ENGINEERING INVENTIONS.

A revolving cylinder engine has been patented by Mr. John J. Blair, of Tacoma, Wash. Ter. The piston remains stationary and the cylinder revolves, the steam being admitted into meniscus-shaped spaces between the inner surface of the cylinder opening and the outer surface of the piston only during one-quarter of a revolution, working under expansion during another quarter.

An automatic electric shut off for water and gas pipes has been patented by Mr. Thomas P. Hughes, of Denver, Colo. It has a spring held lever, a connecting lever, and a drop rod interposed between a stop cock in the pipe and the armature of a magnet having an electric thermometer in its battery circuit, so a certain fall of temperature will break the circuit and release the rod, allowing it to close the stop cock and shut off the water or gas.

AGRICULTURAL INVENTIONS.

A potato digger has been patented by Mr. Lyman Norton, of Hartford, N. Y. It has a beam with a pair of curved standards connected at their lower ends by a plate forming a seat for the scoop, having also a curved separating rod and a shoe with hinged flexible arms, whereby the potatoes are separated from the soil as they pass together from the rear edge of the scoop.

MISCELLANEOUS INVENTIONS.

An artist's box has been patented by Mr. George Stirrup, of Brooklyn, N. Y. This invention provides for certain improvements in the construction, arrangement, and combination of parts in boxes which artists use for carrying color tubes, brushes, water, etc.

A hame fastener has been patented by Mr. George W. Greene, of Abington, Ind. It consists, in combination with a stirrup for receiving the hame strap, of a locking lever for tightening and fastening the hame; it is light and strong, easily operated, and inexpensive.

A printing press has been patented by Mr. Theophilus Reichard, of New York city. This invention covers a novel construction and motion in operating the actuating shaft and controlling the motion of the platen in small printing presses to be operated by steam power or treadle.

A thill coupling has been patented by Mr. George E. Smith, of Newark, Ohio. It is a pole and shaft shackle, which may be readily connected or disconnected to admit of the change from pole to shaft or the reverse, all rattling being prevented, and no rubber or leather filling being necessary.

A drip cup and binder for paint brushes has been patented by Mr. John T. Sutton, of Urbana, Ill. An elastic binder fits close around the base of the handle and the head of the brush, where there is a drip cup and rigidly attached sleeve, to prevent the paint from getting between the sleeve and handle.

A derrick has been patented by Mr. Chas. F. Ruff, of Phœnixville, Pa. The invention consists principally in providing the derrick with adjustable braces for laterally bracing it, to prevent the derrick from tipping sidewise in either direction, and is alike applicable to hand and power derricks.

A bale tie has been patented by Messrs. Owen P. Brown and William S. Deidrich, of Smithville, Ga. This invention covers a strip with a loop at each end and a hook pivoted at one end, the hook having on its free end a lug, prong, or projection for locking it in place, so the tie can be opened or closed easily and rapidly.

A toy money safe has been patented by Mr. Edward T. Gibson, of Minneapolis, Minn. It has separate chambers for coins of different value, and is intended to cause any coin inserted to deposit itself in the proper chamber, besides enabling a person to ascertain how much money the safe contains without disturbing it.

A leather working machine has been patented by Mr. John A. Panton, of Quincy, Mass. The object of this invention is to make more convenient the setting and adjustment of such machines as the Fitzhenry and the Holmes, the construction doing away with the counting of threads heretofore necessary in adjusting the parts.

A furnace has been patented by Mr. Thos. C. Zetzsche, of Okawville, Ill. In combination with a cylindrical casing, lugs are made to project from the inner surface to support the grate, and the ash pan is suspended by rods from the lugs, making a furnace for heating kettles, caldrons, etc., which is simple in construction and saves fuel.

A saddle and bridle for breaking horses has been patented by Mr. Hugh O. V. Kelly, of Virginia City, Montana Ter. The saddle and bridle are strapped together in such a manner as to form a bitting and breaking rig for horses and colts, to prevent them from kicking, bucking, and throwing themselves or their rider.

A circular saw mill has been patented by Mr. John H. Jones, of Dardanelle, Ark. The invention covers a stationary frame with saw arbor and pulley, and a sliding adjustable frame with saw arbor and pulley, with vertical standards between, and adjustable tension rollers for the belt, with various novel features in construction and arrangement.

A return registering envelope has been patented by Mr. Jacob M. Crull, of Harrisburg, Pa. It has peculiarly formed flaps, and a fixed pin on which a washer, key, and addressing tags may be fastened, making an envelope more especially intended for use by express companies, and in the postal service for registered letters and packages.

