

ENGINEERING INVENTIONS.

An electric alarm for steam gauges has been patented by Messrs. Harvey Carley and Thomas McKenna, of Long Branch, N. J. The invention combines with the steam gauge with metallic binding posts, an electric switch with a binding post, an alarm bell, galvanic battery, circuit plates, etc., so that any increase or decrease of steam beyond certain fixed limits may be signaled at a distant place or office.

A revolving cylinder engine has been patented by Mr. John J. Blair, of Tacoma, Washington Territory. The steam and exhaust passages are formed in the shaft, which is stationary and carries swinging gates, moved in and out of the steamway in the operation of the engine, the object being to have as little reciprocating motion as possible, so reducing friction and obtaining a perfect balance, that the engine may be run at a high speed without vibration.

An ore drier and separator has been patented by Mr. Albert Seneff, of Laramie City, Wyoming Ter. This invention covers an apparatus for slowly passing the ore down a heated shaft of a furnace, on pans or disks, with a slight shaking motion, for shaking and distributing the ore as it goes forward over a long, sloping screen, from which each grade falls separately past or through a blast of air from a blow pipe, by which the earth and other matters are blown away, the ore falling into its distinctive receptacles.

An improved apparatus for raising water has been patented by Mr. Thomas Arthur, of Bangor, Penn. It is more especially for use in mines, and contemplates three tanks at different levels, connected by two bent tubes and a siphon, one of the tubes having a discharge siphon, and the lower tank having a pipe leading to the water, to be raised, an upwardly opening valve, and a discharge pipe with an outwardly opening valve, so water can be raised by atmospheric pressure induced by water flowing through the tanks, siphon, and bent tubes.

MECHANICAL INVENTIONS.

A saw mill feed mechanism has been patented by Mr. Silas Dickson, of Marcy, Ohio. Instead of the usual toothed rack for driving the carriage, a pitch chain with sprocket wheel is used; the carriage may run each way beyond the saw, and the chain has friction rollers to facilitate its working freely on the teeth of the sprocket wheels.

A machine for planing and shaping wooden stirrup slats has been patented by Messrs. Wilber F. Cowles, of St. Mary's, and James Woolworth, of Sandusky, Ohio. It is a rotary planer, with trimming saws, and with feeding and controlling apparatus, so the slats may be received from the sawing machine, surfaced on the outside, shaped on the inside, and trimmed at the ends, suitably for being finally bent into the form in which they are finished.

AGRICULTURAL INVENTIONS.

An improved sickle bar and knife has been patented by Mr. Lorenzo Wallace, of Kansas City, Mo. The object is to provide for attaching the knives for cutters to sickle bars, so as to allow the convenient placing and removing of the knives, the sickle bar having a groove on one side with apertures in its bottom, and cross bars in combination with cutter sections, with hook-shaped lugs and a screw pin and nut.

A cotton-worm destroyer, sprinkler, etc., has been patented by Messrs. John D. Lambert, Sr., and John G. Wiggins, of Monroeville, Ala. With a pump, tank, and sprinkling devices is a three-wheeled vehicle, with side bars forming handles at a height suitable for a man to hold and guide the machine. The nozzles are so fitted to the connections that they can swing out or in, to adapt them for sprinkling two rows of plants at the same time, whether planted widely apart or close together.

MISCELLANEOUS INVENTIONS.

An improved fire escape has been patented by Mr. William Jensen, of Victoria, British Columbia. It is a simple, durable, and cheap rolling ladder escape, portable from window to window, incombustible, and is light and strong without needing side braces.

A button hook has been patented by Mr. James C. Beetle, of New Bedford, Mass. The object is to provide a hook by means of which shoes can be buttoned without requiring the person to stoop; the button hook is pivoted on the end of a handle, and in combination therewith is a spring for holding the hook at right angles to the handle.

An improved ax has been patented by Mr. Richard R. Pace, of Lineville, Ala. The invention provides for an opening in the ax body, from which a screw spindle extends downward, and is made to hold the blade of the ax firmly on the ax body, but so that the bit or blade may be removed when worn out and new ones inserted.

An improved treadle-power device is the subject of a patent issued to Mr. George A. Greene, of Taylor, Texas. It consists in so arranging a pair of treadles that the operator may stand erect and work the machine by a natural walking motion, with contrivances that also allow the power of the hands and arms to assist the legs when desired.

