ENGINEERING INVENTIONS.

A mechanism for driving hand cars has been patented by Mr. Ferdinand E. Canda, of New York city. It consists of a series of links united in the form of a lazy tongs, arranged to be extended and contracted to impart rotary movement to a crank shaft, by a double armed hand lever, so that the car may be driven at a high speed by ordinary hand power.

A cattle car has also been patented by the above inventor, which has an arrangement of food bins, feeding sack, and water trough of novel construction, so contrived that the car may be used to carry cattle in one direction, and freight or merchandise on the return trip, the feeding boxes being adapted to fold back out of the way.

A water tank for cattle cars forms the subject of another patent issued to the same inventor, the tank being arranged beneath the flooring of the car and provided with connections whereby it is filled and the water forced therefrom through a nozzle located above the roof of the car, the parts and their connections being so constructed as not to be injured by excessively cold weather.

A railroad tie has been patented by Mr. Thomas A. Davies, of New York city. This invention consists of friction plates to be driven into the tie beneath the bases of the rails, the plates being tapered and arranged, two near each side of the tie, inclined to the grain of the wood, to prevent the ties from being worn by the movement of the rails.

An ore conveyer has been patented by Mr. John Q. Day, of Red Cliff, Col. It consists of an endless wire cable carrying buckets, and arranged to run over grooved wheels, the motion of the cable being caused by the weight of the charged buckets, there being devices whereby the speed is automatically regulated, and the buckets filled and dumped automatically.

A throttle valve has been patented by Mr. James A. Stout, of Belleville, Ill. The valve casing is formed of two parts, one having a discharge passage near the middle of the casing, and the other having valve seats opposite the discharge passages, circular valves being connected in pairs by stems and carried by a forked cross arm secured to a spindle journaled axially in the valve casing, whereby the valves and valve seat will be evenly worn by use to a truebearingsurface.

MISCELLANEOUS INVENTIONS.

A damper attachment has been patented by Mr. Isaac A. Abbot, of Denver, Col. It consists of a hook-shaped spring clamp, made to be easily attached, and to grasp the damper shank, and by frictional contact therewith to hold the damper in any position to which it may be moved.

A saw guide has been patented by Mr. John F. East, of Tanner's Creek, Va. The invention consists in a support holding guide carrier arms, having their guide ends adjusted laterally, making a simple construction of top guides for circular saws, easily adjustable, so the guide may clear the saw teeth.

A cartridge holder has been patented by Mr. Milan S. Barker, of Wellington, Kan. It is composed of a single piece of spring wire bent to form a novel holder or clasp for paper and metal shell cartridges, to be carried about the person, in or on hunting vests or coats and in a belt around the body.

A cotton gin feeder has been patented by Mr. Jesse G. Wiley, of Lockhart, Texas. It consists of a rectangular inclined box with spiked feeding belts, a revolving fan blower at the upper end of the box and a screen at the opposite end and lower side, the device being simply made, taking up little room, and feeding rapidly.

A steering attachment for sleds has been patented by Mr. Orlando A. Thayer, of Paris, Me. Steering bars are pivoted to the forward parts of the runners, and held up by spiral springs, but in such way that by pulling upon a cord the lower part of either bar will be brought into contact with the snow or ice, turning the sled toward that side.

A bureau has been patented by Mr. Theodore J. Palmer, of New York city. This invention combines with a base and swinging case for drawers, representing a bureau, a back frame for a glass, so as to represent a bureau with a glass above it, or by swinging open the bureau part an elongated mirror is presented, to take in the whole figure of a person.

A sewer has been patented by Mr. Chas. Schlameister, of Brooklyn, N. Y. The sewer pipe has a valve pivoted in it, and a branch pipe formed around such valve, so that the discharge of waste water will not be prevented by a back flow of sewage in the sewer, and the back flow will not rise into the drain pipes and force sewer gas into the air or buildings.

