RECENTLY PATENTED INVENTIONS. Engineering.

ELECTRIC STOP VALVE. -- Robert Wellens, Pittsburg, Pa. This is an oscillating valve, whose stem has a weighted arm to drop and close the valve. with a catch and electro-magnets for operating it, the magnets being in the circuit of a battery whose wires extend throughout the building, with push buttons for closing contact and operating the valve.

Mechanical,

SEWING MACHINE SHUTTLE.-Charles H. Benoit, San Jose, Cal. The shuttle is enlarged at special points to receive a large bobbin and a large quantity of thread, and is of a form to pass readily through the loop, while in connection therewith a novel form of tension spring is employed.

HOISTING MACHINE.-Volney W. Mason, Providence, R. L. The hoisting drum is mounted upon eccentrics, which are operated by a lever to throw the drum alternately in and out of contact with the driving pulley and the brake shoe, the invention | grooved axle, at right angles to which is a rock shaft, covering novel parts, details, and combinations, making a simple and durable machine designed to be very effective in operation.

STONE SAWING.-Ludwig Melchior and Friedrich Meyer, Wilmington, Del. This invention covers an attachment with cross bar, guides, and clamps of novel form, for machines in which a gang of saws is. Tsheppe, New York City. This is a paper having a secured in a reciprocating frame, whereby the saws will be braced and may be operated rapidly and under considerable weight, while causing the saws to make a cleaner cut.

RASP CUTTING MACHINE.-Philip S. Stokes, Tennent, N. J. In this machine springs and cams operate upon two hammers, one preceding the other, in combination with a punch stock and punch held in the anvil frame and pivoted at or about its center, one of the hammers delivering a light blow pre- digesting the mass for a number of hours, after which ceding the heavy blow of the other, whereby the point of each tooth is made perfect and sharp, the invention pure water by successive steepings and soakings. also covering various other novel details.

LACING DRIVING BELTS. - Geo. W. Southwick, Stamford, Conn. This invention covers an evelet or re-enforce for the lace holes, consisting of a flat U-shaped metal piece, with prongs formed on its two branches to penetrate the leather back of the eyelet, and a flange on the inner side of the bend, to form a flat bearing at one side of the eyelet hole, to prevent the lacing cord from pulling out the leather.

PRINTERS' GALLEY. - J. Hatfield Youmans, Asbury Park, N. J. This galley has a movable bar or stick therein, in combination with disks or plates pivoted eccentrically to the frame, and with curved slots and pins, whereby the bar or stick will be automaticallylocked against a standard measurement of type, the device being adaptable by thumb screws for different measurements.

Railway Appliances.

RAIL JOINT. - Ives and Walter T. Lynd, Troy, N. Y. A key plate is constructed to lie lengthwise between the abutting ends of a pair of rails held in a bed plate and an inclined flange of the bed plate, the key plate being wedge-shaped laterally and vertically, whereby the rails may be tightly clamped and held in their bed plate by a lateral and downward pressure of the key plate.

COUPLER ATTACHMENT.-William L. Dwyre, Albany, N. Y. This is a simple device for attachment to the ordinary pin and link car coupler, by which it can be easily set for coupling and uncoupling without the operator going between the cars, and by which it will then couple automatically, the invention covering various novel features of construction and combinations of parts.

Agricultural.

COTTON PICKER.-James W. Wallis, Birmingham, Ala. This machine is an improvement in that class of cotton harvesters in which the pickers or devices for removing the cotton from the bolls have a reciprocating movement, whereby they are caused to swing into and out of the cotton plants, the invention covering various novel features and combinations of parts.

Miscellaneous.

DISINTEGRATING FIBERS.-Sidney S. Boyce, New York City. This invention covers a process of disintegrating fibrous substances, to separate the natural fiber of the straw from gummy and resinous matters, etc., the straw being first broken and subjected to a boiling neutral soapy solution, after which the

TOOTH BRUSH.-William H. Smith, Florence, Mass. This brush is made with a hollow handle, in two parts hinged together and adapted to receive the brush, which is pivoted in one half the handle, whereby the brush may be inclosed when not in use and rendered readily portable.

VEHICLE WHEEL.-Horatio F. Hicks, Ashland, Oregon. Combined with the hub and rim of the wheel are two sections of curved spring spokes, the curves of the two series being oppositely arranged with respect to each other, whereby the spokes will have elasticity enough to yield when the wheel passes over a rough, uneven road.

SLEIGH BRAKE.--William R. Wilcox, Portland, Col. This is a brake which may be put on or taken off by throwing the shaft lever either forward or back with the foot or hand, while it is light and durable. and designed to yield to any obstruction encountered, but yet return to its gripping position, without com municating strain or shock to the operator.

TRICYCLE.-Francis W. Pool, Norwich, Conn. This vehicle has a right and left hand spirally while a sleeve loosely holding rings travels upon the axle, the rings having lugs entering the grooves, and a link connects the rock shaft and sleeve, whereby it is designed that the machine may be propelled at a high speed with but little exertion.

NAPHTHALINE PAPER. - Adolph coating of naphthaline in two or more superposed layers, the first presenting a rough appearance, while the second fills up the interstices, presenting a hard, compact, smooth surface, made by immersing paper in melted naphthaline of different temperatures.

FIBER FROM PINE NEEDLES. - William Latimer, Wilmington, N. C. The process of making the fiber is by first briefly boiling in an alkaline solution, then lowering the temperature and slowly the solution is drawn off and the mass washed with

SCIENTIFIC AMERICAN BUILDING EDITION.

FEBRUARY NUMBER.-(No. 40.)

TABLE OF CONTENTS

- 1. Elegant plate in colors showing elevation in perspective of a suburban club house, with floor plans, sketch of entrance, etc. Munn & Co., architects, New York.
- 2. Plate in colors showing perspective and plans, with details, for a comfortable country dwelling. Cost three thousand five hundred dollars. Designed by Munn & Co., architects, New York.
- View of the Jay Gould tomb at Woodlawn ceme-3. tery, near New York city. A most classical speci-men of mortuary architecture.
- 4. A residence at Rutherford, N. J. Perspective elevation and floor plans.
- A Queen Anne cottage at Flatbush, Long Island. 5. Cost complete, eight thousand dollars. Plans and perspective.
- 6. A carriage house for one thousand dollars, lately built at Flatbush, Long Island. Perspective and floor plan.
- A house for three thousand dollars lately erected at Bridgeport, Conn. Perspective elevation and floor plans.
- 8. A residence at Orange, N. J. Cost fourteen thousand dollars. Plans and perspective.
- 9. A block of eighteen hundred dollar frame dwellings at Syracuse, N. Y. Floor plans and perspective. 10. The Galliera Museum, Paris. Half page engrav-
- ing. 11. Sketches from the Architectural League Exhibition: Proposed memorial campanile for plaza of Pros-
- pect Park, Brooklyn, N. Y., Henry O. Avery, architect-The Washington Hotel, Kansas City, Mo., Bruce Price, architect, N. Y .- Towers of hotel at Big Stone Gap, Va., Brunner & Tryon, architecte District school house at Washington, Conn., Rossiter & Wright, architects.
- 12. Design for a boat house of moderate cost, by Munn & Co., architects, New York.
- 13. Page of engravings of country resider
- 14. Miscellaneous Contents: Restoration of the Doge's Palace .- The broken timber raft .- Raising columns of St. Isaac's Cathedral, St. Peters burg .- Tarred bricks .- Pompeian houses. - Repairing of a well.-Finish for pine.-Architecture as a profession,-Paintwork,-The National Association of Builders .- How best to light our

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.

-Ball Engine.

Automatic cut-off. Ball Engine Co., Erie, Pa. A specialty made of copperforgings for electrical purposes. Steel Wrenches and Eye Bolts, Bronze Forgings. Billings & Spencer Co., Hartford, Conn.

Philip Parsons, Bishopsgate Within, London, solicits gencies for the sale of American goods in England.

Wanted, Toolmaker-Must be experienced in tap and die work. A thoroughly competent man can find steady employment at good wages by addressing "Cleveland," P. O. box 773, New York.

Special facilities for manufacturing light machinery, hardware, and novelties. Stamping, presswork, punches, dies, and special tools. Correspondence invited. Rockaway Manuf. Co., 3 E. 14th St., New York.

Investigate Edson's Recording Steam Gauges, which save coal, etc. Write for pamphlet. J. B. Edson, 86 Liberty St., New York.

Wanted-Assistant superintendent at a chemical works near New York. To a steady, pushing young man. with a knowledge of chemistry and engineering, and some experience with workmen, preference will be giv-Address, giving age, experience, and references, B. C. Co.," P. O. Box 773. New York City.

Patentees and Inventors-Any one having valuable inventions and needing money for developmentsmay obtainfunds by stating full particulars and date of patent, to post office box 356, New York.

Air compressor for sale cheap. Also steel tanks, iron rail, cars, etc. Address The Buffalo Wood Vulcanizing Co., Buffalo, N. Y.

