different mining laws of the States. Even from the point of view of its advertisements only, the work will have definite value for mining engineers and capitalists.

HOW TO KNOW THE WILD FLOWERS: A GUIDE TO THE NAMES, HAUNTS, AND HABITS OF OUR COMMON WILD FLOWERS. By Mrs. William Starr Dana. Illustrated by Marion Satterlee. New York: Charles Scribner's Sons. 1893. Pp. xv, 298. Price $1.50.

This is not a botany, but is designed to have a place in the family where the botany with its technical description and its tedious Latin names would lie neglected in the corner. There is no ignorance so profound and startling as the ignorance shown by even intelligent and educated people about the commonest plants and flowers about them. This work is intended as a guide and aid to such, and not only would the reader learn to have, as the authoress says, a "bowing acquaintance" with old neighbors, but would with little effort be able to call them by name. The work possesses literary merit, and when the description seems to the authoress to wax a little dry, it is redeemed by some happy quotation or by some song of summertide. The accuracy and precision of the description is not sacrificed, however, and the scientific treatment is preserved throughout. There are separate indices for the Latin, the technical, and the common English names of the various flowers. The plants may be readily identified by the illustrations which are very carefully executed and are quite numerous, there being 104 plates, most of which were sketched directly from nature. The book is handy in form and may be easily carried in a stroll through the woods.

MANUAL OF IRRIGATION ENGINEERING. By Herbert M. Wilson, C.E. First edition. New York: John Wiley & Sons. 1893. Pp. xx, 351. Price $4.

Irrigation is every year acquiring increased importance in the Western States. It will yet modify enormous areas of our Western Territories, and may even bring about climatic changes. This work is therefore particularly timely and represents what has been a long felt want. It is written thoroughly up to date and does not confine itself to the smaller features of irrigation, but treats of the great dams of the world as well as of the irrigating conduit. Numerous illustrations of structures and many diagrams are interspersed throughout the text, so that the whole subject is thoroughly covered and illustrated. The measurement of water is treated very interestingly, including the current water meters, the miner's inch, etc. We cordially recommend the book to our readers.

☞Any of the above books may be purchased through this office. Send for new book catalogue just published. MUNN & Co., 361 Broadway, New York.

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.

(4828) J. P. asks: What solution should be used in a Smee's cell in order to get the most strength from the cell? A. The solution used in the Smee battery is sulphuric acid 1 part, water 9 parts. The zincs must be well amalgamated and the platinized silver or carbon should be in good condition to insure perfect depolarization.

(4829) H. B. asks: Can you let me know anything concerning metal plating with Russian white metal for knives and forks? That is, the metal is melted. A. The Russian white metal is probably only a name given to Banca tin, with possibly a small admixture of bismuth to make it flow easy. It is being extensively advertised in the West. The work done with it is excellent. The directions are sold.

(4830) P. F. M. says: As your paper is one of our "standard text books" in our High School, will you please answer in your "Notes and Queries:" 1. If water at 39° Fah. were perfectly confined, could it be frozen in any temperature; *i. e.* could it not expand? A. Water when confined at the temperature of greatest density, 39°, upon being cooled below the freezing point, produces an immense pressure, and begins to freeze at a few degrees below 32°. The increasing pressure from the expansion of the ice so retards the freezing of the remaining water that a temperature below zero may be reached before it is all frozen. 2. Will you please give rule for finding horse power of ordinary locomotive, with cylinders 17 × 24 and 5 foot drivers, steam pressure in boiler 130, and speed 15 miles per hour? 30 miles? A. The actual horse power of a locomotive is so variable that any computation depends entirely upon the cut-off, and the cut-off is governed by the actual pull required of the engine. Assuming a heavy train at 15 miles per hour and a mean piston pressure of 50 pounds per square inch, the piston speed will be approximately $\frac{15 \text{ m.} \times 5{,}280 \text{ feet}}{60}$ 1,320 feet wheel speed per minute and $\frac{1{,}320}{15' \text{ (circumference of wheel)}} = 88$ revolutions per minute. As a revolution is equal to twice the stroke, then 88×4 feet $= 352$ feet piston speed per minute. The area of the cylinders is 2×226 square inches $= 452$ square inches $\times$ 50 pounds mean pressure $\times$ 352 feet piston speed per minute $= \frac{7{,}955{,}200}{33{,}000} = 241$ horse power. The possibilities of such an engine are about 400 horse power. The increase in power of the engine is not proportional to the increase in speed, and for 30 miles may be no more than 300 horse power. 3. Why are the wheels of a locomotive larger near the flange? And how can it pass a curve when the wheels are worn half an inch smaller next to the flange? A. The taper tread on driving wheels is to partially compensate by difference in circumference made by the wheel flanges hugging the outer rail on curves, the wheels slipping to make up for the loss of compensation by taper. Wheels that are grooved run hard on curves, as well also on straight tracks.

(4831) G. J. L. writes: To settle a dispute will you kindly state what scientific astronomers suppose or figure the temperature of the boundless space of the firmament outside of the influence of suns and worlds? If it were possible to have such a thermometer, what would it register if placed in the opposite direction from the sun, as far away from the earth as the sun, where the sun's rays would not be affected by friction of atmosphere whatever? A. The temperature of interplanetary and stellar space is supposed not to be lower than absolute zero, or 461° Fah. below zero Fah., or 493° below freezing temperature.

