LABOR AND PERSONAL CLEANLINESS.

Our attention has been called again to this subject by a statement from a committee of the Board of Health, on the condition of the street cars and the liability of their communicating disease to passengers. Referring to the line skirting the East river, which runs past many large manufacturing establishments, slaughter houses, gas works, etc., the statement referred to asserts that the cars are constantly kept in a filthy condition by workmen who enter them covered with grease and grime, and reeking with perspiration from their work. We have ourselves before noticed this fact, and have endeavored to stimulate a greater regard for personal cleanliness among workmen, but we fear with little avail.

While dirt, and dust, and soiled raiment, are inseparable from some kinds of useful toil, they are admitted even by those who endure them, to be very disagreeable concomitants of labor. Their needless infliction upon others is, to say the least, a very unhandsome thing on the part of those who could, by a little effort, cleanse themselves before crowding into a vehicle for public use, and it is a matter of just complaint. We see, however, a spirit manifested by workmen which indicates that one who tries to avoid contact with them in their besmirched state is regarded by them with disfavor. Not long since, entering a Third avenue car, we saw three men, covered from head to foot with black oil, who threw themselves into seats as though it was a good joke to soil any т one's clothes that were decent. A gentleman, who quietly rose and passed to the seat opposite to avoid their contact, was abused by them, and tauntingly asked why, if he thought so $|H_{y}|$ much of his dress, he did not take a carriage and ride home Ma like a gentleman. Pe

Now it was evident this gentleman did not avoid these men Pa simply because they were workmen. To have done this, would 01 have forfeited his claim to be called a gentleman. It was | **Oi**] the dirt, of which they were the nety vehicles, he wished | Sp to escape. If workmen wish to be regarded with respect, Ste they should avoid making themselves nuisances. One of Et their own craft, in cleanly garb, would have shunned these W dirty and unmanly fellows. Ga

There is no excuse for a workman, in any business, who | An enters a public conveyance, or even as a regular thing walks Bi through crowded thoroughfares, in a condition that is dis Ale gusting to people of cleanly habits. Blackened hands and Sul faces are amenable to soap and water; and greasy overalls may be left hanging in shops, or, if it be needful to carry them, they may be rolled and wrapped up so as not to be offensive to sight or touch.

There is a great lack of true manly pride among certain olasses of workmen. Of unmanly pride, they have overabundance. They profess to be proud of their calling, proud to belong to the great army of producers-in this they are right; they are proud of the power of their associations, and scornful of luxury and wealth, which they claim oppress them with burdens too grievous to be borne. Were they equally proud of their personal appearance and scornful of that which is degrading in their habits, they would command more respect for their rights as members of society, and be able to enlist the sympathy of many who now stand aloof from them. Drink and dirt are the two most degrading habits of working men. No man can possess self-respect who is disrespectful to others, and no man is respectful to others who can willingly annoy them by exposing them to personal uncleanliness.

We are far from applying these remarks to all workmen, or even to the majority of them. We know many whose avocation is of a sooty order, but by whose side we would as soon sit in a car as ride next the sprucest dandy that promenades Broadway. We only ask those to appropriate what we have said, who, upon reflection, find it fits their case.

MEASURING THE HEAT OF COMBUSTION.

It has been shown, in several former articles, how the acceptance of a unit of heat, as a radical measure for the determination of relative amounts of caloric, has had most important results in placing the subjects of latent heat and specific heat in a clear light, subjects which otherwise would always have remained enveloped in much obscurity. Still more important, however, is the application of this unit to determine the results of combustion of different substances, as it settles, in the most rigorous manner, the comparative value of different kinds of fuel. At a time when steam is applied in so many and so diverse directions, or in other words, in an age when heat is continually and universally being converted into motion, the subject of investigating the nature and results of diverse kinds of combustion is of course of the utmost importance. It is an investigation of the amount of caloric or potential force hidden in the fuel, which hidden force is only changed into visible force by the intervention of evaporating water, expanding air, etc., and so the unit of heat may be directly connected with the unit of power. In most cases, combustion is a chemical combination of the fuel with atmospheric oxygen, and in all cases it is a chemical process, by which the latent heat of dissociation is set free (see page 21, current volume). The conversions taking place always form new compounds; for instance, we convert hydrogen into HO (water), carbon into CO (carbonic oxide), or CO₂ (carbonic acid), sulphur into SO₂ (sulphurous acid), phosphorus into PO₅ (phosphoric acid) sodium into NaO (soda) magnesium into MgO (magnesia), iron into FeO (ferric oxide) etc. The amount of heat produced varies with the nature of the substance, but depends more on the amount of oxygen consumed than on anything else; so we find that the combustion of one pound of coal gives as much heat as that of three sist the action of the strongest acid; and a still more re- is now engaged on the World as agricultural editor.

