

Artificial Vanillin and Vanilla Flavors.

Recently considerable excitement was aroused in Vienna, Austria, by the fact that a number of seemingly most mysterious cases of poisoning—and not a few fatalities—were traced to the use of ices and confections purportedly flavored with vanilla. But why the vanilla alone should be at fault is pertinent query, since this was the verdict brought about by the investigation.

That the vanilla bean is in a measure toxic, if ingested in large quantities, no one familiar with this growth will deny; but any amount that could induce an untoward effect must, necessarily, be so great that it could not, by any possibility, be embodied in gallons of ices or a hundredweight of confections. Again, though the bean produces a malady in those handling it known as the "vanilla disease"—a form of skin eruption that, while it may be communicated to others, is necessarily self-limited—this can have nothing to do with poisoning by vanilla "flavors," since its source is a minute insect, the "vanilla louse," of the same precise class as the cheese mite, and its period of life is extremely brief when transferred to the integument of human beings.

Also worthy of being recalled is the fact, admitted even by those most interested in their production, that vanilla "flavors," vanilla "extracts," vanilla "essences" and "tinctures," such as are employed solely to promote *souvenir* or piquancy, are never absolutely pure; on the contrary, for the most part, they are made with tonka bean alone, or with tonka to which from five to twenty per cent of vanilla bean is added. The high prices the latter command, and which oftentimes are actually prohibitory, are cited as an excuse for the deception; further, it is added, the mixture secures a better flavor, one preferred for domestic, culinary, and confectionery purposes. In this connection it may be remarked that while so-called "fruit flavors," employed in kitchens, confectionery establishments, bake shops, and at soda fountains, are almost invariably derived from butyric ether—a product of rancidity—this accusation does not hold good as regards vanilla preparations.

But even tonka beans are at times expensive, and recently they, as well as vanilla, have been replaced, in the manufacture of flavors, by vanillin. This latter is the active principle of both vanilla and tonka beans, but if had from this source, would manifestly serve to still further increase the cost of "extract" production. It has been had also from coal tar by process of synthesis, but this again was held insufficiently economical, or it was feared the knowledge that a flavor owed

its origin to an anilin factory would militate against it as a marketable product. Now vanillin is purportedly derived from the inner rind of the bark of certain pine and fir trees, by the aid of sulphuric acid and either sodium or potassium chromate, the process being somewhat intricate, secret, and legally protected. It is likewise (and perhaps more commonly, certainly more economically) had from oleaginous, gummy, and balsamic substances that are possessed of an aromatic, stereoptin constituent known as cardol; and it is the latter upon which the burden of reproach is supposed to rest—a supposition that does not appear to be well founded.

Cardol is certainly highly toxic; so is hydrocyanic (prussic) acid, to which our most delicious fruits owe their flavor. Cardol is found, but only in infinitesimal quantities, in most forms of vegetable growth, the only fruit yielding it in fairly tangible proportions being the "elephant louse" (*Anacardium orientale*) of the far East; and while it is highly poisonous when injected into the circulation, and most irritating when applied to the skin, producing a painful burning eruption, attended with considerable swelling and infiltration of serum (cellulitis), it is known to be inactive when taken into the stomach, being insoluble in any of the digestive secretions. Manifestly, then, cardol cannot be deemed a factor in vanilla poisoning, unless it can be shown: First, that it is present in artificial vanillin in appreciable quantities; second, that in the manufacture of vanillin certain chemical transformations result whereby a cardol combination of free and ready solubility is had.

The remarkable part of the Vienna investigation lies in the fact that no evidence is offered to show that the constituents of the ices and confections other than the vanilla flavoring were investigated. Considering the number of fatalities, an examination for developed and contained ptomaines, or for anilin coloring matters, would seem to have been demanded. At the same time, more knowledge regarding artificial vanillin is desirable.

The Scientific American in Colorado.

The following entirely unsolicited criticism of the work achieved by the SCIENTIFIC AMERICAN during the war recently appeared in the Daily Chieftain, of Pueblo, Col., and we feel sure that our readers will bear with our pardonable pride and that they may be interested in reading the notice:

"It is singular but true that the SCIENTIFIC AMERICAN, a paper which might be supposed to be devoted to musty and tiresome compilations of scientific lore, has

throughout the Spanish war contained the most accurate and interesting illustrated war sketches, especially those pictures presenting naval vessels and their structure. The war ended, the SCIENTIFIC AMERICAN this week presents elaborate illustrations of that great Western triumph of peace and progress, the Omaha Exposition. Provincial and narrow the New York dailies may be, but the SCIENTIFIC AMERICAN is always progressive, not only metropolitan, but cosmopolitan."