For Sale-A complete set of SCIENTIFIC AMERICAN, bound, from 1853 to 1889, and also complete SUPPLE-MENTS. Address F. Lunkenheimer, Cincinnati, Ohio. Screw machines, milling machines, and drill presses

E. E. Garvin & Co., 139-143 Center St., New York. For the latest improved diamond prospecting drills

ddress the M. C. Bullock Mfg. Co., Chicago, Ill. For the best Hoisting Engine for all kinds of work ddress J. S. Mundy, Newark, N. J.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J Perforated metals of all kinds for all purposes. The

Robert Aitchison Perforated Metal Co., Chicago, Ill. The Holly Manufacturing Co., of Lockport, N. Y., will send their pamphlet, describing water works ma-chinery, and containing reports of tests, on application. Planing and Matching Machines. All kinds Wood Working Machinery. C. B. Rogers & Co., Norwich, Conn. The Improved Hydraulic Jacks, Punches, and Tube

Expanders. R. Dudgeon, 24 Columbia St., New York. Friction Clutch Pulleys. The D. Frisbie Co., N.Y. city.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N.Y. See illus. adv., p. 25. Rotary veneer basket and fruit package machinery.

I. E. Merritt Co., Lockport, N. Y. Belting .- A good lot of second hand belting for sale

cheap. Samuel Roberts, 369 Pearl St., New York. The Star Fountain Gold Pen. The best made stylo.

Price, \$1.00; fountain, \$1.50 and up. Send for circulars. J. C. Ullrich & Co., 106 Liberty St., New York. Duplex Steam Pumps. Volker & Felthousen Co., Buf-

falo, N. Y. Send for new and complete catalogue of Scientific nd other Books for sale by Munn & Co., 361 Broadway, New York. Free on application.



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.

Beferences 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.

(368) T. H. T. writes : Two years ago I had a present of a very fine cane with a buck-horn handle. From constant use, the white part of the handle became dirty, and after trying several methods to clean it, scraped it with a knife, which of course made it look worse than ever in a few weeks. A. A very perfect surface is given by scraping; the scraper may be of a razor blade, the edge of which should be rubbed upon an oil stone, holding the blade nearly upright, so as to form au edge like that of a currier's knife, and which, like it, may be sharpened by burnishing. Work, when properly scraped, is prepared for polishing. To effect this, it is first to be rubbed with a buff made of woolen cloth perfectly free from grease ; the cloth may be fixed upon a stick, to be used by hand; but what the workmen call a bob, which is a of longitude, allowing one hour for each 15 degrees; to wheel running in the lathe, and covered with the cloth. is much to be preferred, on account of the rapidity of the operation. The buff is to be covered either with powdered charcoal and water, or fine brick dust and water; after the work has been made as smooth as possible with this, it is followed by another buff, or bob, on which washed chalk or dry whiting is rubbed; the article to be polished is moistened slightly with vinegar, and the buff and whiting will produce a fine gloss, which may be completed by rubbing it with the palm of the hand and a small portion of dry whiting or [†]rotten stone,

(370) J. C. W. asks: What kind, size, and amount of wireshould I use in making electro-magnets? A. We refer you for a very full article on electromagnets to Scientific American Supplement, No. 182. The size and amount of wire depends on your requirements.

ten to twenty cells.

(371) D. & H. ask if it would injure a watch in any way to ride on an electric motor street car? A. It may injure it, but probably will not.

(372) G. B. writes: The fishermen of this city are discussing the question, " Does water form ice on the top or on the bottom?" and cannot agree. A. Ice forms on the surface of water. Fine crystals may form and be carried down by currents and eddies, so as to become packed together into a solid mass at or near the bottom, but water forms ice on the top.

(373) W. W. V. writes: 1. In making an electro motor like the one described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 641, but only one-half the dimensions, what size wire should I use on armature and field, when the motor is to be run by gravity battery? A. Use wire three or four numbers smaller than specified for regular size. 2. How many cells of 5×7 crow-foot battery will be needed, and how coupled? A. The gravity battery is entirely unsuited for such work, owing to its high resistance. You will find suitable batteries described in the SCIENTIFIC AMERICAN of September 3, 1881; August 20 and December 17, 1887; and a good method of making carbon plates, issue of October 27, 1888. Use six or eight cells of large bichromate battery, or thirty of gravity arranged in five series. 3. Could soft iron wire be used for field magnets instead of sheet iron? A. Yes, 4. Does a person making a patented article for his own use infringe on the patent? And is he liable to prosecution? A. You have no right to do this, and will infringe, and be liable to prosecution if you do. 5. Would ordinary glass fruit jars do to make Leyden jars out of? A. It is doubtful, as some cheap glass is a very poor dielectric. You can determine its quality by testing it roughly for insulation.

(374) "Gold" writes : 1. I tried etching on 14 carat gold, which was rolled on silver, using muriatic acid two parts, nitric one part, and three parts of water. It etched a very little, and then a black skin seemed to spread over the unprotected gold, and it would not etch any farther. Could you explain it? A. The acid dissolved the gold, but refused to dissolve the silver, as the lattermetal forms an insoluble chloride in the presence of muriatic acid, or refuses to dissolve at all. After the mixed acids act no longer, wash the metal and treat with nitric acid, when the silver will be dissolved. The acid will probably under cut the gold. You cannot dissolve gold and silver by the same acid. Cyanide of potassium, especially if assisted by the battery, might answer your purpose. 2. Do you know of any book which treats of the action of different acids and chemicals on metals? A. Manuals of chemistry contain this information scattered through them. We can supply any you desire.

(375) F. W. asks: 1. How can indelible ink be removed from linen? A. Chloride of mercury is the best eradicator of indelible ink. 2. What size wire to wind fields and armature with, of the small dynamo described in Scientific American Supplement, No. 161, so it can be run as a motor from an Edison incandescent circuit, 110 volts; want to run from an Edison lamp socket. A. For motor see SUPPLEMENT, No. 641, which we can send you for 10 cents. Place in shunt; do not attempt to use a full Edison current on it. 3. Would the above motor run a sewing machine? A. The simple motor would run a sewing machine.

(376) A. B. M. writes : Will you inform me of the ingredients used, and how applied to canvas, as prepared by manufacturers for artist's use? A. Size it first with thin glue size, then apply moderately thick white lead paint with a palette knife and allow to dry.

(377) J. P. M. asks for a conductor for an electric current that will stand in cyanide of potassium; he often has articles to spot gild, and has been unable to find anything that would resist corrosion. We recommend lead wire; this will be littleaffected by a true cyanide solution.

(378) C. E. E. says: Will you please tell me what the liquid is that is used with bronze powder? A. Try 1/2 lb. linseed oil, mixed with 2 oz. gum animi, the latter powdered and gradually added to the heated oil; then boil, strain, and dilute with turpentine.

(379) T. L. C. writes : Please tell us the precise time from new moon to new moon, or is there any regular time? Comstock's Philosophy says 29 days 12 hours and 44 minutes, but almanacs differ as much as three hours. A. The mean solar revolution of the moon is 29 days 12 hours and 44 minutes. The ellipticity of its orbit makes a variation of nearly one hour. The time of new moon also varies with the geographical distances in longitude from the meridian at the moment of the new moon. For instance, if new moon should take place at the meridian of Washington at noon, all places west would have morning time, and all places east would have afternoon time, according to their difference which a correction must be made for the moon's orbital variation. (380) L. F. L. asks: 1. How to filter wintergreen, cedar, and like essential oils to effectually cleanse them? And how to reclean the filter without a waste of oil? A. You may use any filtering material, such as cotton wool, and wash it out afterward with benzine. You will inevitably lose some of the oil, unless it is a non-volatile oil, when it can be recovered. If volatile, you may save most of it by forcing steam through the filter. 2. Is there such an oil as laurel oil? If so, is it an expensive oil? And what is it used for?

fibers are dried, rolled, and finished.

BEE HIVE. - Jonathan Beeson and John H. Hirschfeld, Saline City, Ind. This hive is made with a comb chamber having a hopper shaped bottom, formed of inclined boards having a space between them, below which is a section with sirup trough from which the bees may feed, and a reversible section with screen doors for closing the chambers formed by the bottoms, so that rain or snow cannot beat into the hive.

STOPPER FASTENER. - Charles P. Maiser, Allegheny, Pa. This fastener is also designed to serve as a guard to protect the upper edge of a bottle or jar to which it is applied, and consists of a wire bail with eves or loops, and a cross bar to protect one side of the bottle neck, while a lever, in connection with the stopper and eyes and loops, protects the opposite side.