A boot and shoe last has been patented by Mr. William Pond, of Kansas City, Mo. The invention consists in making lasts with the outer edges of the bottoms raised, and inclined or beveled inwardly, to take the place of leather removed by the workman in beveling the edges of the insole, thus giving a better surface for work on the outer sole.

A sad iron holder has been patented by Serena M. Carnes, of New York city. This invention relates to improvements in connection with a former patent of the same patentee, and consists in attaching the clasp springs of the holder to the under side of the pad in such way that the pad will be free to open away from the handle of the iron when the hand of the user is removed, so helping to keep the holder cool.

A folding chair has been patented by Mr. Jonathan Hill, of New York city. It consists of pairs of legs crossed and pivoted together so that the seat-board projects farther to the front than usual, and the seat is locked so that it cannot move either up or down about its central pivot, and grooves or sliding connections at the back, with their objectionable friction and loss of strength, are avoided.

A sleigh-runner attachment for vehicle wheels has been patented by Mr. Frank J. Larkin, of Kenosha, Wis. A runner is shaped the same as a sleigh-runner, and two wedge-shaped pieces, having a longitudinal groove in the bottom, adapted to receive the runner, can be adjusted thereon according to the diameter of the wheel, so the runner can be adjusted to wheels of any diameter.

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office assembly as Thursday morning to appear in next issue.

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Fox's Corrugated Boiler Furnace, illus. p. 354. Hartmann, Le Doux & Maecker, sole agents, 134 Pearl St., N. Y.

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If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, \$40. Various other foreign patents may also be obtained. For instructions address Munn & Co., SCIENTIFIC AMERICAN Patent Agency, 261 Broadway, New York.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

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Wanted.—Patented articles or machinery to make and introduce. Gaynor & Fitzgerald, New Haven, Conn.

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Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 229 Center St., N. Y.

Straight Line Engine Co. Syracuse, N. Y. Best in design, materials, workmanship, governing; no packing.

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Lightning Screw Plates, Labor-saving. Tools, p. 92.

Catalogues free.—Scientific Books, 100 pages; Electrical Books, 14 pages. E. & F. N. Spon, 35 Murray St., N. Y.

Curtis Pressure Regulator and Steam Trap. See p. 142.

Woodwork'g Mach'y. Rollstone Mach. Co. Adv., p. 141.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 142.

American Fruit Drier. Free Pamphlet. See ad., p. 158.

The Chester Steel Castings Co., office 407 Library St., Philadelphia, Pa., can prove by 20,000 Crank Shafts and 15,000 Gear Wheels, now in use, the superiority of their Castings over all others. Circular and price list free.

Brass & Copper insheets, wire & blanks. See ad. p. 153.

The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Friction Clutch Bellets. D. Frisbie & Co., Phila. Pa.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv. p. 153.

Sewing Machines and Gun Machinery in Variety. The Pratt & Whitney Co., Hartford, Conn.

The Porter-Allen High Speed Steam Engine. South-
ark Foundry & Mach. Co., 420 Washington Ave., Phil. Pa.

Special.

JUDGE FLANDERS, OF NEW YORK.

The Hon. Joseph R. Flanders enjoys the eminent distinction of being one of the most prominent lawyers in New York. Born and brought up in Malone, Franklin County, on the edge of the Adirondack region, he early devoted himself to the practice of law, and took an active part in the politics of the State. He was for years judge in Franklin County, and served with distinguished ability several terms in the Legislature of New York. He was for a long time in partnership, in the practice of law, with the Hon. W. A. Wheeler, who was Vice-President of the United States during the Presidency of Mr. Hayes. Judge Flanders was a member of the famous committee appointed about thirty years ago to revise the Constitution of the State of New York. He always has been a staunch and fearless advocate of temperance reform, and of purity in political affairs. During the controversy which led to the war, he was conspicuous for his consistent and forcible advocacy of "State rights," always taking the ground of the statesman and jurist, and not affiliating with the demagogues or noisy political charlatans on either side.

In his present appearance Judge Flanders' countenance gives no indication of the remarkable physical experience through which he has passed. No one would suppose, from seeing him busily at work in his law office, a cheerful, hearty, and well preserved elderly gentleman, that he was for many years a great sufferer, and that his emancipation from slavery to severe disease was a matter of only recent date. But even so it is. Visiting him a few days ago in his well appointed law offices in "Temple Court," which is one of the new twelve story office buildings of the Metropolis, we found him disposed to engage in conversation regarding his illness and his complete restoration to health. The information which he communicated in regard to this extraordinary case was substantially as follows:

"For many years I suffered from weak digestion and the dyspepsia consequent upon it. My health was not, at any time since I was twenty-one years of age, vigorous; although by persistence and close application I have been able in most of the years to perform a large amount of work in my profession. Gradually I declined into a state of physical and nervous prostration, in which work became almost an impossibility. In 1879 I was all run down in strength and spirits. Energy and ambition had entirely departed. That summer I went to Saratoga, and took a variety of the waters, under the direction of one of the resident physicians. But instead of receiving any benefit I grew weaker and more miserable all the time I was there.