A saw horse has been patented by Mr. Richard Wylie, of Napa City, Cal. It is constructed of two pairs of crossed legs united by a suitable bolt, the legs each being formed of two leg bars with recesses in their inner surfaces, a third leg bar being held between the recessed bars, making a very stiff and rigid horse, which can be quickly erected or folded.

NEW BOOKS AND PUBLICATIONS.

ELECTRICITY; ITS THEORY, SOURCES, AND APPLICATIONS. By John T. Sprague. [Second edition.] E. & F. N. Spon, New York and London.

HANDBOOK OF ELECTRICAL TESTING. By H. R. Kempe. E. & F. N. Spon, New York and London.

THE PARIS ELECTRICAL EXHIBITION OF 1881. Report of Major D. P. Heap, U. S. A. D. Van Nostrand, New York.

Mr. Sprague is a member of the English Society of Telegraph Engineers and Electricians, and has here given the public an eminently practical work. Of the first edition 2,000 copies were sold, and the volume is now greatly enlarged. The book deals with the principles of the study of electricity, rather than making a historical record of facts, the instruments necessary for the understanding of the subject being so far explained that those who have some mechanical aptitude may construct for themselves a great variety of practical apparatus. The thousands of individuals who are now making experiments for themselves in this most interesting field may here find valuable aid—The handbook of Mr. Kempe, which now reaches its third edition, is for the more advanced student, or the experimentalist who is ready to attempt the more difficult problems in electrical engineering. It describes all the most approved methods of measurement of electrical force, with the apparatus required, cable testing and how faults are localized, specifications for cable manufacture, and system of testing during the manufacture. A diligent perusal of these two books will make the investigator acquainted with most that has been done in the development of electrical science up to date.—The report of Major Heap appears simultaneously with its issue from the government printing office, and apparently from the same plates. It evinces the care and comprehensiveness of scope which have characterized so many former publications from the department of engineers of the United States Army, and forms a valuable part of the record of the world's progress in the branch to which it relates.

ART YEAR BOOK. John Mason Little, Boston, Mass. Price $4.

This volume is an outgrowth of the illustrated catalogue of the Fine Arts Department of the New England Institute, which in 1883 reached its highest attainment, appearing as a magnificent volume of about seventeen full page etchings, besides a number of albertypes and photographs, all executed in the highest state of the several arts employed in its embellishment. A great number of our cleverest American artists have been engaged on the Art Year Book for 1884, the illustrations of which are taken from subjects exhibited at the last art exhibition of the Institute, Boston. To Mr. Arthur B. Turnure, of the Art Age Press, was intrusted the arranging of the cuts and the printing and binding of the volume, and he has in this succeeded in producing the choicest effect both in arrangement of the engravings and in the binding, the covers being of white parchment bond paper, on which is printed in colors a Japanese design by Mr. Turnure, which adds much to the beauty of the binding.

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 as early as Thursday morning to appear in next issue.

Notes & Queries

HINTS TO CORRESPONDENTS.

Name and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or mail, each must take his turn.

Special Information requests on matters of personal rather than general interest, and requests for **Prompt Answers by Letter**, should be accompanied with remittance of $1 to $5, according to the subject, as we cannot be expected to perform such service without remuneration.

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

Minerals sent for examination should be distinctly marked or labeled.

(1) H. A. S.—Use the solid paraffine for preserving eggs.

(2) C. F. B. asks: Will rubber be affected by direct contact with hot steam? If so, in what way and how soon? A. It becomes hard and inelastic in a few weeks.

(3) H. B. asks for a formula for making ink suitable to print on tin with a rubber stamp. A. Use printer's ink.

(4) S. H.—The gold fish (*Cyprinus auratus*) is a native of China, said to have been introduced into Europe in 1691, thence to the United States.

(5) J. M. S. writes: In a room for public purposes, 43 feet by 54 feet 6 inches inside measure, the ceiling highest in the middle, but not arched, what would be the acoustic properties when the distance between the floor and highest point of ceiling is 27 feet? A. In parts of the room there will probably be considerable reverberation. The general acoustic properties will depend much upon the location of the speaker, the angles of the ceiling, and continuity of sides or position of rostrum.

(6) J. G. E. asks: How are copper tubes bent, say 1¼ inch tube in a 5 inch curve? A. Bend after annealing and filling with resin, around a grooved former, then melt the resin out. 2. What is the gauge of copper tubing to stand 120 pounds pressure on the inside with steam? A. Three thirty-seconds of an inch thick.