A hopple has been patented by Mr. John T. Stoll, of Sacramento, Cal. It is of that class which consists of leg straps and a connecting chain with a swivel, but the arrangement and form of the loops connecting with the chain is such that they are not liable to bruise or cut the legs of the animal, either when walking or lying down.

A broom holder has been patented by Mr. Jacob J. Hiner, of Harvard, Ill. It consists of a wire bent at its ends to form two eyes in alignment, and looped between its ends to form a circular spring-holding side at each side of the eyes, connected by an integral inclined cross piece, the holder being made of a single piece of wire.

A machine for shrinking hat bodies and other articles has been patented by Mr. James Dunlap, of Boston, Mass. It has a revolving shaft carrying arms on which perforated drums are mounted, revolved by suitable gearing, pipes conducting steam to the drums, the machine having great capacity, being simple in construction, and working rapidly.

A band cutter and feeder for thrashers has been patented by Mr. William Tennison, of Mount Vernon, Ind. It has an endless feed apron and slotted feed table, with vibrating arms for feeding the bundles, and vibrating band cutter, with other novel features, the construction being such that it can be placed at either or both sides of the feed hopper of the thrashing machine.

A physician's buggy case has been patented by Mr. Joseph J. Stevens, of Coalesburg, Mo. This invention consists mainly in the manner of combining two opposite medicine or instrument boxes, and attaching to them a single lid, making a case convenient to carry in a buggy or in the hand, when the medicines and instruments will be easily accessible, and which is waterproof.

A straw burning attachment for stoves has been patented by Mr. Silas C. Purdy, of Atkinson, Neb. It consists of a fire box adapted to the front of an ordinary cook stove, on which a straw or fuel reservoir is adapted to be set when filled, and turned bottom upward, the construction being such that the draught can be readily regulated, while the attachment does not interfere with the ordinary uses of the stove.

A hoisting and lowering apparatus has been patented by Mr. Augustus Ilse, of Evanston, Wyoming Ter. This invention embraces a rectangular frame attached to a heavy base to support the apparatus on the floor of a building inside of a window opening, there being a cross piece carrying a swinging arm or boom hinged to the frame, making a device for hoisting and lowering furniture, goods, etc.

A horseshoe has been patented by Mr. Edwin A. Monroe, of Saratoga Springs, N. Y. It has a continuous calk, and inwardly and forwardly projecting lips at its heel, with upwardly projecting lugs, and other novel features, making a shoe which can be readily put on by an amateur after fitting by an expert, and also one which will not ball or pick up stones, and will give the horse an excellent foothold.

A process of casting car wheels has been patented by Mr. William Wilmington, of Toledo, Ohio. This invention covers an improvement on a former patent of the same inventor, to secure with certainty the melting of ferro-manganese or spiegeleisen before it has entered the mould of a car wheel, thus better attaining the gradual modification of the chill-hardening properties of the cast iron in varying degrees in different parts of the wheel.

A glass beveling machine has been patented by Mr. Thomas F. Gilroy, of New York city. Combined with a grindstone and its carriage, and means for moving the latter back and forth parallel with the axis of the grindstone, is an adjustably pivoted and spring pressed rod for holding the glass plate on the carriage against the grindstone, with other novel features for automatically shifting and pressing the edge of the glass against the stone.

A circular knitting machine has been patented by Messrs. Wm. Pearson, Wm. R. Brown, and HerbertPrice, of Salt Lake City, Utah Ter. This invention provides means for raising the needles when preparing for "ribbing" by means of a semicircular bar inserted in the inner portion of the tube, the bar having notches to raise the proper number of needles at once, and being moved from the outside by handles or hooks, to catch the needles by the shoulders.

A machine for waxing paper has been patented by Mr. Edward G. Sparks, of Brooklyn, N. Y. This invention consists in the novel use of one or two heated blankets charged with wax or paraffine, and so arranged that the web of the paper to be waxed may be drawn beneath or between these blankets, and so waxing the paper that it will not need any subsequent treatment, such as reheating, polishing, or scraping, to remove surplus wax.

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Notes & Queries

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

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

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

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

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Minerals sent for examination should be distinctly marked or labeled.