"In September I returned to New York in a very reduced state. I was incapable of work, and hardly able to leave the house. Soon after my return I suffered a violent chill, which prostrated me to the last degree. But under medical treatment I gradually rallied, so that in the course of the winter and spring I managed to do a little work at my office in my profession. During this time, however, I was subject to frequent fits of prostration, which kept me for days and weeks at a time in the house.

"So I kept on until the summer of 1882. I tried a variety of medicaments which kind friends recommended, and was under the care of several physicians from time to time. In the latter part of the summer I went to Thousand Islands, where I staid several weeks with friends. But I found the atmosphere did not agree with me. Soon I had a chill, not a severe one, yet in my state it added to my weakness and general discomfort. Several days after this I had another chill, which totally prostrated me.

"As soon after this as I was able to travel, I went to Malone, my old Franklin County home, intending to stay for a while among relations and friends, and to consult my old family physician. But I found that he was away in the White Mountains with Vice-President Wheeler, my old friend and former law partner. They did not return to Malone until three days before I left there. Of course I consulted the physician. He neither said nor did much for me. I came away, feeling that the battle of life was nearly ended. The next time I saw Mr. Wheeler in New York, he told me that the doctor had said to him that he never expected again to see me alive. When I arrived at home in September, it was in a state of such exhaustion that I was unable to leave home except on bright and sunny days, and then only to walk slowly a block or two.

"Meanwhile, my son, who had been in Massachusetts, made the acquaintance of a country postmaster in that State, an elderly gentleman, whose prostration seemed to have been as great as my own, or nearly so. This gentleman had been taking the Compound Oxygen Treatment, and he had received from it the most surprising advantage. My son wrote frequently, and urged that I should try this treatment. But I had lost all faith in remedies. I had tried many things, and had no energy to try any more. But in September my son came to New York, and persuaded me to visit Dr. Turner, who is in charge of Drs. Starkey and Palen's office in New York, for the Compound Oxygen Treatment. My going there was not because I had any faith in this treatment, but to gratify my son's kind importunity. When Dr. Turner examined my case, he thought I was far gone that he hardly dared to express the faintest hope.

"On the seventh of October I commenced taking the treatment. To my great surprise I began to feel better within a week. In a month, I improved so greatly that I was able to come to my office and do some legal work. I then came to the office regularly except in bad weather. On the nineteenth of December a law matter came into my hands. It was a complicated case, promising to give much trouble, and to require very close attention. I had no ambition to take it, for I had no confidence in my ability to attend to it. I consented, however, to advise concerning it, and to do a little work. One complication after another arose. I kept working at it all winter and into the spring. For three months this case required as continuous thought and labor as I had ever bestowed on any case in all my legal experience. Yet under the constant pressure and anxiety I grew stronger, taking Compound Oxygen all the time. In the Spring, to my astonishment, and that of my friends, I was as fit as ever for hard work and close application.

"My present health is such that I can without hardship or undue exertion attend to the business of my profession, as of old. I am regularly at my office in all kinds of weather, except the exceedingly stormy, and even then it is seldom that I am housed. My digestion is good, my sleep is as natural and easy as it ever was, and my appetite is as hearty as I could desire.

"A remarkable feature of my case is the hopelessness with which Dr. Starkey viewed it at the outset. It was not brought to his personal attention until after, in Dr. Turner's care, I had begun the treatment. Then my son wrote to him, setting forth my condition, and asking him to interest himself individually in endeavors for my benefit. Dr. Starkey replied that he had carefully examined the case, as set before him, and that there was

evidently nothing that could be done. He saw no possible chance of my being made better, and doubted if I could even be made more comfortable. 'I am very sorry,' he wrote, 'to give such a hopeless prognosis, but conscientiously I can give no other.' What would Dr. Starkey have said, had he then been assured that in less than a year from the time of his writing I should be thoroughly restored to as good health as ever I had, and that I should be able to attend regularly to the arduous duties of my profession?