The Current Supplement,

No. 1185, contains a number of articles of general interest. "A Day in the Chief Fire 'Watch' of Berlin" is an illustrated article showing the various types of fire companies, practice houses, practice towers, etc. "Central Station Statistics" gives valuable and authoritative figures as to central electric lighting stations in the United States owned and operated by private corporations, individuals, and municipalities. "General Blanco, the Governor-General of Cuba," is a subject of a biographical note accompanied by a large portrait. "American Competition from an English Standpoint" is another article on the subject from our English contemporary, The Engineer. "Some Forms of Filariae" is an article by Dr. G. Archie Stockwell and is an interesting study in natural history. "Glacial Geology in America," by Herman L. Fairchild, is concluded. "The Cultivation of Saffron" is an illustrated paper on this industry. "A Hunting Expedition in the Altai Mountains" describes an interesting excursion of two Germans in a little known region. "The Development of Pure Food Legislation" is an important address by W. D. Bigelow, the retiring president of the Chemical Society of Washington, D. C.

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RECENTLY PATENTED INVENTIONS.**Mechanical Contrivances.**

AN APPARATUS FOR EXAMINING THE EXACT SPHERICAL FORM OF BALLS.—HENRICH MELTZER, Ratibor, Germany. This is an apparatus by which to detect inaccuracies in the spherical form of steel balls, and it is based on the principle that truly spherical bodies, placed on a true inclined plane, will roll in an undeviating path. In carrying out the invention, a narrow incline plane, of true formation, is provided, and the balls to be tested are liberated at its top in regular succession, and in a line longitudinal with the plane. The true balls will roll throughout the length of the plane, while the untrue balls will, in deviating, roll off the edges of the plane. It is thus that the test is effected.

PROPELLER.—CARL J. H. FLINDT, New York city. This invention relates to propeller wheels for steam vessels, and its object is to provide a propeller wheel so constructed that its friction against the water during rotation will be reduced to a minimum, so that greater speed will be secured. It consists of two propeller blades attached to the shaft, and crossing each other at right angles, the blades being extended in straight lines from the shaft outward and having their fore and aft edges forward and rearward of their connection with the shaft, the width of the blades being greater than the height and the extreme stern ends being curved toward the shaft.

STRAP OR ROPE CLAMP AND TIGHTENER.—AARON GRANT THAYER, Kensington, Kan. This new invention provides a simple and durable clamp for ropes or straps. In brief, it consists of a clamp comprising a frame having guide bars, a ring and cross bar for the admission of a rope or strap, and a slidable cross bar on the guide bars, and arranged to operate in conjunction with the ring and cross bar to securely clamp the end of the strap or rope in place.

SCREW-JACK HEAD.—DANIEL GLENN, Del Rio, Texas. This invention provides a locking device for screw-jack heads, so that the parts cannot separate, the locking mechanism being used as a brake to prevent the jack from moving backward. It consists of a screw-jack having a threaded shaft terminating at one end in a peripherally grooved head, a bearing head recessed to fit over said head and having an internally opening groove in the wall of said recess adapted to register with the groove in the shaft head, locking blocks fitting the grooves and holding the two parts together, the groove in the bearing head being of a depth to entirely receive the blocks, and set screws in the bearing head and engaging the locking blocks.

BALL-BEARING SCREW-JACK.—DANIEL GLENN, Del Rio, Texas. This invention consists in the peculiar shape of the thread of a screw-jack by which the thrust surfaces upon the shaft and nut are substantially at right angles to the direction of the thrust, also in the stop mechanism, which will prevent the backward rotation of the jack and which can readily be released at

will. Both the screw and nut have the flank of the thread receiving the thrust curved to fit the balls and the nut has an inclosed passage or ball race connecting its opposite ends. By means of this construction, the screw-jack may be operated with less friction and wear than in the ordinary type.