(1) S. L. M. asks (1) a recipe for making alcohol from acorns. A. Crush the acorns, winnow carefully free from shell and skin, mix about 10 per cent of malt and water, heat to 150° Fah. for a few hours, strain, mix the liquid with 1 per cent yeast, and keep at 63° Fah., until fermentation is complete, and then rectify by several distillations. Personal experience and technical skill are of the highest importance, and no success is possible without them. 2. A recipe for making a snare for insects? A. For nocturnal insects, such as moths and beetles, a lighted lamp; sugar or molasses will attract many. 3. How is hydraulic cement made? A. In various ways. Sometimes by calcining and grinding impure limestones. Sometimes by grinding limestones and clays together and then calcining the mixture. 4. Could a person who has good facilities make a good living out of trout culture? A. Trout culture seems not to be very remunerative at the present day. 5. Who was the first inventor of the cash railway for stores? A. It would require an extensive and costly search to determine who was the first inventor of the invention in question. 6. Why does salt preserve meat? A. It resists the development of bacteria and low forms of life, as do many other metallic salts. 7. Four arc lamps, with a resistance of 6 ohms each, are joined in series 150 feet apart, the first lamp 1,500 feet and the last 1,350 feet from the dynamo. The line wire has a conductivity of 96 per cent that of pure copper. Its resistance must not exceed 8 per cent of that of the lamps. The resistance of a foot of pure copper wire 1 mm. in diameter being 9·94 ohms, what must be the diameter of the line wire? The total length of wire is 1,500+450+1,350= 3,300 feet. The resistance of the four lamps is 24 ohms. Eight per cent of this is 1·92 ohms. A foot of the 96 per cent wire 1 mm. diameter would have a resistance of 9·94÷0·96 ohm=10·35 ohms. With this as standard the line wire should be 133·38 mm. in diameter to give a resistance of 1·92 ohms. 8. What length of No. 0000 pure copper wire will have a resistance of one ohm? A. 19,605·69 feet.

(2) W. N. writes: I am using a mixture of some kind for soldering which is of a milky white color and smells of alcohol. What is it made of? A. Possibly it is a solution of lactic acid in alcohol, with perhaps other ingredients.

(3) E. J. N.—See the word asbestos in Webster. Lead pipe is made by forcing partially congealed molten lead by hydraulic pressure through dies in which a core is inserted.

(4) S. T. W.—The efflorescence on brick walls to which you refer is quite common. It consists, as a rule, of more or less of sulphate of magnesia (Epsom salts), contained either in the bricks or the mortar or in both. Unfortunately there is no cure, although it will often disappear of itself or will only be seen at long intervals. In some cases painting the walls with several coats of good oil color has been found effective. Read a paper on the subject by W. Trautwine, contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 123; also paper on preservation of building material in SCIENTIFIC AMERICAN SUPPLEMENT, No. 526.

(5) E. H. asks how near to New York sulphur springs have ever been discovered. A. While water containing slight traces of sulphur may be found within comparatively few miles of the city, the nearest springs, we believe, which contain a sufficient amount of sulphur (hydrogen sulphide) to make them of any medicinal importance are those at Sharon Springs, in Schoharie County, about 165 miles from New York.

(6) L. M. B. asks: 1. What horse power would a 3 cylinder engine 3×3 inch have at 300 revolutions, 80 pounds pressure? A. A three cylinder engine, 3 inches cylinder and 3 inches stroke, running at 80 pounds, no expansion, and at 300 revolutions, would give nearly 8 horse power. 2. What size wire would be necessary for a dynamo four times the size of the dynamo described in SUPPLEMENT, No. 161? A. Use No. 12 and 14 wire. 3. How many 16 candle power incandescent lamps should it be capable of running? A. About four such lights.

(7) W. H. M. and J. M. ask how and of what material the carbons for electric lights are made. A. Of finely powdered coke or some other form of carbon cemented together with coal tar, pitch, or sugar, and heated to a high heat to decompose the cementing material, and sometimes redipped several times into the tar or other liquid and reheated. This is the general method, but there are numerous variations.