of coal is able to combine with nearly as much oxygen as three pounds of sulphur can do. The combustion of one pound of coal produces, however, only one quarter of the amount of heat produced by the combustion of an equal weight of hydrogen; but here again analytical chemistry teaches that, in the combustion of three pounds of carbon, no more oxygen has been converted into CO₂ than in the combustion of one single pound of hydrogen into HO, because the weight of O is six times that of H; six pounds of hydrogen, therefore, combine with 6×8 of oxygen, while six pounds of carbon combine only with 2×8 of oxygen.

Practical experiments with different kinds of fuel have shown, however, that this estimate of the heat produced by the amount of oxygen consumed is not strictly correct; and that other circumstances must be taken in account in order to explain the discrepancies. The principal influence on the result is the nature of the product of combustion, its gaseous or vaporous or solid condition, latent or specific heat, etc. We communicate here a table, giving the units of heat produced by the combustion of one pound of different substances, obtained by practical trial, and the amount of water which each of these substances may convert into steam, making the supposition that the latent heat of steam is 962 units of heat, and that some 150 units are required to heat the water from the ordinary temperature to the boiling point.

ABLE OF THE UNITS OF	HEAT AND AMO	OUNT OF STEAM	PBODUCED BY THE
	COMBUSTION	OF FUEL.	
ame of substance.	Formula.		Pounds of water changed into steam

me of substance.	Formula.	produced.	changed into steam
ydrogen	н	56,000	50.4
arsh gas	C_2H_4	23,500	20:9
etroleum	$C_n H_{n \times 2}$	22,000	19 .6
araffin	$C_{40}H_{42}$	21,600	18.9
lefiant gas	C_4H_4	21,350	17.6
l of turpentine	$C_{20}H_6$	20,000	160
permaceti		18,000	15 [.] 6
earic acid	$C_{36}H_{36}O_{4}$	17,500	14.2
ther	C4H50	16,000	12.5
ood charcoal		14,500	12 ·4
as coke		14,450	12.2
nthracite coal		14,220	11.6
ituminous coal		13,500	13.0
lcohol	$C_4H_6O_2$	13,000	11.1
ılphur	sŤŤ	3,500	3·0

SCIENTIFIC AND PRACTICAL INFORMATION.

METALLIC DUST IN FACTORIES.

The injuries to health, arising from infinitesimal metallic particles inhaled by the breath into the lungs in cutlery and other works, are especially serious in the operation of dry grinding, used in the manufacture of steel forks. Mr. Charles Stodder, of Boston, has recently made an investigation into the quality of a similar dust produced in the process of polishing fire arms in the United States arsenal, at Springfield, Mass.; and he found that it consisted of a few organic fibers, some minute crystalline fragments, and about 66 per cent of iron and steel dust. He makes a useful and practical suggestion that magnets be placed near the grinding surfaces to withdraw the iron dust from the air breathed by the workmen; and the simplicity and feasibility of the device will ensure it a trial.

CABINETS FOR THE STUDY OF MINERALOGY.

The Department of Public Instruction of New York city has recently approved a specimen cabinet of mineralogical specimens, compiled for the use of teachers. Such a collection, if properly and judiciously selected, may be made available for laying the foundation of a highly practical technical education; and we should be glad to see similar objectteaching introduced into other branches of knowledge. The specimens were chosen and arranged by Professor E. C. H. Day, whose name is familiar to all readers of the SCIENTIFIC A MERICAN.

WINE GROWING IN AMERICA.