BOOK SHELF. - John M. D. France, St. Joseph, Mo. This invention covers a casing with metallic horizontal mortises therein, in combination with a sliding board having metallist tongs on its ends, whereby the board will slide in the casing, making an improved shelf for the protection of record books.

and resorts, illustratio ntry Larch lumber.-The Thomson Houston motor for street cars.-Hints on plumbing and cellars.-The fatal climate of Pauama .- Improved hoist for passenger or freight elevators, illustrated,-Clark's new antifriction caster, illustrated .-- Tool cabinet, illustrated .-- Universal bevel protractor, illustrated.-California slate.-Pipe wrench, illustrated .-- The 'Gorton " boiler, illustrated.

The Scientific American Architects and Builders Edition is issued monthly. \$2.50 a year. Single copies 25 cents. Forty large quarto pages, equal to about two hundred ordinary book pages; forming, practically, a large and splendid MAGAZINE OF ARCHITEC TURE, richly adorned with elegant plates in colors and with fine engravings, illustrating the most interesting examples of Modern Architectural Construction and allied subjects.

The Fullness, Richness, Cheapness, and Convenience of this work have won for it the LARGEST CIRCULATION of any Architectural publication in the world. Sold by all newsdealers.

> MUNN & CO., PUBLISHERS, 361 Broadway, New York.

A. There are several laurel oils ; one is made by distilling with water the berries of the sweet laurel (Laurus nobilis); the product is often called bay oil, and is used for making toilet preparations. It is expensive. The specimen you speak of did not reach us with your letter. 3. What effectual means can I use to cleanse a flue which cannot be reached by a sweeper? Have always burnt wood. A. Explode a small amount of gunpowder at the bottom, and if there is danger of the chimney catching fire, burn a little sulphur held well within it.

(381) A. K. asks how to make the modeling wax that is used by artists. A. Melt carefully 100 parts yellow wax, add 13 parts Venetian turpentine, 6½ parts lard, and 72½ parts elutriated bole or other inert powder; mix thoroughly, pour off, and knead as it cools. The wax must be melted at a low temperature.

(382) W. C. B. writes: Please inform me how to find the exact focus of my camera lens. The focus of a camera lens and the distance from that lens to the object to be photographed being known, is there any rule by which I can tell what distance the negative plate should be from the Jens, thereby substituting instrumental focusing for visual focusing? A. The focus of a camera lens depends npon the distance of the object from the camera, there being an exact focus for every given distance. If the camera has a solid box or a fixed position for the plate, the focus can be adjusted for varying distances and marked upon the slide. This would be reliable for the distance, but would not take in the variation for effect with various kinds of objects, as between landscapes and portraits or other objects. In portraiture there is a little variation required for different faces that the eye only can appreciate. We do not think that index focusing will give the best results, except for copying, by which the focus and distance of the object become exact exponents.

(383) F. D. P. writes : I inclose herewith a problem for your correspondence column. It was given by a man at our school and there was quite a diversity of opinion in regard to it. A solution from you will greatly oblige. I would also like a little information on another matter which I also inclose. Have been greatly entertained by some of the questions in your paper. 1. A tank 10 feet inside diameter, 232 feet high, made of 4 inch staves, is hooped with 6 inch iron hoops 12 inches apart. What is the pressure per square inch on third hoop from bottom, allowing 2.03 feet to equal one pound? A. The pressure against the sides of the tank at the third hoop is equal to 230 feet hydrostatic pressure, or 100 pounds per square inch. To get the pressure or strain on the third hoop, multiply the pressure by one-half the diameter in inches, which we make 6.000 pounds for one inch height. Now, as you say that the hoops are 1 foot apart and 6 inches wide, this makes 18 inches in height between the centers of the spaces for each hoop to hold $-6,000 \times 18 = 108,000$ pounds strain upon the hoop. Now if the hoops are half an inch thick, there will be but three square inches of metal, and as iron hoops should not be trusted for more than 20,000 to the square inch in any case, you have $3 \times 20,000 = 60,000$ pounds safe resistance against 108,000 pounds strain. Such a tank could not be filled with safety. 2. What metal possesses the quality of expanding and contracting in the greatest degree with temperature from 40° to 80° Fah.? A. Zinc has the greatest range of expansion and contraction of the solid metals, being eight-tenths of an inch in 100 feet for a difference of 40° Fah. 3. How much does an iron rod 1/2 inch by 1/4 inch, 2 feet long, expand in length for a change of temperature from 40° to 80° Fah.? A. For the iron rod 2 feet long, the change of length would be equal to 64 ten thousandths of an inch for a change of temperature of 40° Fah.

through the columns of your paper. 1. The cause of with your pigment. You can use thick India ink dishooting stars and velocity of same. A. You will find complete illustrated articles on meteors or shooting stars-history, theory, speed, and distances, as far as known-in Scientific American Supplement, Nos. 532 and 667. 2. The simplest way of boring a hole in glass, excluding the use of a drill? A. The simplest and safest way to bore holes in glass is to use a copper or brass tube, quite thin, of the size of the hole. Bore a bole in a small block of wood about 1/4 inch thick. Hole to fit the tube loosely. Fasten the block to the glass with beeswax, so that the hole corresponds with the required hole in the glass. Insert the tube in the hole and pour emery (No. 90) and water into the tube with a spoon and turn the tube back and forth with the fingers, or a little grooved pulley may be put on the tube to work with a string, in which case a center should be placed at npper end to guide the tube. In this way a doubt if you can repair them. hole of any size from 1/8 inch to an inch or more may be cut through ordinary window glass in a few minutes.

(385) J. B., Fire Department, writes:

(386) G. F. M. writes : Please inform us, through your valuable paper, the most economical lacquer for chandelier work. What is the test mixture to apply to the ends of metal spinners' wooden chucks to keep them for cracking? A. Lacquers are generally made with shellac and alcohol, with a little gum coloring from dragon's blood or turmeric. See "Techno-Chemical Receipt Book," which has a variety of receipts or processes for lacquering, varnishing, and bronzing of metals. We can mail it for the price, \$2.00. Chucks for spinning should be thoroughly seasoned before use. Dipping in hot linseed oil and drying in a warm oven after the chuck has been shaped may answer your purpose.

(387) E. J. S. asks (1) for the component parts of the Disque Leclanche battery. A. The porous cup contains a carbon prism embedded in clear graphite and binoxide of manganese mixed in about equal parts. The outer cell contains an unamalgamated zinc rod, Sal-ammoniac dissolved in water is the exciting fluid. 2. How to make a battery of uncoppered electric light carbons, nsing sal-ammoniac for the exciting fluid? A. See SCIENTIFIC AMERICAN December 17, 1887, and October 27, 1888. 3. How to make an electric gas lighting coil for two or three burners? A. Wind 5 pounds No, 18 wire on a bundle of iron wires, the bundle to be 6 inches long and 1 inch thick. 4. What kind of battery is best to use in connection with it? A. A Leclanche battery is excellent or the battery shown in first named SCIENTIFIC AMERICAN, using only one zinc rod, and using sal-ammoniac and water as the solution.

(388) P. W. W. asks for the ingredients used in the making of British gum. A. British gum of dextrine is prepared by the artificial roasting of dry starch at a temperature between 413° and 482° Fah. It is also made by an acid process, in which the dry starch is moistened with dilute nitric or hydrochloric acid and heated to a temperature between 212° and 248° Fah. and may also be made direct from potatoes. For the illustrated details of its manufacture see Spons' "Encyclopedia of the Industrial Arts."

(389) E. F. L. writes : Please give a simple and practical way to purify resin and precipitate its impurities. A. Melt and allow to settle, and if necessary, strain through sacking.

(390) P. L. M. writes: I am in search of recipe to make what is called "compressed Chinese sheet bluing." It is a very nice article of bluing, that is sold to families by agents in small sheets of about the size of playing cards. A. The preparation may be paper saturated with a strong solution of Prussian blue in water containing ferrocyanide of potassium.

(391) A. H. S. writes : What can Tuse torub npon or cover a bony substance so that it will become a conductor of electricity, that will enable me to plate it with gold, silver, or nickel, etc., so that it will adhere to the surface with tenacity and durability? A. Coat it with plumbago of good quality, applying it with a brush, as polishing a stone. The adherence to the surface will not be very great, but the model, if under cut, will hold it with great tenacity.

(392) G. E. W. asks for the surface of the zinc and copper and the number of cells of gravity sufficient to run a Sawyer-Man 19 volt 12 candle power incandescent lamp. A. Use carbon zinc couples excited by electropoion (bichromate and sulphuric acid) fluid. Twenty cells, each having eight square inches of zinc and copper facing each other, will answer.

(393) D. E. W. asks how to prepare the surface of glass so that it may be drawn on with India ink (the purpose being to make lantern slides). A. Try the following: Shake white of egg with twice its volume of water, and ten drops of ammonia, pour off the froth, and flow the plate with the clear solution and allow to (384) W. L. S. writes: Please state dry, and heatslightly in an oven. Mix a little ox gall rectly upon the glass.

