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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 This is for our information and not for publication.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.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

INDEX OF NOTES AND QUERIES.

	No.
Batteries, amperage of	4222
Boiler explosions	4229
Copper oxide, to prepare	4221
Dynamo	4239, 4243
Etching glass	4244
Galvanometers	4222, 4231
Profession, choice of	4223, 4242
Screw, propeller, pitch of	4230
Secondary and tertiary currents	4226
Water telescope	4224

(4221) A. H. asks: 1. Could I use a cup made out of tin plate for the Lalande-Chaperon battery described in SUPPLEMENT, No. 792, and in "Experimental Science," instead of cast iron? A. A cup of tin plate would not be very serviceable. Use cast iron or glass in preference. 2. What is the black oxide converted to by the action of the battery? Is it to pure copper? A. Pure copper. 3. Have a lot of copper scrap; how can I convert into black oxide? A. Heat to strong red heat in air and pound or shake off oxide as fast as it forms.

(4222) C. A. B. asks: 1. If the needle of an ordinary galvanometer is deflected say 30° by two different cells of battery, does it denote that they have the same voltage or amperage? A. It depends upon the character of your galvanometer. If its resistance is very high, it is practically a voltmeter, and shows that the voltage of the two batteries is the same; but if its resistance is very low it acts as an ammeter and indicates that the amperage of the two cells is practically the same. 2. If one cell deflects say 20° and the other 30°, what is the rule for estimating their comparative voltage or amperage? Is it as the square of these numbers? A. This depends so much upon the character and proportions of the galvanometer that it does not admit of a very direct reply. If your galvanometer acts as a tangent galvanometer, the current will be proportional to the tangents of the angle of deflection. 3. What is the voltage and amperage of the ordinary Grove battery (small size), and also of the gravity battery? A. The voltage of the Grove battery is about 1·9 or 2. As the resistance of the Grove cell is about one-half an ohm, the battery will yield a current of nearly 4 amperes. The resistance of the gravity battery averages about 3 ohms, and its electromotive force being about 1 volt, it would yield a current of ⅓ of an ampere. 4. In the construction of a storage battery, how large square should each of a pair of lead plates be in order to obtain one ampere hour? A. Plates 5½ by 12 have a voltaic capacity of 14 ampere hours per pair. 5. What size of iron wire and what length of same can be heated to redness by one ampere? Thus affording an approximate method of measurement. A. As wire of the same nominal size from different manufactories varies considerably, your proposed test would be of no value. 6. How many ampere hours and what would be the voltage of a storage battery of six cells connected in series each cells containing two lead plates 6 by 8 inches? A. The electromotive force would be about 12 volts. Its voltaic capcity would be 14 ampere hours per pair of plates.

(4223) G. E. T. writes: Outside of the question as to adaptability, what are a few of the occupations that are most promising to the rising generation of young men, businesses that are new, at least comparatively so, and, at the same time, sure, both as regards the financial and the physical and moral phases of the question? Could you direct me how to get a beginning in any such, and work up? Am a young married man, 25, a stenographer, graduate 1885 of high school in Ohio, with physics and chemistry favorite studies. Might it be possible for me to materially modify the confining, sedentary nature of my present work by combination with something requiring a good proportion of manual exertion? If this were possible, it seems to me it would considerably reduce the otherwise frequent tendency to nervous irritability. I am always an enthusiastic reader of SCIENTIFIC AMERICAN. Believing that your knowledge of some such embryo enterprises, to whom it might not be unprofitable for me to make application, and perhaps right here in my own city, is much more extensive than mine could possibly be, I take this liberty to intrude upon your valuable time. A. Among the thousand and one ways of livelihood in this age of progress and invention, we feel our incapacity to enumerate in detail the business ways to success for the energetic and persevering young man. Adaptability must not be left out of the question; if you do, you are sure to fail. Find what you would most like to do, and what you would feel contented with under any conditions, and do it with all your might. Do not forget that there is always room at the head of the class. There is no royal road to financial success in these times, although the lucky strings may still hang out. The new ways are devious and misty. Better follow the trodden paths of well known business ways than fall into the quagmire of adventure. Finally we advise the development of present employment to its best income, and take up a systematic study of any profession or business best suited to your taste and devote all your spare time in becoming familiar with all its aspects, when in the near future you may be able to make the change smoothly and without strain upon the necessities due to your social condition.

(4224) W. A.—A water glass such as you require is made by inserting a plain piece of glass in the lower end of a tube, and making the joint watertight, so that the tube can be forced down into the water, leaving the upper surface of the glass dry. The size of the glass is immaterial. The object of this arrangement is to secure a smooth plane surface and to prevent reflection from the surface of the water.

(4225) A. W. writes: 1. Referring to the simple motor described in SUPPLEMENT, No. 641, will a soft cast iron core for the armature do as well as the soft iron wire core? A. Cast iron does not answer well as an armature core. The core must be laminated to secure good results. 2. Will a soft cast iron field magnet do as well as the Russia iron magnet? A. A cast iron field magnet will answer very well. 3. Can the motor be run as a dynamo without altering? If not, what changes must be made? I have a small steam engine that I made, and has been pronounced to be a very good engine, by an expert machinist (cylinder 1½ inch by 3 inches), and I am very anxious to run the motor or dynamo with it. Will you please tell me whether it will work or not (that is the motor)? How many revolutions ought the dynamo to make? A. Yes, but the electromotive force would be quite low. If you desire a higher electromotive force, wind the machine with finer wire. Your engine will undoubtedly run the motor when used as a dynamo, but we advise you to construct a better machine after the directions given for making the Edison dynamo in SUPPLEMENT, No. 844.

(4226) H. P. H. asks: 1. Why is insu- lated iron wire not used on field magnets? A. Because of the disadvantages due to its resistance. 2. Can an induction coil be made to give 50 to 100 volts and 2 to 10 amperes from a battery current of 10 amperes 5 volts; 15 volts 5 amperes? A. No. 3. Would reversing the current in an induction coil without breaking the circuit be an improvement on the vibrator? A. An induction coil worked with an alternating current will give equal impulses in opposite directions, and has advantages over an induction coil worked by direct current interrupted by a vibrator. 4. Will a storage battery made of tin plates coated with red lead be practicable? A. We think the tin plate would be rapidly corroded. 5. What would be the effect of joining the terminals of a half inch spark induction coil to the primary of another half spark induction coil? If I connect the two secondary currents, what kind of current will it produce in the primary? A. You would secure a tertiary current in the secondary wire of your induction coil, but it would be far less than you could secure by using a primary coil having a sufficient number of turns to utilize the secondary current of the first coil. Your proposed induction coil we think is impracticable.