(4832) L. A. L. writes: Last fall I dug a well here for domestic use. I struck water at 26 feet, in a gravel bed, immediately below a stratum of blue clay. We have used the water all winter and always considered it good (though hard) until a week or so ago, when it developed a peculiar mineral taste, having a lot of reddish sediment in it. I inclose a sample of this latter, which I took from less than a gallon of the water. I would like to know what is the reason of it, and also if it is safe to use the water? A. The sample appears to be oxide of iron and clay. Probably it is harmless, but not pleasant to drink. We recommend putting a drive pipe in the bottom of the well and connecting directly with a pump to draw water from a deeper and possibly more satisfactory stratum.

(4833) L. S. F. asks the fastest way to find how many gallons a cistern or tank can hold, and if it is better to pump water into a tank through the bottom. I can use the pipes to lead the water off or where we need it; but I think it is much harder on the pumps when the tank is half full. A. If tank is round, square the diameter in feet and decimals. Multiply the product by 0·7854. Multiply last product by the height in feet, for cubic feet. Multiply the cubic feet by 7½ for gallons. You can pump into bottom of the tank or the distributing pipe without loss of power.

(4834) L. W. B. asks if copper is more difficult to heat by hammering than soft iron. A. Copper develops less heat than wrought iron by hammering or compression. Its specific heat is considerably less than that of wrought iron. It also parts with its heat faster than iron.

(4835) B. asks: Would the atmospheric pressure on a piece of gold leaf be greater than on a spherical piece of gold which displaces the same amount of air? A. The pressure is as the surface exposed to atmospheric pressure. The total pressure would be much greater on the gold leaf.

(4836) G. S. N. asks how the induction coil in a Blake transmitter for a telephone is wound, amount of wire, etc. A. The induction coil in the Blake transmitter consists of a bundle of soft iron wires, No. 20, inserted in a thin spool, about 2½ inches long, with two layers of No. 20 wire on the spool and ten layers of No. 36 wire wound in the primary wire, an intervening layer of writing paper being tightly wrapped on the primary before winding the secondary. The direction of the winding in either case is immaterial.

(4837) G. D. C. asks: 1. Will the gravity or Crowfoot battery run the simple electric motor in Experimental Science? If so, how many cells will it take to get enough power to run a sewing machine or other light machinery? A. The gravity battery, owing to its resistance, is not suitable for running an electric motor. 2. What size wire should I use to make one half the size of the one described? I have completed the one man power, now I want a smaller one. A. If you intend to make a smaller motor, one-half the size linear, No. 20 wire will be about right.

(4838) J. N. F. asks: How many strokes per minute can an air compressor, similar to the one used by the Westinghouse Air Brake Company, be driven and work successfully? Or, in other words, how many cubic inches of air will valves of similar size and capacity receive and deliver per minute? A. The Westinghouse air brake can safely make 250 single strokes per minute, and will deliver air at nearly their full capacity, the valves being equal to their pumping capacity. We cannot name the cubic inches.

(4839) F. & T. ask how many storage batteries it would take to run eight lights (incandescent) for five or eight hours, provided the cells were about 12 × 7 × 5? A. The number of storage batteries required to run your lights depends upon the resistance of the lamps. For eight 20 volt lamps you will need 11 cells; for eight 30 volt lamps you will require 16 cells; for eight 50 volt lamps you will require 26 cells; but these cells will run about 20 such lamps.

(4840) J. W. D. writes: I am winding some field magnets with two wires in parallel, and I wish to determine their resistance when so connected. The two wires are of different sizes. One is No. 22 double cotton-covered and the other is No. 21 bare. I do not know how much of each yet, so I would be greatly obliged if you could give me some general rule for finding the resistance. I should also like to know the comparative resistance of the fields and armature in shunt and series wound dynamos. A. It is bad practice to wind the field magnet with wire of two sizes. No. 22 wire runs 60 feet 6 inches to the ohm, while No. 21 is 76 feet 4 inches to the ohm. In a shunt wound machine the resistance of the field magnet should be about fourteen times that of the armature, while in a series wound machine the resistance should be as small as possible consistent with the proper excitement of the field magnet.

(4841) B. J. E. says: If oil put in the cylinder of an engine would pass through the exhaust pipe (into a well into which the suction pipe runs) and be drawn into the boiler with the water, would the oil ignite or cause boiler explosion if taken up? Or would it take a long time before enough oil to get into the boiler, as the boiler pipe, of course, is at the bottom of the well? A. The oil from the exhaust pipe in the well might do no harm for a while; but its gradual accumulation would cause it to come within the range of the suction pipe and to the boiler. In the boiler it will tend to gather the dirt and loose scale, forming masses that agglomerate and finally lodge on the fire sheet, cause it to be overheated, bulge, and if not discovered in time may cause a disaster. Many a boiler has made a large bill of expense from this cause alone. The oil will not ignite in the boiler; the danger is from lodging over the fire and allowing the boiler plate to be heated red hot and to bulge.

(4842) P. B. asks: 1. How many volts does it take to run the small electric motor described and illustrated in No. 641 of the SCIENTIFIC AMERICAN SUPPLEMENT? A. Two volts. 2. Of what resistance is the field magnet and of what resistance is the armature? A. The resistance has not been measured. We think, however, that the entire resistance of the machine is not more than three or four ohms.

(4843) E. E. J. says: I am desirous to know which is the hardest to bend, a solid bar, say 2 inches in diameter and 6 feet long, or a hollow bar of the same dimensions having a 1 inch hole in the center. What is their difference, both in strength and price of manufacture? A. The solid bar is the hardest to bend, *i. e.*, it will bear the greatest load, and costs less than a hollow bar, which by your dimensions would have to be a double extra strong pipe, which costs twice as much as a solid bar of the same size. On the other hand, the same weight of metal as a tube is harder to bend, or will bear more weight than a solid bar, both of the same length.