(8) M. T. L. says: I am making an electric motor, like that described in SCIENTIFIC AMERICAN, vol. liv., No. 7, page 102, and I have a spool 2¾ inches between flanges, tube ¾ outside, ½ bore, diameter of flange 1¾. 1. What size wire shall I use to wind, and how many layers? A. Use No. 16–20 wire, winding the spool full. 2. Have I made my flanges too wide? A. Your flanges are a good width. 3. How wide an armature ¾ thick do I want? A. Make your armature about ¾ inch wide. 4. Would a counterweight on rear end help any? What length of stroke? A. Use no counterweight; it would reduce the power; give it ¾ inch stroke. 5. Approximately, how much gravity battery is needed to run it? A. Six to ten cells.

(9) G. E. C. asks: What are the chances for success in the profession of chemistry as a practical chemist? Is it possible for a young man with a good education but unable to take college course in chemistry to become a chemist, and what is necessary to be done? How can one get started, and while learning is it possible to earn a fair living by working at the business? Finally, is it an unhealthy business? A. Chemistry as a profession is quite healthy, but except for the few is rather unremunerative. You will earn little while in the learner's stage. Study at home supplemented by work in the laboratory would answer as an imperfect substitute for a regular course.

(10) W. W. R. asks whether railroads whose motive power is electricity are cheaper than those employing horse power. A. This depends on many factors. Where the dynamos can be worked by natural power, as by tidal or other mills, an electric railroad is the cheaper to run. 2. Also, if there is a description in any of your papers of an electric railroad in operation at Baltimore? A. No, but the New York electric railroad of the same constructor is described in SCIENTIFIC AMERICAN, vol. liii., No. 21.

(11) W. W. C. asks: 1. Will you please explain the construction of an annunciator on a burglar alarm, and how it operates? A. Annunciators are frequently worked by drop shutters, connected individually to the doors or windows of the different apartments. When the connection is made by opening a protected window or door, the shutter drops, and discloses the name of the apartment. 2. What is it that makes annunciators so expensive? A. General expensiveness of manufacture, royalties on patents, and similar causes. 3. Of what use is an induction coil in a circuit? A. In a telephone circuit it substitutes a high tension current for a low tension one, obviates the necessity for heavy batteries and large line wire, and by doing away to this extent with induction effects, makes the line more sensitive and less sluggish.

(12) W. S. H.—All steam launches on navigated waters have to pay a license fee of $5.00, be registered, and have a pilot's and an engineer's license, 50 cents each, which may be to one person. Launches on private waters or on waters having no traffic are free.

(13) H. B. asks how to make a boiler that will heat say about two gallons of water in the quickest time to 212°. A. By making the bottom with deep corrugations, so as to expose a large surface to the fire.

(14) H. A. B.—It is cheaper and more economical to carry steam to the distance of a hundred yards than to transmit power this distance by cable. Felt and protect the pipe thoroughly. The friction of the wire cable with its shafts and carrier wheels is greater than the loss of steam by condensation. Cable is not as good or cheap as shafting for the same power for a distance of 300 feet. The turning of a right angle on a cable need lose no more than 5

per cent of the power. This can only be ascertained by knowing the amount of friction in the change wheels for a given strain. There are examples in which not 2 per cent is lost.

(15) B. F. T.—High pressure engines exhaust into the air, and realize their power only from boiler pressure and expansion. Low pressure engines add to this about 10 pounds per square inch by creating a partial vacuum in front of the piston. This style of engine is not always available, for want of water in sufficient quantity for condensing the steam. Low pressure adjuncts are not considered economical for small engines. Many condensing engines, also, use very high pressure steam.

(16) D. H. V. asks: 1. Can a complete vacuum be formed, and, if so, what would be the external pressure on vessel containing same? A. Yes; about 14⅞ pounds. 2. Does the external pressure on the vessel denote the exact weight of the atmosphere? A. Yes; per superficial area. 3. To what height can water be drawn with sufficient suction power? A. Possibly, 33 feet or a little more. Generally, 25 to 26 feet.

