springfield, Mass.
Wheels, manufacture of, C. Bried, Newark, N. J.