There is little reason to doubt that a large proportion of the territory of the United States is suited for the cultivation of grapes from which wines, not only in practically unlimited quantities but of the highest excellence, may be produced. California takes the lead of all other States in this culture and manufacture, and exhibits great variety of qualities and flavors in her productions. A writer in the Overland Monthly catalogues these as follows, according to the los calities in which they are respectively cultivated: Sonoma county is best adapted to produce white wines, resembling those of Germany; the upper part of Napa valley and cer. tain portions of Santa Clara county will make excellent clarets; the Sacramento valley, near the foot of the inclosing hills, is destined to produce our future sweet muscats; El Dorado county is best adapted to the production of wine resembling the far famed Burgundy; Solano county produces a wine which is a natural port; San Joaquin and Stanislaus counties give wines which closely resemble, both in flavor and taste, the best Madeira, but they have to attain an age of from five to six years before this taste is sufficiently developed; Anaheim and certain portions of Los Angelos county produce light white wines, which very closely resem ble those of Chablis, in France, and they, too, must be some four years old before this peculiarity shows itself distinctly; and the last two years should be in bottle.

pounds of sulphur, while chemistry proves that one pound markable and important phenomenon has been observed. which is that iron so treated will form a galvanic circuit with ordinary iron, the treated metal being decidedly negative to the latter. Dr. Schönn produces further evidence of the changed character of the iron by showing that it refuses to reduce copper from the solution of its salts. He shows also, that cadmium, in strong nitric acid, remains unacted on if platinum wire be coiled around it; but on the removal of the wire, the cadmium is at once attacked by the acid. Tin exhibits similar characteristics. The result of the experiment with iron points out electrical action as the cause of these effects, which, on further investigation, may give us some new light on the subject of electrolysis.

OBTAINING ABSOLUTE ALCOHOL.

A German savan has recently improved on the well known method, employed by Mendelejeff, for obtaining absolute alcohol. Alcohol of 792 is boiled with quicklime, the pieces of the latter projecting above the surface of the liquid, for half an hour more, with a condenser inverted so that the liquid may return by its own gravity to the flask. The condenser is then reversed, and the alcohol redistilled. If the alcohol contains more than 5 per cent of water, the process must be repeated two or three times. ' The vessel should only be half filled with the pieces of lime, as the rapid formation of hydrate of lime may break it to pieces.

ELISEE RECLUS.

It was with much pain that we read the news of the condemnation of this eminent French geographer to a term of deportation; and we shall not be accused of political bias when we express our regret for his defection from the ranks of science to follow a chimera. Among the idiosyncracies of the talented and misguided man may be mentioned the union in one mind of the blind cruelty of the commune, and a humanity which forbade to eat meat for the reason that it is not lawful for man to slay his fellow creatures. Reclus is a native of the south of France, and was educated at Neuwied and subsequently in Berlin. His contributions to the Revue des Deux Mondes are well known for their learning and lucidity of style. Petitions on his behalf have been addressed to the Committee of Pardons, Versailles, having been signed by Sir Charles Lyell, Sir John Lubbock, Sir Henry Rawlinson, Professors Owen, Duncan, Tennant, Forbes, Carpenter, Richardson, Darwin, and many others. The pleadings of these men will hardly be ignored by the government of such a nation as France, and it would be a graceful act for the scientists of America to forward a similar petition, which possibly might set Professor Reclus once more free to pursue his studies and teachings for the benefit of mankind.

LEAD POISONING.