(4844) C. H. S. says: Will you please give me a rule, through Notes and Queries, for finding the remaining bearings of a survey when the interior angles, length of sides, and the bearing of one side are given? A. Plot the survey on paper with the side having the given bearing for the base, and draw the meridian at the proper angle with the side given. Use the difference of the given course and the meridian for adjusting the several angles of the plot. Make the necessary changes as the angles carry the lines across the cardinal points of the compass. Then retrace the angles and bearing the reverse way to prove the work. See Gillespie's Surveying, by Staley, a complete guide to the survey and plotting of land. $3.50, maile .

(4845) W. H. P. writes: I have a storage battery which, after charging for about twenty hours with large dynamo, it will only run about two hours. It looks to me as though it runs down while not in use, as it gives a large spark when freshly charged. The negative plates look all right, but the positive plates look empty. If so, how can I refill them? Is there any article on making and repairing storage batteries in the SCIENTIFIC AMERICAN? If so, what number? A. Possibly your storage battery is short-circuited, or it may be that you are using it on machines having too little resistance. We think you have destroyed your storage battery by subjecting it to the action of too much current. Better send the battery to the makers for refilling. We hardly think you will be able to refill the plates yourself. You will find many references to articles on storage batteries in our new SUPPLEMENT catalogue, which is mailed to any address without charge.

(4846) A. L. E. writes: In your issue of March 4, 1893, page 134, C. L. Wolley describes a storage cell. What is the use of the red lead paste? How are the connections made with dynamo or primary cells when charging it? How long should the connection between dynamo and storage cell be kept up? When charged, how long will it be before it is necessary to charge it again? Can you give a description of a small dynamo, one say that would run from 10 to 20 incandescent lamps? A. Red lead paste is used on storage battery plates to facilitate the forming of the oxide, the red lead being more easily converted into lead peroxide than the metallic lead. The two poles of the battery are connected with the binding posts of the dynamo for charging, and the battery should always be connnected up in the same manner. It requires from five to seven hours to charge a storage battery. We cannot, within these limits, give you full information in regard to the construction and use of storage batteries and dynamos. We refer you to our SUPPLEMENT catalogue.

(4847) C. P. P.—1. Please give me a list of all the metals, as I am unable to find a complete list, including the later discoveries. A. A list of metals will soon be published in the SCIENTIFIC AMERICAN. 2. What is the fastest railroad time ever made? When and where was it made? A. The fastest railroad time is claimed at the rate of 80 to 90 miles per hour on the Central Railroad of New Jersey, between Bound Brook and New York. See SCIENTIFIC AMERICAN, October 24 and November 21, 1891, for particulars of fast railway time.

(4848) H. G. M. writes: I am designing an automatic plug for electric light circuits. The plan requires a substance of great resistance, which will expand greatly when hot. Now what I want to know is, what will this substance have to be to heat and expand quite a little with about 4 amperes and 110 volts? A. We know of no substance better adapted for your purpose than brass. Compound bars of brass and steel are often used for thermostatic bars. Possibly such a bar would be better than one of brass only. Neither the brass bar nor the compound bar would have great resistance.

(4849) L. P. writes: I have built my house from plans made by you, and am more than pleased with it. Since then a number of lightning rod agents have been around to try to sell me their rods

Would it not be just as safe to put up ½ inch or ¾ inch gas pipe, with a good point and a large plate at the bottom to scatter the current? A. Gas pipe is often used for lightning rods, but iron is not as good; copper is preferable. Probably the best form of lightning rod is a copper strip nailed directly to a building and connected with a good earth plate.

(4850) F. K. & Son ask: 1. What size belt should we use to deliver 1½ horse power; speed of main shaft 260 revolutions, with 12 inch pulley to drive line shaft, having an 18 inch pulley? A. A 1½ inch belt. 2. What size belt should we use to deliver 1½ horse power; speed of main shaft 173 revolutions, with 10 inch pulley, to drive line shaft with 16 inch pulley? A. A 2 inch belt. 3. What size belt should we use to deliver 1½ horse power; speed of main shaft 173 revolutions, with 16 inch pulley to drive line shaft with a 12 inch pulley? A. A 1½ inch belt.

(4851) G. R. C. writes: A friend of mine would like to know why a Stevenson horizontal check valve will clatter, and does not seat when he stops the feedpump; and as long as it clatters it leaks, and when it does not is perfectly tight, and to stop its clattering he has to close the globe valve between the check and the boiler, or open the pet cock on the air chamber. The clattering resembles a telegraph instrument with the circuit open and closed two or three hundred times a minute. A. The air in the pump chamber is highly compressed, according to the pressure in the boiler. It is elastic and acts like a spring on the water in the pipe between the pump and the boiler. The action of the water in the boiler when making steam is like a tremor or vibration, and communicates a vibratory motion to the water in the feed pipe, which is balanced by the air pressure in the air chamber. The opening of the pet cock breaks the exact balance and the overpressure from the boiler closes the check valve. The closing of the valve between the boiler and the check valve also stops the vibration by closing communication with the boiler.

(4852) H. H. S. asks: 1. What chemical is put in the porous cup of a Leclanche battery? A. Equal parts of granulated carbon and granulated black oxide of manganese. 2. What chemicals are used in electroplating with copper, and in what proportion are they mixed? A. For an answer to this query we refer you to SUPPLEMENT 310. 3. Is there any chemical that will take the copper coating off the sticks of carbon from an arc light without destroying the carbon? A. Use nitric acid. 4. Is there any article on the construction of an electric machine in the SUPPLEMENT? A. You will find a description of the Holtz machine in SUPPLEMENTS 278 and 279, and of the Wimshurst machine, in Nos. 546, 648, 584, and 647.