(17) J. M. S.—The atmospheric pressure only acts upon surfaces freely exposed to the atmosphere. When other pressures are applied, the atmospheric pressure is not removed, but rather included in the new pressure, so that the atmospheric pressure, being originally in equilibrium, should not be added to the mechanical pressure either within or without a cylinder or boiler. The removal of atmospheric pressure in front of a steam-engine piston is actually effected by a condenser and pump. The effect of atmospheric pressure on the steam side of a piston is absorbed in the indicated steam pressure, and should not be separately expressed. In a vacuum pump there should only be one expression for force caused by the removal of the air.

(18) W. C. B. asks a short practical method of calculating, without the aid of the nautical almanac, the time of high water on any given day at a port whose corrected establishment is known. A. The method for obtaining approximate high water from the table of the "establishment of a port" requires a common almanac for the year, which gives the date of new and full moon. Multiply the average daily variation of the tides (about 53 minutes) by the number of days following the last new or full moon, which reduce to hours and minutes, and add to the "established hour" for a given place, for approximate high water.

(19) J. G. McK. writes: We have boiler and engine capacity to do our work with 30 pounds steam. Is it not economy of fuel to carry a higher pressure, say 80 or 90 pounds? A. On general principles, high steam and equivalent expansion is said to be economical, and with the automatic modern engine a saving of fuel is thus realized. If your engine has a cut-off suited for the change, we recommend it. If of the plain slide valve style, with direct eccentric connection, with governor operating a throttle or governor valve, we advise you to let it alone.

(20) R. K.—The solar mean day is 24 hours. The sidereal day is 23 hrs., 56 m., 4·091 s. in solar mean time, which is the time of revolution to the same star.

(21) L. S. D. asks what to use to polish a new mahogany counter. A. Bees' wax ½ pound, alkanet root ¼ ounce; melt until well colored. Then add linseed oil and spirits of turpentine, of each ½ gill, straining through a piece of coarse muslin.

(22) C. G. desires a remedy to destroy ants. A. Use powdered borax sprinkled around the infested places.

(23) J. L.—Stuttering is a purely nervous difficulty. The vocal muscles are able to do perfect work, but, from deficient innervation the mind cannot command them fully, and the trouble of speech commences, and soon the habit is formed, and generally grows worse and worse. The mind *fears* that the words will fail, and as the result they do fail. If the fear could be removed, the trouble would in large part cease. A cure can be accomplished in no way but by the persistent and determined effort of the sufferer himself. Others can accomplish little for him. If his attention and his *fear* can be removed from the muscles of his throat while speaking, if he can *forget* that any trouble is there, he will soon improve in his power. This is the one line in which his efforts must be made, and with persistent patience it can be successful.

(24) D. E. X. asks a remedy for the "heaves" in a horse. A. Take calcined magnesia, balsam of fir, balsam copaiba, of each 1 ounce, spirits of turpentine 2 ounces, with 1 pint best cider vinegar; give for a dose 1 tablespoonful in the feed, once a day for a week; then every other day for two or three months. Wet the hay and other feed with brine. The horse will cough more at first, but looser and looser till cured.

(25) J. F. asks how wash bluing, such as is put up in small wooden boxes, is made. A. Ultramarine is thoroughly mixed with small quantities of an adhesive substance, such as gum arabic, dextrine, or starch, worked into a thick dough, rolled flat, cut into square blocks, and rolled by hand into balls.

(26) E. J. K. asks if aluminum is prevented from rusting by the formation of a thin scale of aluminum oxide. A. Aluminum may, like many other metals, become protected from further oxidation by the formation of a semi-oxidized film, which may become a hydrate by the moisture of the air. So far as we have observed with a bar as cast, broken, and cut, also as polished, we have not been able to discover oxidation upon the surface in several months' exposure to the air of a room. We are disposed to rank it as one of the precious metals of a higher grade than silver, although, like silver, it has its special affinity.