> (394) R. H. S. asks: Please tell me how o construct a glass melting apparatus, such as is used by amateur glass blowers. A. We refer you to Shenstone on Glass Blowing, which we can supply for 80 cents, for full description of glass blowing pro

(395) B.A. asks: 1. What preparation would be the best to fasten cue tips to cues? A. Use carpenter's glue. 2. Please let me also know the way to make pool balls. A. The best are turned ont of ivory, various compositions are used for inferior ones, into which celluloid or analogous substances enter. 3. The balls I now have are more or less disfigured by use. Will you please let me know what compound I can use to repair them? A. Have them turned down. We

(396) G. I. writes: Can you tell me through your paper how water can be sucked up a hill, 50 or 60 rods long with an elevation of 60 feet by the use Will you please answer the following: What should be of a windmill, without triangles and have the mill the size of the steam ports for whistles with cylinders above the spring? A. You cannot draw the water lift over 25 feet and force the water to the required height. This, with a windmill of moderate height, should give a fair working power for ordinary uses, and is preferable to the bell crank connections for any considerable distance. (397) A. G., Patras, Greece, writes: As a subscriber I take the liberty of asking you to reply the sizes above should be one thirty second of an inch i through the columns of your paper as to which is the best method of polishing hippopotamns hide? I have a strip of the said hide which I wish to convert into a riding switch, and am told that it admits of a very high polish. A. Hippopotamus hide, if tanned, can be polished by preparing the surface by planing or cutting to the required shape and scraping with broken glass, so as to obtain as smooth and fine surface as possible. Then rub the surface with paraffine and polish with a woolen cloth or wool buff. (398) E. U. asks: Can you give me di rections for making porous cups for battery purposes A. They are made of porous clay, baked in a kiln. You may have to mix a little sand with the clay to prevent it from cracking, and you should have enough heat in an ordinary stove for firing them.

cribed in your paper can be made so as to run by a Westinghouse alternating current. If so, please inform me what change should be made? A. It is not adapted. 2. What is the easiest way to make a storage battery? A. There is no easy way. Consult our index to SUPPLEMENTS. 3. Can the field magnet in the motor be cast out of brass? A. No.

(400) M. A. N. asks: How many Bun sen cells would be required to produce a light to study by, and illuminate a room 14 ft. square? What would be the cost of getting cells and light ready and the runningexpenses? A. Twenty or thirty quart cells; they will cost about \$1.50 each; the lamps and connections, \$2; they will cost to run not far from 25 cents an hour

(401) H. E. M. asks: Does resistance of wire decrease the number of volts or amperes of current? A. It decreases the amperes only, and does not necessarily affect the volts.

(402) Inquirer writes: 1. Will a current of electricity instantly applied to and instantly broken from a very tightly stretched wire make it vibrate enough to produce sound? A. No. 2. Can it be said of a battery that it collects electricity or that it sets it free by chemical action? A. The second statement approaches the truth. In a battery, chemical energy is transformed into electric energy. 3. Is the present open winter accounted for upon any astronomical basis? If so, what is it, and how does it affect the earth's atmosphere? A. No tangible basis can be assigned.

Euquiries to be Answered.

The following enquiries have been sent in by some of our subscribers, and doubtless others of our readers will take pleasure in answering them. The number of the enquiry should head the reply.

(403) T. H. DeS. writes: 1. Is a steam adiator more effective under 15 pounds of steam than under, say 2 pounds, or is the temperature of the radiator unaffected by the rise in the temperature of the steam due to the increased pressure? I have seen it stated that the pipes of a radiator could not be made hotter than 212°, and cannot help thinking that it must be a mistake. 2. What is the relative efficiency of the following coals for making steam under the ordinary return tubular boiler, without blast? (a) The bituminous coal mined from Jelico Mountain, Tenn., having streaks of cannel through it occasionally. (b) Pure cannel mined in North Alabama. (c) Semi-cannel nined in North Alabama. (d) Semi-anthracite mined in North Alabama. If you are not familiar with these special coals, give values generally, based upon the kinds of coals named. 3. For deep well pumping, which is the best, in your judgment, to have, a vertical steam cylinder, etc., such as Knowles steam pump works make, and the Deanes also, placed over the mill with the piston rod in direct connection with the sucker rods, or to have an ordinary horizontal engine with a small pulley on a shaft belted to a large wheel, pulley say 8 feet in diameter, having a crank pin 2 feet from cen-ter, said crank pin to be connected to the sucker rods through a cross head and connecting rod? Which will work the smoothest over the ends of the stroke? 4. Will bones thrown in the retort with coal enrich the candle power of gas? If so, why?

(404) H. R. writes: 1. What is the rule for estimating the horse power of water powers? 2. Which will last the longer, a post set top or butt down? 3. With bark on or off, dry or green? 4. What is the difference in the lasting of posts charred and uncharred? 5. Does the time of year in which a post is cut make any difference in its lasting qualities?

(405) C. A. A. writes: Is water collected from a galvanized iron roof in a cistern safe to use for drinking, and is it safe to use galvanized pipes to convey drinking water? Which makes the best roof, tin or galvanized iron? Will water from a painted roof be fit and safe for drinking?

NEW BOOKS AND PUBLICATIONS.

LES INDUSTRIES D'AMATEURS. Le Papier et la Toile. La Terre, pa Cire, le Verre et la Porcelaine. Le Bois, les Metaux. By Henry de Graffigny. 395 drawings. Bailliere et Fils, Dorio Paris.

A field which seems to be expanding more and more and which is constantly growing in popularity is the subject of amateur mechanics. Every few months brings out some new work on the subject. It is a refreshing symptom that there are large classes whose recreations are improving in their nature and who find that labor and pleasure may be combined. The above work, which is in French, is the latest production of this character. It treats of the various subjects men-

(399) J. J. B. asks (1) if the motor de- INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

