steaming, a strong tank with quick-opening door, equal show no characteristic color, and the coal will show to a steam pressure of 120 pounds per square inch, will may be used. The heating is to be done by a Bunsen burner.

(5642) C. M. W. asks: In selecting coke for cupola purposes, how may the first or best quality bc known from poorer grades, without trying it in the cupola, and why is it that the poorer grades resemble so closely in appearance the better grades, making it thereby so difficult to know anything about it without a cupola test? A. The carbon element in coke is the key to its quality for furnace work; 5 to 10 per cent difference in the amount of silics or ash cannot be discovered by surface inspection. An analysis only will show it. The only practical way is to obtam the coke from known sources of good quality by trial. The Colorado cokes appear to have more fixed carbon than the Connellsville cokes. Their faultiness may be in excessive sulphur and phosphorus. The Crested Butte field is said to be the best coking coal.

(5643) G. R. asks: How much work, foot-pound-minute, is the ordinary two horse tread power capable of developing, the tread power being the ordinary portable one as used in the country for thrashing? How much work, foot pound and minute, does the average two horse power gasoline engine exhibit in a friction brake applied to the driving pulley? A. The capacity of the horse treadmill depends much on the weight, strength and steadiness of pull of the horses. The friction absorbs probably 25 per cent of the power, so that the actual power delivered by two good horses

(5644) J. S. P. says: Will you please give the velocity of steam or the distance it will travel per minute? A. The velocity of steam flowing into a vacuum is about 1,600 feet per second.

(5645) W. J. B. asks (1) for a good formula for liquid glue. A. Two ounces gelatine, 4 ounces water; when the gelatine has fully swelled, add 2 ounces glacial acetic acid. It is used for mending china, glass, etc. 2. I have made a drum armature for the hand power dynamo (Supplement, 161), but I have used iron wire instead of brass wire for binding on the wire, as is generally recommended. I have tried it, but it does not work very well. Would the iron wire around the armature cause this? A. The iron winding will do no harm You must settle the position of the brushes by experiment. They should be on opposite extremities of the same diameter. As far as your drawing is intelligible, it would appear that all the bells in the case given would ring.

(5646) R. W. O. asks: Can a sailing ves sel sail faster than the velocity of the wind at the time? What is the fastest time ever made by a sailing vessel crossing the Atiantic? A. A sailing vessel cannot sail faster than the wind under any conditions. The American clipper Flying Cloud made 374 miles in one day in What was thosize of the storage cells used in the World's 1851; the Dreadnought, New York to Liverpool in 1859, 13 days 8 hours, 3,000 miles; the same in 1860, Sandy Hook to Queenstown, 2,700 miles, 9 days 17 hours,

(5647) C. M. G. asks: Is there any electrical connection between the primary and secondary coils in an induction coil? A. There is none. For induction coil connections see our SUPPLEMENT, No. 160. 2. Also why is it that a needle laid gently in water will not sink for some time? A. It tloats in virtue of the surface tension. The surface film supports it somewhat as a thin sheet of Indiarubber would. There is no question of porougness

(5648) I. A. M. asks: The best month to cut hickory, so that the worms will not cuter the wood when cut. A. January is the best month

way to make an air pump for experimenting. A. pressure on the pump will gradually increase from 0 to A large variety of air pumps of various forms have been described and illustrated in Scientific American Sup-PLEMENT. See Nos. 224, 303, 629, 630, 631, 10 cents each lacquering brass? Is there more than one way? A. rise to 120 to 150 pounds persquare inch. When ex-There are many receibts for dipping and lacquering brass ploded, the product is nitrogen and carbonic acid gas, work, coloring, bronzing, etc., in the "Scientific American Cyclopedia of Receipts."\$5 by mail.

(5650) W. B. asks for some process by which printing ink may be removed from paper, such as the page of a magazine, etc., without injuring the paper. A. Apply sulphuric ether to the ink with a little cotton wool ball, gently rubbing and using white blotting paper to absorb the ink; continue the operation until the ink is nearly all removed. The process is not very satis-

(5651) E H. P. writes: I wish to make a spark coil and all else that I can toward lighting my gas by electricity, some four or five burners. A. For a spark coil use a core of pieces of soft iron wire eight inches long made into a bundle shout one inch thick Wind it with four or five pounds magnet wire No. 18; a battery in open circuit with it, special electric burners. and a switch or push button are required. Address any dealer . electric supplies for fittings.