ROTARY ENGINE.—F. M. RICHARDS and H. M. FORBES, Portage, Wis. In this engine the piston and the abutments are rotary, the abutments being mounted on shafts which are arranged at right angles with the main shaft carrying the piston. The abutments are in the form of disks, with flanges projecting into the steam room of the cylinder, and each having a portion cut away at one side to allow the piston to pass. The abutments and the piston are inclosed in a suitable casing. The engine is provided with a steam chest containing an oscillating valve. There are ports in the piston through which steam is admitted to and exhausted from the working chamber. The shafts of the revolving abutments are connected positively by gearing with the shaft which carries the piston. This novel and ingenious rotary engine cannot be fully described without the aid of illustration.

HARNESS SUSPENDING AND RELEASING APPARATUS.—JOSEPH W. HOWGATE, Wilmington, Del. The invention comprises an improved method of construction whereby the suspension and releasing devices are quite compact, easily and quickly worked, and so arranged also that the moment the harness is released the suspension device is at once reset in position by supplementary springs and raised high enough to be out of the way of the horses and fire engine. The pulling on a strap secured to the actuating lever sets off the releasing mechanism, allows the harness to fall upon the horses, and, at the same time, operates the resetting attachment.

AWNING.—CELESTIN BERGERON, New York city, N. Y. In this invention there is a combination of a vertical shaft with a horizontal awning roller located at the top of the window, connected by beveled gear and a driving mechanism or crank at the lower end of the vertical shaft attached by a universal joint, so arranged that it can be detached after the awning has been rolled up. There is also a ratchet device attached to the vertical shaft to enable the awning to be held at any desired angle. The construction prevents the awning from being tampered with by unauthorized persons.

AWNING FIXTURE.—JAMES SULLIVAN, New York city. The object of this invention is to provide a fixture through the medium of which the awning is lowered or dropped and automatically locked in position, and when the awning is raised the runners will be freed, enabling the entire awning to be carried upward to its highest position in the usual manner. The device can be economically and durably constructed.

PIANO.—BERNARD KROEGER, White Plains, N. Y. The object of this invention is to permit a specially trussed piano string frame to be readily removed from the casing of a piano, such as that styled the "Grand," whereby the case can be moved independently of the

frame and consequently with less risk, inasmuch as it will be greatly lightened. Metal trusses are arranged on the underside of the sounding board free from contact therewith, for the purpose of strengthening the frame and to prevent buckling by the strings on the upper side.

Railway Appliances.

CAR AXLE BOX.—ELISHA J. HUNT, New York city, N. Y. This improved car axle box is arranged to reduce friction to a minimum and to prevent the car journals and bearings from becoming hot. The portion of the car axle in the box is provided with a corrugated wheel which meshes into a secondary corrugated wheel located above it, the axis of which supports the weight of the car frame. The ends of this axis are constructed in spherical form for the purpose of reducing friction and the prevention of end thrust. It appears to be a very satisfactory means of reducing friction.

AUTOMATIC STOP VALVES FOR HOSE COUPLINGS.—GEORGE W. EDGINGTON, Coalville, Utah. This invention is designed to provide an improved automatic stop valve, arranged to close each of the coupling members when the same is uncoupled, and prevents dust and other impurities from passing into the train pipe, thereby preventing damage to the air brake mechanism. The essential feature of the coupling consists in providing each member with two disks having perforations, one disk being movable and the other stationary. In the act of coupling, the movable disk is located so that the perforations slide over the solid portions of the stationary disk and thereby prevent the expulsion of air at the time the coupling is parted. When the ends of the coupling are placed together and locked, the rotation of the movable disks causes the apertures of each to correspond with the apertures in the stationary disks, and thereby completes the circuit of air. The simplicity of the mechanism and the certainty of its operation are very desirable features.

Miscellaneous.

MOVABLE CAISSON.—CHARLES C. LOVEJOY, New York city. The purpose of this invention is to provide an improved caisson more especially designed for use on frozen ground, in rivers or streams having bottoms of gold-bearing sand. The caisson is arranged to permit its floating about from one place to another. It can be raised or sunk at will and is provided with a working chamber for miners in its lowermost position. The caisson has a water-loading compartment in the upper portion of its casing and a working chamber in the lower portion. A compressed-air supply pipe opens into the working chamber and water-pipes lead from the working chamber into the loading compartment, so that the water is forced by the compressed air from the working chamber into the loading compartment. Doors in the bottom of the working chamber give access to the sand in the bed of the waterway.