(4227) W. A. S. asks: What current is used on the ordinary incandescent circuit, also what voltage? A. The current used in an ordinary Edison lamp is a half ampere. The total current on the circuit would depend on the number of lamps. The E. M. F. is 110 volts. 2. Could a person standing on an insulating stool handle bare electric light wires on an arc circuit without danger? A. There is always danger in handling arc light wires under any circumstances. 3. Is a compound or shunt-wound dynamo best for arc lighting purposes? A. We believe series-wound dynamos are commonly used for arc lighting.

(4228) H. J. F. asks: 1. Will you please give me a receipt for making a dry battery for hydrogen and oxygen, and what kind of vessels to use? A. If you refer to a battery for decomposing water, we would say that any battery will do it, provided you use a sufficient number of cells. You will find a dry battery described in SUPPLEMENT, No. 794. 2. If I make simple electric motor twice the size, can I run a canoe 16 feet long, and how many miles an hour, and what part of a horse power would its strength be? A. A properly proportioned electric motor twice the size of the simple motor will run a boat of the size given. You can probably attain a speed of four miles per hour.

(4229) W. W. writes: Having seen in several articles (in some of our leading periodicals) on steam boiler explosions the frequent mention made of the proverbial saw mill engineer and his consequential explosions, and I being one of these unlucky waifs, would like to inquire how does he come to be a notorious outlaw? Is it through gross negligence on his part as a class, or is his boiler taxed harder than it should be, that is, why more saw mill boilers explode than any other class? A. As the explosions of saw mill boilers largely exceed in number those of the boilers of any other kind, and are from one-quarter to one-third of all the recorded explosions, there must be something in the management of saw mill machinery that perhaps engineers do not control. The overloading of boiler work and pressure beyond the safe condition of old boilers, by the instructions of parsimonious owners to inexperienced engineers, is probably at the bottom of the trouble. If a good engineer protests, the owner will find somebody to run his boiler, and the fraternity bears the ridicule.

(4230) E. J. K. asks: 1. Would two of the motors described in SUPPLEMENT, No. 641, run a row boat 12 or 14 feet long fitted with twin screws? A. Yes. 2. What is meant by the pitch of a propeller? A. It is the distance the screw would travel forward in one revolution if working in a rigid nut, or in other words, if one of the blades of the screw were widened so as to form one turn of a screw thread, the distance between the ends of the blade measured parallel to the shaft would be the pitch. 3. What pitch and diameter of propellers would be most suitable? A. The screw for such a motor should have a pitch of 8 inches and a diameter of 6 inches. 4. At what speed do you think they would drive it? A. Your boat would probably travel at the rate of about 3 or 4 miles an hour. 5. Can I increase the power of the motors by using more than 8 cells of battery to each motor? A. You would gain little by the use of more battery.

(4231) J. F. B. asks: 1. What is the re- sistance of an Edison 16 candle power lamp, and how much (length) No. 22 German silver wire will it take to equal it? A. About 115 ohms. It will require about 530 feet of No. 22 German silver wire to equal it in resistance. 2. In making a detector galvanometer for use on the Edison system, how much and what sort of wire should be used for the coil, wire to be wound on wooden ring with compass in center? A. Use enough No. 28 wire to secure its required sensitiveness and make the resistance of your galvanometer circuit equal to the resistance of an Edison lamp by the means of a rheostat. 3. What is the best way to remove oil from belts that are completely saturated with it? A. You can dissolve out the oil by using benzine or bisulphide of carbon. Both are highly inflammable.

(4232) M. S. S. asks: 1. What proportion of bichromate of sodium and water is used in the Fuller cell? A. Make a saturated solution of bichromate of sodium in water; to this slowly add one-fifth its weight of common sulphuric acid. 2. Does the zinc have to be of the shape shown in "Experimental Science," or could it be square? A. The conical form is generally preferred, but almost any shape will answer. 3. Of what material should the rod be which connects the zinc with the wire? A. Brass or copper. It should be well protected by means of gutta percha cement.

(4233) C. W. writes: 1. A says a one pint Bunsen will not run 10 hours on a motor. (Per answer SCIENTIFIC AMERICAN March 12, E. W.) B says it will. Which is right? A. It depends upon how the battery is used. On a short circuit it would probably run down in less than ten hours, but used on a circuit of proper resistance it will run 4 or 5 days, or a week, with one renewal of the electropoin fluid. 2. Will a 1-16 horse power motor run a coffee mill, common size? A. We think not. Considerable power is required for running even a small coffee mill. Probably a one-eighth horse power motor would not be too large.

(4234) H. P. A. asks: 1. Could the field magnet for the motor described in SUPPLEMENT, No. 641, be made of one piece of wrought iron, ends welded together? A. Yes. 2. Is there any dry battery that can be carried in the pocket powerful enough to light a one-half candle power light? A. Probably a Burnley or Gassner dry battery could be made small enough for this purpose. It would require 2 or 3 cells. 3. Could a tube of glass be used instead of one of hard rubber to go through the washers used in the dynamo described in SUPPLEMENT, No. 600? A. Glass could be used, but it is liable to be broken and might make trouble.

(4235) E. L. asks: 1. How many bat- teries 5 by 9 inches charged with diluted sulphuric acid will it take to furnish power for a two horse power motor? A. Plain sulphuric acid batteries are not adapted for running motors because they polarize readily and the power ceases. The best battery for power is probably the Bunsen cell. It will require 12 or 14 large cells per horse power. 2. Which is the best to charge a battery—copper sulphate or sulphuric acid? A. You will find the electric power from primary batteries very troublesome and expensive.

(4236) T. B. says: Please inform me how to ascertain the necessary horse power to run a boat of given dimensions? A. The power to run a boat depends upon required speed, form of boat and kind of wheel. The whole matter is discussed and tabulated in Haswell's Engineer's Pocket Book, pages 660, 661, 662. $4 mailed.

(4237) W. F. W. writes: Your explana- tion of the "juggler automaton," in a recent number of the SCIENTIFIC AMERICAN, leads me to ask for an explanation of the famous chess and checker automaton at the Eden Musee of New York. A. The chess playing automaton to which you refer is supposed to contain an expert player. It is believed that the mechanism shown to those who witness the game has nothing whatever to do with the playing.