(4853) E. F. S.—1. Where I work we have a large quantity of glue which has been used for moulds in plaster casting (plaster of Paris). It has become very dirty and hard from grease and bits of plaster, etc., and unfit for use. Is there any way to renew it at reasonable cost? A. Glue and glycerine jelly, adding a little water to thin it, and strain it through a cloth, hot. Skim off any oil that may rise in heating. Boil the strained jelly to evaporate the water. 2. Would ether or chloroform work better in an ice machine, not taking cost into consideration? A. Ether is preferable as a refrigerant in ice machines. 3. Some time ago I saw a description of magazine photograph camera in your paper. Where can I find it? A. The magazine camera is described in SCIENTIFIC AMERICAN, July 16, 1892.

(4854) O. G. F. M. says: 1. Have a shunt-wound dynamo, with 4 wire No. 20 on field and 1½ same on armature. I carry from 5 t 7 16-candle power lamps of 50 volts each; but the field magnets get very hot. It does not matter what load I have or whether I insert some resistance in field magnets. What is the reason? Is the wire wound in the right proportion? A. Too much of your current goes around your field magnet. You should rewind with finer wire, say No. 24, or use the machine as a series machine. 2. Can you give me a formula of some good composition for use in blocking tablets, something which will not adhere to the sheet of paper when torn off? A. The composition is said to be prepared as follows: Glue, 4 pounds; glycerine, 2 pounds; linseed oil, ½ pound; sugar, ¼ pound; aniline dyes, q. s. to color. The glue is softened by soaking it in a little cold water, then dissolved together with the sugar in the glycerine, by aid of heat over a water bath. To this the dyes are added, after which the oil is well stirred in. It is used hot. Another composition of a somewhat similar nature is prepared as follows: Glue, 1 pound; glycerine, 4 ounces; glucose sirup, about 2 tablespoonfuls; tannin, one-tenth ounce. Give the compositions an hour or more in which to dry or set before cutting or handling the pads.

(4855) P. J. L. asks: 1. What objection can be urged against the sprocket wheel and chain for high speed belting? Does it make too much noise or is the friction greater than leather or rubber? A. The sprocket wheel and link belt is noisy under high speed and has considerable more friction than belts of leather or rubber. It is not a noiseless transmitter of power under any speed, and seems to have been invented for a peculiar work not suited for the nature of belts or for a slow and unyielding pull. 2. What, if anything, has been done or accomplished in the way of compounding the explosive force of gas compounds in gas engines, and would not there be a reaction of the expansion of this combustion, the same as the condensation of steam in a steam cylinder? A. There has been no practical application of a compounding system to the gas engine. Heretofore, the irregular and intermittent action of the explosive force seems to have been a bar to efforts at compounding, yet with the later improvements we do not see why there is not a good field open for compounding gas engines. Of course there can be no condensation and no latent heat to keep up the temperature, and therefore the principle of expansion in a second cylinder would have to conform to the limit of a compound air engine.

(4856) A. E. H. asks: Would a lamp of the following description be safe and practical? Gasoline to be used instead of coal oil, the bowl to be near the bottom, the burner to be not closer than 4 inches above, the intervening space to be used for the generating of the gas, the lamp to be made of strong material such as cast iron or something that will not break and that will stand considerable pressure. A. We cannot recommend any form of gasoline lamp for house use. There are many difficulties and dangers attending the use of gasoline unless entirely isolated from the lamp. There is a class of gasoline lamps or torches used for outdoor illumination with large, smoky flames, in which the fountain is several feet from the burner, with the feed regulated by a cock. The gasoline is vaporized in the burner. They can be procured through the lamp trade.

(4857) F. K. says: Please inform me which of the common metals expands and contracts most and how much per foot with a change of 20° tem. Also how much will an iron wire, No. 16 B. S., 10 feet long, expand with 20° rise in temperature and what force will it give? A. Zinc expands and contracts most of all the metals by changes of temperature. It expands a fraction over 0·004 of an inch per foot for 20° rise in temperature. Iron wire about 0·002 of an inch per foot for 20° rise in temperature, or 0·020 of an inch for a 10 foot rod, its push will be equal to the elastic strength or size of the wire or rod.

(4858) A. B. asks: 1. Can double thick window glass be used for the glass plates of an "influence" electric machine? A. Yes; but it is not as desirable as the thinner glass. 2. How can I drill a hole in the center of the glass plates? A. Make a drill from Stubs' wire, without heating or forging. Heat it to a low red and plunge it into a solution of chloride of zinc (ordinary soldering fluid). With this drill you can readily make holes through a glass plate. You should lubricate it with turpentine. 3. What numbers of the SCIENTIFIC AMERICAN SUPPLEMENT give the best directions and drawings for making an influence machine? A. You will find articles on the Wimshurst machine in SUPPLEMENT, Nos. 546, 648, 584 and 647.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

March 28, 1893.

AND EACH BEARING THAT DATE.