(5652) W. K. S. asks: Can a Crowfoot battery be made strong enough to run a motor with any power. A. Yes; but, owing to its high resistance and lov voltage, a very large number of cells are required.

(5653) C. T. D.—The specimen sent has peen identified by Professor C. V. Riley as being a large Muria vod-spirobolus mar quatus, which, aithough dan gerous in appearance, is quite harmless.

(5654) J. V. W. asks: 1. Will the chloride of manganese fume on charcoal before the blowpipe? Whatcolor is theflame? Are there any colors left on the coal? A. Not to any extent. The flame will "Insect Life," vol. v., pp. 219-226.

brown color, not characteristic. 2. What diluted acids be required. An air-tight iron box heated in an oven to can be used to dissolve the phosphate of manganese? the required temperature may be used for small operations. Again, for buttons and small work heated dies will appear? A. Hydrochloric acid or other mineral acid will dissolve it, giving a light pink solution. 3. What solution of manganese will stay green or blue? How prepared? A. None; the alkaline permanganates are dark violet or purple. 4. What is a neutral solution of peroxide of iron? A. A solution containing no free acid and not basic; for each equivalent of ferric oxide six bonds must be supplied by the acid. 5. Will a solution of hyposulphite of soda dissolve the phosphate of silver A. Phosphoric acid dissolves it.

> (5655) W. C. Mfg. Co. asks what the ${\bf re}$ sistance of No. 22 and No. 24 German silver wire is per thousand feet. A. German silver varies in resistance. You may take 215 and 342 ohms respectively for 1,000 feet of No. 22 and No. 24 wire.

> (5656) H. M., Jr., asks if cast iron rings can be used in armature of dynamo described in Supple-MENT 600. A. No. Use softest possible iron.

(5657) E. S. & S. ask: How would you change the winding of your 110 volt dynamo to produce a potential of 50 volts? A. Use half the number of turns on the armature, with wire of twice the diameter of that given. Wind field for one half the resistance and same

(5658) B. B. K. asks for the required amount of storage batteries to light fifteen 16 candle power 50 volt lamps, with plates of storage batteries 3 inches by 7 inches and ten plates to one cell; also how long it would take to charge them with a three light 110 may be 11/2 horse power. The gasoline engine should have volt dynamo. A. You will need 10 parsilel series of 25 the actual power named in its size, or 33,000 foot pounds cells each. The dynamo, giving only a smail amperage, will charge them very slowly-several days being needed to charge after exhaustion.

(5659) J. E. M. writes: I have the SCIENTIFIC AMERICAN SUPPLEMENT, April 14, 1888, No. is about 1,550 feet per second at atmospheric pressure; at 641, in which you give plan and figures for making a dy-10 atmospheres about 1.780 feet per second. When flow name? Cannot this plan be enlarged to make advname ing through a hole in a plate into the atmosphere at 15 of two horsepower to run on an arc circcuit? A. Yes pounds pressure per square inch, the velocity is 650 feet; Wind your motor for the amperage of the circuit as if and at 20 at mospheres or 300 pounds pressure the velocity, it were a dynamo to develop voltage equal to $746 \times 2 +$ amperage in question. The amperes in arc circuits vary according to the system used.

> (5660) S. E. L. C. asks whether two 2,000 candle power lights will throw their rays of light farther than one 2,000 candle power lamp of the same voltage. A. In general terms, the more powerful lights would be seen farthest.