(4238) E. P. V. R. asks: What is it that the photographers use to spot positive pictures? I mean the spots caused by dust on the paper. A. Most photographers touch up with India ink or sepia.

(4239) J. S. asks: 1. How can I make a small quantity, say a quart, of concentrated solution of sulphate of zinc, such as described for Trouve's blotting paper battery? (Niaudet, pg. 112.) A. You can procure the crystals of sulphate of zinc at any drug store. Dissolve as much as possible in warm water, allowing the solution to cool. Some of the zinc sulphate will crystallize out; the remaining solution is a saturated solution, which is what you require for a battery. 2. What is the difference between a polarized bell and an ordinary call bell? A. In a polarized bell, the armature which actuates the bell hammer is magnetized so that it will be acted upon by an alternating current. 3. "Experimental Science," page 421, states that it has been found uneconomical to use lamps of a lower voltage than 60; how can the eight-light dynamo in SUPPLEMENT, No. 600, be made suitable for that voltage? A. You can increase the voltage of the eight-light dynamo by increasing its speed. 4. Will tin plate (tinned sheet iron) do for washers in drum armatures? A. They will answer very well. They should be separated by paper as in the case of iron disks. 5. When resistance is introduced in a primary or secondary battery circuit, is the consumption of chemicals in battery retarded, or is the same quantity of current generated and partly wasted in resistance, and will a dynamo require less power to run it while the extra resistance remains in circuit? A. The consumption of chemicals in the battery is retarded by the resistance, and the output of the dynamo is reduced by the resistance, so that it requires less power to drive it.

(4240) G. L. G. writes: 1. I am making an induction coil as described in "Experimental Science." What size single-covered wire should I use for secondary coil? A. No. 36. 2. What difference would it make if I should use a soft iron rod instead of wires? A. A soft iron rod will not magnetize or demagnetize as rapidly as a bundle of wires; besides, eddy currents will form in the rod, which would interfere with the working coil. 3. In making the condenser would it do to put the foil on the paper while the paper is wet with shellac, as the foil condenser is easy to handle? A. Yes.

(4241) Steady Reader asks: 1. If I make the simple motor, described in Hopkins, twice the size, linear measurement, how much more power would I obtain? At what speed per hour would it drive a 12 foot boat, and how many volts and amperes would be required to run it properly? What diameter should the propeller be, and what should be the speed of the motor? A. About four times. You would probably not attain more than four miles per hour. The screw for the motor of the size described should be about 10 inches in diameter. The motor should make a speed of about 1800, and the screw 300 to 400 revolutions per minute. 2. Why is a bundle of iron wire preferable to solid rod in magnets, etc.? Give scientific reason. A. A magnet core of wires or of laminated iron is preferred to solid iron on account of the rapidity with which it can be magnetized and demagnetized, also on account of the absence of eddy currents in the cores. 3. Of what use is a telescope on galvanometers? A. A telescope serves to magnify the movement of the galvanometer needle and scale, and allows a more accurate reading.

(4242) C. S. H. says: Being about to take up some profession, and having no particular bent toward either mechanical or civil engineering, I write to you to ask you if you would kindly answer the following questions through your valuable columns, viz.: Which of the above professions is the most lucrative? In which is there the more opening? In both these questions I mean as a general thing, which is the best place to learn them? What college or shop? A. Both professions as stated are lucrative to those that succeed. Success is the reward of mastership in the business as well as the knowledge necessary to either profession. A college course is a necessity unless you have natural talent and push to master the details. If you have no practical experience, the shop is the place to begin, for the experience necessary to the profession of a mechanical engineer. A position with a surveying party as rod or chain man has been the starting point with some of our successful civil engineers.

(4243) P. C. S. asks: 1. In the 8 light dynamo, what material is the base between the base proper and bottom of field made of? A. Wood. 2. How are the fields held to bottom and apart? A. By bolts extending through the base board and through the wooden piece at the bottom of the field magnet. 3. What is the base proper (having binding posts) made of? A. Wood. 4. Would it make any difference if armature shaft was made ¾ inch with ⅝ trunnions? A. No. 5. Can the armature shaft-bearing yokes be made of brass instead of bronze? A. Yes. 6. Is the cross piece at top holding wire made of wood and just screwed to field magnets? A. It may be of wood; vulcanized fiber, however, is preferable. 7. Can you inform me of a book on gearing from which a person could learn to draught teeth? A. MacCord, Mechanical Drawing, price, paper $2.50, cloth $3.50.

(4244) J. R. asks how the ink is made and how it is used to protect the surface of glass from the white acid when used in etching floral and other designs such as are seen on table ware, etc.? Is there any book published on the subject? A. Beeswax is very generally used to protect glass in acid etching. Often the design is applied with diamond ink, a mix-

ture of hydrofluoric acid and barium sulphate, no protector being used or needed. The "Scientific American Cyclopedia of Receipts, Notes and Queries," price $5, contains several receipts on the subject of your inquiry.

(4245) G. S. W. writes: In vol. x, No. 252, SCIENTIFIC AMERICAN SUPPLEMENT, "How to Make a Telescope," by Hopkins, it says the focusing tube, G, of brass is 1¼ inch internal diameter. Then, speaking of the astronomical eyepiece, the eye aperture should be 1¼ inch diameter, and the diaphragm about the same. As the diaphragm would be same diameter as the brass tube G, of what use is it? Is it not an error? Also what are the diameters of the lenses for the astronomical eye piece described, and what would be the combination for one of higher and one of lower power? A. In the article referred to, for "eye aperture 1¼ inches" read eye aperture ¼ inch. The rule for the combination of lenses for astronomical eye pieces is given in the article referred to. The focal lengths of the eye and field lenses should be as 1 to 3.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

April 5, 1892,

AND EACH BEARING THAT DATE.