(27) G. E. B.—Hydrogen gas has the lowest conducting power of the gases; lead the lowest conducting power among the metals; asbestos the lowest conducting power of minerals; and cotton is probably the lowest conductor among vegetables, charcoal being also very low.

(28) E. H. asks how near to New York sulphur springs have ever been discovered. A. While water containing slight traces of sulphur may be found within comparatively few miles of the city, the nearest springs, we believe, which contain a sufficient amount of sulphur (hydrogen sulphide) to make them of any medicinal importance are those at Sharon Springs, in Schoharie County, about 165 miles from New York.

(29) F. S. B. asks for the composition of hydraulic mortar. A. One part of Portland cement to two parts of sand.

(30) T. J. G. asks: 1. Explode a charge of dynamite between two stone slabs of equal weight and strength, lower one on the ground, and both in contact with the charge. Would one suffer more than the other, and which? A. We would expect under ordinary cirmcumstances that both would be so destroyed that there would be little choice between them. 2. Suspend a stone slab and explode a charge of dynamite in contact with under surface, would effect be the same as if exploded on top? A. Substantially the same if the contact was as perfect.

(31) S. V. T. asks for a cement that will mend china, which will not give way under cold water. A. Mix quickly 50 parts of plaster of Paris, 10 of quicklime, and 20 of white of egg, and use immediately.

(32) Sphinx ("L. L. S.," "O. J., Jr.," and "T. L.").—The Grecians usually represented the sphinx as a winged lion with the head and breast of a woman. The great Sphinx of Egypt, however, is a recumbent andro-sphinx, or man-headed lion. It symbolized the mysterious nature of the Deity. The extended fore paws, and the small temple between them, are both constructed of masonry. The main body of the Sphinx is hewn out of a natural eminence in the solid rock. In several places, deficiencies in the natural material have been supplied by a partial stone casing. In our illustration (June 5), the ruins of the temple are partially shown. The sketch, however, was evidently made before the excavations had been carried down sufficiently to expose the paws. It is probable that either the artist or the engraver has represented the masonry as extending further back than it does in reality. The head was originally covered with a cap, and had a full beard, but the greater part of both of these has now fallen away, and the outlines generally are very indistinct.

(33) J. E. C. asks: How much would a composition of gas and air expand in exploding in the proportion of one of gas to ten of air? A. About 4½ times.

(34) W. E. W. asks: Why is it that hydrogen is any more diffusive than oxygen or any other diatomic element? Why is it that a hydrogen molecule can crawl between the intervening spaces between the molecules of an iron cylinder, in attempts to liquefy it, any more easily than an oxygen molecule? A. The lighter gases are more diffusive because their molecules, being lighter, move in the kinetic motions with higher velocity, and hence travel faster. As for hydrogen "crawling" through the pores in an iron vessel, if it does this any more readily than other gases, it is on account of its high diffusive power.

(35) H. A. M. says: A has an orange tree which gives a sour flavored orange. To sweeten the fruit he makes a hole in the tree and fills it with as much sugar as he can stow in. This he asserts has the effect desired. B says it will not sweeten the fruit even to a small extent. Please say which is correct. A. We side strongly with B. Why do you not try it?

(36) G. F. H. asks: Will you please inform me if silkworms in cocoons can be killed by electricity, and how it is done? A. We know of no way of killing silkworms in cocoons by electricity. We are informed also by the U. S. Department of Agriculture that they know of no method.

(37) J. B. asks: Is the stroke of an engine the length of cylinder? If not, how is the stroke measured? What is relative horse power of two engines: 1st cylinder 10 inches, 3 feet stroke, 2d cylinder 12 inches, 2 feet stroke. A. The stroke of the engine is twice the length of the crank, center of pin to center of shaft, or the distance of the crosshead movement on the slides multiplied by two. The 10 inches by 3 feet cylinder in power has the relation to the other cylinder mentioned as 235·62 to 226·18. These numbers are obtained by multiplying the areas of each cylinder by its stroke.