February 5, 1889,

AND EACH BEARING THAT DATE

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

t		
	Agricultural heater, C. A. Masterson Armature for dynamo-electric machines, O. B.	
4	Shallenberger	
ļ	Ash or garbage can, McKeever & Smith	
1	Atomizer, A. M. Shurtleff	397,315
1	Automaton, W. G. Spiegel	397,398
	Axle box, car, W. E. Heffner	397,283
ł	Ax poll, W. C. Kelly	
	Ax polls, die for making. W. C. Kelly	397.369
1	Axle, wagon, N. S. Ketchum	
	Bag. See Paper bag.	0011201
:	Bag holder, B. F. Ellis	207 246
1	Baling press, H. N. Smades	
Т	Balls, machine for winding, H. Harwood	907 909
	Bark from timber, machine for removing, N. H.	091,004
1		
•	Dolsen	397,114
ł	Barrel, I. J. W. Adams.	397,325
ĺ	Barrow, double deck, W. H. Hall	
	Baseball winding and rolling machine, B. B.	
	Newell	397,305
	Battery. See Galvanic battery. Secondary bat-	
1	tery.	
1	Bed bottom, spring, E. Yeoman	397,324
	Bed. folding. J. Penney	397,308
	Bed or upholstered springs, spring, C. B. Howell	397.234
ł	Bedstead, folding, W. J. Griebel	397,183
	Bedstead, folding, J. Penney	
ιŀ	Bell, signal, E. Olsen	
i		
. Í	Belts, lace hole protector for driving, G. W.	
ļ	Southwick	
į	Blcycles from a single blank, forming backbones	
ł	and rear forks of, G. T. Warwick	
1	Binder shifting mechanism, J. A. Graham	397 ,356
; ļ	Bit. See Bridle bit.	
, I	Blasting, Plom & D'Andrimont	397, 440
,	Block. See Hat block.	
	Board. See Bulletin board. Drawingboard. Em-	
	balming board. Vehicle dash board. Wash-	
:	board.	
1	Boat. See Racing boat.	
1	Boiler. See Steam boiler.	
ι	Boiler tube plug, E. W. Tucker	397,450
	Boot or shoe sole protector, E. & D. J. Rowlands.	397,250
	Bottle stopper, J. A. Traut	397,449
	Box. See Axle box. Salt box. Telephone call	
2	box.	
1	Boxes, etc., art of and machine for making, M.	
۰İ	Young	
:		397,162
	Young	397,162
	Young Boxes, means for securing metallic bands to, J. H.	397,162 397.262
r -	Young Boxes, means for securing metallic bands to, J. H. Williams.	397,162 397.262
r - 3	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner	397,162 397.262 397,153
r - 	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert	397,162 397.262 397,153 397,120
r - 3 - 8	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake. See Sled brake.	397,162 397.262 397,153 397,120 397,273
r - 3 - 8	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert Bridle bit, safety, L. P. Britt.	397,162 397,262 397,153 397,120 397,273 397,482
r - - 	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn	397,162 397,262 397,153 397,120 397,273 397,482
r - - 	Young Boxes, means for securing metallic bands to, J. H. Williams Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert Bridle bit, safety, L. P. Britt Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M.	 397,162 397,262 397,153 397,120 397,273 397,482 397,465
r - - 	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, See Sled brake. Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar Burial apparatus, G. L. Gehring.	397,162 397.262 397,153 397,120 397,273 397,482 397,465 397,283
r - 3 - 5 1	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar.	 \$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,283 \$97,350
r - 3 - 5 1	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, See Sled brake. Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Buttonhole cutter, E. Nowill.	 \$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,482 \$97,465 \$97,283 \$97,350 \$97,438
r - 3 - 5 1 · 2 · 2	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert Brake, O. L. Gilbert Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Witzgerald. Buttonhole cutter, E. Nowill. Button setting implement, F. H. Richards297,388,	 \$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,482 \$97,465 \$97,283 \$97,350 \$97,438
r - 3 - 5 1 · 2 · 2	Young	 \$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,482 \$97,465 \$97,283 \$97,350 \$97,438
r - 33 - 38 - 18 - 18 - 18 - 18 - 18 - 18	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can. See Ash or garbage can.	397,162 397,262 397,153 397,120 397,273 397,482 397,485 397,485 397,485 397,350 397,438 397,471
r	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert. Broom corn, utilizing waste, S. M. Youngjohn. Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Witzgerald. Button, D. P. Witzgerald. Button ble cutter, E. Nowill. Button setting implement, F. H. Richards. 297,388, Camera. See Photographic camera. Can. See Ash or garbage can. Can jacket, W. Zinsser, Jr.	397,162 397,262 397,153 397,153 397,273 397,452 397,455 397,455 397,453 397,453 397,453
	Young Boxes, means for securing metallic bands to, J. H. Williams Braiding machines, racer for, J. A. Turner Brake, See Sled brake. Brake, O. L. Gilbert Bridle bit, safety, L. P. Britt Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar Burial apparatus, G. L. Gehring Button, D. P. Fitzgerald Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can. See Ash or garbage can. Can jacket, W. Zinsser, Jr Car coupling, D. C. Bassett.	 397,162 397,262 397,153 397,120 397,273 397,492 397,465 \$97,283 397,450 \$97,263 397,471 397,163 397,412
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Vitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can. See Ash or garbage can. Can iacket, W. Zinsser, Jr. Car coupling, E. N. Colwell.	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,485 \$97,485 \$97,485 \$97,485 \$97,485 \$97,485 \$97,485 \$97,485 \$97,485 \$97,485 \$97,471 \$97,163 \$97,171
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Button, D. P. Fitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can. See Ash or garbage can. Can jacket, W. Zinsser, Jr. Car coupling, D. C. Bassett. Car coupling, E. N. Colwell.	\$97,162 \$97,262 \$97,158 \$97,120 \$97,273 \$97,482 \$97,485 \$97,485 \$97,485 \$97,485 \$97,485 \$97,485 \$97,485 \$97,471 \$97,163 \$97,412 \$97,277 \$97,375
r - 3 - 5 1 · 2 · 2 · 2 · 2 · 2 · 2 · 2 · 2 · 2 ·	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, See Sled brake. Brake, O. L. Gilbert Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Vitzgerald. Buttonhole cutter, E. Nowill. Button setting implement, F. H. Richards Samera. See Photographic camera. Can. See Ash or garbage can. Can coupling, D. C. Bassett Car coupling, E. N. Colwell. Car coupling, H. H. Mansfield. Car coupling, S. P. Mickey.	\$97,162 \$97,262 \$97,158 \$97,120 \$97,273 \$97,273 \$97,465 \$97,283 \$97,465 \$97,283 \$97,452 \$97,350 \$97,412 \$97,412 \$97,412 \$97,375 \$97,375
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Vitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can jacket, W. Zinsser, Jr. Car coupling, D. C. Bassett. Car coupling, E. N. Colwell. Car coupling, H. H. Mansfield. Car coupling, S. P. Mickey. Car coupling, S. P. Mickey.	\$97,162 \$97,262 \$97,158 \$97,120 \$97,273 \$97,482 \$97,482 \$97,485 \$97,283 \$97,482 \$97,483 \$97,453 \$97,453 \$97,453 \$97,453 \$97,471 \$97,163 \$97,175 \$97,173 \$97,175 \$97,175 \$97,175 \$97,175 \$97,175 \$97,175 \$97,175 \$97,175 \$97,175 \$97,175 \$97
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burtal apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can See Ash or grabage can. Can jacket, W. Zinsser, Jr Car coupling, D. C. Bassett. Car coupling, H. H. Mansfield. Car coupling, H. H. Mansfield. Car coupling, J. H. Simpson Car dour, freight, E. H. Whitaker	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,482 \$97,482 \$97,485 \$97,350 \$97,350 \$97,350 \$97,412 \$97,412 \$97,275 \$97,137 \$97,375 \$97,137 \$97,822
	Young	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,452 \$97,452 \$97,453 \$97,453 \$97,453 \$97,453 \$97,453 \$97,471 \$97,413 \$97,137 \$97,413 \$97,413 \$97,413 \$97,422 \$97,423 \$97,423 \$97,423 \$97,423 \$97,43 \$97,423 \$97,423 \$97,423 \$97,43 \$97,423 \$97,423 \$97,43 \$97,43 \$97,432 \$97,433 \$97,432 \$97,433 \$97,432 \$97,433 \$97,432 \$97,433 \$97,432 \$97,433 \$97,433 \$97,433 \$97,433 \$97,455
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, See Sled brake. Brake, O. L. Gilbert Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar Burial apparatus, G. L. Gehring Button, D. P. Vitzgerald Button setting implement, F. H. Richards Button setting implement, F. H. Richards Camera. See Photographic camera. Can. See Ash or garbage can. Car coupling, D. C. Bassett Car coupling, E. N. Colwell. Car coupling, E. N. Colwell. Car coupling, S. P. Mickey Car coupling, S. P. Mickey Car coupling, J. H. Simpson Car door, freight, E. H. Whitaker Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,283 \$97,485 \$97,283 \$97,485 \$97,283 \$97,455 \$97,455 \$97,453 \$97,412 \$97,163 \$97,163 \$97,163 \$97,163 \$97,177 \$97,473 \$97,175 \$97,120 \$97,120 \$97,120 \$97,120 \$97,120 \$97,273 \$97,475 \$97,120 \$97,120 \$97,273 \$97,455 \$97,283 \$97,283 \$97,283 \$97,283 \$97,283 \$97,455 \$97,283 \$97,455 \$97,283 \$97,455 \$97,283 \$97,455 \$97,455 \$97,455 \$97,455 \$97,455 \$97,455 \$97,455 \$97,455 \$97,455 \$97,455 \$97,455 \$97,455 \$97,475 \$97,455 \$97
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can See Ash or garbage can. Car coupling, D. C. Bassett. Car coupling, E. N. Colwell. Car coupling, H. H. Mansfield. Car coupling, H. H. Simpson Car door, freight, E. H. Whitaker Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, F. M. Wilder	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,482 \$97,482 \$97,485 \$97,283 \$97,350 \$97,484 \$97,471 \$97,412 \$97,412 \$97,163 \$97,375 \$97,137 \$97,375 \$97,137 \$97,322 \$97,420 \$97,161
	Young	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,482 \$97,482 \$97,482 \$97,483 \$97,483 \$97,471 \$97,412 \$97,412 \$97,275 \$97,262 \$97,255 \$97,262 \$97,255 \$97,262 \$97
r 	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, See Sled brake. Brake, O. L. Gilbert Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Vitzgerald. Button setting implement, F. H. Richards237,388, Camera. See Photographic camera. Can. See Ash or garbage can. Car coupling, D. C. Bassett Car coupling, E. N. Colwell. Car coupling, S. P. Mickey. Car coupling, S. P. Mickey. Car coupling, S. P. Mickey. Car coupling, S. P. Mickey. Car coupling, J. H. Simpson Car door, freight, E. H. Whitaker Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, Passenger, M. Wood.	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,465 \$97,283 \$97,465 \$97,283 \$97,454 \$97,455 \$97,483 \$97,454 \$97,471 \$97,465 \$97,412 \$97,412 \$97,413 \$97,413 \$97,413 \$97,413 \$97,413 \$97,413 \$97,413 \$97,413 \$97,413 \$97,413 \$97,413 \$97,413 \$97,413 \$97,413 \$97,413 \$97,413 \$97,422 \$97,152 \$97,161 \$97,212