"Do I still continue to take the Treatment? No, not regularly, for my system is in such condition that I do not need it. Once in a while, if I happen to take cold, I resort to the Treatment for a few days, and always with certain and beneficial effect.

"My confidence in the restorative power of Compound Oxygen is complete; as also it is in the ability and integrity of Drs. Starkey and Palen, and of Dr. Turner, who is in charge of their New York Depository; otherwise I should not allow my name to be used in this connection. I have thus freely made mention of the history of my case as a duty I owe of rendering possible service to some who may be as greatly in need of physical recuperation as I was."

From the above it would seem that even the most despondent invalids and those whose condition has been supposed to be beyond remedy, may take courage and be of good cheer. For the most ample details in regard to Compound Oxygen, reference should be made to the pamphlet issued by Drs. Starkey and Palen, 1109 and 1111 Girard Street, Philadelphia. On application by mail, this pamphlet will be sent to any address.

NEW BOOKS AND PUBLICATIONS.

THE CREATORS OF THE AGE OF STEEL. By W. T. Jeans. Charles Scribner's Sons, New York. Price, \$1.50.

This is a volume of sketches, anecdotal and somewhat historical, but well adapted to suit the popular taste, for it touches upon the most prominent points in the lives of Sir Henry Bessemer, Sir William Siemens, Sir Joseph Whitworth, Sir John Brown, Mr. S. G. Thomas, and Mr. G. J. Snelus. These are all names of men who have become known to the world since 1850, in connection with the wonderful development of the period in metallurgy, although some of them, and particularly the late Dr. Siemens, have been equally distinguished by eminently valuable researches in many other directions. The book is a particularly good one for the reading of boys engaged in any mechanical employment, its facts being such as are calculated to lighten studious labors and stimulate ambition.

BULLETIN DE LA SOCIETE INTERNATIONALE DES ELECTRICIENS, Paris: Librairie Gauthier-Villars. Price, 27 fr. per annum.

The first number of Vol. I. of this periodical contains the history of the formation of the society, its constitution and by-laws, together with a list of more than 1,200 members. As the name indicates, the society is open to all nationalities, irrespective of the occupation of the applicant; any one in any way interested in electricity may become a member. The Bulletin appears monthly, and will contain the proceedings of the society, together with contributions from men of science.

STEEL AND IRON. By William Henry Greenwood, F.C.S., Assoc. M.I.C.E., M.I.M.E. Cassell & Company, London and New York. 536 pp. Price \$2.

This is one of a series of manuals of technology edited by Prof. Ayrton, F.R.S., and R. Wormell, D.Sc., M.A. The general student and the intelligent workman will find in this volume a clear and comprehensive manual of practical information, and of the scientific principles upon which the practice rests, in the metallurgical and mechanical treatments between the iron ore and the production of the finished bar, rail, or section. The author disclaims endeavoring to compass such minute detail as would be necessary to cover all particulars of the whole range of such operations, but the vast field of practical knowledge which the title suggests has evidently been faithfully gleaned, the progress of recent years intelligently considered, and about as much well-digested information given thereon as could well be got into a treatise of such dimensions.

HISTORY OF THE UNITED STATES IN RHYME. By Robert C. Adams. D. Lothrop & Co., Boston.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from \$1 to \$5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at the office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) C. F. P. asks for an ink that will copy well in an ordinary letter press and will not gum in a stylographic pen? A. We would recommend you to use an ink made by dissolving one part of commercial nigrosin, soluble in water, in 80 parts of water, and to this add a sufficient quantity of glycerine or sugar to produce a copying ink.

(2) W. H. W. writes: You recently gave an interesting account of the manufacture of walking canes. Will you be kind enough to state in your next issue the mode of polishing, or rather the receipt for varnishing the canes? A. Use the following: gum shellac, 3 oz.; gumastic, 1 oz.; gum sandarac, 3 oz.; alcohol, 40 oz. Dissolve the last two in the alcohol, then dissolve the shellac, and pour off the clear for use.

(3) J. C. L. asks if there is any cheap way of making Prussian blue, and which is the best way? A. The following method is given in "Spens' Encyclopedia": (a) A solution of two parts of alum and one part of iron sulphate is made in water; a solution of potassium ferrocyanide is then acidulated with sulphuric acid, and some of the first solution is dropped in till the precipitate falls slowly; the latter is well washed in a filter and dried. (b) Mix a solution of ferrous sulphate with one of potassium ferricyanide; wash and dry.

