

RECENTLY PATENTED INVENTIONS.

Mechanical Appliances.

PRESS GEAR.—Charley L. Stanley, Montezuma, Ga. This invention relates especially to press gears for operating cotton presses, providing therefor a simple and durable gear which may be quickly reversed, so that the follower may be moved back and forth without stopping the machine. A friction pulley and driving wheel are mounted, one in stationary and the other in movable bearings, and there is a recessed support adjacent to the wheel and pulley in which fits a pulley block having a pulley to contact with the friction pulley and driving wheel, there being a lever mechanism for raising the driving wheel shaft. This gear is also adapted for use with other kinds of presses and machinery.

LUBRICATOR.—Karl A. Jakobson, Christiania, Norway. This is a device adapted to be conveniently connected with machinery to lubricate its parts, and consists of a cylinder of two diameters, a reservoir being connected with the larger portion of the cylinder, while there is a valve-controlled opening in the other portion, a plunger of two diameters being held to slide in the cylinder, the smaller portion of the plunger carrying a slide valve to fit the smaller portion of the cylinder. The plunger serves as a pump to suck oil down from the reservoir and force it outward through suitable tube connections to any part of the machinery, the plunger being connected by a crank with a shaft carrying a ratchet wheel, and moved with a step by step movement by the machinery.

OIL CAN.—Charles B. Underhill, Lancaster, N. Y. This invention covers an improvement upon an oil can formerly patented by the same inventor. The oil can has a spring bottom, while a cap containing air vents closes the upper opening of the body, there being a spring-controlled valve in the cap, so that when the bottom is pressed inward and released a vacuum is made in the can which automatically opens the valve. The can may be used in any position, and when it is almost empty a small quantity of oil may be forced out with as much facility and force as when the can is nearly full.

BRICK MOULD.—Charles E. Simpson, Portsmouth, Ohio. The die, according to this invention, consists of a frame with recesses in its side walls, lugs on the lining plates fitting the recesses and flanges overlapping the edges of the die, there being a filling of easily melted metal between the lining and frame. Lead or Babbitt metal may be used for this filling, whereby the lining plates are held in place, the plates being readily removed by heating the die when it is necessary to replace a worn plate with a new one. Brick moulds fitted with such dies with removable lining plates are especially adapted for use in pressing firebrick, red brick, tiles, etc., as the lining ordinarily wears out much faster than the die in such service.

COTTON CONDENSERS.—George P. Melchior, Bellevue, Miss. This invention provides a simple and novel form of safety cap, so that if the condenser belt slips from the condenser drum an outlet will be opened for the cotton, to prevent it from accumulating and choking within the condenser casing. An intermediate mechanism is provided between the cap or gate and the condenser drive belt, an operating device being supported on the belt and arranged when the support is removed to open the gate by gravity, while the gate may also be opened at will by the operator.

PUMP.—Stephen G. Mills, Wichita, Kansas. This is an improved form of pump designed to allow water to flow out of the bottom of the piston cylinder in order to prevent its freezing up in cold weather. A check valve is hinged to a spring plate at the bottom of the cylinder, a rod extending upward from the plate to a notched lever pivoted in the stock, whereby the plate may be raised, the extent which it may be lifted being governed by an adjustable stop. A priming mechanism is also provided for priming the stock after it has been emptied.

WINDMILL PUMP REGULATOR.—Daniel A. Ferrier, Crete, Neb. This invention provides a device operated by a float and designed to automatically throw the mill in the wind when the cistern is low and throw it out of the wind when a sufficient supply has been received, the construction being such, also, that should the mill be thrown in the wind too suddenly, the pull rope, wire or chain controlling the mill will not be subject to undue strain. The mill wheel may also be thrown into the wind by drawing downward on its rope or cable when the cistern is full.

PIPE CONNECTIONS.—Wilhelm Thielmann, Styrum, near Mulheim, Germany. The manufacture of angle pipe connecting joints in a simple and effective manner is provided for by this invention, which has been likewise patented in eight European countries. A blank of suitable shape is cut out of malleable cast iron, steel, or other metal, and is bent to shape while hot by a machine, with its edges forming the seam adjacent to each other; the moulded angle pipe joint is then placed on the mandrels of a machine and the adjacent edges of the moulded pipe joint while in a heated condition are welded together by being compressed in the machine.

Agricultural.