(38) Dr. H. S.—Warts may be burned off by application of nitrate of silver or other caustic, but we know of no special treatment to prevent their recurrence. We have printed numerous remedies for the removal of corns, but as they will go away of themselves if one wears only shoes that do not press on them, so they will constantly return, no matter how many times removed, if one wears tight shoes.

(39) H. J. P.—Vacuum gauges do not indicate pounds, but correspond with the barometer, and indicate inches of mercury. Dividing the indication in inches by two will give you nearly the vacuum in pounds.

(40) E. S. asks directions by which considerable adulterations of white lead and linseed oil may be detected by one not a chemist. A. To detect barytes in white lead, dissolve the latter in dilute nitric acid. Any undissolved residue will be foreign material, and probably barytes.

(41) A. B. asks why infusorial earth is called electro-silicon. Is it a non-conductor of electricity or a non-conductor of heat? What is it composed of? A. It is diatomaceous silica, from which the trade name "electro silicon" has been derived. It has no particular electrical qualities.

(42) Mrs. J. B. F.—The insects which you send are a species of plant louse of the genus *Lachnus*. They prove injurious to evergreens when they occur in large numbers. To completely destroy them, it is only necessary to drench them well with a solution of whale oil soap or tobacco water. Another remedy is hot water a few degrees below the boiling point, which will not injure the tree, but will effectually destroy the pest.

(43) O. W. M. desires a recipe for making a stain to imitate cherry or cherry stain. A. A cherry stain may be made by boiling in a copper kettle 3 quarts of rain water, and 4 ounces of annatto. Boil till the annotto is dissolved, then put in a piece of potash the size of a walnut; keep it on the fire about half an hour longer, and it is ready to bottle for use.

(44) G. A. G. asks how to destroy ants that infest his lawn. A. If the nests of the ants can be readily found, there is no better remedy than to pour a tablespoonful of bisulphide of carbon into each hill. This substance is inflammable, and should be used with care.

(45) W. A. writes: I have noticed in your issue of the SCIENTIFIC AMERICAN, at various times, the receipt for making a printing machine called the hektograph. You also gave a recipe for making a black ink to be used with the same. I have tried both, but I find a great difficulty in gaining a success. I have tried the process for the ink in the manner you describe, but I fail to produce any copies. Ink is prepared with nigrosine. It will not create a bronze. Would you therefore kindly direct me in the right direction, that is to say, to get a black ink, that can be used by the hektograph? A. The ink you desire is made by dissolving soluble nigrosine (aniline black) in 5 to 7 parts of water. It should be a saturated solution and rather thick. For use on the hektograph it is best to use a purple ink. See "The Copying Pad, etc.," contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 438.

(46) W. C. B.—To make stereotypers' paste: Take 5 ounces of flour, 7 ounces of white starch, a large tablespoonful of powdered alum, and four quarts of water. Put the flour, starch, and alum into a saucepan, and mix with a little of the water, cold, until the whole becomes of the consistency of thick cream. Then gradually add the remainder of the water, which must boiling, stirring well meanwhile to prevent lumps. Put the mixture over the fire and stir until it boils; then let it stand until quite cold, when it should look like jelly. When you are ready for work, add Spanish whiting, the mixture not to be too stiff to spread readily with the paste brush. Put through a fine wire sieve with a stiff brush, and it is ready for use.

(47) W. F. C.—Black, glossy leather belts, made of japanned leather, can be improved in appearance by rubbing with linseed oil, but there is no suitable permanent blacking for them that also keeps their polish. There is no cure for their cracking as they get old, or from rough usage.

(48) G. H. L.—The fluid extract of sarsaparilla is made by exhausting the powdered root with alcohol. Sarsaparilla sirup used in soda fountains is made of oil of wintergreen 10 drops, oil of anise 10 drops, oil of sassafras 10 drops, fluid extract of sarsaparilla 2 ounces, simple sirup 5 parts, powdered extract of licorice 1 ounce. Sarsaparilla beer is made by dissolving 1½ ounces compound extract of sarsaparilla, with 1 pint of hot water, when cold, add of good pale or East India ale, 7 pints.