(4) A. F. asks: 1. What are the ingredients, and their exact proportions, for the silvering of glass, new process? 2. How can I successfully silver small sheets of glass by that process? 3. How are glass balls and other similar articles silvered by the same process? A. 1, 2, 3. We presume reference is made to the following process, recently published by Prof. Palmieri: When into an ammoniacal solution of silver nitrate is poured, first, a little potassium hydroxide and then a few drops of glycerine, the reduction of the silver begins at once. This action is accelerated if ether or alcohol be added to the mixture. A moderate heat and darkness are said to increase the brilliancy of the precipitate, and darkness also favors the adhesion to the mirror of the deposit. 4. Is heat necessary by the more simple process of the silvering of above named objects? A. Heat produces a better result, and the operation takes place more quickly.

(5) J. McD.—Chloride of lime is made in England chiefly by the alkali or soda ash manufacturers. The chlorine gas obtained as a by-product is used to saturate the lime. In this way they are able to produce it much less expensively than would be possible in this country, where a special plant would be necessary. The manufacture of tobacco is described in SUPPLEMENT, 196.

(6) W. C. W. asks: 1. How much space does one cubic foot of air fill when under pressure of one additional atmosphere—when under two? A. One-half cubic foot; one-third cubic foot; space occupied inversely as the pressure. 2. What per cent of water is wasted when using a hydraulic ram? A. From two-thirds to eleven-twelfths of the water will be lost, according to the height the water has to be raised.

(7) G. S. G. writes: How can I prevent a water tank situated in the tower of a wind mill from freezing? I notice that some of the Western manufacturers of mills give instructions in their catalogues for frost proofing. What is their process? A. You may protect your water tank from freezing by placing a tight cover over the top with an extra siding part of the way down from the top. Lay on the cover straw, hay, or felt, anything to keep the air from circulating at the surface of the water. If the inlet and outlet pipe is at the bottom the water stratifies in cold weather, the cold water remaining at the top while the feed and discharge is constantly going on at the bottom. Hence the top freezes first. If two pipes are used, the inlet pipe should be carried to the top of the tank, which will force a mixing of the water and lessen the liability to freeze. If ice cold water is pumped, as from rivers or creeks in winter, then the whole tank must be covered in as close as a country cellar to prevent freezing.

(8) M. F. asks if there is any leather pulp made from leather waste, how it is made, and whether anything like leather would mix with it to make grinding or polishing wheels? A. The waste from tanneries and currying shops, in the shape of fleshings from the hide, and trimmings and skivings from partly tanned leather, are used to some extent in this way in the making of what is known as "leather board," a cheap rolled and pressed substitute for sole leather in the cheapest grades of boots and shoes, but the fiber when made into a pulp has no cohesive force to fit it for the purpose suggested. It makes rather a gelatinous tissue. The thick hide of the walrus is especially tanned and largely used for polishing wheels.

(9) M. L. D., Saratoga, asks for the process of making Russia leather, and where the materials can be obtained? A. Russia leather is made in this country substantially the same as any cowhide, calfskin, or sheep leather, allowing for the different way of finishing, but using birch bark tar to give the peculiar aroma. The process was long considered a trade secret, until about ten years ago, when Mr. Jewell, our Minister to St. Petersburg, and himself a tanner, looked into the business, and sent over the first lot of several barrels of birch bark tar to our largest sheepskin tanning firm. Since that time we have made a great deal of what is really only imitation Russia leather, for while it has the peculiar smell, it is very rare that any such leather is made here equal to the sterling quality of that which the Russians take so long a time and use so much care in making. The birch bark tar can probably be had of some of our importers trading with Russia, or possibly of one of the large sheepskin firms making the imitation Russia leather.

(10) N. J. H. says: Please state whether the bridge that spans the river Tay, in Scotland, has not given way since being finished, and let a train of cars into the river? A. A section of the original Tay bridge, 3,000 feet long, fell on the evening of Dec. 28, 1879, carrying down with it a train of passenger cars. A violent gale was blowing at the time. All on board the train were lost.