(7) R. H. C. asks where to get small steel balls, such as are used in the hose carriage wheels. The balls are about three-eighths of an inch in diameter. A. These balls are not on sale. You will have to get them made by a machinist.

(8) A. J. M. asks: To what height will a siphon draw water? When the supply end reaches 33 feet, balancing atmospheric pressure, does not the siphon cease to operate? A. Yes.

(9) H. B. G.—You can make plastic metal, or what are called amalgams, by treating precipitated copper with mercury—2 of copper, 3 of mercury, by weight. You can use the fusible alloy of 1 part each of tin and lead to 2 parts bismuth by weight for casting on gelatine plate. It melts in boiling water. Buy celluloid from the Celluloid Manufacturing Company, Newark, N. J.

(10) H. L. C. asks: 1. Where can the mercury flasks used for constructing boiler shown in SUPPLEMENT, No. 182, be procured? A. Of persons using mercury for silvering looking glasses or other purposes; sometimes of the junk dealers. The flasks are almost all made in Pennsylvania, and cost, new, to the miners, $1.15 each, second hand ones selling for 80 to 90 cents each. 2. What pressure will they stand? A. They are considered good for a thousand pounds pressure; they are half an inch thick at the top, three-eighths inch at the bottom, and three-sixteenths inch at the sides of the shell.

(11) J. S. H. asks how much coal a steamer burns per day in crossing the ocean, how many days it takes to cross, also the amount of tonnage. A. The first class steamer America burnt about 200 tons a day; the Oregon nearly 350 tons a day; the quickest passages of both have been under six days and a half; the tonnage of the America is 5,528, and that of the Oregon 7,375.

(12) F. A. W. writes: Some time since I read in your Notes and Queries advice to add glycerine to some mixture as a preventive, or partial preventive, against freezing. May I ask how much should be added to say one gallon of water or other fluid to accomplish this object? A. One per cent by measure for each degree of cold below 32°.

(13) J. W. L. asks (1) the dimensions necessary in a balloon to lift 500 pounds, said balloon to be of a conical shape. A. Diameter 26 feet, for hydrogen gas. 2. The difference in the lifting powers of gas and hot air? A. Hot air has very little buoyancy, probably one-fifth as much as hydrogen gas.

(14) S. G. writes: Have trouble with stationary engine—running hot, gumming, etc.; have tried every imaginable way, but have failed. A. You are probably using bad oil. Use the best lard oil or a heavy petroleum oil made for engines.

(15) H. L. asks how many square inches there are in 3 inch safety valve. A. If the opening is exactly 3 inches, the area is 7·0686 square inches.

(16) G. L. T. asks: Which is the best floor for roller skating rink—a cement or hard kiln—dried floor? Which wears out the rollers the quickest? A. The hard wood floor. Cement floor disintegrates and becomes dusty, and then is destructive to the rollers also.

(17) W. S. W. asks: 1. How fast does heat travel? A. It depends entirely on the conductor. 2. Can heat be brought to a focus by passing through a lens? A. Yes.

(18) N. K. writes: If you were to put a 2 inch pipe in a 40 foot well, and put a pump on top of the ground, with the valve 40 feet from the water, would the pump work? If not, how high will the water come up in the pipe? A. Twenty-eight to thirty-three feet is the greatest lift for an ordinary pump.

(19) F. I. P. asks the ingredients of the brown powder used by cigar makers to produce the Madura color on cigars? It is soluble in water or spirits, and is of a mahogany color. A. A solution of an aniline color known as acid brown is the article used. It can be procured of dealers in dyestuffs.

(20) J. I. C. asks what should be the dimensions of valves, ports, and bridges of an engine 2x4 inches, to run 250 revolutions per minute, also size of pipes and what power should it develop; how large a cooler should be needed, and how large and heavy a fly wheel should be needed, and throw of eccentric, etc.? A. The steam openings should be ¼ inch by 1¼ inches, exhaust ½ inch by 1¼ inches, bridge ⅜ inch. Steam pipe ¾ inch, and exhaust 1 inch. Boiler should be 20 inches to 24 inches diameter and 36 inches high, tubular, and have 35 to 40 feet fire surface. Throw of eccentric would depend upon the lap of the valve and mode of connection; if direct, about seven-sixteenths inch. Fly wheel about 18 inches diameter and rim 2½ inches diameter.

(21) W. E. asks for a recipe to soften horse and cow hair. A. Use a solution consisting of 1 ounce glycerine, 20 grains potassium carbonate, 1 salts of tartar to the pint of water.