COTTON CHOPPER AND SCRAPER.—Albert Whitley, Woodville, Miss. This machine is designed to scrape the edge of a row of plants, and chop it out at intervals, to convert the continuous row into a series of hills. A running wheel with cams on its side is mounted on an axial shaft in the rear of the main frame, a slotted chopping arm embracing the shaft and being pivoted to the frame in front, while a chopping hoe is attached to the arm in the rear, a spring forcing the chopping arms against the cams.

MOWING MACHINE.—Edward Bartlett, Belleville, Canada. The cutter bar of this machine is adapted to be raised or lowered as desired, and tilted to and from the ground, in a convenient and expeditious manner, while the machine is light and strong, and comparatively inexpensive. Combined with the main

frame and a vertically swinging frame carrying the cutting apparatus is a crank shaft, the cutter-operating arm being connected to the main frame, the crank, and the cutter bar, by universal or ball and socket connections, while a longitudinal spring connects the arm and the swinging frame and acts as a cushion for the crank shaft. In this machine the shoe can be raised sufficiently high to carry the channel bar at an angle of forty-five degrees to the ground.

HAY FORK.—John Anderson, Hickson, North Dakota. The arms of this fork are fulcrumed upon the trunnions of a central lifting beam, two arms upon each of the trunnions, the arms being inwardly curved and consisting of two hinged members, the upper member of each arm carrying a spring-controlled latch adapted to engage with the upper end of the lower member, trip ropes being attached to the latches and means provided for operating the ropes. The device is simple and inexpensive, and will lift either long or short hay, while it can be readily operated to dump the hay cleanly from the carrying arms.

PLANTER MECHANISM.—Albert J. Helvern and William B. Schwalm, Walton, Ind. This invention relates to the driving mechanism for the seed drop bars of planters, and is an improvement on a former patented invention of the same inventors. Combined with the seed drop bar is an actuating mechanism consisting of an endless chain in which are pivoted fingers having a shovel like lower end and a forwardly inclined head, with cavities in one side face, while spurs projecting forward from the under edges of the links between the fingers are adapted to enter the cavities of the fingers, and hold them while in action in a perpendicular position.

Miscellaneous.

PROCESS OF TREATING ZINC ORES.—William West, Denver, Col. This is a reissued patent for a process of eliminating zinc from complex ores. The ore is roasted to form sulphurous acid gas and oxidize the zinc, and the gas is cooled to 180° F. and passed in gaseous form with steam, without oxidation, into sulphuric acid, through a previously roasted charge, to form soluble sulphate of zinc, and then immediately leached out, separating the zinc sulphate with warm water. The leached ore residuum is simultaneously dried by the transit of the hot sulphurous acid gas, thereby cooling the latter. The zinc is thus separated and recovered from the other metals in a single economical operation, the remaining metals being left in good condition for further treatment.

WRAPPER PASTER.—David W. Collins, Philadelphia, Pa. This device has a paste-holding pan with a longitudinally apertured bottom and an inner bottom having a series of perforations over the apertures of the lower bottom, while there is an adjustable paste discharge controlling slide beneath the lower apertured bottom. The apparatus is designed to automatically supply paste and lay it on the part of each wrapper to be pasted, being more particularly applicable for use with newspaper and similar wrappers, but also suited for use for general purposes, economizing space and obviating the scattering or dropping of paste.

PASTING MACHINE.—George W. Leiman, New York City. The pasting of paper or fabric in tape form is provided for by this machine, which has two graded reservoirs connected by a valved pipe, a paste wheel revolving in the smaller tank, while a shaft carrying a reel is journaled in a hanger over the larger tank, there being a driving connection between the reel shaft and the paste wheel shaft. There is a frictional feed device and a guide pulley, a tape reel being secured to the upper shaft, and a brush is located between the feed device and the paste wheel. The paste is fed from the smaller to the larger reservoir as needed, that the paste wheel may not carry any more paste than is needed, all surplus material being removed from the fabric or paper treated, and the pasted tape being delivered from the machine for convenient application to any object.

TWINE CUTTER.—Frank Grigsby, Alma, Neb. This invention covers an improvement in the class of twine cutters which have a blade and spring plate so arranged that the twine or thread is drawn between them and thus severed. It is a very simple device, adapted to be conveniently attached to a counter or any suitable support, and consists of a twine holder of spring metal having a reversely bent or hook shaped portion, and a shank section similar to that of the cutter, which is arranged parallel and close to one edge of the holder. The end of the twine is held by the holder, after cutting, in convenient position to be again taken hold of when the next bundle is to be tied.