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

Advertising counter guard for rails or bars, W. R. P. Clark 494,298
Air moistening and attemperating apparatus, J. F. Dornfeld 494,292
Air propeller or ventilating fan, W. Sayer 494,307
Alarm indicator, H. Bolthoff 494,519
Back rest, H. Ohlschlager 494,434
Bag. See Mail bag. Nose bag.
Baling press, C G. Wilson 494,267
Baling press operating mechanism, H. H. Huntley 494,527
Barge, coal, J. Chase 494,121, 494,122
Barrel making machine, G. S. Pasquith 494,260
Barrel, metal, J. L. Kirby 494,275
Bath tub fitting, J. Powell 494,160
Battery. See Pyro-electric batte y.
Bearing, ball, P. Dansereau 494,190
Bearing composition, J. F. Newell 494,156, 494,433
Bearing vehicle ball, Pettit & Congdon 494,384
Bed, folding, W. S. Gunn 494,419
Bed table attachment, H. Ohlschlager 494,435
Beds, etc., fanning cover for, R. R. Parrish 494,486
Bedstead brace, M. M. Ritch 494,228
Bell, electric, Manger & Huebel 494,278
Belt clasp, F. J. Herrick 494,293
Belt shifter, A. V. M. Sprague 494,177
Beverages, apparatus for carbonating and dispensing, P. E. Malmstrom 494,483
Bicycle saddle, F. D. Cable 494,408
Bit, W. Dodge 494,251
Boat. See Portable nesting boat.
Boiler. See Steam boiler.
Boiler furnace, J. Gilbert 494,137
Boilers, etc., making supporting brackets for, G. H. Drake 494,370
Bolster spring, A. G. North 494,158
Book, H. P. Parmelee 494,382
Book, blank, W. N. Winfield 494,360
Bottle stopper, W. P. Bonwick 494,361
Bottles, etc., wrapper for, R. G. Brenack 494,364
Box. See Knockdown box. Pocket box. Salt box.
Brace. See Bedstead brace.
Braiding machine, J. McCahey 494,379
Braiding machine carrier, J. McCahey 494,380
Brake. See Car brake. Flax or hemp brake. Machine brake.
Brake mechanism, H. Bolthoff 494,518
Breast supporter, M. Tucek 494,397
Bridle, W. Friedrich 494,196
Brush, electric, R. E. Williams 494,359
Bucket, drop bottom, G. H. Hulett 494,294
Buckle, shoe, D. F. Dalton 494,464
Butchering derrick, J. Ulfers 494,398
Button fastener, R. Blaeske 494,456
Calking tool, J. O. Walton 494,516
Camera. See Magazine camera. Photographic camera.
Camera lens, E. Decker 494,128
Camera shutter, W. H. Lewis 494,256
Cane and camp stool, combined, J. A. Nixon 494,303
Car brake, M. E. Campany 494,505
Car brake, W. C. Whitacre 494,503
Car controlling device, electric, J. H. Neal 494,344
Car coupling, P. C. Brown 494,246
Car coupling, C. H. Dale 494,125
Car coupling, J. S. Derrough 494,327
Car coupling, G. Jenkins 494,424
Car coupling, C. Koerner 494,376
Car coupling, H. H. Markley 494,539
Car coupling, A. C. McCord 494,219
Car coupling, G. W. Roberson 494,167
Car coupling, W. W. Smith 494,391, 494,512
Car door, grain, A. C. McCord 494,220
Car fender, H. T. Field 494,524
Car fender, electric, E. Rochester 494,281
Car fender, street, T. C. Rice 494,165
Car, railway, C. Brown 494,319
Car sanding device, Ghent & Colbran 494,136
Car signal, C. Callahan 494,366
Car stake pocket, J. P. Cagigal 494,409
Cars, track sanding device for street, C. W. Sherburne 494,283
Carbureting apparatus, J. Ruthven 494,442
Carding engines, device for adjusting the bends of traveling flat, A. Hitchon 494,422
Cards, etc., packing case for, S. J. Murray 494,218
Case. See Sample case.
Cash register and indicator, W. R. Fowler 494,374
Cash register and indicator, E. T. Taylor 494,534
Chain, G. G. Howe 494,423
Chair seats, machine for weaving cane for, C. W. Greenwood 494,198
Chairs, fan attachment for rocking, J. Martin 494,213
Checkrein guide, J. R. Sturgeon 494,308
Chimney cowl, W. H. Ashton 494,454
Churn, J. R. Hayslit 494,302
Churn, W. F. Martin 494,420
Churn and butter worker, combined, J. Overhalser 494,222
Cigar bunching machine, C. Browning 494,521
Cigar fillers, apparatus for making, N. H. Borgfeldt 494,362, 494,363
Cigarette rolling case, E. Schmidt 494,445
Clasp. See Belt clasp.
Clay mill, C. W. Vaughn 494,515
Cleaner. See Sewer cleaner.
Clock movement, A. Kehl 494,145
Cloth drying, tentering, and trimming machine, E. H. Schofield 494,492
Cloth napping machine, F. Martinot 494,152
Cloth, pulley for feeding, J. Edmunds 494,131
Clothes drier, M. C. Burr 494,247
Clothes drier, W. E. B. Harris 494,141
Clothes line support, safety, T. Rasmus 494,162
Clothes pin, W. E. Crump 494,414
Clutch, self-adjusting friction, F. M. Shaw *et al.* 494,173
Coffee pot, W. C. Jones 494,206
Coffin, W. J. Leonhardt 494,297
Coin-freed machine for the automatic sale of newspapers, Salter & Hughes 494,444
Coloring or burnishing composition, J. F. Thompson 494,514
Combination gauge, O. W. Schaum 494,169
Compass, beam, M. E. Gladfelter 494,475