(49) N. P.—Ox gall is an excellent and delicate cleansing agent. It is a liquid soda soap. But a receipt said to be excellent for removing all such substances as tar, axle grease, etc., from colored cottons: First, smear with lard, rub with soap and water, and let it stand for a short time; then wash with oil of turpentine and water, alternately.

(50) R. I. M.—For a good paste that will neither decay nor become mouldy, mix clean flour with cold water into a paste well blended, then add boiling water, stirring well up until it is of a consistency that can be easily and smoothly spread with a brush; add to this a spoonful or two of brown sugar, a little corrosive sublimate, and about half a dozen drops of oil of lavender or other suitable perfume.

(51) A. W. L. writes: 1. A gentleman who has been lecturing here says that but very little rain has fallen in Palestine for 1,200 years, and that now (within 5 or 6 years) it is receiving copious rains and becoming fruitful. Is this a fact, and, if so, what is the cause? A. By consulting the Encyclopedia Britannica, you will find full information in regard to the rainfall of Palestine. The average rainfall is 60 inches, which exceeds that of many portions of this country. 2. What is the receipt for a so-called white house paint made of skimmed milk and lime or whiting? A. Take of whiting 5 pounds, skimmed milk 2 quarts, fresh slaked lime 2 ounces.

(52) E. A. M. D. asks the greatest height known of a wave of water in mid-ocean and near land, during a storm. A. According to Scoresby, the greatest height of waves from storms observed by him was 43 feet from top to bottom of trough. Captain Wilkes, while on his exploring expedition in the Pacific, made one measurement and obtained only 32 feet.

(53) J. T. McC. asks how oil can be taken out of a marble tombstone; has been in it now about four years. A. Such stains can be removed by applying common clay saturated with benzine. If the grease has remained long enough, it will have become acidulated and may injure the polish, but the stain will be removed.

(54) J. N. W. asks how the composition used for whitening military belts is made. A. First brush the belt over with a mixture of:

Best boiled linseed oil..... 4 oz.
Precipitated oxide of zinc..... 1 "

And dry over a stove at a heat not over 160° Fah. When thoroughly dry, roughen by means of pumice powder and apply another coating. Dry as before, and varnish with amber or copal varnish.

(55) E. D. asks how to gild the edges of cards in gold and silver. A. Obtain an extremely thin leaf of gold. Put your cards together so that the edges are perfectly even. Then place in a press, with the exposed edge uppermost. Coat the edge with a mixture of red chalk and water. The gold is blown out from small books, and spread on a leather cushion, where it is cut to the proper size by a smooth edged knife. A camel's hair pencil is dipped into white of egg mixed with water, and with this the partially dry edge is moistened; the gold is then taken up on a tip brush and applied to the moistened edge, to which it instantly adheres. When all the four edges have been gilt in this way, and allowed to remain a very few minutes, take a burnisher formed of a very smooth piece of hard stone (usually bloodstone), and rub the gold very forcibly, which gives the gold a high degree of polish. To silver edges take a brush, dip it in a saturated solution of gallic acid, and wash the edges; then dip the brush into a solution composed of 20 parts nitrate of silver to 1,000 parts distilled water. Keep on alternating these solutions until the edges assume a brilliant tint. Then wash with distilled water, and dry by free air and heat.

(56) G. Z. asks: 1. Would you kindly give me a good and simple method for purifying the gas called carbonic anhydride (CO_2), chemically expressed? A. Wash it with a little water already saturated with gas. 2. Also a formula for making fireproof wood having a black appearance. A. Wood is made fireproof by treatment with various metallic salts, as tungstate of soda or silicate of soda. It is blackened by treatment first with nitrate of iron in solution, followed by solution of logwood.

INDEX OF INVENTIONS

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June 22, 1886,

AND EACH BEARING THAT DATE.

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