(11) W. B. M. asks: 1. What are the black crystals formed on the carbons of the Grenet battery, using solution of potassium bichromate? A. Chrome alum. 2. About what is the ratio of power between the Grenet and Grove cup battery? A. Measured in volts the Grove is 1,956, and the Grenet 1,095. The latter has been somewhat augmented lately by improvements in the bichromate solution. 3. Would that insulating substance known as "hard gelatinized fiber," in sheets one thirty-second inch thick, be suitable for insulating layers of secondary wire in an induction coil? A. It

would answer, but a good quality of sheet hard rubber would probably be better. 4. In a medical induction coil, the magnetic induction of the core, as I understand it, is shut off by a tube of brass, fitted to slide over the core. How is it that the vibrator, which is operated by the magnetized core, is not also stopped? A. The tube diminishes the current induced in the secondary wire, but produces no effect on the magnetic core of the coil. 5. In a small induction coil I am able to get a shock with one of the secondary poles (I do not know which) and either of the primary poles. Where is the circuit? It seems impossible that there can be a circuit through the coil, it is so thoroughly insulated. A. There may be no metallic circuit. You can get a shock from a section of the wires without touching the other. It is the discharge of static electricity accumulated at the extremities of the secondary wire.

(12) E. F. M. writes: I have in my dwelling an iron tank and iron pipes to convey water through my house. I find iron scales constantly flowing and getting in the valves and water cocks, which causes them to leak. Please suggest a remedy. A. You do not say that your tank is painted. It should have been thoroughly painted before being used. The only way now is to clean it thoroughly and free it from scale on the inside; have it well dried. Then paint the inside with red oxide of iron (Prince's metallic paint) and boiled linseed oil only; no turpentine or other mixtures. Mix so that the paint spreads easily. Let the first coat dry well before putting the second coat on. This may take several days, unless you can open the tank to the sun and air.

(13) W. C. R. asks: 1. If Portland cement will take a polish, and if impervious to water, no oil or varnish to be used in the polishing? A. The Portland cement will not take a polish without varnish or resinous filling. 2. Also, if that imitation of wood which I saw described in your paper some months ago will take a polish with water the same as stone, no oil to be applied? A. You will have to give the date or name of article in relation to imitation of wood.

(14) A. M. B. asks how the hoops of wooden pails, tubs, etc., are painted; whether they are done after putting in place or not? A. The hoops on wooden pails are painted by means of a roller charged with paint. The tubs and pails are revolved.

(15) S. P. C. asks for a simple method to prevent the reverberation of sound in a school room? A. Rough finished walls and ceiling are better than hard smooth finish. Paper hangings with dead finish or flock surface or flock figures will sometimes break the sharpness of the reverberation. Curtains hung upon the walls or windows, they can be of muslin or cheese cloth tastefully hung. Sometimes on only one side, opposite the speaker, will accomplish the purpose. In a school room large maps hung between the windows illustrating the daily teaching are both instructive and very useful as anti-reverberators. They are on sale by the school book publishers of New York and probably St. Louis.

(16) A. R. B.—Your spy glass with a level mounted above will have no means of adjustment. You must have level arranged so that you can vary its position with the axis of the spy glass. The horizontal line is necessary, and must be placed across the field in the focus of the eye glass. As you will have no means of reversing the spy glass with accuracy for ascertaining the coincidence of alignment between the level and the glass, you will have to adjust by some observed level with another instrument. You can make a fair spirit level with a small long bottle nearly filled with alcohol and corked tightly, leaving just enough air in for a bubble; fasten it in a socket with plaster of Paris. A common carpenter's level is a very good instrument for leveling, by sighting across the top for ordinary ditches and drains.

(17) J. B. C. asks whether malleable iron can be cut with a sheet iron saw, run with a great degree of speed, and what causes it—the expansion of the saw or the friction of the air? Iron can be cut without touching the saw when still. And, also, what velocity would an 8 inch saw have to be run at? A. A wrought iron saw under high speed cuts iron or steel cold by the friction of the saw. An 8 inch saw would do very little work on iron, and would have to run 3,000 turns per minute; 24 to 36 inch saws are used for such work running from 2,000 to 3,000 turns per minute.

(18) H. G. asks: What ought to be the diameter of smoke stack, also height, for 3 boilers, 52 in. in diameter and 23 ft. long, with 5 fires in each boiler four-tenths in. and one-fifteenth in. in each? A. Forty-two to 44 in. square and 68 to 70 ft. in height, if any high buildings surround the chimney, increase the height, to 80 ft.