Compound engine, J. Klein 494,425
Confessional, portable, M. H. Sullivan 494,179
Conveyer, pneumatic, H. C. Kelly, Jr. 494,274
Coop, hen, E. B. Voss 494,181
Copper, apparatus for electrolyzing, C. B. Schoenmehl 494,232
Copyholder, A. B. Reid 494,305
Corn husker and fodder shredder, combined, G. W. Packer 494,511
Coupling. See Car coupling. Hose coupling. Pipe coupling. Thill coupling.
Cover, milk pan, S. Newell 494,157
Cover, tobacco pail, E. A. Davis 494,465
Crupper, J. W. Fitzgerald 494,195
Cultivator, F. E. Montgomery 494,341
Cultivator and fertilier distributor, D. W. Bricker 494,457
Cultivator for listed corn, E. Dimity 494,130
Current meter, alternating, W. Stanley, Jr. 494,513
Cutter. See Stalk cutter. Vegetable cutter.
Dental plugger, F. J. Richards 494,227
Desk or cabinet, T. Billington 494,406
Die and die holder for drawing steel rods, etc., S. & W. Moltrup (r) 11,318
Die head, revolving, H. A. Cumfer 494,415
Digger. See Potato digger.
Ditching machine, G. W. Decker 494,368
Dividers, H. Esser 494,132
Door, sliding, L. Hendershot 494,142
Doubling and twisting machines, yarn guide for, A. E. Rhoades 494,490
Drawing roll, fluted or grooved, J. Dodd 494,271
Dress skirt, M. Aronson 494,404
Drier. See Clothes drier.
Drills, die for pointing metal, F. H. Richards 494,226
Drinking places, cup holding and lifting attachment for public, A. L. Peirce 494,346
Electric signal, switch moving, and interlocking mechanism, Ramsey, Jr., & Harden 494,489
Electrical excitation of vacuum tubes, H. T. Barnett 494,239
Electrical meter, G. Rennerfelt 494,225
Elevator. See Pneumatic elevator.
Elevator wells, device for operating gates to, C. F. De Arden 494,126
Engine. See Compound engine. Gas engine. Rotary engine. Steam engine.
Engine indicators, attachment for steam, W. Houghtaling 494,482
Envelope, A. L. Sewell 494,170
Extractor. See Honey extractor.
Feed trough, J. E. Wenger 494,236
Feedwater heater and purifier, R. McDougall 494,302
Feedwater purifier, F. J. Henderson 494,143
Fence machine, picket wiring, M. F. Connett 494,537
Fender. See Car fender.
Ferrule, plumber's, C. A. Cotter 494,413
Fibrous material, machine for opening and cleaning, M. T. Wadlin 494,500
File holder, A. W. Taylor 494,498
Filter, E. M. Knight 494,426
Fire escape, W. E. Bradley 494,407
Flask. See Moulder's flask.
Flax and hemp brake, portable, J. T. Smith 494,176
Flax or hemp brake, J. T. Smith 494,174
Flax or hemp fiber, finishing machine for, J. T. Smith 494,175
Fruit press, S. R. Thompson 494,396
Fuel feeder, pulverized, H. S. Grigsby 494,375
Funnel for cans, indicator, H. B. Watson 494,403
Furnace. See Boiler furnace. Smoke consuming furnace.
Gauge. See Combination gauge. Siding gauge.
Game apparatus, A. E. Stokes 494,496
Gas apparatus for manufacturing, T. G. Hall 494,198
Gas burner heating attachment, G. Edwards 494,470
Gas engine, Foos & Endter 494,134
Gas, process of and apparatus for manufacturing, T. G. Hall 494,200
Gate. See Swinging gate.
Gate, H. A. Smith 494,390
Generator. See Steam generator.
Glass grinding and polishing, apparatus for recovering sand used in, J. M. Krampf 494,209
Grain separating screen, C. & J. Closz 494,290
Grain spout carriage, E. D. Mayo 494,153
Grapes, etc., apparatus for cleaning Malaga, E. Fabbrini 494,193
Grate, B. F. Chollar 494,462
Grate, E. Fales .... 494,371 to 494,373
Grinding or polishing wheel and manufacturing same, F. N. Gardner 494,471, 494,4 2
Guitars, mandolins, zithers, or other stringed instruments, attachment for, I. Nightingale 494,485
Gun, breech-loading, D. E. Grant 494,330
Gun sight, D. M. Barringer 494,240
Hammer, bush, F. T. Viett 494,266
Hammer, foot power, G. Humphry 494,335
Handle. See Vessel handle.
Hanger, C. C. Lockstaedt 494,148
Harness support, W. Morgan 494,532
Harrow, C. La Dow 494,538
Harvester, self-binding, W. Butterfield 494,321
Hat and clothes rack, combined, A. L. Coffey 494,269
Hat sweats and bands, machine for attaching, G. E. Brush 494,365
Hay derrick, portable, D. V. Garrison 494,473
Hay rake, horse, F. L. Osborn 494,381
Hay stacker, J. A. Carlisle 494,506
Hay stacker, G. A. Kennedy 494,336
Heater. See Feedwater heater. Hot water heater.
Heating apparatus, electric, M. W. Dewey 494,291
Heating, induction system of electrical, S. B. Jenkins 494,295
Hide working cylinder, A. E. Whitney 494,183
Hoisting and transfer apparatus, W. D. Sherman 494,389
Hoisting machine, J. E. Ennis 494,328
Honey extractor, centrifugal, O. M. Hill 494,421
Horse weight, M. S. O'Neil 494,159
Horseshoe, J. Curtin 494,250
Horseshoe machine, J. Roberts 494,186
Hose coupling, S. M. Beery 494,316