r 	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Buttonhole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can jacket, W. Zinsser, Jr. Car coupling, D. C. Bassett. Car coupling, E. N. Colwell. Car coupling, H. H. Mansfield. Car coupling, H. H. Simpson Car door, freight, E. H. Whitaker Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway passenger, M. Wood	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,482 \$97,482 \$97,485 \$97,283 \$97,485 \$97,482 \$97,485 \$97,483 \$97,471 \$97,163 \$97,412 \$97,163 \$97,173 \$97,375 \$97,137 \$97,375 \$97,137 \$97,375 \$97,137 \$97,420 \$97,161 \$97,161 \$97,122 \$97,327
r 	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Button, D. P. Fitzgerald. Button ble cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Car coupling, D. C. Bassett. Car coupling, B. N. Kolwell. Car coupling, H. H. Mansfield. Car coupling, H. H. Mansfield. Car coupling, J. H. Simpson Car door, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, F. M. Wilder Car starter, Ackers & Lindsey, Jr Car starter, N. V. Viele.	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,482 \$97,482 \$97,482 \$97,483 \$97,483 \$97,483 \$97,471 \$97,163 \$97,412 \$97,471 \$97,163 \$97,412 \$97,277 \$97,137 \$97,423 \$97,275 \$97,137 \$97,420 \$97,275 \$97,275 \$97,275 \$97,275 \$97,275 \$97,275 \$97,275 \$97,281 \$97,282 \$97,282 \$97,285 \$97,275 \$97,275 \$97,275 \$97,285 \$97,285 \$97,285 \$97,285 \$97,285 \$97,285 \$97,285 \$97,275 \$97,275 \$97,275 \$97,285 \$97
r 	Young	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,452 \$97,452 \$97,452 \$97,453 \$97,453 \$97,453 \$97,453 \$97,453 \$97,454 \$97,454 \$97,455 \$97,155 \$97
r 	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can. See Ash or garbage can. Car coupling, D. C. Bassett. Car coupling, E. N. Colwell. Car coupling, H. H. Mansfield. Car coupling, H. H. Simpson Car door, freight, E. H. Whitaker Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, Bassenger, M. Wood Car starter, Ackers & Lindsey, Jr Car, stock, J. Montgomery. Car, suck, M. Barnhart.	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,482 \$97,482 \$97,485 \$97,283 \$97,485 \$97,485 \$97,483 \$97,471 \$97,412 \$97,412 \$97,412 \$97,163 \$97,97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,158
r 	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Button, D. P. Fitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Car coupling, D. C. Bassett. Car coupling, B. N. Kolwell. Car coupling, H. H. Mansfield. Car coupling, H. H. Mansfield. Car foor, W. L. Everit. Car foor, W. L. Everit. Car heating apparatus, railway, F. M. Wilder Car starter, Ackers & Lindsey, Jr Car starter, N. V. Viele. Car, stock, J. Montgomery. Car, unloader, H. M. Barnhart. Car wheels, device for lubricating, S. M. Briggs.	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,482 \$97,482 \$97,482 \$97,483 \$97,483 \$97,483 \$97,471 \$97,163 \$97,412 \$97,471 \$97,163 \$97,471 \$97,163 \$97,471 \$97,163 \$97,471 \$97,163 \$97,471 \$97,163 \$97,471 \$97,163 \$97,173 \$97,471 \$97,277 \$97,175 \$97,137 \$97,420 \$97,152 \$97,152 \$97,152 \$97,158 \$97,158 \$97,199 \$97,165 \$97,165
	Young Boxes, means for securing metallic bands to, J. H. Williams Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar Burial apparatus, G. L. Gehring Button, D. P. Witzgerald Button hole cutter, E. Nowill. Button setting implement, F. H. Richards Can. See Photographic camera. Can. See Photographic camera. Car coupling, D. C. Bassett. Car coupling, B. N. Colwell. Car coupling, H. H. Mansfield Car coupling, J. H. Simpson Car door, W. L. Everit. Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car starter, Ackers & Lindsey, Jr Car starter, N. V. Viele. Car, stock, J. Montgomery. Car, unloader, H. M. Barnhart. Car wheels, device for lubricating, S. M. Briggs.	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,283 \$97,482 \$97,482 \$97,482 \$97,483 \$97,483 \$97,483 \$97,471 \$97,163 \$97,412 \$97,163 \$97,412 \$97,212 \$97,161 \$97,212 \$97,216 \$97,161 \$97,121 \$97,161 \$97,122 \$97,161 \$97,123 \$97,161 \$97,121 \$97,161 \$97,121 \$97,161 \$97,161 \$97,161 \$97,161 \$97,165 \$97,165 \$97,182
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Vitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can jacket, W. Zinsser, Jr. Car coupling, D. C. Bassett. Car coupling, E. N. Colwell. Car coupling, S. P. Mickey. Car door, freight, E. H. Whitaker Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, F. M. Wilder Car heating apparatus, railway, F. M. Wilder Car starter, A. Kers & Lindsey, Jr. Car starter, N. V. Viele. Car, stock, J. Montgomery Car, spring buffer for railway, G. M. Briggs Cars, Spring buffer for railway, C. S. Roberts	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,482 \$97,482 \$97,485 \$97,283 \$97,485 \$97,380 \$97,482 \$97,483 \$97,471 \$97,163 \$97,412 \$97,420 \$97,152 \$97,158 \$97,158 \$97,165 \$97,165 \$97,812 \$97,812 \$97,812 \$97,165 \$97,812 \$97,812 \$97,812 \$97,165 \$97,812 \$97,812 \$97,812 \$97,165 \$97,812 \$97,812 \$97,812 \$97,165 \$97,812 \$97,812 \$97,812 \$97,165 \$97,812 \$97,812 \$97,812 \$97,812 \$97,812 \$97,165 \$97,812 \$97,812 \$97,812 \$97,812 \$97,165 \$97,812 \$97,812 \$97,812 \$97,812 \$97,812 \$97,165 \$97,812 \$97,812 \$97,812 \$97,812 \$97,812 \$97,165 \$97,812 \$97,812 \$97,812 \$97,812 \$97,812 \$97,812 \$97,812 \$97,165 \$97,812 \$97,812 \$97,812 \$97,812 \$97,812 \$97,812 \$97,812 \$97,165 \$97,812 \$97
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can See Ash or garbage can. Car coupling, D. C. Bassett. Car coupling, E. N. Colwell. Car coupling, B. P. Mickey. Car coupling, S. P. Mickey. Car dour, freight, E. H. Whitaker Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, F. M. Wilder Car starter, Ackers & Lindsey, Jr Car, stock, J. Montgomery. Car, wheels, device for lubricating, S. M. Briggs Card colting, Gurffor Tailway, C. A. Schroyer Car douder, H. M. Barnhart. Car wheels, device for lubricating, S. M. Briggs Card colthing, foundation of, S. Roberts Car douting, Gurdation of, S. Roberts	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,482 \$97,482 \$97,482 \$97,485 \$97,283 \$97,350 \$97,350 \$97,350 \$97,471 \$97,412 \$97,473 \$97,375 \$97,375 \$97,375 \$97,375 \$97,375 \$97,375 \$97,375 \$97,375 \$97,375 \$97,375 \$97,420 \$97,420 \$97,420 \$97,421 \$97,420 \$97,168 \$97,168 \$97,168 \$97,168 \$97,168 \$97,168 \$97,168 \$97,168 \$97,168 \$97,414
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert. Broom corn, utilizing waste, S. M. Youngjohn. Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Witzgerald. Buttonhole cutter, E. Nowill. Button setting implement, F. H. Richards. 297,388, Camera. See Photographic camera. Can. See Ash or garbage can. Car coupling, D. C. Bassett. Car coupling, B. N. Colwell. Car coupling, H. H. Mansfield. Car coupling, J. H. Simpson Car door, W. L. Everit. Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, F. M. Wilder Car starter, Ackers & Lindsey, Jr Car, stock, J. Montgomery. Car, stock, J. Montgomery. Car, stock, J. Montgomery. Car, stock, J. Montgomery. Car, alton, foundation of, S. Roberts. Car colohing, foundation of, S. Roberts. Car colohing, foundation of, S. Roberts. Car doothing to flat bars, apparatus for attaching G. & E. Ashworth.	\$97,162 \$97,262 \$97,263 \$97,273 \$97,273 \$97,283 \$97,283 \$97,283 \$97,482 \$97,482 \$97,483 \$97,483 \$97,471 \$97,163 \$97,471 \$97,163 \$97,471 \$97,163 \$97,471 \$97,163 \$97,471 \$97,163 \$97,471 \$97,163 \$97,212 \$97,327 \$97,161 \$97,161 \$97,212 \$97,165 \$97,185 \$97
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can See Ash or garbage can. Car coupling, D. C. Bassett. Car coupling, E. N. Colwell. Car coupling, B. P. Mickey. Car coupling, S. P. Mickey. Car dour, freight, E. H. Whitaker Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, F. M. Wilder Car starter, Ackers & Lindsey, Jr Car, stock, J. Montgomery. Car, wheels, device for lubricating, S. M. Briggs Card colting, Gurffor Tailway, C. A. Schroyer Car douder, H. M. Barnhart. Car wheels, device for lubricating, S. M. Briggs Card colthing, foundation of, S. Roberts Car douting, Gurdation of, S. Roberts	\$97,162 \$97,262 \$97,263 \$97,273 \$97,273 \$97,283 \$97,283 \$97,283 \$97,482 \$97,482 \$97,483 \$97,483 \$97,471 \$97,163 \$97,471 \$97,163 \$97,471 \$97,163 \$97,471 \$97,163 \$97,471 \$97,163 \$97,471 \$97,163 \$97,212 \$97,327 \$97,161 \$97,161 \$97,212 \$97,165 \$97,185 \$97
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert. Broom corn, utilizing waste, S. M. Youngjohn. Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Witzgerald. Buttonhole cutter, E. Nowill. Button setting implement, F. H. Richards. 297,388, Camera. See Photographic camera. Can. See Ash or garbage can. Car coupling, D. C. Bassett. Car coupling, B. N. Colwell. Car coupling, H. H. Mansfield. Car coupling, J. H. Simpson Car door, W. L. Everit. Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, F. M. Wilder Car starter, Ackers & Lindsey, Jr Car, stock, J. Montgomery. Car, stock, J. Montgomery. Car, stock, J. Montgomery. Car, stock, J. Montgomery. Car, alton, foundation of, S. Roberts. Car colohing, foundation of, S. Roberts. Car colohing, foundation of, S. Roberts. Car doothing to flat bars, apparatus for attaching G. & E. Ashworth.	\$97,162 \$97,262 \$97,158 \$97,120 \$97,273 \$97,273 \$97,482 \$97,485 \$97,283 \$97,485 \$97,283 \$97,482 \$97,455 \$97,350 \$97,412 \$97,163 \$97,413 \$97,471 \$97,163 \$97,471 \$97,163 \$97,471 \$97,473 \$97,473 \$97,473 \$97,158 \$97,158 \$97,165 \$97
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Vitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can jacket, W. Zinsser, Jr. Car coupling, D. C. Bassett. Car coupling, E. N. Colwell. Car coupling, S. P. Mickey. Car coupling, S. P. Mickey. Car door, freight, E. H. Whitaker Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, F. M. Wilder Car starter, Ackers & Lindsey, Jr. Car starter, N. V. Viele. Car, stock, J. Montgomery Car, wheels, device for lubricating, S. M. Briggs Cars, Schorger. Card clothing to fat bars, apparatus for attaching G. & E. Ashworth. Carding engine cylinders, means for driving, G. &	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,482 \$97,283 \$97,485 \$97,283 \$97,350 \$97,350 \$97,471 \$97,412 \$97,471 \$97,163 \$97,163 \$97,471 \$97,163 \$97,175 \$97,137 \$97,137 \$97,152 \$97,152 \$97,152 \$97,153 \$97,153 \$97,153 \$97,153 \$97,153 \$97,153 \$97,153 \$97,155 \$97,156 \$97,156 \$97,156 \$97,156 \$97,156 \$97,155 \$97,156 \$97,267 \$97,266
	Young Boxes, means for securing metallic bands to, J. H. Williams Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar Burial apparatus, G. L. Gehring Button, D. P. Vitzgerald Button ble cutter, E. Nowill. Button setting implement, F. H. Richards Sortage and the set of the	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,482 \$97,283 \$97,485 \$97,283 \$97,350 \$97,350 \$97,471 \$97,412 \$97,471 \$97,163 \$97,163 \$97,471 \$97,163 \$97,175 \$97,137 \$97,137 \$97,152 \$97,152 \$97,152 \$97,153 \$97,153 \$97,153 \$97,153 \$97,153 \$97,153 \$97,153 \$97,155 \$97,156 \$97,156 \$97,156 \$97,156 \$97,156 \$97,155 \$97,156 \$97,267 \$97,266