SHUTTER FASTENER.—Edwin T. Keener, Moberly, Mo. This fastener is a simple and inexpensive form of the latch hook type, and is a practical device to securely lock a pair of shutters and release them from the inside of an apartment without raising the sash. The fastener mechanism is mainly supported in a separable casing, and comprises a rocking latch connected with the inner end of a sliding operating rod provided with a locking device to lock the latch against rocking when the rod is turned in one direction.

PORTABLE FENCE.—Charles E. Harris, Winnipeg, Canada. The posts from which the sections of this fence are supported have each a bed beam to which a plate or block is transversely attached, the post proper having recesses at its upper end, and being secured to the plate or block and bed beam. The fence is designed to be staunch and durable, and capable of being expeditiously and easily set up on even or uneven ground, its sections being also readily disengaged for removal.

CHIMNEY CAP.—Joseph A. Hodel, Cumberland, Md. A vibrating valve which automatically adjusts itself to prevent downward draught is employed in this cap, the base plate of which has flanges fitting the chimney flue, while its inverted semicircular cap portion has lateral flanges fitting under retaining brackets or plates, the valve being pivoted in the cap to swing against flanges when vibrated. The construction is simple and inexpensive, and the cap is designed to be thoroughly effective for its purpose.

FIRE ESCAPE.—Michael O'Reilly, Boston, Mass. The hoisting apparatus of this device is carried by a main frame on a truck, or may rest on any convenient support, and has drums operated by cranks to move cables, running over sheaves secured to different points on a building, conveniently operated brakes being provided, and the cables being adapted to raise and support a car opposite any desired part of a building, to carry people safely to the ground, the car being also capable of carrying firemen with their hose and holding them in position to direct a stream of water efficiently.

FIRE ESCAPE.—Peder Thoresen, Svelvig, Norway. The buildings to which this escape may be applied have pulleys at intervals near their cornices, from which depend small wire ropes, by which larger ropes may be hauled up over the pulleys. The escape proper consists of a tubular chute of canvas, whose upper end is suspended on a hinged bar supported by the large rope to be swung horizontally, a bent rod holding the chute open near its top, and a cord extending downward through it, which may be grasped by a person descending in the chute, to regulate the velocity of descent.

EXERCISING MACHINE.—Frank G. Gollon, Hoboken, N. J. This device has a platform horizontally fulcrumed between standards on a base, with an adjustable seat, and friction rollers journaled in an opening in the platform near its forward end, a cord attached to the platform and connected with its base passing over the rollers. The machine is designed to afford amusement as well as exercise, and is capable of adjustment to accommodate persons of different weights, while it is of simple construction and may be readily taken apart and packed in a small space.

CHURN DRIVING MECHANISM.—Charles D. Olds, Barnard, Mo. A shaft with a crank arm is mounted in a supporting frame having guide rods in which slides a crosshead, a pitman being connected to the crank arm and to the crosshead, a rod secured to the latter having an angular extension to which the churn dasher is attached. The device is simple and durable in construction, and is designed to greatly reduce the labor of churning.

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5. Climbing roses over a doorway, illustrated.
6. View of Napoleon the First's bedstead.
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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.

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(3391) P. J. H. asks: 1. How would the flow of water vary to a pump with the height lifted? A. The flow to and through the pump will be the same for various heights, but more power would be required to run the pump with the higher lift. 2. What is the relation between the velocity and friction of water in horizontal pipes? A. Friction of water in pipes is nearly as the square of the velocity. 3. A tank of water 20 feet high by 15 feet in diameter has a horizontal pipe 1 inch in diameter and 100 feet long connected to its bottom. What would be the velocity of its discharge per second? A. The velocity of flow will be 0.89 of a foot per second, and will discharge 0.47 of a cubic foot per minute. See SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 788, 789, 791, 792, 793, 799, and 805 for an excellent series of articles on hydraulics.

(3392) J. M. S. asks the best thing for keeping my shoulders straight. I have tried shoulder braces, and they do not give me good satisfaction. A. A thorough course of good gymnastic exercise would probably straighten you and help you to keep so.