The painful effects of poisoning by lead are not by any means confined to painters, white lead manufacturers, and others whose trades bring them into constant contact with this deleterious metal. There are some persons whose obstinacy allows them to use it, in cosmstics and hair washes, in spite of the warnings of the medical profession; and the evil is augmented by the fact that such preparations may be used for years with impunity, and the palsy, paralysis, and other effects do not appear till the whole system is thoroughly impregnated. One medical man writes to a contemporary to say that he has one patient who has been paralyzed for nearly three years, her vision is imperfect, and her memory is gone; and another victim to this criminal practice has constant torture in her eyes, and is obliged to stay in a dark room. Many similar cases have been reported; but the practice still continues, and now Dr. J. M. Crocker publishes an account of a man, aged 55, who was afflicted with what appeared to be muscular rheumatism, affecting mainly the deltoid and other muscles of shoulders. When first visited, he was suffering from pains which he had felt more or less severely for a month or two. Both arms were in this manner crippled. Dr. Crocker ordered cotton batting to affected parts, lemon juice and opiates internally; and the patient made quite a rapid recovery, but when seen in the month following, he was suffering from an almost complete paralysis of extensor muscles of fingers and hands, with dropping of wrists. He could readily and forcibly grasp, but found difficulty in letting go. Subsequently, upon inquiry, it was discovered that for fifteen years he had used a hair renewer, made by himself, of three teaspoonfuls lac sulphur and two teaspoonfuls sugar of lead to a pint of water. With this he had drenched his head and scalp as often as once a week. Under use of iodide of potassium and galvanism, he has made a good recovery, the hair dressing having of course been discontinued.

THE MINERAL RESOURCES OF SOUTH CAROLINA. Mr. A. C. Laughlin, of Columbus, S. C., informs us that corundum is found in South Carolina in inexhaustible quantities; this mineral is specially adapted for spindles and pivots of watches, and other fine machinery where the wear is constant. Sapphires and garnets are frequently found, some of the latter being perfect specimens of crystallization. Magnesian iron ore is very abundant, but is as yet almost undeveloped. Mica is another substance yielded by the soil of that state, and is daily coming into increased use. Mr. Laughlin speaks most favorably of the South Carolinian gold fields, and states that the precious metal can be obtained therefrom with great facility.

THE BEHAVIOR OF CADMIUM, IRON, AND TIN UNDER THE ACTION OF NITRIC ACID.

It has been observed that iron acquires, by being placed in nitric acid, a peculiar condition of surface enabling it to re-

ONE cubic inch of water weighs 03617 lbs. One cubic foot of water weighs 621 lbs. One cabic foot of ice weighs 581 lbs. One cylindrical inch of water weighs 02842 lbs. One cylindrical foot of water weighs 49.1 lbs.

Mr. H. E. COLTON, an occasional contributor to this paper

Scientific American.

What they think at the White House of the United States Watch Company's MARION WATCHES.

The following is from General PORTER, President GRANT'S Private Sec retary:

EXECUTIVE MANSION, WASHINGTON, D.C., October 18th, 1871.

DEAR SIR-My watch has kept excellent time since I have carried it. Yesterday, in some unaccountable way, the crystal was broken. Will you please replace it, and oli the works? they have never been oiled or examined since the watch left the factory. I expect to be in New York a day, about Thursday or Friday of next week, and I shall call at your place, 18 Maiden Lane, for the watch. Yours very truly, (Signed) HORACE PORTER.

F. A. GILES, Esq. The Watch referred to above, is No. 27,335, Stem Winder, Trade Mark "John W. Lewis-manufactured by the United States Watch Co., (Giles, Wales & Co.,) Marion, N.J. "-and has been carried by Gen. Porter for ver a year. We are glad to see that our officials in high places appreciate fine American mechanism, and set the example of patronizing home productions instead of sending our gold abroad for inferior articles.

Examples for the Ladies.

Mrs. T. M. Scullin, Troy, N. Y., has used her "dear friend," a Wheeler & Wilson Machine, since 1858, in dress and cloak making. The last six months she earned \$332, and the year before, \$417.

Mrs. C—, of New York, has used a Wheeler & Wilson Machine since 1857, never averaging less than \$700 a year, and for the last five years \$1,000. She used the same needle during 1870, and earned with it over \$1,000.

For Irritation of the Scalp, apply Burnets's Cocoains night and morning.

Business and Eersonal.

The Chargefor Insertion under this head is One Dollar a Line. If the Notice exceed Four Lines, One Dollar and a Half per Line will be charged.

Dry Steam, dries green lumber in 2 days; tobacco, in 3 hours; and is the best House Furnace. H. G. Bulkley, Patentee, Cleyeland, Ohio.