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

Acid, apparatus for condensing nitric, O. Guttmann 472,498
Air brake coupling, W. A. & B. S. H. Harris 472,190
Alarm. See Burglar alarm.
Album, Baum & Muller 472,470
Album, stereoscopic, J. H. McGrew 472,196
Animal trap, J. C. Gould 472,213
Animal trap, McLeod & Garrett 472,386
Annunciator, W. C. Dillman 472,439, 472,440
Arithmetic, means for instruction in, P. Kalisch 472,057
Armature for electro-magnets, adjustable, E. Hofmann 472,480
Auger, earth, Scott & Gardiner 472,403
Auger, post hole H. M. Cryer 472,339
Axles, manufacture of, W. J. Parmelee 472,398
Baby jumper, J. Higham 472,351
Ball and eartherefor, detachable, L. N. Lusk 472,130
Baling press, W. Hemingway 472,048
Barrel bushings cleaner for, E. T. Mueller 472,065
Battery. See Electric battery.
Bean picker and sorter, E. Knapp 472,299
Bearing box adjuster, automatic, H. L. Hopkins 472,122
Bed, folding, W. P. Tracy 472,321
Beer or other liquids, device for dispensing, M. Itjen 472,358
Bell trip, alarm, J. A. Chamberlain 472,030
Bellows, blacksmith's and hand, S. H. Brand 472,187
Belt, C. Scherer 472,402
Berth, automatic leveling ship's, D. Parks 472,070
Bicycle, M. D. Smalley 472,487
Bicycle saddle, W. S. Brooks 472,427
Bicycles, umbrella holder for, F. J. Wernerth 472,282
Bit. See Bridle bit. Curb bit.
Blotter and ruler, combined, D. C. H. Ross 472,079
Board. See Dash board.
Boat. See Toy boat.
Boat lowering apparatus, J. H. Throop 472,410
Book, check, D. A. McIntyre 472,067
Book holder, H. H. Baker, Jr 472,247
Book, indexed, E. T. Douglass 472,441
Book or sheet music holder and leaf-turner, J. A. Jamison 472,125
Book or the like, note, W. Penman 472,073
Boot or shoe stay, W. A. Neely 472,197
Bottle stopper, Foster & Crowley 472,041
Bottle washing machine, L. A. Koplin 472,368
Bottle wrapper, H. J. Mark 472,462, 472,463
Bottling aerated liquids, machine for, Johnston & Hallett 472,362
Box. See Letter box. Match box. Packing box. Power box.
Box, H. Gass 472,114
Brace. See Shoulder brace.
Brake. See Vehicle brake.
Bracket. See Wire shelf bracket.
Brick kiln, W. Sercombe 472,404
Brick machines, loading barrow for, E. New 472,138
Brick mould sander, G. Carnell 472,334
Bridge gate, C. Dietz 472,208
Bridge piers, method of and means for building and anchoring, F. E. Sickels 472,277
Bridle bit, H. S. Squier 472,145
Broom head, J. O. King 472,365
Brush holder, J. R. Coffman 472,435
Brushes, bridle for paint, C. Boeckh, Jr 472,425
Bucket cover, sap, J. L. Shigley 472,180
Buffing wheel, W. W. Crooker 472,287
Buggy top, Watkins & Bayless 472,154
Buildings, fire shield for, A. A. Hagen 472,479
Bundle carrier and shocker, R. Woods 472,155
Burglar alarm and door fastener, combined, C. K. Donnell 472,340
Burner. See Gas burner. Hydrocarbon burner. Vapor burner.
Button, R. Liebmann 472,375
Camera. See Magazine camera. Photographic camera.
Can heading machine, B. Adriance 472,284
Can screw and faucet, H. F. Bartlett 472,157
Car coupling, A. J. Allen 472,245
Car coupling T. J. & J. Baylor 472,328
Car coupling, F. R. Brown 472,138, 472,249
Car coupling, H. A. Frantz 472,290
Car coupling, S. P. Heath 472,350
Car coupling, J. H. Langschmidt 472,505
Car coupling, G. W. Powell 472,509
Car coupling, T. L. Rivers 472,395
Car coupling, J. H. Wilson 472,418
Car, exhibition, M. Leak 472,300
Car, freight, J. M. Burton 472,158
Car wheel, W. Ward 472,415
Cars, brake and heating system for railway, Bangs & Waite 472,424
Cars, center plate for logging, Todd & Anderson 472,151
Cars, chock block for logging, Todd & Anderson 472,152
Cars, safety attachment for street, P. S. Townsend 472,184
Carbon holder, H. Howard 472,055
Carpet button, stair, A. A. Cardwell 472,250
Carpet fabric, ingrain, G. H. Harvey 472,215
Carpet stretcher, Arnold & Babcock 472,204
Carpet stretcher, L. Coffman 472,434
Carriage and cradle, combined, J. Schlich 472,314
Carrier. See Bundle carrier. Hay carrier.
Case. See Clock case.
Cash recorder, C. H. Coles 472,336
Cash register and indicator, F. S. Hunt 472,123
Casket handle, J. McCarthy 472,195
Caster, H. C. Deane 472,254
Casting apparatus, stereotype, J. R. Cummings 472,473, 472,475
Cattle dehorner and plant pruner, combined, E. B. Stauber 472,146
Chain link, J. W. Garland 472,166
Chair. See Surgical chair.
Chart, builder's, Kindl & Childs 472,266
Checks, lock-stub for sale, A. N. Southwick 472,235
Churn dasher, I. F. Sterling 472,061
Cigar bunching machine, N. H. Borgfeldt 472,331
Cigarette machine, H. Bohls 472,101
Cistern, self-cleaning, A. D. Strong 472,488
Clevis, R. A. Marshall 472,132
Clip, R. W. Jones 472,398
Clock case, E. Davies 472,162
Clock operating device, Burton & Gould 472,028
Cloth cutting machine, P. Howe 472,172
Cloth guiding machine, J. E. Windle 472,203
Cloth laying machine, P. Howe 472,173
Clothes drier, R. H. Burdge 472,188
Clover hulling machine, J. N. Kallor 472,218
Coat hanger, W. C. Perkins 472,508
Cock, plug, M. G. Wilder 472,093
Coke oven, Gates & Sharp 472,115
Colter attachment, plow, W. J. Stowe 472,082
Colter, plow, A. A. Yackee 472,186
Compasses, electric recording device for, C. L. Jaeger 472,124
Cooker, compound, C. McConalogue 472,384
Corn sheller, separating, M. G. Shindle 472,181
Corset fastening, C. R. Viehofer 472,087
Coupling. See Air brake coupling. Car coupling. Eccentric coupling. Friction coupling. Hose coupling.
Cracker cabinet, F. C. Acker 472,020
Creasing and folding machine, J. Corbett 472,253
Crushing and grinding mill, G. S. Knapp 472,367
Cuff holder, N. B. Eccleston 472,343
Cultivator, E. H. Jenkins 472,361
Cultivator, A. E. Wilder 472,416
Curb bit, L. J. Jimenez 472,297
Curling tongs, E. Fontaine 472,446
Cut-out, safety, M. Thumcher. See Pipe cutter. 472,084
Damper, automatic, Bradbury & Griswold 472,102
Dash board, Gooding & Crossan 472,450
Decorative films, packing, W. H. Coe 472,252
Dehorner, W. H. Newton 4 72 39