(19) J. A. C. asks: 1. What is the best speed to run a main line machine shop shaft, so as to use pulleys with plenty of belt surface? A. About 130 revolutions per minute. 2. Also, what is the best speed to run a main line mill shaft for sawing cord wood, plank, and trees, so as to use pulleys with plenty of belt surface? A. About 200 or 250 revolutions per minute. 3. How many revolutions per minute should a 26 in. circular saw be run, also what size belt to use for sawing oak cord wood plank? A. Fifteen hundred to 1,600 revolutions per minute. We think a 5/4 in. belt would suit. 4. Also what size boiler will it take to run an engine 8 x 12 100 revolutions per minute, whether vertical or horizontal? A. A boiler with 180 ft. surface if vertical tubular or 145 ft. surface if horizontal tubular.

(20) J. H. B. asks: 1. Does the weight of a loaded wagon bear equally on the entire length of the spindles of the axles? A. Yes. 2. If the wheels of a loaded wagon with tires two inches wide be taken off and wheels with tires four inches wide substituted, will the friction or traction be increased on a hard road? A. Your question is very indefinite. If the wagon be a road engine, the traction will be increased.

(21) M. H. asks: What changes would be necessary for us to make in our furnace to use natural gas to generate steam? We have been using soft coal. Is natural gas used anywhere as fuel to generate steam? If so, how are the jets arranged under the boiler? A. There are a number of devices in use for burning gas under boilers, most of which are patented. The general principles are those of a Bunsen burner, in which a

central jet is placed in a short tube so arranged that a strong blast from the central tube will draw in through small holes the gas or air from another source and force a mixture at the point of the nozzle. In some, the center blast is air under high pressure, drawing the gas around it after the manner of an injector. In others, the gas is under a pressure, as the central blast drawing air in by suction. Again, steam from the boiler is used for the center jet, drawing both gas and air by suction. These jets are multiplied to suit the conditions and requirements of the boiler, from one to six jets being used when applied through the doors with large pressure. In some the entire grate is removed and a nest of Bunsen burners put in its place, all being united in a common feed pipe with gas under five to ten pounds pressure issuing through the center tubes.

(22) M. G. writes: We think one of our refineries is mixing glucose with sugar. We wish to know how to detect glucose in a sugar mixture? A. Cane sugar has no effect on Fehling's solution, while a liquid containing glucose will throw down a red to yellowish precipitate of copper oxide in this reagent.

(23) J. M. D. asks: How is it possible that coffee becomes burned in the making, the kernels being kept constantly in circulation by the boiling of the water? A. It is the extract of the coffee that is in contact with the overheated tin that at first becomes baked to the tin and then burns, and makes the disagreeable flavor called burned coffee. This occurs often when coffee pots are not kept perfectly clean, or coffee is allowed to stand in the pot when not in use. A scum deposits upon the bottom which easily burns when the pot is placed on a very hot fire.

(24) C. F. P. asks: Can a "cut" of type metal be cast in a mould of plaster of Paris, so as to distinctly show the hair lines when printed, and if so, please describe process? A. The ordinary stereotype process will afford a fair copy of a cut, but an electrotype is to be preferred. You can take a stereotype mould from your cut by very carefully oiling the cut and then pouring over it a thin batter of very fine plaster of Paris. When it hardens it should be removed and dried in an oven or other equally warm place. When dry it should be lowered face up in a kettle of melted type metal and allowed to remain below the metal until bubbling ceases, when it may be carefully drawn up and allowed to cool. To secure the necessary thickness of metal the mould is surrounded by a metal frame.

(25) S. H.—Tungsten or wolfram is worth 60 to 80 cents per pound in Liverpool, and is subject to 20 per cent ad valorem duty. Sells here for \$1 per pound. Used in making musket steel, the hardest steel made.

(26) H. W. asks: How is the gilt label or title on the back of a book made? Theoretically, I know how it is done—burned into the leather, etc.; but what I want to get at is—what is used in the work, and what is the process? There is no bindery in our neighborhood, so I turn to you for help. A. Gilding on leather, cloth, and other book binding material is similar to sign gilding, except that heat is applied. A size is used, the ordinary gold leaf is applied thereto, the type or engraved metal is heated and pressed against the gold leaf upon the book cover, and the gold remains in the letters or where the pressure was made. The surplus gold leaf is then brushed away.

(27) E. H. R. asks: What is the difference between coke and charcoal tin, and how are they manufactured? A. The difference is in the quality of the iron—charcoal iron making the best tin—it is tougher and easier worked. The tinning is done by dipping the sheets in melted tin.