COMBINED WAGON, SLEIGH, AND BOAT.—CHARLES BALTRUWEIT, New York city. The object of

this invention is to provide a vehicle, combining a wagon, a sleigh, and a boat, and arranged to permit a convenient and rapid change from one form to the other, according to the condition of the route to be traveled. The vehicle has a front and rear axle, a bolster connected by a king-bolt with the front axle, sleigh-runners secured to the bolster and rear axle, and a boat removably carried by the runners. A pair of posts are mounted on the runners, the posts of each pair being connected with each other by a cross-beam to form supports for the boat.

CAN-TOP.—MARY E. ANDERSON, Columbia, Mo. The invention relates to can-tops and is intended to protect the contents of the can from insects, etc. The top is provided at its upper end with an internal and external or double cylinder, the said cylinders being united at their lower ends and forming an annular groove, in which is mounted a slide adapted to open and close the outlet openings in the cylinders leading to the discharge spout. When the slide is closed, all foreign substances are absolutely excluded from access to the interior of the can.

COMBINED LAUNDRY-TUB COVER AND DRAINING-BOARD.—PETER C. FISCHER, Homestead, N. J. The object of this invention is to provide a substantial cover for laundry-tubs which will not be injured by steam and which will ventilate the tub thoroughly, and which may be used as a dish-drainer or draining-board without removing the cover. It consists of a metal top hinged to a back strip. The cover has a depression forming a tray and is provided with apertures in the depressed surface whereby the cover may be used as a draining-board. A hollow, ventilated, marginal flange receives the cover, so that air may circulate even when the cover is closed.

ENVELOPE FASTENING.—CLYDE L. SMITH, Leipsic, O. The object of this invention is to provide means of an inexpensive construction by which envelopes and similar packages may be readily and effectually sealed. It consists of the envelope provided with a slot, a sealing flap adapted to enter the slot, and of a fastening plate secured to the sealing flap and having a hooked end adapted to engage the upper wall of the slot. In sealing the envelope, the sealing flap is merely inserted within the slot and it is found to fasten the same. To unseal it, it is only necessary to place the forefinger beneath the flap and move the flap toward the bottom of the envelope and then withdraw.

PROCESS OF EXTRACTING METALS FROM METALLIC OXIDES.—HENRICH C. ASCHERMAN, Cassel, Germany. In electric furnaces, the extraction of pure metals from their oxides presents considerable difficulty when the metals have a great affinity for carbon. This is obviated in the present invention by adding to the oxides treated the sulphide of antimony in greater proportion than the oxide, and then subjecting the mixture to electric currents in a fusion furnace, the mixture forming the negative pole of the arc.

FURNACE.—JOHN S. L. RODRICK, Washington, D. C. This invention refers more particularly to an addition to

an ordinary hot air furnace for the purpose of concentrating a given amount of heat and conducting it through an interior pipe much smaller than the regular heating flue of the furnace, thereby heating the air more thoroughly in the regular furnace flue than is usual.

APPARATUS FOR PRODUCING ACETYLENE GAS. - THOMAS HOLLIDAY, Huddersfield, Eng. This apparatus is constructed to permit the use of the gas directly from the generator, the surplus pressure being compensated for by the weight of water in adjoining compartments.

MILL FOR CUTTING TEA. - CHARLES HENRY BARTLETT, Bristol, Eng. This invention relates to mills for cutting tea, and consists essentially of a revolving cylinder presenting cutting edges acting in conjunction with the stationary knife.

NOTE.-Copies of any of these patents will be furnished by Munn & Co. for 10 cents each. Please send the name of the patentee, title of the invention, and date of this paper.

NEW BOOKS, ETC.

SAJOUS' ANNUAL AND ANALYTICAL CYCLOPEDIA OF PRACTICAL MEDICINE. Vol. I. "Abdominal Injuries" to "Bright's Disease." Philadelphia: The F. A. Davis Company, 1898. Pp. 602. Cloth. 8vo. Price \$5.