> (5661) C. C. N. writes: 1. How long would it take to charge 200 storage cells, each one being $2 \times 2 \times 4$ feet, with a 10 horse power dynamo? A. The dynamo would give a current of about 16 amperes. Divide the amperage of a cell by this figure and multiply by 10 for time of charging. 2. How long would it take to discharge them? A. Allow a rate of 6 amperes per square foot of positive plate. S. How many horse power would they e on a motor? A. Multiply their amperage by 400 and livide by 746, and deduct 10 to 20 per cent for waste. 4. How often does the fluid have to be changed in storage cells where they are used ten hours each day, and how is the fluid made? A, It is dilute sulphuric acid, and occasionally needs slight additions of water or of acid. 5. Fair electric launches? A. Address Electric Light and Navigation Company, 44 Broad Street, New York.

> (5662) M. S. S. asks: 1. Can gravity batteries be used to light an incandescent lamp? A. Not practically. 2. If so, how many will it take to light a lamp of 10 voltage and 8 candle power? A. About 60 cells. 3. Should the number of the cells be increased if the candle power of the lamps is increased? A. Yes.

(5663) W. E. C. says: I have a cylinder, dimension 2½ inches by 10 inches, and wish to force 150 cubic inches of gas in with the air the cylinder contains. How much pressure will ittake? Also how much pressure per square inch will the explosion of the gas in the cylinder exert? Does the gas consume the air? If so, what change takes place when the cylinder is opened? (5649) J. J. A. D. asks: 1. The simplest put the quantity of gus into the cylinder as stated, the 44 pounds per square inch. It will not be explosive, as there is too much gas in proportion to the air. For the best explosive mixture, 6 parts of air should be mixed mailed. 2. What is the process used in dipping and with 1 part of gas, when, by exploding, the pressure may with a little steam formed by the union of the hydrogen of the gas with part of the oxygen of the air.

> (5664) B. M. K. says: Some time ago we dug a new well, the water being soft when found. Since that we have walled the well with limestone and the water is very hard. Did the stone cause this? Will it be permanent? What would be the remedy? A. The limestone is probably the cause of the hardness. By drawing a larger quantity you may modify the hardness to a con siderable extent; or if there is a deep water soil beneath the well, a drive pipc in the well and pump should give you soft water from the lower stratum.

> (5665) T. A. C. savs: I herewith inclose species of scale insect infesting our persimmon, peach, and orange trees. Some know it as "hutton smut scale." Will you let mcknow its species and any known remedy? This scale leaves a "smut" similar to that of "white fly." The latter is doing great damage in Central Florida, and is spreading rapidly, coming south at rate of about forty miles each season. Reply by Professor Riley .-- The scale insect sent, and to which you apply the popular term "button smut scale," is the Florida Ceroplastes, also called the white scale and the wax scale (Ceroplastes Fioridersis, Comstock). A full account of this insect will be found in Hubbard's "Insects Affecting the Orange," pp. 56-59. A perfectly satisfactory remedy consists in spraying with dilute kerosene soap emulsion at the time when the young hatch. The principal hatching times are first in April and May, second in July and August, and third in October and November. A full account of what is called "white fly" is to be found in