Die press, Colomy & Albee 472,337
Disinterating, mixing, and other purposes, apparatus for, J. A. Young 472,421
Door guard, A. W. Eckerson 472,110
Draught equalizer, J. W. Gamble 472,448
Drawing frames, etc., automatic stop mechanism for, J. W. Gaunt 472,043
Drier. See Clothes drier.
Drill. See Ratchet drill.
Driving mechanism, C. O. Palmer 472,178
Drying apparatus, R. White 472,323
Dust pan, J. Lees, Jr 472,371
Dye, azo, H. Kuzel (r) 11,231
Dye, manufacture of blue, A. Weinberg 472,091
Dye tub, C. L. Auger 472,327
Dyes, manufacture of yellow, M. Hoffmann 472,121
Dyeing, Micbaelis & Henning 472,267
Dynamometer, rotary transmitting, F. Van Winkle 472,468
Eaves trough hanger, G. W. Heartley 472,294
Eccentric coupling and tool and work holder, A. Johnson 472,126
Educational appliance, W. H. Wind 472,419
Electric battery, thermo, R. J. Gulcher 472,261
Electric element, thermo, E. N. Dickerson 472,037
Electric motors, switch box for, P. Wright 472,283
Electric wire hanger, H. H. Luscomb 472,220
Electrical distribution, system of, W. Marshall 472,193
Electrical indicator, J. W. Henderson 472,500
Electrical meter, J. F. Kelly 472,265
Electricity, production and distribution of, W. Marshall 472,379
Elevator, C. W. Fowler 472,113
Engine. See Gas engine.
Fabric. See Carpet fabric. Rattan fabric. Woven fabric.
Facial hygienic steaming apparatus, M. Meyberg 472,134
Facing compound, C. F. Lawton 472,369
Fall hook, F. S. Hilton 472,263
Fare register, Cushman & Canfield 472,035
Fare register, W. L. Silvey 472,232
Feeding grain to live stock, receptacle for, C. A. Smith 472,316
Fence, barbed wire, J. W. Griswold 472,496
Fence machine, hand, M. Hays 472,167
Fence wire device for spooling and stretching, A. Hankel 472,047
Fences, barb for wire, H. Gearty 472,044
Files or other tools, handle for, J. W. Payler 472,140
Fireman's respirator, T. O. Helbing 472,048
Flax puller, J. M. Smith 472,234
Fog signal, W. R. Close 472,335
Folding machine, L. C. Crowell 472,472
Foot rest, E. L. Button 472,205
Friction coupling, H. P. Christie 472,432
Fruit jar, D. Rylands 472,401
Fur dags, machine for opening, E. Beesley, Sr., *et al* 472,025
Furnace. See Hot air furnace. Metallurgical furnace.
Furnace, F. F. Thedens 472,183
Furnace regulator, steam, J. Levey 472,373
Furnaces, draught regulator for heating, R. A. May 472,305
Furniture attachment, C. Seiler 472,200
Gauge. See Track gauge.
Galvanometer, Bergmann & Scott 472,026
Game apparatus, J. A. Eno 472,289
Game apparatus and sample exhibitor, F. H. Smith 472,408
Gas and other products given off during the process of fermentation, method of and appliance for the collection and utilization of carbonic acid, C. R. C. Tichborne *et al* 472,085
Gas, apparatus for the manufacture of, H. C. Rew 472,077
Gas burner, B. McGregor 472,385
Gas burner for heating purposes, P. H. Nelson 472,198
Gas engine, J. Charter 472,106
Gas manufacturing apparatus, C. W. Isbell 472,191
Gate. See Bridge gate.
Gate, J. C. Shannon 472,080
Generator. See Steam generator.
Glass, decorating, J. H. Scharling 472,230
Glove fastening, P. A. Raymond 472,272
Glove for baseball catchers, T. A. Kennedy 472,482
Gold leaf, spool for carrying and applying, G. P. Hogan 472,051
Governor, F. Hart 472,233
Governor, steam engine, R. G. Manifold 472,378
Grain binder, G. Schubert 472,143
Grain conveyer, H. M. Hastings 472,454
Gramophones, coin-controlled apparatus for, E. L. Wilson 472,417
Grate, J. W. Greene 472,171
Grate, fire, M. N. Forney 472,039
Grate, fire, O. A. Kyser 472,058
Grubbing machine, J. Starks 472,279
Guard. See Door guard. Snow guard.
Gun, Acland & Holmstrom 472,244
Gun, magazine breech-loading, A. A. Clive 472,251
Gun, recoil-operated magazine, R. Mallen 472,377
Gypsum, composition for retarding the solidification of calcined, E. Watson 472,322
Hair waving or crimping device, E. Gaudin 472,449
Hame, F. X. Perry 472,270
Hammer, magazine tack, A. T. Lewis 472,374
Handle. See Casket handle.
Hanger. See Coat hanger. Eavestrough hanger. Electric wire hanger. Pipe hanger.
Harrow, C. H. Kading 472,129
Harrow, spring tooth, F. Van Patten 472,185
Harvester, potato, F. W. Lee 472,370
Hay carrier, W. Louden 472,175
Hay press, J. A. Hayes 472,349
Hay stacking machine, S. Concannon 472,338
Heater. See Sad iron heater. Water heater.
Heating and ventilating apparatus, C. D. Howard 472,054
Heel burnishing machine, F. Molloy 472,307
Heel plate and ice creeper, W. Rosenfield 472,396
Heel plate attaching machine, W. Rosenfield 472,397
Hinge, F. W. Loring 472,192
Hinge, lock, G. L. Loomis 472,483
Hinge, mirror, W. P. Tarbell 472,409
Holder. See Book holder. Book or sheet music holder. Brush holder. Carbon holder. Cuff holder. Label holder. Pillow sham holder. Sash holder.
Hook. See Fall hook. Whiffletree hook.
Hoop fastener, W. F. Robertson 472,142
Horseshoe, C. Hammelmann 472,262
Hose coupling, C. Christy, Jr 472,471
Hose coupling, E. & A. Draudt 472,342
Hot air furnace, M. Koehler 472,219
Hydrocarbon burner, M. E. Ray 472,226
Hydrocarbon burner, G. H. Scott 472,231
Ice, can for the manufacture of, A. Smith 472,407
Indicator. See Electrical indicator. Station indicator.
Inflatable tube, L. J. Phelps 472,485
Inhaler, C. D. McGrath 472,176
Inhaler, J. M. Van Orden 472,238
Insecticides, device for applying, M. A. Hawley 472,456
Insulating electric wires, compound for, L. Hill 472,352
Jar. See Fruit jar.
Joint. See Rail joint.
Journal bearing, Todd & Anderson 472,150
Kiln. See Brick kiln.
Knife. See Pocket knife.
Knife cleaning and flouring device, J. H. Mitchell 472,194
Knitting machine, circular, A. T. & W. L. Cathcart 472,029
Label holder, H. F. Bente 472,248
Label holder, H. J. Small 472,278
Lace fastener, shoe, E. H. Roberts 472,078
Ladder, E. L. Ripp 472,141
Ladder and ironing board holder, combined step, W. H. Lish 472,303
Lamp chimney attachment, J. Shoemaker 472,405