- To Ascertain where there will be a demand for new Machinery, mechanics, or manufacturers' supplies, see Manufacturing News of United States in Boston Commercial Bulletth. Terms \$4.00 syear.
- Manufactures and Mill Supplies of all kinds. Greene, Tweed & Co., 18 Park Place, New York.
- The "Safety" Hold Back for Carriages prevents runaway accidents. See Sci. Am. Feb. 24, 1972. Undivided Interest, or State and County Rights, for sale. Address N. W. Simons, Williamsfield, Ohio.
- Lord's improved Screen or Separator—also Watchman's Time Detector. For particulars, address Geo. W.Lord, 232 Arch St., Phila., Pa.
- Scale in Steam Boilers. We will remove and prevent Scale in any Steam Boiler, or make no charge. Geo. W. Lord, 232 Arch Street, Philadelphia, Pa.
- Walrus Leather for Polishing Steel, Brass, and Plated Ware Greene, Tweed & Co., 18 Park Place, New York.
- The Exeter Machine Works, Exeter, N. H., manufacturers of Sectional Boilers and Steam Engines, will soon open, in Boston, Mass., a centrally located sales room, in connection with their works; and are willing to take the agency of a few first class Machines and Tools not already introduced in that city.

For Diamond Turning Tools for Trueing Emery Wheels and Grindstones, address Splivan Machine Co., Claremont, N. Hamp.

Standard Twist Drills, every size, in lots from one drill to 10,000, at χ manufacturer's price. Sample and circular mailed for 25c. Hamilton E. Towle, 176 Broadway, New York.

- Hydraulic Jacks and Presses, New or Second Hand, Bought and sold, send for circular to E. Lyon, 470 Grand Street, New York.
- All kinds of Presses and Dies. Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth St., Brooklyn. Send for Catalogue.

Brown's Coalyard Quarry. & Contractors' Apparatus for hoisting and conveying material by iron cable. W.D.Andrews & Bro, si4 Waterst., N.Y Presses, Dies, and Tinners' Tools. Conor & Mays, late Mays & Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N.Y.

Over 1,000 Tanners, Paper-makers, Contractors, &c., use the Pumps of Heald, Sisco & Co. See advertisement.

In the Wakefield Earth Closet are combined Health, Cleanliness and Comfort. Send to 38 DeySt., New York, for descriptive pamphlet. Enameled and Tinned Hollow-Ware and job work of all

kinds. Warranted to give satisfaction, by A. G. Patton, Troy, N.Y. For Circular of the largest variety of Wood Planing and Mi-

tre Dovetailing Machinery, send to A. Davis, Lowell, Mass. Rubber Valves-Finest quality, cut at once for delivery; or

mouidedto order. Addr. Gutta Percha & Rubber Ml'g Co., 9 & 11 Park Place, New York.

Bestand Cheapest—The Jones Scale Works, Binghamton, N Y. Grist Mills, New Patents. Edward Harrison, New Haven, Conn Taft's Portable Hot Air Vapor and Shower Bathing Apparatus

Address Portable Bath Co., Sag Harbor, N.Y. Send for Circular. Mining, Wrecking, Pumping, Drainage, or Irrigating Machin-

ery, for sale or rent. See advertisement, Andrew's Patent, inside page. For Steam Fire Engines, address R. J. Gould, Newark, N. J. For Solid Wrought-iron Beams, etc., see advertisement. AdWanted—An agent to sell territory for a new and valuable patent. Address, for circular and terms, P. O. Box 773, New York. Hoisting Engines. Simplest, cheapest, and best. Send to

John A. Lighthall, Beekman & Co., Office 5 Bowling Green, New York. L. & J. W. Feuchtwanger, 55 Cedar St., New York, Manufacturers of Silicates, Soda and Potash, Soluble Glass, Importers of Chemicals and Drugs for Manufacturers' use.

New & Improved Bolt Forging Machines, J.R.Abbe, Prov., R.I.

File Grinders' Grindstones, coarse grit-Mitchell, Phila., Pa

Independence Grindstones—J. E. Mitchell, Phila., Pa.

Well auger which will bore at the rate of 150 ft. per day. Sendioc. for circular to W. W. Jilz, St. Joseph, Mo.

Improved Foot Lathes, Hand Planers, etc. Many a reader of this paper has one of them. Selling in all parts of the country, Canad's, Europe, etc. Catalogue free. N. H. Baldwin, Laconia, N. H.