(22) G. L. F. writes: 1. I want to transmit power by wire rope about 175 yards; can I do it successfully? A. Yes, by making two ropes run over a double carrier wheel in the center. 2. In tarring or pitching felt roof, what can I use to make it set good and hard, so it will not run in hot weather? A. Boil the tar to thicken it, and use all the sand that it will take when spread.

(23) F. D. B. asks: In regard to the manufacture of "potato flour or farina," what it is worth per ton, and what quantity of potatoes is required to make a ton of flour. A. The manufacture of potato flour is described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 313, under the title of "Potatoes and their Utilization." Cuts illustrating the articles used in the preparation are there given. Its value in New York is 4¼ to 4⅜ cents per pound.

(24) S. B. B. writes: I have a solution of nitrate of soda which has been made in an iron kettle with a copper worm to heat it. If the solution is allowed to crystallize, the crystals turn blue. I have the same result with a copper worm and lead kettle. I suppose it to be the result of chemical action of the metals. Can you inform me what I can do to cause the copper or lead in the solution to deposit or drop, or to take the color out? A. The blue coloration is probably due to the copper. The latter can be more or less completely removed by being precipitated with iron.

(25) T. C.—Shellac or French spirit varnish with a small quantity of fine lamp black added to it forms a brilliant black varnish, which might answer your purpose.

(26) W. S. B. asks by the use of what acids or tools he can cut a round or oblong hole in a piece of window glass which is about one-sixteenth inch thick. A. Use a copper tube charged with emery and water and revolved in a lathe or hand drill.

(27) C. Y. M. asks whether a long coupled wagon pulls easier or harder than a short coupled, or whether it is the same; and if one pulls easier than the other, why? A. The long coupled wagon will draw the easier, because the horses will have a greater leverage over a twisting strain, caused by an obstruction on one side of the road.

(28) W. G. R. asks how to prepare thin paper that, by writing on it with a pointed stick while lying on white cloth, the writing will be transferred to the cloth. Would like to have it stand washing. A. We do not know of an indelible transfer paper.

(29) H. G. M. asks the formula of a composition used in soldering to make solder stick. A. Dissolve zinc in muriatic acid until effervescence ceases; dilute it with a quantity of water equal to that of the acid.

(30) J. S. writes: I make an axle grease which I put up in cans. The trade calls for goods put up in wooden boxes. I placed some of my grease in such a receptacle, but cannot prevent the oils penetrating the wood. How can I treat the boxes in order to avoid that? A. Coat the inside of your boxes liberally with glue size.

(31) A. C. H. asks: What are the ingredients of gold solutions that deposit a red color on metal to be plated? I use the Smee battery; has that any effect on the coloring or gilding in this case, or what battery is best to use? A. A Smee's battery is as good as any for the purpose. For information on electro-metallurgy, consult SUPPLEMENT, No. 310.

(32) C. L. W. writes: Our house is alive with fleas from a pet cat. We have tried Persian insect powder without much effect; can you tell me of anything better for the purpose? A. The oil of pennyroyal will drive your fleas away. Beds made of pennyroyal for dogs to lie on will also drive away fleas.

(33) G. W. S. asks a receipt of some liquid or oil to place in gravity batteries that will keep them from evaporating and using up so quick? A. Any non-drying oil will do; try common lard oil.

(34) G. S. T. writes: I have an eighty barrel water tank on barn; the bottom of tank is 24 feet above the ground. A windmill supplies the tank automatically. My carpenter's shop floor is 26 feet below low water mark in tank and about 6 rods in a lateral direction; with a two inch pipe connecting tank to a suitable turbine at the shop, what amount of power ought to be developed, and in what time 80 barrels be run out, when turbine is at full work? A. The discharge of the 80 barrels of water will develop ¼ horse power for an hour, or ⅛ horse power for 2 hours. You will not realize more than 60 to 70 per cent of this power through a motor.

(35) Engineer writes: I have some celluloid billiard balls that have become faded. I wish to recolor them. What shall I use? A. Use the following colors in the proportion of about 10 grains to the gallon of water: Black, use nigrosine; for violet, methyl violet; blue, soluble blue; red, aniline red or magenta; green, malachite green. Dissolve these aniline colors in hot water. The balls are immersed in the hot water, and then allowed to cool in the coloring solutions until sufficiently dyed. Perhaps three to four hours.