Lamp, electric arc, J. A. Mosher 472,064
Lamp, electric arc, S. W. Rushmore 472,274
Lamp for burning mineral oils, A. Howat 472,056
Lamp lighter and extinguisher, automatic electric, J. H. Caughy 472,494
Lamp, miner's safety, L. N. Williams 472,098
Lamp, spirit, A. C. Monfort 472,506
Lamp suspending device, G. W. Baldwin 472,468
Lamp wick raiser, H. H. Hipwell 472,354
Latch, J. K. Clark 472,430
Latch, coach door, J. M. Orr 472,388
Leather skiving machine, A. J. Tewksbury 472,148
Leather splicing device, N. B. Holdsworth 472,052
Leg, artificial, C. E. Ervin 472,443
Letter box, W. W. Speer 472,182
Letter box, combined collection and delivery, W. Bussard 472,105
Level attachment, Finmant & Nissen 472,345
Lighting, system of arc, H. A. Foster 472,346
Lightning arrester, E. G. Miller 472,135
Lock. See Nut lock.
Loom Jacquard connection, J. Vacher 472,513
Looms, heddle for cross weaving, H. Topbam 472,412
Lubricator. See Spindle lubricator.
Lubricator, E. McCoy 472,086
Magazine camera, A. L'Eplattenier 472,442
Match box and holder, combined, E. C. Bachert 472,022
Metal plates, apparatus for coating, E. R. Jones 472,502
Metal shears, C. J. Colling 472,107
Metallurgical furnace, regenerative, H. C. Rew 472,076
Metallurgical process, J. B. Alzugaray 472,422
Meter. See Electrical meter.
Milk tester, R. Messenger 472,382
Mill. See Crushing and grinding mill.
Mining cage attachment, J. W. Canty 472,159
Mining machine, Keil & Westerdahl 472,363, 472,503
Mining machine, C. O. Palmer 472,177
Mining pick and drill, electric, J. Fish 472,444
Mixing machine, W. B. Wheeler 472,092
Moulding machine, O'Connor & McNamara 472,312
Mole trap, H. Durston 472,038
Motor. See Water motor. Wave power motor.
Music leaf turner, E. G. Gillespie 472,170
Musical instrument, Guerre & Martin 472,453
Newspapers, automatic apparatus for the sale of, A. Begg 472,492
Nut lock, R. C. Elliott 472,111
Nut lock, W. P. Sweetland 472,489
Nut lock, H. R. Wallis 472,413
Nut lock, V. E. Whitelock 472,242
Nut, self-locking, Plummer & Chapman 472,465
Orange clipper, T. B. Langford 472,459
Ores and like materials, machine for classifying or sizing, T. Clarskon 472,483
Ores, treating and concentrating pyritiferous, J. W. Neill 472,387
Organ, M. Clark 472,032
Organ, reed, J. W. Trainer 472,201
Overseam for fabrics, J. G. Greene 472,117
Packing box and savings bank, combination lock, J. B. Morris 472,136
Pan. See Dust pan. Vacuum pan.
Paper folding machine, J. H. Stonemetz 472,317
Pencil sharpener, W. K. Culver 472,161
Pencil sharpener, M. E. Worn 472,420
Pencil sharpener, slate, G. H. Rutschman 472,313
Photographic camera, H. J. Edwards 472,257
Piano action, A. D. Dimick 472,109
Piano action, upright, G. M. Guild 472,478
Picker. See Bean picker.
Pictures, stretcher for the paper or canvas of, J. N. Anderson 472,021
Pillow sham holder, G. H. Davis 472,036
Pipe and rod wrench, J. J. Tomey 472,153
Pipe cutter and threader, Bowman & Godfrey 472,426
Pipe hanger, A. Newbury 472,068
Planter, check row corn, J. R. Ayers 472,246
Planter, corn, J. C. Tunnicliff 472,281
Plaster, wall, W. Robinson 472,511
Plow, J. I. Hatfield 472,348
Plow, J. H. Linebarger 472,302
Plow attachment, S. F. Savits 472,179
Plow, hillside, D. B. Englisb 472,112
Plow, sulky, J. R. Warren 472,240
Plowshare, W. R. Russell 472,400
Pocketbook, L. Hummel 472,174
Pocket knife, A. Pauls 472,390
Pocket knife, B. Von Bultzingslowen 472,104
Pool table, F. E. & W. F. Augustin 472,423
Portfolio, H. M. Hoelscher 472,264
Postmarking and stamp canceling machine, W. Groth 472,497
Potato bug gatherer, G. Carlson 472,428
Powder box, toilet, W. Hill 472,217
Power transmitter, F. C. Osborn 472,222, 472,223
Press. See Baling press. Die press. Hay press. Printing press.
Pressure plate, E. F. Lewis 472,301
Pressure regulator, W. Werle 472,241
Printing machine, C. B. Cottrell 472,206
Printing press, J. H. Stonemetz 472,318
Printing press, cylinder, J. H. Stonemetz 472,319
Propelling vessels, apparatus for, F. G. Curtis 472,207
Propelling vessels, means for, S. Seabury 472,199
Propulsion, apparatus for piston, E. J. Meister 472,380
Protector. See Tree protector.
Pruning implement, C. L. Mann 472,304
Puller. See Flax puller.
Pulley, loose, A. Streit 472,083
Pulley, sash, F. V. Phillips 472,074
Pump, A. F. Abrahamson 472,156
Punch, check, SW. Peek 472,391
Punching and riveting machine, portable, A. C. A. Holzapfel 472,356, 472,357
Puzzle, G. A. Goodson 472,292
Rail fastening, G. A. Weber 472,090
Rail holding splice, F. G. Johnson 472,168
Rail joint, C. Roberts 472,228
Railway blocks, electric indicator for, R. W. Jaggard 472,359
Railway rail supporter, E. G. Patterson 472,071
Railway rails to metal sleepers, fastening, J. Conley 472,034
Railway switch, automatic, Maxwell & Clark, Jr 472,063
Railway ties, tamping, E. G. Patterson 472,072
Railway track, street, J. A. Duggan 472,164
Railways, fastening and seating of guard rails, etc., for street, J. A. Dugkan 472,165
Railways, inclosed supply system for electric, J. C. Fyfe 472,447
Ratchet drill. C. W. Higgins 472,120
Rattan fabric, knit, E. L. Taft 472,320
Recorder. See Cash recorder.
Reel, E. J. Hill 472,263
Register. See Casb register. Fare register.
Regulator. See Furnace regulator. Pressure regulator. Speed regulator. Temperature regulator. Touch regulator.
Rheostat, J. R. Masury 472,062
Rocker, W. M. Boenning 472,330
Roundabout, J. F. Fralinger 472,212
Roundabout, cable, J. F. Fralinger 472,211
Rubber articles, manufacturing hollow, E. L. Perry 472,225
Rubber sandal, J. C. Hammond, Jr 472,118
Ruler, roller blotter, F. M. Priestley 472,510
Sad iron heater, S. Thomason 472,149
Saddle, harness, J. A. Jamison 472,360
Sash fastener, Alteman & Macdonald 472,325
Sash fastener, J. W. Klapperich 472,364
Sash fastener, L. C. Walker 472,088
Sash holder, F. Shealy, Jr 472,276
Sash, window, H. A. Howe 472,458
Saw filing and setting machine, E. Christensen 472,031