Parties wishing to go S. W. with cotton or woollen machinery, address Isaac Sharp, Evening Shade, Sharp County, Ark.

Wanted Situation, by a Draughtsman—competent to design any kind of Engines or Machinery; or would be found expert in carrying out designs for Engineers, and good Practical Mechanic. Good reference. Address E. M., Box 157, Mansfield, Obio.

A young man desires a situation in a Civil Engineer Corpsunderstands leveling. Good references. Address Engineer, Camptown, Bradford County, Pa.

For Sale—A 2 H.P. Stationary Engine. Address J. Abbot, Fitchburg, Mass.

Wanted, to correspond with owners of Patents-Picture Frames, Hangers, or other light metal work-view to manufacturing. Address H.J. Dorchester, 618 North Main Street, St. Louis, Mo.

For the best Match Splint Machinery made, address H. M. Underwood, Kenosha, Wis.

Manufacturers of Spoke and Last Machines, send description and price list to William Graham, Smiths Falls, Ont.

Parties desiring articles prepared for the press, describing really meritorious and useful inventions or processes, may find it to their advantage to communicate with Richard H. Buel, Consulting Mechanical Engineer, 7 Warren Street, New York.

Get your steam boilers and pipes covered with the best nonconductor in the world. Call for Circular. Asbestos Felting Company, 45 Jay Street, New York City.

The paper that meets the eye of manufacturers throughout the United States-Boston Bulletin, \$4 00 a year. Advertisements 17c. a line.



[Wepresent herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to slicit practical ensuers from our readers.]

1.—CUTTING GLAZIERS' DIAMONDS.—Can any of your correspondents tell me how to cut worn glaziers' diamonds to a new point?— W. K.

2.—FLUID AND LIQUID.—Will some one tell me the proper and fine distinction between a fluid and a liquid? Can a substance be both at once? I assume that the difference is great, and would like to have other opinions.—H. W. H.

3.—COLORING SHELLS.—Is there any way of coloring these a bright red?—C. H.

4.—HYDROGEN GAS.—Is there any process yet discovered by which illuminating gas can be made over into pure hydrogen? Has the metallic base of hydrogen ever been discovered?—E. X.

5.—NITRIC ACID IN BATTERY.—Is the nitric acid, in the porous cup of a Grove or Bunsen battery, raised auy degrees of tempera ture; and ifso, about how many, if the acid is put in at about 60 degrees Fahr. ?—E. X.

6.—FROZEN WATER MAIN.—Will some of your readers please inform me which is the quickest and cheapest way to thaw out 150 feet offrozen water main, 4 feet under ground?—C. H. J.

7.—COMPRESSION OF WOOD PULP.—Is there any way by which wood pulp can be compressed so as to be impervious to liquids, with out destroying the elasticity of the wood?—H. B.

8.—FAST COLORS.—Will some of your readers inform me how I can make a dye of log wood and copperas "fast" so that it will not rub off?—F. W.

9.—BRASS COLORED PAINT.—Can any one tell me if there is any paint of the same color as brass, and of what is it made?—O. W. V.

10.—ELASTIC CEMENT.—I have broken an india rubber gas bag; will some one please give me a recipe for a good, durable elastic cement, suitable for mending it?—W. M. S.

11.—W. B. D., of N. J.—Please give us the title of the book you refer to containing notice of asbestos packing. Also extract, if convenient.

12.—BATTERY FOR PLATING.—I would like to know how to make a good galvanic battery for plating with gold and sliver. I want some one to tell me how to get up the cheapest and best for that kind of work.—W. B. J.

13,—CRACKED FLUTE.—Will some one please inform me how to keep a flute from cracking, and how to stop cracks that have already appeared?—A. E. T.

19.—HEATING BY STEAM.—How large a boiler will it need to heat a building 60x30 feet, and four stories high? How can I calculate the size of a boiler required to heat any particular building?—J. C.

20.—MICROSCOPY.—I have a microscope (non-achromatic lenses) which, though it shows a transparent object clearly enough, gives little more than the outlines of an opaque one. How can this difficulty be overcome? Will a condenser make the whole top of an object plain ?—A.M.