TO INVENTORS

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Ice cream freezer, H. W. Atwater. 11.3 Incubator, C. D. Purvis. 511.5 Inkerand, J. S. Hose 511.6 Insulator, C. N. Hammond 511.61, 511.61	\$\frac{1}{2}\$
Ice cream freezer, H. W. Atwater. 11.3 Incubator, C. D. Purvis. 511.5 Inkerand, J. S. Rose. 5115. Insulator, C. N. Hammond. 511611. 51161 Journal bearing, W. Small, Jr. 51161. 51161 Journal box, I. Metzger. 511.4	\$\frac{1}{2} \frac{1}{2} \frac
Ice cream freezer, H. W. Atwater	9596936527
Hook. See Wbiffletree book. Hook. De Long & Kempsball. Hoop. See Barrel boop. Horse checking device. C. Roys. Horsesbield, D. G. Tenney. Horsesbield, D. G. Tenney. Horsesbield, D. Anderson. Lee cistern covers, fastening for, A. M. Tippner. 511.48 Lee cream freezer, H. W. Atwater. 11.33 locubator, C. D. Purvis. 11.43 locubator, C. D. Purvis. 11.45 1.51 1.54 1.54 1.54 1.54 1.55 1.	95969126527 4 557
Ice cream freezer, H. W. Atwater. 511.35 Incubator, C. D. Purvis. 511.55 Inkstand, J. S. Rose. 511.65 Inkstand, J. S. Rose. 511.65 Insulator, C. N. Hammond. 511.61 Journal bearing, W. Small, Jr. 511.65 Journal bearing, W. Small, Jr. 511.65 Keybole guard, O. J. Davidson. 511.65 Key opening cao, J. Zimmerman. 511.65 Kin, A. Knacker. 511.76 Knitting machine, circular, J. B. Hipwell. 511.76 Knitting machine, circular, J. B. Hipwell. 511.76 Lamp, chandellercar, K. Boescb. 511.76 Lamp, chandellercar, K. Boescb. 511.76 Lamp, chandellercar, R. Boescb. 511.77	9596926527¥5780
Ice cream freezer, H. W. Atwater 11.3 Incubator, C. D. Purvis 511.5 Insusand, J. S. Rosen 511.5 Keybole guard, O. J. Davidson 511.5 Key opening can, J. Zimmerman 511.6 Kin, A. Knacker 511.7 Kintting machine circular, J. B. Hipwell 511.7 Knitting machine circular, J. B. Hipwell 511.7 Lamp, chandellercar, R. Boesch 511.7 Lamp, electric arc, R. Boesch 511.7 Lamp, electric arc, R. Beffeld 511.4 Lamp, cludger 511.7 Lamp, electric arc, R. Beffeld 511.4 Land roller, C. I. & E. Williamson 511.5 Lamp electric arc, R. Beffeld 511.4 Land roller, C. I. & E. Williamson 511.5 State 511.5 Sta	#596926527¥578059
Lamp, C. W. Kembel. Lamp, chandellerear, E. Boesch	3789059139
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Lamp, C. W. Kembel. Lamp, chandellerear, E. Boesch	78059190 27284481 1299367 V9 5
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Lamp, C. W. Kembel. Lamp, chandellerear, E. Boesch	78059190 27284481 1299367 V9 5
Lamp, C. W. Kempel. Lamp, chand ellercar, E. Boesch	378059190 2772844481 1299367 59 5 20169466506
Lamp, Chan Kembel. Lamp, chand ellercar, E, Boesch. Sill. 38 Lamp cord fire gaar d. Argell & Porter. Sill. 38 Lamp cletric arc. R. Belfield. Sill. 48 Land roller, C. I. & E. Williamson. Sill. 38 Lanteru, C. T. Ham. Lattch, E. S. Wheeler. Letter box, house, G. E. Wilson. Letter port cover and name plate, combined, J. J. Bisel. Level, spirit, J. A. Trant. Lid for vessele, odor-arresting, W. Fowler. Sill. 36 Lid for vessele, odor-arresting, W. Fowler. Sill. 45 Lock and atch, J. D. Perkins. Lock and atch, J. D. Perkins. Locomotive, W. J. Tripp. Locomotive electric, J. G. McCormick. Locomotive engine, Klein & Linduer. Magnetic from non-magnetic substances, ma. chine for separating, G. G. Crosby. Marker and coverer, corn