Scaffold, H. L. Clark 472,160
Scaffold, W. J. Sankey 472,514
Scaffold, I. Smith 472,406
Scrubber and mop head, combined, E. F. Rowe 472,486
Separator. See Steam separator.
Sewing machine, E. Calm 472,333
Sewing machine, Willcox & Borton 472,094, 472,095
Sewing machines for stitching buttonboles, J. T. Hogan 472,501
Sewing machine loop taker, J. A. Russell 472,512
Sewing machine needle, Willcox & Borton 472,096
Sewing machine, overedge, J. G. Greene 472,046
Sewing machine ruffling mechanism, O. M. Chamberlain 472,491
Sewing machine tension apparatus, Willcox & Borton 472,097
Shafts, dust proof bearing for, T. A. Edison 472,288
Shaper, reversible universal, M. Morton 472,061
Shears. See Metal shears.
Sheet metal and wire cutting tool, W. H. Flinn 472,210
Sheet metal articles, enameling, H. Claus 472,033
Shelf, adjustable store, C. Baum 472,469
Shelf support, F. Gibbs 472,347
Sheller. See Corn sheller.
Shoe float or rasp, A. D. & H. E. Goodell 472,259
Shoe treeing machine, Copeland & Crisp 472,108
Shoulder brace, J. Town 472,086
Sign, street, M. Hofheimer 472,050
Signal. See Fog signal.
Signal, J. T. Hambay 472,499
Sink connection, F. Goss 472,045
Skylight, watertight, A. Danzer 472,438
Small arms, front sight in, E. O. C. Ord 472,065
Snow guard, Houghton & Barker 472,296
Soap fixture, toilet, G. A. Schmidt 472,315
Sole, G. F. Hall 472,214
Sole trimming machine, S. Ross 472,399
Speed regulator, R. J. Hoffman 472,355
Spindle lubricator, R. B. Parker 472,269
Spinning machinery, J. F. Foss 472,477
Spout, sap, F. O. Mitchell 472,306
Station indicator, J. M. Nelson 472,221
Steam generator, C. D. Mosher 472,309
Steam separator, C. D. Mosher 472,308, 472,310
Steam trap, E. E. Gold 472,116
Steering apparatus, J. D. Williamson, Jr 472,324
Stereotype plate and base, J. R. Cummings 472,474
Stopper. See Bottle stopper.
Stove, gas, J. L. Sharp 472,144
Stoves or heaters, non-conducting lining for, C. F. Walther 472,414
Stoves or heaters, oil burner attachment for, G. R. Moore 472,268
Stovepipes, evaporator attachment for, H. W. Libbey 472,060
Strainer, rotary, C. Wandel 472,089
Street sweeper, J. Damm 472,437
Street sweeper, M. S. Kjellstrom 472,366
Supporter. See Railway rail supporter.
Surgical chair, C. N. Leonard 472,372
Surgical needle and holder, F. Eissner 472,258
Surveying instrument, H. E. Grabau 472,451
Suspender attachment, B. O. Foster 472,040
Switch. See Railway switch. Tramway switch.
Switch and signal mechanism, interlocking, G. H. Pfeil 472,393
Switch and signal operating apparatus, G. H. Pfeil 472,464
Switch and switch box, S. Bergmann 472,027
Table. See Pool table.
Tag end jaw, H. S. Pfeil 472,392
Telegraph, automatic, F. Anderson 472,326
Telegraphs, unison apparatus for printing, H. Van Hoevenbergh 472,237
Telephone transmitter, E. G. Acheson 472,243
Telephones, toll collecting apparatus for, Kato & Rhodes 472,169
Temperature regulator, L. F. Easton 472,255, 472,256
Thill support, A. H. Fletcher 472,476
Thrasher, pea or bean, W. H. Grayson 472,452
Thrashing machine tooth, Z. Macomber 472,151
Tiles, die for roofing, J. E. Donaldson 472,189
Time lock attachment, F. H. Peck 472,224
Tire pneumatic, L. J. Phelps 472,484
Tire, pneumatic, Toney & Livingston 472,411
Tire, vehicle, F. Douglas 472,341
Tongs, W. A. Cornelius 472,436
Tool, combination, J. F. Sullivan 472,147
Tool, pneumatic, D. Drawbaugh 472,495
Tooth crown, metal, G. Evans 472,344
Touch regulator. F. C. Lighte 472,376
Toy boat, G. A. Goodson 472,291
Toy, figure, R. A. Chapman 472,429
Tracing apparatus, A. Wyns 472,099
Track gauge and level, C. Roberts 472,229
Tramway, switch, G. A. McMenimen 472,381
Trap. See Animal trap. Mole trap. Steam trap.
Tree protector, W. W. McCallip 472,137
Trousers, G. J. Rupprecht 472,273
Truck, car, J. Taylor 472,300
Truck, railway car, Pfingst & Bemis 472,271
Trunk or case, S. Herman 472,119
Tub. See Dye tub.
Tube. See Inflatable tube.
Tubes, tool for upsetting ends of metal, J. Kitsmiller 472,504
Turning machine, rod and broom handle, S. H. Britton 472,332
Typewriting machine, W. J. Barron 472,023
Typewriting machine, G. M. Beerbower 472,024
Typewriting machine, C. Fleckenstein 472,445
Typewriting machine, J. F. Frankey 472,042
Typewriting machine, J. Jackson 472,481
Umbrella or parasol, folding, Hayes & Millay 472,457
Vacuum pan, J. R. Farnham 472,309
Valve controller, electro-magnetic, O. E. Lundstedt 472,461
Valve for safety plugs for steam boilers, L. Sleno 472,233
Valve gear for steam engines, B. Bertermann 472,100
Vapor burner, C. A. Pope 472,394
Vaporizer, C. W. Merrill 472,133
Varnish, apparatus for applying, J. J. Clause 472,286
Vehicle brake, M. Potter 472,075
Vehicle running gear, T. Sutherland 472,280
Vending machine, coin-actuated, R. Moran 472,507
Ventilation, system of, J. F. Duffy 472,163
Vessel, air tight, G. A. Lawrence 472,460
Vise, J. W. McIntyre 472,311
Wagon running gear, C. E. Holley 472,053
Wagon running gear, J. M. Holler 472,295
Washing machine, J. D. Reed 472,227
Watch cases, ornamenting, C. Wilhelm 472,490
Water heater, H. B. Joyce 472,128
Water motor, running, J. E. Belt 472,467
Wave power motor, A. Rosenholz 472,398
Weighing and bagging machine, H. E. Hawk 472,455
Weir, automatic measuring, A. Johnson 472,127
Wells, apparatus for boring artesian, F. O. Brown 472,493
Wheel. See Buffing wheel. Car wheel.
Wheel locking device, electric, G. W. Blanchard 472,329
Whiffletree hook, T. Andress 472,491
Winding machines, traverse motion for bobbins in, J. A. Murphy 472,383
Window, O. Wagner 472,239
Winnowers, shaking sieve for, E. G. N. Salenius 472,275
Wire shelf bracket, H. L. Bradley 472,285
Wires, device for joining intersecting, G. M. & H. R. Lamb 472,069
Wood graining machine, W. W. Grier 472,260
Woven fabric and weaving the same, G. H. Harvey 472,216
Wrapping machine, S. D. Tripp 472,202
Wrench. See Pipe and rod wrench.