This is the initial volume of a work calculated to afford material aid to the general practitioner, the teacher and the student: first, by abbreviating the time and labor that has heretofore been demanded in order to critically review any medical topic; second, to obviate the necessity for accumulating a large, constantly increasing and expensive library devoted to special or exclusive subjects; third, to record every detail of progress during the previous decade, up to and including the current year; fourth, to lay the same, in connection with the negative and positive evidence, so concisely before the reader that he may at once grasp and solve a given problem with a minimum expenditure of effort; fifth, to do away with expensive medical indexes and index catalogues.

HEAT EFFICIENCY OF STEAM BOILERS, LAND, MARINE, AND LOCOMOTIVE. With Tests and Experiments of Different Types, Heating Values of Flues, Analyses of Gases, Evaporation, and Suggestions for Testing Boilers. By Bryan Donkin. London: C. Griffin & Company, Limited. Philadelphia: J. B. Lippincott Company, 1898. 8vo. Pp. 311, 149 illustrations, tables, plates. Price \$8.

The present work is a very valuable one. It is a book which no steam engineer can do without. It is filled with tables of the most valuable kind, embracing hundreds of tests by an engineer of high standing. The author has conducted many boiler tests and has collated and compared a large number of reliable tests by others, so that the principles governing combustion and efficiency in different types of boilers can be determined.

THE PHYSICAL GEOGRAPHY OF NEW JERSEY. By Rollin P. Salisbury. With an Appendix. by C. C. Vermeule. Trenton, N. J. 1898. 8vo. Pp. 200. Plates and maps.

This forms Vol. IV. of the final report of the State geologist. Like the preceding volumes, it is an important contribution to our knowledge of this State, which has been surveyed in a remarkably thorough manner. The volume will prove of great value to those who are

in any way interested in geology or the State of New Jersey.

L'UTILIZZAZIONE DELLE FORZE IDRAULICHE E LA TRAZIONE ELECTRICA SULLE FERROVIE. By Marchese Achille Afan de Rivera. From the Nuova Antologia, July 16, 1898. Roma, 1898. Pp. 26.

NEUBAUTEN IN NORDAMERIKA. Berlin: Julius Becker, Friedrich-Strasse 240-241. 1898. Folio. 10 plates. Price \$1.50.

This is a section of a work which will include 100 plates and which is certainly well calculated to give foreigners an idea of some of our architecture. The plates are beautifully executed and the subjects are well selected.

SUBMARINE TELEGRAPHS. THEIR HISTORY, CONSTRUCTION, AND WORKING. By Charles Bright, F.R.S.E. London: Crosby Lockwood & Company, 1898. 8vo. Pp. 743, xxxvi. 145 illustrations, plates. Price \$25.

The present volume is based somewhat upon Wünschendorf's classic work, "Traité de Télégraphie Sous-Marine." Even a cursory examination shows that it is a book of great merit. A treatise on the subject has long been needed, and the book appears to admirably fill this somewhat neglected niche in electrical literature.

MILITARY EUROPE. A NARRATIVE OF PERSONAL OBSERVATION AND PERSONAL EXPERIENCE. By Major-General Nelson A. Miles. New York: Doubleday & McClure Company, 1898. Pp. 112. 4to. Plates. Price \$1.50.

There is no one better fitted to write upon military Europe than General Miles, who is every inch a soldier and to whom we owe much of our military success in our war with Spain. He writes interestingly about the "Turkish and Greek Armies," the "Military and Naval Glory of England as Seen at the Queen's Jubilee," and "Military Maneuvers." There is no doubt that General Miles obtained valuable information on his trip, and it is certain that many of the good features which European armies possess would be incorporated in our own if it were not for the evidently hopeless bureaucracy at Washington.

EXPLOSIVE MATERIALS. The Phenomena and Theories of Explosion and the Classification, Constitution, and Preparation of Explosives. By Lieut. John P. Wisser, U.S.A. New York: Van Nostrand Company, 1898. Pp. 160. 16mo. Price 50 cents.

The author is an instructor in the United States Artillery School and is editor of the Journal of United States Artillery. The book gives much valuable information in regard to explosives in very condensed form.

SECOND ANNUAL REPORT OF THE COMMISSIONERS OF FISHERIES, GAME, AND FORESTS OF THE STATE OF NEW YORK. Albany, 1898. Pp. 521. 4to. Plates.