(28) Mrs. J. L. H. asks: 1. For a recipe for making sirups to use in medicines, as sirup of rhubarb? A. Sirup of rhubarb may be prepared by macerating 6 ounces bruised rhubarb in 4 ounces dilute alcohol; press and filter, and evaporate to 2 pints. Mix 10 fluid ounces of this tincture with 28 fluid ounces simple sirup. For further details consult the U. S. Dispensatory. 2. Would like information of silk culture from cocoons? A. Some information on this subject is given on page 1707, of SCIENTIFIC AMERICAN SUPPLEMENT, 107, and further in great detail in SCIENTIFIC AMERICAN SUPPLEMENTS, 174 and 175.

(29) J. M. O'M. writes: I have a very valuable meerschaum pipe which I have failed to color by smoking; please let me know through the medium of your valuable paper of an artificial or other way to color it. A. Ordinarily the pipe is boiled for coloring in a preparation of wax which is absorbed, and a thin coating of wax is held on the surface of the pipe, and made to take a high polish. Under the wax is retained the oil of tobacco, which is absorbed by the pipe, and its hue grows darker in proportion to the tobacco used. A meerschaum pipe at first should be smoked very slowly, and before a second bowlful is lighted the pipe should cool off. This is to keep the wax as far upon the bowl as possible, and rapid smoking will overheat, driving the wax off and leaving the pipe dry and raw. A new pipe should never be smoked out doors in extremely cold weather.

(30) W. T. B. asks: Where is the largest steam engine in existence? A. We think it is the Pilgrim's engine, 110 in. cylinder, 14 ft. stroke, the largest, single cylinder engine; but the double engines of the large Atlantic steamers have more power.

(31) J. A. H. asks: Can you inform me of a method of marking a steel tape with acids so that the figure so marked will show bright against the dark steel? A. Melt ordinary beeswax and tallow equal parts, or better beeswax 2 parts and Venice turpentine 1 part, and coat the steel with it where you wish the letters to appear, using it as a paint with a camel's hair brush to form the letters. Immerse the steel in a bath of sulphuric acid 1 part, nitric acid 1 part, water 2 parts by measure, for ten minutes or even less. The progress may be noted by taking from the bath and immersing in clear water.

(32) N. S. H. asks: 1. For the composition used for impression paper? A. Impression paper is prepared by mixing lamplack with cold lard to the consistency of thick cream, and applied to the paper with a rag. Then take a flannel rag and rub until all the color ceases coming off. 2. The receipt for the composition that is put on illuminating watch boxes? A.

For the preparation of a luminous paint see SCIENTIFIC AMERICAN SUPPLEMENT, No. 249. 3. Also a receipt for making liquid glue? A. See back numbers of SCIENTIFIC AMERICAN.

(33) M. N. W.—The method of making cast iron malleable is briefly as follows: "White" or brittle iron is used for the castings. When the castings are cleaned from the moulding sand, they are packed in cast iron boxes with sides and bottoms three-quarters of an inch thick, with powdered sal ammoniac and forge scales, put in an oven, and kept at a red heat from six to eight days, according to the size of the castings. They must cool gradually.

(34) E. A. J. asks: If corn meal will cause a locomotive boiler to foam? A. If put in in any quantity it will cause foaming for a time, but gradually wear off.

(35) C. E. McC. asks for a receipt for painting or staining a checker board on marble top table. Something that will not spread or wash out. A. In staining marble it is necessary to heat it hot, but not so hot as to injure it, the proper heat being that at which the colors nearly boil. Blue is produced with an alkaline indigo dye. Red by dragon's blood in alcohol. Yellow by gamboge in alcohol. Gold color with (sal ammoniac) ammonium chloride, zinc sulphate, and verdigris, equal parts. Green, sappreen in alcoholic potassium hydroxide. Brown, tincture of logwood. Crimson by a solution of alkanet root in turpentine. Black spots may be produced with silver nitrate. As a general rule, however, we believe these tables are made by inlaying rather than by staining.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

R. C. P.—The specimen is ordinary clay. It would have no value in New York on account of the iron it contains, but you might find some local demand for it. —D. M. D.—No. 1 consists of decomposed or oxidized sulphides of iron; the taste is due to the sulphur. No. 2 is an iron ore consisting of oxides and sulphides. No. 3 is the magnetic oxide of iron, or magnetite. No. 4 is a sample of clay too gritty for polishing purposes.—M. S.—It is impossible to form any opinion in regard to No. 1 unless it is chemically examined, the expense of which would be \$5.00. No. 2 is a decomposed shale rock of no use or value.

INDEX OF INVENTIONS For which Letters Patent of the United States were Granted February 26, 1884, AND EACH BEARING THAT DATE.

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

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