(36) J. P. B. writes: Please give me a recipe for making the following inks, aniline preferred: green, blue, burnt sienna, yellow and purple. A. Green: Dissolve 1 part of iodine green in 100 to 110 parts of hot water. This ink writes a brilliant bluish green; if it is desired to give it a yellowish green tint, a little picric acid is to be added. Blue: Dissolve 1 part of the soluble bleu de nuit (bleu de Paris) in 200 to 250 parts of hot water. Yellow: Dissolve 1 part of picric acid in 120 to 140 parts of water. Purple: Dissolve methyl violet in sufficient water. For brown ink select a suitable aniline color that is soluble in water, and add a small quantity of alcohol and a little glycerine (1 to 4 per cent). The addition of these two ingredients is desirable in any case.

(37) E. S. writes: We have lately had our cistern cleaned. The water seemed perfectly clear and pure, without taste or odor; but as it had gotten quite low, and as the cistern had not been cleaned for several years, we thought it best to have it emptied and thoroughly cleaned. Since then, the water has had a very bad taste and smell, which we can notice even after it has been through the filter. Can you tell me why this is so? A. In cleaning your cistern you may have exposed the clean cement to the action of the water, which may have given it the taste of lime or alumina. As you do not tell us how it tastes or smells, we cannot well solve the mystery. The soot that was found in the cistern was no doubt derived from the smoke of soft coal, which deposits carbonaceous matter with a little pyroligneous acid upon the roofs where bituminous coal is used. This is washed into the cistern and becomes a deodorizer and disinfectant, finally settling as the black soot mentioned. If the water tastes and smells of lime or alumina, it is all right. If of decayed animal matter, it is all wrong.

(38) A. & F. B. ask if there is such coke manufactured in any part of the States as is used for fuel in English locomotives, and where. A. The coke made at Connellsville, Pa., is considered the best made in the United States, and nearly equal to the best English coke. You will find the names of makers in any commercial agency reference book.

(39) J. W. K.—There is no special examination required for entering the classes at Cooper Union. You must be 15 years of age. Appear in person, with a letter of recommendation if possible from employer. By calling at the office in second story of the institute you may obtain a circular containing all needed information.

(40) S. L. W. writes: Will a Breguet upright galvanometer, such as is sold for $10, do for experimental work in electric measurement, and also asks how to construct a cheap rheostat to use with the same. As I am studying electricity out of school hours, I do not wish an expensive instrument for the present. I principally wish to measure the resistance of batteries, electro-magnets, and short stretches of outside wires, principally on a private telegraph line. A. The galvanometer referred to will answer a good purpose; but one provided with a horizontal needle would be more serviceable, as it would be more sensitive. You cannot readily construct a cheap rheostat without having a standard rheostat with which to compare it. An imperfect instrument of this kind is of no value whatever.

(41) J. S. H. asks: Can you inform me what causes the ivory on piano keys to turn yellow? Some I have recently seen change in a few months from a pure white. Others, many years in use, still retain their original whiteness. Please explain the cause, and suggest a remedy or preventive. A. The yellow color of the piano keys may be due to grease absorbed from the fingers of the player, or it may be that the piano sits in a dark place or is generally closed. Under these circumstances ivory is apt to turn yellow. There are also many kinds of ivory, and the inferior qualities do not retain their whiteness without precautions. Good ivory keys having a liberal exposure to the light ought to retain their whiteness for many years. Ivory is bleached by exposure to sunlight for periods varying from four weeks to six months, or by immersion in turpentine, kept near the surface, and exposure to the sun for three or four days.

(42) L. P. A.—We have frequently published articles on microscopy and upon all the modern investigations in this branch of science. It is possible that we may in the future publish elementary articles on the subject.

(43) S. E. K. F. writes: I have constructed a small pressure blower as described on page 75 of vol. xxxix., SCIENTIFIC AMERICAN, and get a fair blast through a ¾ inch tube, but I cannot contract it so as to serve as a blowpipe, as I desire. Please give directions as to construction of pipe from the fan to the bench, say four feet. A. We do not think you will find it possible to so change your blower with any form of pipe as to make a blow pipe with much, if any, additional force.

(44) W. C. M. asks how to refine whale oil soap, so that it will produce a white lather. A. You will be obliged to first refine the whale oil. Whale oil soap is usually made from the sediment produced in refining the whale oil. 2. What is "English crown soap?" A. English crown soap is an imported soft soap used by harness makers and the like for rubbing and polishing leather. 3. Also soap stock. A. Soap stock is the residuum from cotton seed oil and from olive oil.