21.—MATCHES FOR MOLDING.—Can any of your readers inform me how to make sand and oil matches to mold from, and how to prevent plaster matches from softening with work?—O. K.

22.—LETTERS FOR PATTERN MAKERS' USE.—What kind ofmetal is used, what are the proportions of mixture, and what is the best way to make, letters, figures, etc., for model and pattern makers to use on their work?—J. M. S.

#3.—PIN SPOTS IN STEEL.—How can I treat steel so as to soften the hard spots or pins in it? I have bars of the finest steel I could purchase in New York, but it all has had spots in it. I have tried many different ways to soften them and failed. How can I make steel as soft as possible without hurting its quality?—H. M. H.

24.—IRON CASTINGS.—Is there any process by which soft iron castings can be made from old castings, without the addition of new iron?-H. M. H.

25.—SUCTION FAN.—What is the best shape for the wings of a suction fan, intended to draw the shavings from four or five planing machines? What should be the shape of the spouts, and the proportionate sizes of inlet and outlet?—J. E. G.

26.—CARBON BATTERY.—In your paper of Jan. 6th, 1872, there are directions for making a carbon battery, and also for making the carbon plates. I have been experimenting in electricity, and I was anxious tory the different kinds of batteries, so I tried to make a carbon battery. I made the plates all right, but when I came to set the battery to work, it would not go; and I have failed to make it go. Can any one give me definite instruction as to what are the component parts and quantities necessary to make a carbon battery?—L. E. H.

27 — TEMPERING STEEL.—Is there any way in which I can bring a large number of small steel articles to a uniform degree of hardness, other than the slow process of "drawing?" Will dropping them into some liquid, heated to a high temperature, prevent them from becoming too hard? —E. B. T.

28.—BURNING CHARCOAL.—I am engaged in the manufacture of charcoal. I burn about sixteen cords in a pit. The wood is cut four feet in length, set up endwise, two tiers high, to form a conical shaped pit, and covered with earth in the usual manner. I have experienced difficulty incharring the ends of the lower tier, which rest on the ground, having a loss of8 to 15 per cent in "uncharred butts" left in the pit. Will some one give me the best mode of burning? Also, tell me if any have tried or seen ovens used similar to cooking ovens for burning charcoal?-B.C.C.

29.—MEASURING FLOW OF WATER.—How can I ascertain how much waterwould flow over a given point, in a given time (say one minute) in a creek? The minimum of water flowing in the creek is45 squara inches. Its descent is as much as 20 feet in 30 rods. The plan given in your valuable paper a year or two ago for this purpose is useless to me, be. cause there are so many short turns and obstructions (fallen trees) in the creek.—C. B.

30.—PLASTIC SLATE ROOF.—Is there any way of repairing a plastic slate roof which has, in three and a half yea s, become so cracked and torn as to be exceedingly dangerous? The roof originally consisted of a heavy coat of felt, covered with some composition which is now, with the felt, highly inflammable.—J. M.

Answers to Correspondents.

SPECIAL NOTE.— This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries however, when paid for as advertisements at 1 00 a line, under the head of "Business and Personal.

ALL reference to back numbers must be by volume and page.

F. B., of Conn.—Your question about fire from steam pipes has been repeatedly answered in these columns, both in editorial articles and answers to queries. We do not wish to reopen the subject at present.

D. B. H., of S. C.—We have met with no explanation of the statement that the eyes are affected in ice boating when running with the wind at high speed. We have, in our own experience, suffered no such inconvenience.

W. K. R.—Sound is the vibration of the air; the rubbing of agobletwith wet fingers produces vibration in the glass which communicates it to the air and to the ear. Let him rub agoblet in a vacuum, and listen if he hears anything.—J. A. L., of O.

VOLTAIC PILE.—Let T. F. G. take disks of copper, zinc, and woolen cloth of any size, soak the cloth in a solution of sal ammoniac, then pile them up in the following order: copper, zinc, cloth, and so on; then connect the outer disks with a copper wire. The larger the disks and the greater their number, the greater is the intensity of the current.— J. A. L., of O.