(3393) O. asks: How many gallons of water evaporated into steam will give one horse power pressure with a properly constructed engine? Also how much can the common gas we burn be compressed in strong canvas gum lined bags? A friend said 3 feet into 1 foot space. I supposed it could be much more. A. 3 1/2 gallons of water to the horse power per hour. You cannot compress gas in a bag, such as you describe, to above a 1/4 to 1/2 pound pressure; 3 feet in 1 foot is equal to 30 pounds pressure. For this pressure a metallic cylinder is the best.

(3394) N. B. N. writes: 1. I weighed one hundred and sixty-six pounds about a year ago, and I now weigh only one hundred and forty-two, a loss of twenty-four pounds. I am healthy, eat hearty, sleep sound, and am never sick. I am a blacksmith by trade. Can you tell me the reason of this loss of weight and give me a prescription by which I can regain my former weight? A. Your health being good, there is no advantage in additional weight. You can probably increase your weight by eating more nitrogenous food. All kinds of sweets and sweetened food tend to produce fat. 2. Please give a receipt for the most sensitive invisible ink used with heat and not with light. A. Write with a solution of cobalt chloride. It will appear when the writing is submitted to some heat. Or use a weak solution of nitrate of copper. It gives an invisible writing which becomes red by heat. 3. Give the size of wire to use on an electric bell on a line of 1,000 feet and how many Leclanche cells it will take to run it. A. Use No. 16. About four cells of battery will be required. 4. Can you tell me how the wax on the drum of a phonograph is prepared, and how it is put around the axle or shaft? A. The composition of the phonograph cylinder is a secret. The cylinders slip on a conical drum.

(3395) A. D. B. asks (1) how to make Trove's battery, thimble size. A. A Trove battery may be made by providing a plate of zinc, a plate of copper, and a series of sheets of blotting paper of the same size. Have enough sheets of blotting paper to make a pile $\frac{3}{4}$ of an inch thick. Separate the pile into two halves, soak one pile in a saturated solution of sulphate of zinc, soak the other pile in a saturated solution of copper, put the two piles together, place the zinc plate against the sulphate of zinc side and the copper against the sulphate of copper side. Inclose the whole in a suitable casing and connect a wire with each of the plates, and you have a Trove battery which will yield a small current for a long time. 2. How to make very smallest battery that will generate current sufficiently strong to be felt if electrodes are applied to tongue or temple, and how long will it run without recharging, I mean a dry or moist battery? A. Probably a chloride of silver battery is capable of being made in as small sizes as any. Consult SUPPLEMENT, No. 157, for information on the chloride of silver battery. The current from any battery is not very perceptible to the touch unless used in connection with an induction coil. A very slight current, however, can be detected by the tongue. 3. What material makes good terminal electrodes? I mean, by terminal, the end of the wires. A. Platinum or carbon would make good terminal electrodes for the ends of the wires. 4. Will the three pieces of electric light carbons 4 inches long, wrapped with one layer of felt and inclosed in amalgamated zinc tubes, contain enough moisture when saturated with solution to generate a current? If so, for about how long without dipping them in solution, and how shall I fix carbons? Would it be necessary to inclose the tubes in anything? A. The battery you describe, if charged with a solution of chloride of ammonium, would work for a few minutes. 5. What makes best battery solution to dip an absorbent material in to use in a dry or moist battery? A. See description of Trove battery above.

(3396) G. W. V. writes: 1. I have made an electric motor like the one described in 641, and I have wound the magnet and armature with No. 18 bell wire, and would you let me know if that would hinder it from going, because I did not use bell wire? A. The insulation on bell wire is very heavy, and occupies so much room on an armature or field magnet as to prevent winding enough wire in the allotted space. Besides this difficulty, it removes the wires too far from the cores of the field magnet and armature. 2. Would you let me know the difference between bell wire and magnet wire? A. Bell wire or office wire is provided with a single or double covering of cotton braided upon the wire and occupying about four or five times the space needed for covering which is sufficient for magnet wire. Magnet wire is provided with a single or double covering of cotton or silk, which is quite thin. 3. Would you let me know how to make carbon plates and mould zinc plates? A. For information on making carbon plates consult SCIENTIFIC AMERICAN, vol. 60, page 307, or "Experimental Science." You can cast your zincs in a metal mould, or in a sand mould if you have a suitable pattern. 4. Would you let me know how many half pint cells it would take to run the motor I referred to? I used eight. A. Half pint cells are rather small for running the motor referred to. It would require a large number connected up in parallel to equal one cell of large battery. It would be better for you to construct larger cells, such as you will find described in SUPPLEMENT, No. 792. 5. Let me know how to make a paint or compound that would be suitable to paint the inside of a wooden cell for a bichromate battery. A. A wooden battery cell may be rendered acid-proof by soaking it in paraffine, filling in the corners well with melted paraffine. Another method of protecting a wooden cell is to coat it with coal tar pitch. Wooden cells are not very desirable, as they are sure to fail after a time.