(45) J. H. G. writes: 1. How much of 100 per cent of bitartrate of potash or cream of tartar can be dissolved in one gallon of boiling water? A. Cream of tartar is soluble in 18 to 14 parts of boiling water. 2. Cream of tartar manufacturers utilize all their waste products, by converting them into tartaric acid. Can I use any other test besides litmus paper, for absolutely determining if sufficient lime carbonate has been used, to perfectly precipitate the first equivalent, and secondly, what is a good test for determining if all the tartaric acid has been freed from the potash in using the sulphate of lime? A. To determine the acidity by other means than with litmus is possible. You can add a little cochineal solution to a portion of the mixture, and then pour in potassium hydroxide (caustic potash) until the coloring disappears. This reaction will show you approximately how much lime carbonate to add. 3. Would hydrate of lime added to very weak solutions of bitartrate of potash take the place of lime carbonate for freeing the first equivalent? A. The use of hydrate of lime would not be as effective as the carbonate. The tartaric acid decomposes the lime carbonate, and we do not think such a reaction would follow if the hydrate was used. 4. Can the sulphur be freed from the potassium sulphate? If so, how? A. Barium chloride will precipitate the sulphur from potassium sulphate, forming barium sulphate and potassium chloride. 5. What work in chemistry, published, can I get, that will thoroughly post me in this particular industry? A. There is no literature available on baking powders other than articles found here and there in the SCIENTIFIC AMERICAN and other similar journals. Blyth's book on Foods may contain some information suited to your wants.

(46) F. G. H. asks if there is any foundation in fact for the prevailing belief that tomatoes cause cancer. And if so, why? Or, rather, how do they operate—by poisoning the blood, or otherwise? A. The belief, which has become quite common, that tomatoes cause cancer is utterly without foundation. There is not the slightest ground for fear in using freely what is really one of our most valuable vegetables. At the same time, they ought to be used like everything else, with proper moderation. Even a good thing may be abused, and a person may become so extremely fond of tomatoes as to consume an excessive quantity, and thereby derange the functions of the stomach. The acid nature of the fruit would, in such a case, perhaps, cause canker sores in the mouth. But it must be understood that there is no resemblance between cancer and canker, except the similarity of spelling. Cancer is a malignant, frightfully dangerous disease; canker is merely a result of disturbance of the stomach, and is commonly of small importance except from the pain and annoyance it causes. But even for this the tomatoes are not fairly responsible, for though, as stated, it may sometimes follow their very free use, yet with most persons no such result would occur. 2. Have you ever set forth the wonderful power of red clover in curing cancer, a fact indisputable, if taken before death is inevitable? A. The belief in the efficacy of red clover is not very common; it is local, and has no better claim than that concerning tomatoes. Very frequently harmless tumors are considered to be cancers; in such cases the various popular remedies—red clover (*Trifolium pratense*, cancer root (*Conopholis Americana*), etc., are used, and when the tumor disappears, as of course it presently does, a "cancer cure" is falsely reported, and a reputation for a perfectly inert remedy is established.

(47) W. G. S. writes: I wish to make a telescope as described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 252, and would thank you to explain the following: 1. Diameter of object glass as given is 2½ inches and external diameter of tube 3 inches; drawing shows both of same diameter; which is right? A. The internal diameter of the telescope tube should be larger than the clear aperture of the object glass. 2. How thick should paper tube be? A. The thickness of the tube is of no consequence. 3. Please give diameter of field and eye lenses. A. The diameters of the field and eye lenses are unimportant if they are of the correct focal length. 4. Paper reads eye aperture should be 1¼ inches; should it not be ¼ inch? A. The aperture should be ¼ inch. 5. What combination of lenses would you recommend for higher and lower power eye pieces than that described? A. It is only necessary to preserve the same relation between the focal lengths of the field and eye lenses for higher and lower powers. 6. What gauge of wire is used for gas lighting spark coils? A. Almost any size of wire will answer for this purpose; No. 24 is often used. 7. What should be size of coil? A. The coil may be 6 inches long, 2 inches in diameter for three or four burners. 8. How many Leclanche cells will be required to light a single burner? A. From two to four cells.

(48) W. F. D. asks (1) proportions and ingredients for blue prints. A. Dissolve 40 grains ammonia citrate of iron in 1 ounce distilled water. Also dissolve 1 drachm potassium ferrocyanide in 1 ounce distilled water. The foregoing solutions are prepared separately and kept from the light. 2. Chemical reaction in making making blue prints? A. The ferric compound (ammonia citrate of iron) is by the action of the light reduced to the ferrous condition, which with potassium ferrocyanide produces an intense blue coloration similar to Prussian blue. 3. Chemical action of bicarbonate of soda in bringing out white lines on blue prints? A. The soda bicarbonate turns the picture to a lavendar color, and prevents its fading. A dilute solution of acid (citric or hydrochloric) will produce the effect described by you, as it dissolves out the superfluous blue and so brings out the white lines.