This is certainly among the finest, if not the finest publication ever issued by any State in the Union, and is a credit not only to the commissioners, but to the State as well. It shows exactly how reports should be issued. The day of dry and musty documents is certainly at an end. The volume is large, handsomely printed, freely illustrated with colored and half tone plates and is bound in rich Holliston cloth stamped in black. The subjects selected for illustration are eminently pictorial and are of the kind which will delight the hunter, the fisherman, and those who like to pass a few weeks in a mountain camp. Although a considerable part of the report is taken up with statements of accounts, reports, laws, etc., still there are chapters which are very interesting. It is surprising to see what a really valuable book can be made from materials which in other hands would have been served up in the familiar rusty black cover and which is so promptly consigned to the waste basket.

PROCEEDINGS AND PAPERS OF THE NATIONAL FISHERY CONGRESS HELD AT TAMPA, FLA., JANUARY 19 TO 24, 1898. Washington: United States Commission of Fish and Fisheries, 1898. Pp. 375. 4to.

This is an important collection of scientific papers presented at the congress, and the commission has undertaken the publication of the papers and an abstract of the proceedings.

A DETERMINATION OF THE RATIO (X) OF THE SPECIFIC HEATS AT CONSTANT PRESSURE AND AT CONSTANT VOLUME FOR AIR, OXYGEN, CARBON DIOXIDE, AND HYDROGEN. By O. Lummer and E. Pringsheim. Washington: Published by the Smithsonian Institution, 1898. Pp. 29.

BULLETIN OF THE GEOLOGICAL INSTITUTION OF THE UNIVERSITY OF UPSALA. Edited by H. J. Sjogren. Vol. III., 1896-1897. Upsala, 1898. Pp. 457.

The Process Year Book for 1898, published in England by Penrose & Company, which we have already reviewed, is sold in this country by G. Gennert, 24 and 26 East 10th Street, New York city. He is the American agent for this beautiful publication.

"Art Education" is a new publication devoted to art interests. It is issued by the J. C. Witter Company, 76 Fifth Avenue, New York city. This is a sumptuous quarto filled with excellent half tones and line engravings. It seems to admirably fill a much neglected niche in American journalism.

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.

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The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, \$4. Munn & Co., publishers, 361 Broadway, N. Y.

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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. Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same. 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.

(7491) J. A. A. wants to know (1) the process of mending negatives, that is, where holes are made in the film by scratching, or the film began to frill so the emulsion got soft and bare spots were made. How can these be filled up? A. Use Gihon's opaque and a pencil camel's hair brush. See also SCIENTIFIC AMERICAN SUPPLEMENT, No. 658. 2. Describe the process of solandri printing as used by botanists. A. We suppose it is like the blue print process, using a natural leaf in place of a negative. 3. What would be the proper size of a camera for amateur use and what style of lens would you recommend? A. A 4x5 hand camera with an astigmat or rapid symmetrical lens. 4. Please tell me how to make flash light cartridges? A. See formula in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 1022 and 1080.

(7492) A. I. B. says: Will you do me the kindness to explain the following statement appearing on page 531 (fourth line from top of page) of the seventeenth edition of "Experimental Science," by George M. Hopkins, and published by you: "Where several lamps are connected in series and the series are connected in parallel, if one lamp of a series should fail, the other lamps of the series would be useless without some device for automatically throwing into the circuit a resistance equivalent to that of a lamp, thus maintaining the same resistance in the circuit." What I wish to know particularly is what is meant by "some device for automatically," etc. A. When electric lamps are used in series, should one of the series be extinguished, the whole of that series would go out, because of the broken circuit. To prevent the rest from going out, there is attached to the lamp an automatic device which cuts in a circuit for the current around this lamp and the current is not cut off from the series. The rest of the lamps continue to burn. This circuit around the broken lamp must have a resistance equal to that of the lamp, in order to keep the current in the series the same as before.

(7493) J. A. R. says: Can you describe the process of working carbon in making one of the elements of an electric battery cell? I wish to construct a cell of battery of my own design which will require a carbon plate of peculiar shape which cannot be supplied by electric supply houses here; so I have decided to make one, provided the process is not too difficult an undertaking. Can you give general information which will be of use to me? I thought probably carbon could be obtained in crude form, which, after undergoing a process of pulverizing and pasting together, could be made to conform to the shape required. A. Carbon plates and rods are made from pulverized coke and lampblack, mixed with gas tar or asphalt and a cheap molasses. This is pressed in moulds by hydraulic pressure, and heated in an oven to decompose the carbonaceous materials and drive off the gases. This is often repeated several times, dipping the carbons in sirup between the heatings. One formula given is: Powdered coke..... 15 parts. Calcined lamp black .. 5 " Special sirup..... 8 " Mix with water and mould.