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Vitzgerald. Button, D. P. Vitzgerald. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can. See Ash or carbage can. Can. See Ash or carbage can. Car coupling, E. N. Colwell. Car coupling, E. N. Colwell. Car coupling, S. P. Mickey. Car coupling, S. P. Mickey. Car door, freight, E. H. Whitaker Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, F. M. Wilder Car starter, N. V. Viele. Car, stork, J. Mongomery. Car, unloader, H. M. Barnhart. Car wheels, device for lubricating, S. M. Briggs Card clothing to flat bars, apparatus for attaching G. & E. Ashworth Carding engine cylinders, means for driving, G. & E. Ashworth.	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,482 \$97,482 \$97,485 \$97,283 \$97,485 \$97,283 \$97,482 \$97,483 \$97,412 \$97,413 \$97,413 \$97,161 \$97,161 \$97,161 \$97,161 \$97,161 \$97,161 \$97,163 \$97,161 \$97,161 \$97,161 \$97,163 \$97,161 \$97,161 \$97,161 \$97,163 \$97,161 \$97,161 \$97,163 \$97,161 \$97,161 \$97,162 \$97,165 \$97,165 \$97,165 \$97,165 \$97,165 \$97,165 \$97,267 \$97,267
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar Burial apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can. See Ash or garbage can. Can jacket, W. Zinsser, Jr Car coupling, D. C. Bassett. Car coupling, B. N. Colwell. Car coupling, H. H. Mansfield. Car coupling, J. H. Simpson Car door, freight, E. H. Whitaker Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, B. Wilder Car heating apparatus, railway passenger, M. Wood Car, stock, J. Montgomery. Car, stock, J. Montgomery. Card clothing to flat bars, apparatus for attaching G. & E. Ashworth. Carding engines, device for securing card clothing. Carding condition of, S. Roberts Card clothing to flat bars, apparatus for driving, G. & E. Ashworth Carding engines, device for securing card clothing to flat bars, apparatus for driving, G. & Carding engines, doffer comb head for, G. & E.	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,482 \$97,482 \$97,485 \$97,283 \$97,485 \$97,283 \$97,483 \$97,483 \$97,471 \$97,163 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,420 \$97,158 \$97,158 \$97,158 \$97,158 \$97,158 \$97,158 \$97,163 \$97,161 \$97,122 \$97,158 \$97,158 \$97,168 \$97,168 \$97,168 \$97,267 \$97,265 \$97,265
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can. See Ash or garbage can. Can gacket, W. Zinsser, Jr Car coupling, D. C. Bassett. Car coupling, B. N. Colwell. Car coupling, H. H. Mansfield. Car coupling, J. H. Simpson Car door, freight, E. H. Whitaker Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, F. M. Wilder Car starter, Ackers & Lindsey, Jr Car, suck, J. Montgomery. Car, unloader, H. M. Barnhart. Car, spiring foundation of, S. Roberts Cardolning of at bars, apparatus for attaching G. & E. Ashworth. Carding engines, device for securing card cloth- ing to the flats of, G. & E. Ashworth. Carding engines, device for securing card cloth- ing to the flats of, G. & E. Ashworth. Carding engines, device for securing card cloth- ing to the flats of, G. & E. Ashworth. Carding engines, doffer comb head for, G. & E Ashworth.	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,482 \$97,482 \$97,485 \$97,283 \$97,485 \$97,283 \$97,483 \$97,483 \$97,471 \$97,163 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,420 \$97,158 \$97,158 \$97,158 \$97,158 \$97,158 \$97,158 \$97,163 \$97,161 \$97,122 \$97,158 \$97,158 \$97,168 \$97,168 \$97,168 \$97,267 \$97,265 \$97,265
	Young Boxes, means for securing metallic bands to, J. H. Williams Braiding machines, racer for, J. A. Turner Brake. See Sled brake. Brake, O. L. Gilbert Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar Burial apparatus, G. L. Gehring. Button, D. P. Witzgerald Button be cutter, E. Nowill. Button setting implement, F. H. Richards Can. See Photographic camera. Can. See Photographic camera. Car coupling, D. C. Bassett. Car coupling, B. N. Colwell. Car coupling, H. H. Mansfield Car coupling, J. H. Simpson Car door, W. L. Everit. Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, F. M. Wilder Car starter, Ackers & Lindsey, Jr Car, stock, J. Montgomery Car, stock, J. Montgomery Car, stock, J. Montgomery Car, spring buffer for railway, C. A. Schroyer Card clothing, foundation of, S. Roberts Card clothing to flat bars, apparatus for attaching G. & E. Ashworth Carding engine cylinders, means for driving, G. & E. Ashworth Carding engines, device for securing card cloth- ing to the flats of, G. & E. Ashworth Carding engines, dorfer comb head for, G. & E Ashworth Carding engines, dorfer comb head for, G. & E Ashworth Carvieweit	 \$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,283 \$97,482 \$97,483 \$97,483 \$97,471 \$97,163 \$97,471 \$97,163 \$97,471 \$97,163 \$97,412 \$97,277 \$97,375 \$97,161 \$97,267 \$97,266 \$97,266 \$97,266
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can. See Ash or garbage can. Car coupling, D. C. Bassett. Car coupling, E. N. Colwell. Car coupling, H. H. Mansfield. Car coupling, H. H. Mansfield. Car coupling, J. N. Colwell. Car door, freight, E. H. Whitaker Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, F. M. Wilder Car heating apparatus, railway, B. M. Wilder Car starter, Ackers & Lindsey, Jr. Car starter, N. V. Viele. Car, stock, J. Montgomery. Car starter, N. V. Viele. Car, spoing buffer for railway, G. M. Briggs. Card clothing to flat bars, apparatus for attaching G. & E. Ashworth. Carding engines, device for securing card clothing to flat bars, apparatus for attaching G. & E. Ashworth. Carding engines, doffer comb head for, G. & E Ashworth Carrier. Sweeper, Ru Toon & Gore	\$97,162 \$97,262 \$97,263 \$97,120 \$97,273 \$97,273 \$97,482 \$97,482 \$97,482 \$97,485 \$97,283 \$97,483 \$97,483 \$97,471 \$97,163 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,412 \$97,158 \$97,161 \$97,122 \$97,158 \$97,168 \$97,168 \$97,168 \$97,168 \$97,168 \$97,168 \$97,168 \$97,168 \$97,266 \$97,266 \$97,266 \$97,266
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Brake, O. L. Gilbert. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Vitzgerald. Button hole cutter, E. Nowill. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can. See Ash or grabage can. Can jacket, W. Zinsser, Jr Car coupling, D. C. Bassett. Car coupling, E. N. Colwell. Car coupling, H. H. Mansfield. Car coupling, J. H. Simpson Car door, freight, E. H. Whitaker Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, F. M. Wilder Car, stock, J. Montgomery. Car, stock, J. Montgomery. Car, stock, J. Montgomery. Car doldring, G. M. Barnhart. Car wheels. device for lubricating, S. M. Briggs Cardolder, H. M. Barnhart. Car wheels. device for lubricating, S. M. Briggs Cardolting to fat bars, apparatus for attaching G. & E. Ashworth. Carding engines, device for securing card clothing G. & E. Ashworth. Carding engines, device for securing card clothing Carding engines, device for securing card clothing G. & E. Ashworth. Carding engines, device for securing card clothing Carding engines, device for securing card clothing to the flats of, G. & E. Ashworth. Carding engines, device for securing card clothing to the flats of, G. & E. Ashworth. Carding engines, device for securing card clothing to the flats of, G. & E. Ashworth. Carding engines, device for securing card clothing to the flats of, G. & E. Ashworth. Carding engines, device for securing card clothing to the flats of, G. & E. Ashworth. Carding engines, device for securing card	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,482 \$97,285 \$97,285 \$97,285 \$97,285 \$97,350 \$97,485 \$97,283 \$97,471 \$97,412 \$97,412 \$97,412 \$97,412 \$97,375 \$97,137 \$97,375 \$97,137 \$97,222 \$97,421 \$97,267 \$97,168 \$97,212 \$97,212 \$97,158 \$97,158 \$97,158 \$97,168 \$97,168 \$97,212 \$97,158 \$97,158 \$97,168 \$97,168 \$97,212 \$97,215 \$97,168 \$97,216 \$97,216 \$97,265 \$97,265 \$97,266 \$97,266
	Young	\$97,162 \$97,262 \$97,153 \$97,120 \$97,273 \$97,273 \$97,482 \$97,285 \$97,285 \$97,285 \$97,285 \$97,350 \$97,485 \$97,283 \$97,471 \$97,412 \$97,412 \$97,412 \$97,412 \$97,375 \$97,137 \$97,375 \$97,137 \$97,222 \$97,421 \$97,267 \$97,168 \$97,212 \$97,212 \$97,158 \$97,158 \$97,158 \$97,168 \$97,168 \$97,212 \$97,158 \$97,158 \$97,168 \$97,168 \$97,212 \$97,215 \$97,168 \$97,216 \$97,216 \$97,265 \$97,265 \$97,266 \$97,266
	Young Boxes, means for securing metallic bands to, J. H. Williams. Braiding machines, racer for, J. A. Turner Brake, O. L. Gilbert. Bridle bit, safety, L. P. Britt. Broom corn, utilizing waste, S. M. Youngjohn Bulletin board and broom holder, combined, M. W. Mahar. Burial apparatus, G. L. Gehring. Button, D. P. Fitzgerald. Button setting implement, F. H. Richards397,388, Camera. See Photographic camera. Can. See Ash or garbage can. Car coupling, D. C. Bassett. Car coupling, B. N. Colwell. Car coupling, H. H. Mansfield. Car coupling, H. H. Mansfield. Car coupling, J. N. Colwell. Car door, freight, E. H. Whitaker Car floor, W. L. Everit. Car heating apparatus, railway, H. R. Towne Car heating apparatus, railway, F. M. Wilder Car heating apparatus, railway passenger, M. Wood Car starter, Ackers & Lindsey, Jr. Car starter, N. V. Viele. Car, stock, J. Montgomery Car wheels, device for lubricating, S. M. Briggs. Card clothing to flat bars, apparatus for attaching G. & E. Ashworth. Carding engines, device for securing card clothing G. & E. Ashworth. Carding engines, device for securing card clothing. Carding engines, dorfer comb head for, G. & E Ashworth Cartige engines, dorfer comb head for, G. & E Ashworth Carting engines, and for call clothing. Carting engines, dorfer comb head for, G. & E Ashworth Carting engines, dorfer comb head for, G. & E Ashworth	\$97,162 \$97,262 \$97,262 \$97,153 \$97,273 \$97,273 \$97,273 \$97,482 \$97,283 \$97,485 \$97,283 \$97,485 \$97,385 \$97,383 \$97,471 \$97,163 \$97,412 \$97,412 \$97,412 \$97,412 \$97,375 \$97,375 \$97,375 \$97,375 \$97,122 \$97,121 \$97,122 \$97,161 \$97,212 \$97,163 \$97,161 \$97,212 \$97,163 \$97,163 \$97,175 \$97,163 \$97,163 \$97,163 \$97,175 \$97,163 \$97,163 \$97,163 \$97,165 \$97,165 \$97,165 \$97,165 \$97,266 \$97,266 \$97,266 \$97,266 \$97,226 \$97,226
	Young	997,162 397,262 397,153 397,120 397,273 397,482 397,482 397,485 97,283 397,485 97,283 397,485 97,283 397,471 397,412 397,471 397,375 397,473 397,473 397,423 397,262 397,265 397,266 397,266 397,266 397,266 397,266 397,261 397,221 397,266 397,266 397,266 397,261 397,221 397,265 397,266 397,266 397,266 397,264 397,223 397,223 397,223 397,225 397,226 397,22