(49) W. H. P. asks how alumina soap is made, and also where I can find a description of the hot air engine. A. There is a soap now manufactured in this country, in which caustic soda is replaced by the aluminate of soda. The latter can be prepared either from bauxite or from cryolite. Bauxite is calcined with soda ash, whereby an aluminate of soda is formed, and the iron is separated by lixiviation, the resulting liquors being evaporated until a dry commercial aluminate of soda is obtained. Powdered cryolite is mixed with six equivalents of lime and boiled with water, when an insoluble fluoride of calcium is formed, and the alumina becomes dissolved in the excess of caustic soda. If an excess of lime is used, the alumina will be precipitated, leaving the caustic soda alone in the solution. For making soap from aluminate of soda about equal parts of lard and tallow are preferred, and these should not be heated to a greater extent than is just necessary to liquefy them. The materials are not boiled in the usual way, but the combination is effected at the lowest temperature at which they can be intimately mixed. Hot air engines are described in the SCIENTIFIC AMERICAN SUPPLEMENTS Nos. 162, 247, 284, and 368.

(50) C. W. H. asks: Which is the best method of drying fish scrap after leaving a hydraulic press, whether by some machine or by a kiln? A. When steam is used for boiling and pressing, there will be economy in employing the waste steam, as well also as direct steam in coils of iron pipe in a drying room. Another plan is to make flues in brickwork under the floor of the drying room, making the floor itself of large tile laid over the flues, and carry the hot gases from the boiler furnace through these flues to the chimney, or, if not convenient, use a separate fire for the drying room flues. The slabs of scrap may be laid upon shelves. The coils of iron pipe may be made by any pipe fitting establishment.

(51) W. J. D. asks: Who was the builder of the first locomotive, and where first used? A. Cugnot, a Frenchman, made a small locomotive in 1769, which is still preserved in the Museum of Artsand Metiers, Paris. Watt took out patents from 1769 to 1784, on steam carriages or wagons, but not known to have made any. Symington made a model of a steam carriage in Edinburgh, in 1770. William Murdock built and actualed a locomotive in 1784, in Cornwall England. Oliver Evans, of Philadelphia, obtained patents in Maryland, U. S., in 1787, for the exclusive right to operate steam wagons on roads and railways. In 1803, a Mr. Fredericks built a locomotive for a mine in Hanover, Germany. Trevithick's first locomotive was running in 1802, and is considered the first effective effort on rails. Blenkinsop's locomotive, 1811. Hedley's locomotive, 1813, the "Puffing Billy." Dodds and Stephenson commenced their improvements in 1815.

(52) W. J. D. asks: 1. What is the best and most powerful battery for electro magnet? A. The plunging bichromate battery is the best for this purpose. 2. About how large should an electro magnet be, and how much wire in the coils, and what size, to lift a weight of 1,000 pounds, or as much as it will lift conveniently, at a distance of from 1 to 3 inches? A. An axial magnet would be better for your purpose than the ordinary form of electro magnet. The size of the helix and of the wire of which it is made will depend upon the kind of battery used and the manner in which it is connected up. It would be more or less a matter of experiment to determine the size of coil required to lift 1,000 pounds from 1 to 3 inches. 3. How is an electric reservoir made, and about how long would the electricity last in a reservoir 8 feet long, 4 feet high and 4 feet wide—8x4x4 feet—to lift the aforementioned weight at every second interval by disconnection of the wires? A. For information on storage batteries, consult SUPPLEMENT, Nos. 304, 332, 370, 215, and 354.

(53) J. H. K. asks (1) whether there is any metal or composition ("Delta" metal for instance) that will not rust or corrode when frequently used in water, and hard enough to bear as much friction (or more) as is required of ends of a sewing machine bobbin. Would bone, or zinc, or celluloid, or two of either do? A. Try phosphor-bronze. 2. Let me know also what is the best and cheapest battery to use to work on a line 40 to 100 yards long; and if a battery that is strong enough to work one telegraph instrument on a line like the above, how many more cells would be needed to work six or a dozen instruments on the same length of line? I would want the power of the magnets to be as strong if I had on a dozen as if only one or two, but do not know whether their power depends on the length of the line or on the number or strength of the cells of the batteries. What book or books would best teach me all these things? A. The power of the current on the line depends on the number of cells of battery employed; the gravity battery is probably best for your purpose. For full information on telegraph lines, instruments, and batteries, consult Prescott's Electricity and Electric Telegraph.