The answer to query No. 7475, by some means, was printed with a slight error in it. The last sentence should read: The square root of this result is the lifting power in pounds. The formula as given in algebraic symbols is correct.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

SEPTEMBER 6, 1898,

AND EACH BEARING THAT DATE.

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

Table listing various inventions and their patent numbers, including items like Acid ester of para-amidometaoxybenzoic, Adhesive compound, Alarm, Anchor, expansion, Axle, lubricating, Back pedal, Brake, Baling press, Bar, Barrel heading press, Battery, Bearing, Bearing end, Bearing for rotary disks, Bearing, roller, Bearing, wheel, Bell, Bicycle, Berth and settee for ships, Bicycle brake, Bicycle gear, Bicycle handle, Bicycle handle bar, Bicycle handle bars, Bicycle luggage carrier, Bicycle luggage rack, Bicycle package carrier, Bicycle support, Bicycles, Bill or toilet paper holder, Blackening stands, Bleaching powder, Block, Boiler, Bone cutting machine, Book, Boot or shoe part, Boot tree, Bottle, Bottle corking machine, Bottle, non-refillable, Bottle stopper, Box, Removable box, Box, Brake, Brake, Broom, Broom support, Buffing machine, Burglar alarm, Burner, Camera, Can lacquering machine, Cane and gaslight, Car, Car, convertible, Car door lock, Car door operating and locking mechanism, Car, dumping, Car fender, Car seat, Car wheel, Carriage curtain catch, Carriage curtain light frame, Carriage, motor, Carriage, self propelling, Cash register, Case, Caster, furniture, Chain guard, Chains, machine for manufacturing weldless, Chimney and smoke flue, masonry, Cigar cutter, advertisement device, combination, Cigarettes, machine for making all tobacco, Cigarettes, machine for making all tobacco, Cistern cleaning machine, Class, Clasp, Clavier, mute, Cleaner, Clock train, electric, Clothes pins, machine for making, Coat hanger, Coloring extracts, making, Combing machine, Compasses, Composite pipe, Compressible tube, Corset clasp, Cotton elevator and distributor, automatic, Coupling, Cup or pail, Current regulator, direct, Curtain ring and holder, Curtain stretcher, lace, Cutter, Cutting off apparatus, Cycle running gear, motor, Cycle saddle, Dental engine, Dental handpiece tool holder, Desk, Display device for confectionery, Display rack, Door check, pneumatic, Door hanger, Door holder, Door making machine, Draught equalizer, Dress fastener, Drill, Dry kiln, Guerrero & Ungemach, Dye and making it, red acid, Dye and making it, violet azo, Dye, basic diazo, A. Phillips, Electric currents, resistance and contact apparatus for, H. Lyon, Electric currents to agricultural machines, means for supplying, H. Foerster, Electric switch, E. L. L. Hundhausen, Electrical currents, means for controlling voltage and volume of, H. Williams, Elevator, See Cotton elevator, Safety elevator, Elevator, E. M. Fraser, Elevator brake, G. Brown, Elevator controlling device, electric, Otis & Smith, Embroidering machine jacquard mechanism, H. Scott, End gate fastener, A. Schlapbach, Engine, See Dental engine, Explosive engine, Rotary engine, Engines, device for increasing crank throw of, G. M. Hugus, Exercising machine, E. Sandow, Explosive engine, A. Winton, Extractor, See Nail extractor, Fabric, building appliances, wire, J. T. T. Kisinger, Fence machine, wire, O. N. Owens, Fence machine, wire, W. E. Williams, Fence wire truck, W. Nelson, Fencing, machine for making woven wire, W. E. Williams, Fifth wheel, Finishing machine, C. L. Wiedrich, Fire box door opening or closing device, Griffin & Hogan, Fire extinguisher, automatic, Anderson & Mohr, Fire extinguisher for passenger coaches, automatic, M. Williams, Fireplace heater, J. B. Oldershaw.

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