or potato, S. Emick. Mail bag bolder, G. B. Clark. Measuring apparatus, electric, T. Bruger. Method and the substances of the substancial movement, G. R. Peare. Metter. See Electrical meter. Gas meter. Mill. See Chasing mill. Rolling mill. Miners' bats, lamp support for, J. A. Simpson. Mines, ventilating fan for, D. H. Fisher. Moild. See Glass mould. Motor for cars or other purposes, D. P. Sanders. Musical instrument, A. H. Breinl. D. Streatof. Mould. See Glass mould. Notor for cars or other purposes, D. P. Sanders. Nati lock, J. R. Montgomery Notzle, spraying, W. L. Deming. Sill. 50 Notzle, spraying, W. L. Deming. Sill. 51 Not lock, J. R. Montgomery Sill. 51 Not lock, J. R. Montgomery Sill. 51 Oven, baker's, A. Allen. Ozonegas, process of and apparatus formanufacturing, E. Fabrig. Packing, J. Hoffstadt. Packing for builders' use, sound deadening, S.	778805901990 27728844881 129991867 V99 55 5200186914685006 144
Lamp, Chan Kembel. Lamp, chand ellercar, E, Boesch. Sill. 38 Lamp cord fire gaar d. Argell & Porter. Sill. 38 Lamp cletric arc. R. Belfield. Sill. 48 Land roller, C. I. & E. Williamson. Sill. 38 Lanteru, C. T. Ham. Lattch, E. S. Wheeler. Letter box, house, G. E. Wilson. Letter port cover and name plate, combined, J. J. Bisel. Level, spirit, J. A. Trant. Lid for vessele, odor-arresting, W. Fowler. Sill. 36 Lid for vessele, odor-arresting, W. Fowler. Sill. 45 Lock and atch, J. D. Perkins. Lock and atch, J. D. Perkins. Locomotive, W. J. Tripp. Locomotive electric, J. G. McCormick. Locomotive engine, Klein & Linduer. Magnetic from non-magnetic substances, ma. chine for separating, G. G. Crosby. Marker and coverer, corn or potato, S. Emick. Mail bag bolder, G. B. Clark. Measuring apparatus, electric, T. Bruger. Method and the substances of the substancial movement, G. R. Peare. Metter. See Electrical meter. Gas meter. Mill. See Chasing mill. Rolling mill. Miners' bats, lamp support for, J. A. Simpson. Mines, ventilating fan for, D. H. Fisher. Moild. See Glass mould. Motor for cars or other purposes, D. P. Sanders. Musical instrument, A. H. Breinl. D. Streatof. Mould. See Glass mould. Notor for cars or other purposes, D. P. Sanders. Nati lock, J. R. Montgomery Notzle, spraying, W. L. Deming. Sill. 50 Notzle, spraying, W. L. Deming. Sill. 51 Not lock, J. R. Montgomery Sill. 51 Not lock, J. R. Montgomery Sill. 51 Oven, baker's, A. Allen. Ozonegas, process of and apparatus formanufacturing, E. Fabrig. Packing, J. Hoffstadt. Packing for builders' use, sound deadening, S.	778805901990 27728844881 129991867 V99 55 5200186914685006 144
Lamp, C. W. Kempel. Lamp, chand ellercar, E. Boesch	7980591390 2778844481 12983867 59 5 520016994666506 94 43388
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Lamp, Chen Kembel. Lamp, chand ellercar, E. Boesch. Sil., & Lamb cord fire Faar d. Argell & Porter. Lamb cleric arc. R. Befield. Sil. Argell & Porter. Sil., & Lamb cleric arc. R. Befield. Sil. Argell & Porter. Sil. & Lamb cleric arc. R. Befield. Sil. & S	7880591990 2772844481 12991867 59 5 20016994666506 44 4238 907728 7112582119
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Lamp, Chandellercar, E. Boesch	7880591990 2772844481 12991867 59 5 20016994666506 44 4238 907728 7112582119