(54) S. A. H. writes: In your paper August 10, in No. 4 of Notes and Queries, you state that a carbureter for gas machine to supply 8 five foot burners should have 12 feet evaporating surface. I use Sisal hemp in my carbureting tank, the air passing over the fibers of the hemp, which have become saturated with gasoline; I therefore cannot tell what amount of surface I have. I use an iron tank 2 feet diameter and 2 feet high, fill it with hemp, and keep about 3 inches depth of gasoline on bottom; the air is introduced through a pipe, the end of which is under the surface of the gasoline; this is to supply five 6 foot burners; have carbureter in a cellar the temperature in which is sometimes as low as 32; use 88 gasoline. When weather is cold the gas is poor, making blue light. Is this the best way of making a carbureter? If not, will you please give directions for construction of a good one? A. Your carbureter is probably too small for cold weather. The iron tank in so compact a form absorbs heat from the surrounding air very slowly. Making it long and narrow is advantageous, or use two round ones. Any means that you can use for warming the air used in making the gas by taking it from the cellar will materially help the process. Some use hot water in a pan under the carbureter in winter. There are a great many patents on carbureters; you could not do better than to make them a study. Copies will cost 25 cents each. 2 Is chrome steel much better for lathe tools, etc., than the ordinary cast steel? Does it require different treatment, in forging and tempering, from cast steel? A. Chrome steel is good, but we do not know that it is any better than the best tool steel. The treatment in forging and tempering is the same as for tool steel.

(55) H. W. M. writes: 1. I would like to learn to read faces easily. Would you please inform me in Notes and Queries of a good work on physiognomy? A. To read faces easily is in a great degree a matter of personal faculty not easily learned. There is an excellent book called the "New Physiognomy," also one on "Comparative Physiognomy." 2. How are rings (finger) made? A. Finger rings are cast in moulds if heavy, or rolled out in bars, cut off the proper length, the ends hammered or rolled down to the proper size and bent into a ring around a mandrel; the ends are then cut and fitted for the desired size of ring and soldered together, then the rings are filed up and polished.

(56) C. P. K. writes that during the operation of a steam fire engine near his house, an iron leader shook very hard, so much so he was afraid it would break, seeming to shake in unison with piston rod of the engine. A. Probably the motion of the piston of the fire engine became synchronous with the vibrating properties of the leader, which induces vibration. This is a well known phenomenon in connection with bridges, which are often thrown into a severe vibration by a synchronous step or even the trot of a dog. 2. In your issue of July 12, you speak of the Payne process for preserving timber. Can you tell me what that process is? A. Payne's process for preserving timber consists in impregnating the wood, while in a vacuum, with a strong solution of sulphate of iron, and afterward forcing into the timber a solution of sulphate of lime, or any of the alkaline carbonates, such as carbonate of soda, by which means the oxide of iron becomes insoluble.

(57) J. W. S. asks: How can I harden the calks on horseshoes of malleable cast iron or of steel? A. The steel is low, or decarbonized, and like the iron is amenable best to casehardening. Heat the shoes so that the calks are red hot, either over a fire or in red hot lead, dip the calks in a pan of powdered prussiate of potash, and throw them into water.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

September 23, 1884,

AND EACH BEARING THAT DATE.

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

Acetates directly from metallic ores, manufacture of, J. A. Mathieu 305,524
Aerial transit by wire rope, etc., apparatus for, F. Byrnes 305,422
Alarm. See Fire alarm.
Animal trap, A. L. Bryan 305,664
Antiseptic compound, S. Cabot, Jr 305,423
Artist's box, G. Stirrup 305,544
Auger, T. Newey, Jr 305,625
Automatic lubricator, M. A. Dees 305,678
Awning, F. B. Mallory 305,614
Axle, car, Howe & Green 305,594
Bag holder, P. Cole 305,572
Bagasse pulverizer and furnace feeder, Hibberd & Hibbard 305,450
Bale tie, Brown & Deidrich 305,569
Baling box, O. Bulkeley 305,508
Band wheel, pulley, etc., S. Aland 305,651
Bar. See Claw bar.
Bark breaking and grinding mill, J. T. Phillips 305,711
Barrel heads, machine for trimming, A. Guerdan 305,447
Battery. See Stamp battery.
Bearing for pulley shafts of chain gearing, W. C. Mackinney 305,699
Belt fastener, G. W. Southwick 305,540, 305,541
Billiard and pool table, W. G. Morse 305,643