Hot water heater, F. K. Caswell 494,323
Hydrant, R. A. Brooks 494,318
Index, L. L. Dennick 494,466
Indicator. See Alarm indicator.
Inkstand, automatically feeding, T. Sweesy 494,448
Irrigation, apparatus for distributing water for, F. W. Barkhaus, Jr. 494,455
Jack. See Railway track jack.
Joint. See Pipe joint. Rail joint. Railway rail joint.
Journal box, antifriction, G. Spencer 494,392
Kitchen cabinet, D. R. Cotner 494,124
Kitchen table, J. A. De La Porte 494,191
Knapsack, H. C. Merriam 494,216
Knitting machine, circular, A. Roscher 494,229
Knitting machine stop motion, G. J. Manderfield 494,258
Knockdown box or crate, J. C. Meem 494,215
Lace pointing and punching machine, shoe, J. Wills 494,311
Ladder, extension, I. T. Cross 494,270
Ladder, fire, O. Witzel 494,452
Lamp filament, incandescent, A. De Lodyguine 494,151
Lamp, oil, Ross & Atkins 494,230
Lamp support, electric, C. E. Richardson 494,348
Lamp suspending device, J. Barber 494,116
Lamp vibrator regulator, electric, D. M. Moore 494,531
Lamps, globe holder for electric arc, W. A. Turbayne 494,499
Lamps, manufacturing filaments for incandescent, A. De Lodyguine 494,149, 494,150
Lanterns, lens attachment for tubular, A. L. France 494,135
Lathe, engine, O. E. Perrigo 494,383
Lead from its ores, extracting, B. Rosing 494,349
Leather hammering machine, P. W. Minor 494,259
Lighting the interior of buildings, apparatus for, H. N. H. Lugrin 494,299
Lightning, apparatus for protecting buildings from, J. B. L. Bartlett 494,286
Lightning arrester, A. Wurts 494,186
Liquid shaking and cooling machine, E. H. Gerish 494,474
Lock. See Magnetic lock. Nut lock. Padlock. Permutation lock. Switch lock.
Lock, F. Simons 494,446
Locomotive engineers, indicator for, S. G. Clark 494,189
Log dray, C. W. & G. J. Reichart 494,263
Logwood chips, curing, P. T. Austen 494,237
Loom for weaving bags, H. P. Hunter 494,204
Lubricator, E. D. Bangs 494,315
Machine brake, A. Boulte 494,268
Magazine camera, R. F. Rice 494,164
Magnetic lock, A. E. Kintner 494,146
Mail bag, P. J. Caesar 494,119
Mangle, A. Lorenz 494,277
Matrices, forming, C. L. Redfield (r) 11,316
Measurer and extractor, liquid, W. B. Donathen 494,467
Measuring the density of gases, device for, W. Durr 494,192
Medical purposes, electrical instrument for, B. Y. Boyd 494,520
Meter. See Current meter. Electrical meter.
Mill. See Clay mill. Windmill.
Metal plates prior to electrolysis, treatment of, C. B. Schoenmehl 494,23
Mill feeder, A. C. Brantingham 494,188
Mining coal, D. C. Boyce 494,187
Mirror support and adjusting device, W. P. Tarbell 494,497
Moistening and cooling the atmosphere of rooms, apparatus for, Shilling & Smith 494,494
Moulder's flask, W. Edgar 494,469
Mortising machine, hollow chisel, J. Harris 494,140
Mother-of-pearl and making same, imitation, J. De Jong 494,255
Motion, device for communicating, L. Warfield 494,182
Motor. See Spring motor.
Motor, H. P. McAfee 494,343
Motor driving gear, J. C. Henry 494,478
Mower, lawn, F. & C. G. Carlson 494,120
Musicians, manual gymnasium for, J. Hall 494,197
Necktie stiffening plate, E. L. Wallace 494,501
Non-conducting coverings, removable fastening for, T. Williams 494,313
Non-conducting coverings, support for, T. Williams 494,312
Nose bag, animal, G. D. Leonard 494,428
Nut lock, E. La Rochelle 494,338
Nut tapping machine, L. H. Cole 494,367
Packing, gasket, R. Walsh 495,402
Padlock, F. Meinke 494,340
Paint, fireproof, R. R. Graf 494,508
Painting machine, cloth, E. H. Schofield 494,493
Paper roll spindle, A. L. Flint 494,329
Pencil or pen attachment, J. A. Murphy 494,510
Perforating apparatus, C. B. Wisner 494,184
Permutation lock, C. H. Morford 494,154
Photographic camera, W. A. Armstrong 494,517
Photographic camera, Tracy & Hodges 494,354
Photographic camera, A. Vanderbeek 494,400
Photographic film, T. Sault 494,306
Photographs on glass, making transparent, F. B. Forster 494,526
Piano case, J. Reimer 494,163
Pin. See Clothes pin.
Pipe clips, machine for making, S. Vanstone 494,535, 494,536
Pipe coupling, O. M. Sweet 494,284
Pipe heating device, iron, J. H. McRae 494,484
Pipe joint, gas or water, G. W. Lloyd 494,147
Pipe wrench, H. F. Jenks 494,529
Pipe wrench, monkey wrench, and flange holder, combined, J. Wensing 494,310
Plow, T. E. C. Brinly 494,458
Plow attachment, Maloon & Blake 494,212
Plow, black land, W. B. Vestal 494,309
Plow or cultivator tooth, W. M. Hewitt 494,420
Plow, sulky, Lehr & Wolfe 494,530
Pneumatic elevator, G. Miles 494,217
Pocket box, J. I. Covington 494,249
Portable nesting boat, Clark & Hamilton 494,288
Pot. See Coffee pot.
Potato digger, L. S. Strepey 494,533