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Kindner Kindner St.				
Reel. See Pence whe reel.				
Register. See Cash register. Register and calculator, J. B. Benton				
Roller. See Land roller. Roller. See Land roller. Rolling mill, S. O. Haskin				
Roof leader strainer, J. White				
Roofing, J. White. 511.385 Roofing sheets, expansion foint for, J. White. 511.384 Roofing sheets, jointing, J. White. 511.384 Rotary engine, G. I. & G. Jorda. 511.622 Rubber stamps, apparatus for manufacturing, G. J. B. Rodwell. 511.548				
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Stalk cutter and cultivator, combined, G. M. Snod- grass				
Steam engine, R. T. Abell				
inson 511,648 Still, H. Hinz 511,424 Stone cutting machine, T. Sheact al 511,715 Stone dressing machine, C. Lohr. 511,728 Stopper fastener, C. Nichols. 511,645 Stove, H. C. Willings 511,448				
Stove, H. C. Willings				
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Files 511,327 Teeth separator, J. W. Ivory 511,427 Telephone, B. Pickering 511,338				
Telephone exchanges, multiple switchboard system for, C. E. Scribner				
Telephonic instrument. P. Rabbidge 511,456 Tile roofing, A. M. Cheeseman				
Tyrefor vehicle wheels, elastic, G. Hancock				
Storepipe shield for tents. W. C. Brown. 511.502 Street aweeper. Palmer & Phelps				
Trolley base, J. L. Mauldin 511,634 Trolley wire crossing, H. Geise 511,437 Trough heater, stock, A. Hay ward 511,532 Trough hanger A. Bergeigeto 511,532				
Truck frame for motor cars, C. E. Canfield				
Type writing machine, J. S. Foley 511,416 Type writing machine, C. F. Taylor 511,374 Type writing machine, Taylor & Brown 511,374				
Ürholsterink device, H. B. Pitner 511,649 Valve, safety, C. Prusmann 511,650 Valve, straightway, J. M. Coale 511,510				
vehicle shifting seat. * G. Davis				
Vise, bench, A. S. Hubbell				
Washing machine, R. F. Porch Washing machine, R. F. Porch Water closets, etc., flush tank for, L. Morford, et al. 511,549 Water beater, W. H. Marshall.				
Water wheel in rbine, J. H. Staples 511,716 Water-proofing fabrics, J., Sr., & J. Miller, Jr. 511,707 Wheel. See water wheel.				
Windletree nook J. F. 2.10x. 311.333 Whistle, steam, F. M. Ashley 511.433 Wick raiser W. H. Wilder 511.544 Window V. T. Piener 511.544				
Window frame and sasb, A. H. Cole				
Waterproofing fabrics, J., Sr., & J. Miller, Jr. 511,307 Wheel. See water wheel. Whiffletree hook, J. F. S., ick. 511,538 Whistle, steam, F. M. Ashley 511,498 Wick raiser, W. H. Wilder. 541,572 Window, V. T. Pleper 511,544 Window frame and sash, A. H. Cole 511,499 Wire fabric, machine for and method of weaving colled, C. Kehr. 511,499 Wood carving or engraving machinery, T. Ryland 511,719 Wood, method of and apparatus for reproducing facsimile carvings in C. Hass. 511,689 Wood working machine, S. Hurtean. 511,618 Yard protector, J. Jacobs. 511,700, 511,701				
DESIGNS. Badge, W. B. Conkey 22,984 Badge, F. A. Osboru 22,985				
Badge, W. B. Conkey 22,984 Badge, F. A. Osboru 22,965 Banueret, J. Best 22,985 Box, S. W. Babbitt 22,965 Cracker, T. R. Mackey 22,900 Fork, pie, E. W. Buebl 22,930 Glass, pattern for window, C. Apple 22,985 Pencil, H. W. Morgan 22,985 Table, T. J. Rogers 22,985 Teething plate, C. Wabler 22,985 Teething plate, C. Wabler 22,985				
Fork, pie, E. W. Buehl 22,998 Glass, pattern for window, C. Apple 22,988 Pencil, H. W. Morgan 22,988 Table T. J. Rogers 22,988				
Teething plate, C. Wabler 22.98				

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Badge, W. B. Conkey Badge, F. A. Osboru	99 094
Dauke, w. D. Conney	64.00E
Badge, F. A. Osboru	22,985
Depuspet T Cout	99 009
Banueret, J. Best	24,983
Box, S. W. Babbitt	22,966
Cracker, T. R. Mackey	22 000
Claudel, 1. 10 Manager	200 000
Fork, pie, E. W. Buehl	22,302
Glass, pattern for window, C. Apple	22,982
Donail II W Mosgan	99 000
renci, n. w. morgan	44.969
Pencil, H. W. Morgan Table, T. J. Roßers	22,933
Teething piete C Webler	99 997
Tee think plate, C. Wabiel	24,001
Teething plate, C. Wabier	22,981
Wall Paper, C. Booze	99 000
Wall Paper, C. DOUZE	22,000

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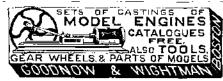


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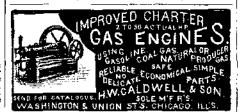
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