DESIGNS.

Badge, W. F. Bowen 21,443
Bretzel, J. Pfenninger 21,450
Buckle, L. B. Prahar 21,448
Button, A. A. Brunswick 21,449
Fireplace front, W. E. Fitch 21,444
Measuring instruments, case for electrical, E. Weston 21,445, 21,446
Monument, W. H. Perry 21,451
Picture frame bracket, L. Wolfsky 21,452
Ruffling or ruching, C. G. Hill 21,447

TRADE MARKS.

Alloy, Frictionless Metal Company 20,952
Boots and shoes, leather, Guthmann, Carpenter & Telling 20,920
Canned vegetables and fish, Seeman Brothers 20,942
Cement, Burham Brick, Lime and Cement Company 20,950
Cigars, D. L. Trujillo & Sons 20,948
Coffee, Elmenhorst & Co 20,926
Complexion, preparation to beautify the, E. C. Clay 20,937
Confectionery or candies, E. F. Gavin & Co 20,939
Currants or similar prepared fruits or vegetables, cleaned, Crandal & Godley 20,938
Dental plates and other uses, aluminum solder for, Gerard & Letord 20,929
Edge tools, cutlery, and instruments and implements of steel for surgical, toilet, domestic, and other purposes, Jacoby & Wester 20,953
Fertilizers, ground bone, Sharpless & Carpenter 20,932
Glass bottles, jars, and other glass receptacles and table ware, Nelson Glass Company 20,931
Gloves, Ormes, Upsdale & Co 20,922
Hair restorative consisting of a natural white oil, White Rock Oil Co 20,934
Hair tonic, W. B. Logan 20,940
Hooks and eyes for garments, Richardson & De Long Bros 20,923
Lard, E. Godel & Sons 20,928
Liniment, W. E. Everitt 20,927
Medical composition for removing fungus growths from the jaws and bones of animals and warts from persons, G. R. Wrage 20,933
Mowers, lawn, Chadborn & Coldwell Manufacturing Company 20,936
Paint, liquid, Hanna & Abbott Manufacturing Company 20,935
Paper for printing and lining strawboards used in making boxes, W. H. Parsons & Co 20,947
Polish for wood and metal work, Manley & Turner 20,930
Remedies, neuraigic, C. H. Sagar 20,941
Remedy against blood poisoning, D. A. Chippinger 20,951
Remedy for rheumatism, J. J. Winsor 20,649
Salves, ointments, or liniments, and cough mixture, F. B. Scheirer 20,924
Soap, harness, Capitol Manufacturing Company 20,946
Starch for laundry or food purposes, preparation of, National Starch Manufacturing Company 20,943
Suet or beef fat and cotton seed oil for cooking purposes, compound of, R. B. Brown 20,944
Toilet wash for the complexion, F. A. Jones 20,921
Wines and whiskies, bottled, C. F. Bode 20,945
Wool dress goods, F. Arnold 20,925