increased according to size of cylinder? What distance should cylinder be from port to give a deep vibrating tone? Should port be exactly the same diameter as the inside of cylinder? Are whistles sounded any other way than a circular groove or port? If so, which gives best results for fire alarm? A. The opening in the ports of steam whistles of cylindrical form or bell for for the 6 inch cylinders and a sixty-fourth of an inch wider for a 9 inch whistle, for the above pressure. As a general rule, the ports should increase in width with the diameter of the cylinder and be made of the same diameter as inside of cylinder or bell. The thickness and length of the bell controls the tone and the distance of the edge of the bell from the ports generally fixes the volume of tone. The distance of the rim from the ports is adjustable, and may vary from 11/2 to 21/2 inches in large whistles, and is the only adjustment in the hands of the engineer for bringing out the full volume to meet variable pressures of steam and any imperfection of the workmen in sizing the ports. The cylindrical whistles with annular ports are the most powerfal and compact, and are in general use.

meable and luminous paper and the methods of preparing them. Then it shows a number of toys, boxes, etc., that may be made of paper. Then the subject of binding is taken up. Then paper flowers, kites, and fireworks made of paper are treated of. The other subjects mentioned are treated in the same manner, the course taken being the steps necessary in progressing from the simplest to more advanced stages of the arts.

TO INVENTORS.

An experience of forty years, and the preparation of nore than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents and to possess unequaled facilities for procuring patents everywhere. synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 961 Broadway, New York.

1	Casks, busning casing for, P. J. westphal 397,261
	Cement, manufacture of, R. W. Lesley 397,373
1	Chairs, spring attachment for rocking, W. I.
1	Bunker
	Chopper. See Cotton chopper.
ľ	Christmas trees, etc., stand for, T. B. Osborne 397,305
	Cigarbunching machine, J. E. Smith 397,396
	Clamp. See Colter clamp.
	Clips for connecting tie bars with switch rails,
	manufacture of, A. A. Strom 397,447
	Clock, advertising, A. V. Strait
	Clutch mechanism, C. A. King 397,238
	Cock, stop, E. E. & L. C. Beauvalet 397,332
	Coke oven front, E. H. Bradley
	Collar, garment. C. F. Henning 397,289
	Collar stuffing machine, G. E. Hoyt
	Colter clamp, R. A. Moore 397,138
	Confectioner's use. lace for. J. R. Stout 397,446
	Contact and switch. overhead, C. J. Van Depoele. 397,451
	Cords and tying strips of sheet metal, tool or in-
	strument for cutting. G. Hiller 897,290
	Corpses, preserving, J. G. Meyers 397,379
	Corset stay, R. Theiler
	Cotton chopper, scraper, and harrow, J. M. P.
	Lyon
	Cotton picker, J. W. Wallis
ľ	Cover fastener. G. Staib