Power transmitter, R. Hahnel 494,331
Press. See Baling press. Fruit press. Seal press.
Printing press pasting mechanism, W. Scott 494,233
Prison cage or cell, P. E. Glafcke 494,252
Prison cell, safe, or other depository, P. E. Glafcke 494,253
Pulley arm pattern, O. C. Little 494,257
Pump, steam, G. R. Kendrick 494,207
Pumping apparatus, portable, D. Noble 494,221
Push button, electric annunciating, J. King 494,337
Pyro-electric battery, T. G. Hall 494,199
Pyrometer, E. Brown 494,244, 494,245
Rack. See Hat and clothes rack.
Radiator, electrically heated, W. Mitchell 494,301
Rail curving machine, Weir & Harden 494,450
Rail joint, J. M. Stamp 494,235
Railway block signal system, E. Fontaine 494,525
Railway, electric, J. C. Henry 494,477
Railway frog, C. C. Andress 494,116
Railway rail brace chair, W. M. Brown 494,243
Railway rail joint, Pearson & Robinson 494,223
Railway rail, street, W. T. Jennings 494,144
Railway rolling stock, guide attachment for, T. E. W. Fay 494,4 8
Railway switch, H. Rich 494,441
Railway tie, metallic, E. D. Bangs 494,314
Railway time signal, B. B. Morgan 494,509
Railway track jack and liner, E. D. Moriarty 494,155
Rake. See Hay rake.
Rake, A. J. Chamberlain 494,324
Rand turning machine, L. A. Merrithew 494,378
Reflector, light, W. G. Marston 494,339
Register. See Cash register.
Regulator. See Temperature regulator.
Ribbons, apparatus for folding and creasing the edges of, W. Remy 494,347
Rod coupling device, A. W. Knight 494,208
Rotary engine, G. H. Graham 494,138
Rubber boot, H. A. Pickering 494,262
Safes, electric bolt operating mechanism for, E. & H. C. Stockwell 494,495
Salt box or cellar, W. L. Johnson 494,205
Sample case, R. H. Stuart 494,394
Sausage stuffing machine, J. Eppler (r) 11,317
Saw, A. Krieger 494,210
Saw filer, A. G. Phillips 494,487
Sawmill feeds, valve connection for steam, J. H. Brown 494,118
Scalding machine, tomato, J. D. Cox 494,463
Scouring and washing apparatus feeder, J. H. Bickley 494,405
Scraper apparatus, W. & H. G. Butler 494,320
Scraper, road, P. Blanchard 494,317
Screen. See Grain screening screen.
Seal press, roller, G. A. Cline 494,411
Sewer cleaner, Lacroix & Dubois 494,427
Sewing machine, G. S. Hill 494,480
Sewing machine, buttonhole, J. Reece 494,280
Sewing machine presser foot, S. W. Philbrick 494,224
Sharpening them, device for holding gravers' or other tools for, M. Bock 494,504
Sheep dipper, Sieker & Schmidt 494,265
Siding gauge, J. J. Martin 494,214
Signal. See Car signal. Electric signal. Railway block signal. Railway time signal.
Signaling apparatus, electric, F. Pearce 494,345
Signaling apparatus, train, W. J. Smith 494,234
Signaling circuit, electric, M. Martin 494,279
Skating rink surface, E. Dowald 494,468
Slate picker, S. Thomas 494,395
Smoke consumer, T. G. Hall 494,201
Smoke consuming furnace, M. Fricke 494,272
Smoke purifier and consumer, J. Butler 494,522
Spindle and its support, W. E. Allen 494,453
Spooling machine stop motion, Lightner & Fransway 494,298
Spring. See Bolster spring.
Spring motor, E. Herrington 494,203
Stagings, etc., implement for dismantling builders', G. H. Cutting 494,4 7
Stair-builder's laying-out tool, C. H. Callahan 494,322
Stalk breaker, W. S. James 494,528
Stalk cutter, H. G. Cady 494,248
Stamp, C. H. Shaw 494,172
Stay, dress, I. Bray 494,242
Steam boiler, J. Lapp 494,211
Steam engine, A. Collmann 494,412
Steam generator, J. R. Vance 494,180
Stopper. See Bottle stopper.
Stove, cooking, S. M. Stevens 494,350
Stovepipe thimble, D. Myers 494,342
Stoves or ranges, air heating device for, F. L. Sheppard 494,388
Strainer, C. L. Wagandt 494,355
Strap. See Trunk strap.
Sunshade, carriage, Douglass & Stouder 494,369
Sunshade for bicycles or other vehicles, G. H. Hill 494,333
Surgical appliance, F. Orth 494,436, 494,437
Swinging gate, C. A. Taylor .... 4 ,449
Switch. See Railway switch.
Switch lock, electrical, Weir & Harden 494,451
Table. See Kitchen table.
Target, J. B. Walter 494,285
Telegraph, printing, J. E. Wright 494,185
Telephone and signaling circuit, Pickernell & Dunbar 494,385
Temperature regulator, B. E. Van Auken 494,399
Thill coupling, R. Hartson 494,476
Tie. See Railway tie.
Tire tightener, J. N. Cuthbertson 494,507
Tire tightener, W. D. Hills 494,334
Tobacco stemming machine, J. C. Guerrant 494,254
Tobacco tagging machine, J. M. King 494,296
Tool, combination, W. Rankin 494,161
Tool, power driven, F. H. Cathcart 494,461
Tooth plate, artificial, J. C. Stapleton 494,393
Top, spinning, N. McLaren 494,481
Torch, fireworks, T. M. Pierce .... 494,438 to 494,440, 494,488
Toy, elastic, O. Carpenter 494,410