VOLTAIC LIGHT.—It will take a battery of forty cells of Grove's elements to make an electric light of any considerable size. If, however, you have a battery of another kind, you can take as follows: Forty-five Bunnen's, fifty-five Daniells', or seventy-five Smee's. Grove's battery is the cheapest and best for the more striking effects of electricity. The carbon pencils should be made of the same kind of coke as the carbon in Bunnen's battery. Browning's lamp is the cheapest lamp for exhibiting the light.—E. X., of Mass.

RAISING NUMBERS TO FRACTIONAL POWER.-T. M. N.,

dress Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Belting as is Belting—Best Philadelphia Oak Tanned. C.W. Arny, 301 and 303 Cherry Street, Philadelphia, Pa.

Boynton's Lightning Saws. The genuine \$500 challenge. Will cutfive times as fast as an ax. A 6 foot cross cut and buck saw, \$6. E. M. Boynton, 80.Beekman Street, New York, Sole Proprietor.

Peck's Patent Drop Press. Milo Peck & Co., New Haven, Ct. Vertical Engines—Simple, Durable, Compact. Excel in economy of fuel and repair. All sizes made by the Greenleaf Machine Works Indianapolis, ind. Send for cuts and price list.

Millstone Dressing Diamond Machine—Simple, effective, du rable. For description of the above see Scientific American, Nov. 27th 1869. Also, Glazier's Diamonds. John Dickinson, 64 Nassau st., N. Y.

Presses, Dies & all can tools. Ferracute Mch Wks, Bridgeton, N.J.

For 2 & 4 Horse Engines, address Twiss Bros., New Haven, Ct

Opium Eaters—If you wish to be cured of the habit, address T. E. Clarke, M. D., Mount Vernon, Ohio.

Blake's Belt Studs. The best fastening for Leather or Rubber Belts. 40,000 Manufacturers use them. Greene, Tweed & Co., 18 Park Place, New York.

14.—TANNING BUFFALO HIDES.—Can any one inform me how the Camanche Indians tan the hides of buffaloes, so that the leather does not get hard and horny, nor does the haircome out?—B. F. B.

15.—PAINTING IRON BATH TUB.—Will some one inform me what kind of paint I can use for painting my iron bath tub, that will adhere and not scale off in a short time? I have had it painted several times with pure white lead mixed with raw and boiled oil; but it scales off.—C. A. H.

16.—DISCOLORED GLASS.—Last summer I had some large glass panes put in my front windows; they have a smoky appearance. It seems to be on the surface and not all through the glass. Is there wothing that will remove it? It is not smoke; if it were, I could remove it with turpentine.—W. G. E.

17.—STAINS ON MARBLE.—What is the best method by which weather, tobacco, grease, iron rust, and other stains can be removed from marble; and by which the original polish can be restored?—A. P.

18.—PAINTING SHEET IRON.—Will some of your correspondents give me a recipe for some kind of paint or substance for coating asheet iron smoke stack, to prevent its rusting and to stand the heat?—J. C. query No. 6, Feb. 24. The best way to raise a number to the power of a fraction is to take the logarithm of the number from a table of logarithms, multiply that logarithm by the fraction, and find in the table the number corresponding to that product. The number, expressed in whole num bers and decimals, will be practically accurate. ---.

BREAKING OF CAST IRON PULLEYS.—The explanation of C. M. R.'s broken pulley is this: Cast iron is always crystalline, and wrought iron often becomes so by constant jarring. That pulley was crystalline in the interior while the surface was not. This caused the interior to expand or rather to attempt to. So long as the surface was whole, the interior was bound, so that it could not expand freely. But when the surface was broken the tension was removed, the piece expanded fully, and became too large to be replaced.—.—

CARBONIC ACID: GAS IN WELLS.—With regard to carbonic acid gas in wells, the most simple plan to get rid of it is to get a blacksmith's bellows—an old one could be borrowed in almost any town—and a tin or lead gas or steam pipe. Attach it to the noize of the bellows and run it to the bottom of the well; so long as the bellows is worked the well will be free from gas. A well digger in this place burned shavings in a well he was di ging every hour; still his workmen were so affected they were about abandoning the work, when the contractor came to me to see if I could tell him how to get rid of the gas; I told him of the bellows; be borrowed one and set a boy to working it, and his men worked for and finished the well without further trouble.—M. W., of N. J.