(3397) J. S. L. asks how to fasten rubber rolls on clothes wringers. A. Clean shaft thoroughly between the shoulders or the washers where the rubber goes on. 2. Give the shaft a coat of copal varnish between the shoulders and let it dry. 3. Give shaft a coat of varnish and wind shaft tightly as possible with five ply jute twine at once, while varnish is green, and let it dry for about six hours. 4. Give shaft over the twine a coat of rubber cement (see receipt below) and let it dry for about six hours. 5. Repeat 4. 6. Remove washer on the short end of shaft, also the cog-wheel if the shaft has cogs on both ends. 7. See that the rubber rolls are always longer than the space between the washers where the rubber goes on, as they shrink or take up a little in putting on the shaft. 8. Clean out the hole or inside of roll with benzine, using a small brush or swab. 9. Put the thimble or pointer on the end of shaft from which the washer has been removed, and give shaft over the twine and thimble another coat of cement and stand upright in a vise. 10. Give the inside or hole of roll a coat of cement with a rod or stick. 11. Pull or force the roll on the shaft as quickly as possible with a jerk, then rivet the washer on with a cold chisel. 12. Let roll stand and dry for two or three days before using same. Cement for use should be just thin enough to run freely. If it gets too thick, thin it with benzine. For rubber cement dissolve pure unvulcanized rubber in pure spirits of turpentine. From "The Scientific American Encyclopedia of Receipts, Notes and Queries." In press.

(3398) W. S. asks: 1. What gas has the greatest lifting and lasting power and how long will it retain its virtue? A. Hydrogen gas has the greatest lifting power, if it may be so expressed, of any gas. There is no question of its "lasting power." Any gas of lower specific gravity than air will last forever. Leakage and diffusion through the pores of the balloon causes the gas to escape and apparently "lose power." Hydrogen escapes thus faster than any other gas. No limit of time can be assigned, as all depends on the envelope or material of the balloon. 2. Would it be possible to inclose it so that it would not waste? A. This has never yet been successfully accomplished. If the metal could be worked thin enough, a copper balloon, which has actually been suggested, would retain hydrogen.

(3399) I. S. A. writes: 1. My cistern sprang a leak and I put about a peck of bran in to stop it. Now the water has spoiled, it smells bad and is

harder than before. What is the matter, and can it be purified and how? A. Pump it out, clean it, and stop the leaks with cement. The bran we presume has fermented and occasioned the trouble. 2. Can glass be cast perfect enough to make an air-tight joint without any grinding after casting? A. No.

(3400) Amateur Stone Cutter asks for a method of polishing Vermont marble. I have a small monument cut out of it, rubbed down ready for polishing, and I can't go any further, as I don't know what is used for polishing or how to use it. Also, in rubbing down face to a fine surface it shows an open seam 3 inches or 4 inches long. Would like to know if there is any preparation used by polishers to fill small cracks before polishing, and what it is? A. After rubbing the marble down with fine sand, use pumice stone, either powdered and applied with a felt rubber or in its natural state in the form of a lump with a plane surface. After smoothing with pumice stone, polish with putty powder and water. The cracks may be filled with Portland cement mixed with marble dust, or with a cement formed of oxychloride of zinc. This cement is made by mixing oxide of zinc with a strong solution of chloride of zinc. It is applied in the same manner as putty. You can tint the cement by adding to it while mixing it any of the dry pigments used in painting.

(3401) J. A. P. asks: What size wire should a telephone magneto armature be wound with to run on a 110 volt circuit filled with 4 magnets instead of 2; also what number will it be? A. A magneto machine cannot be used as a motor without providing a commutator to change the direction of the current. For information on this point consult SUPPLEMENT, No. 161. The armature should be wound with No. 30 wire, a sufficient quantity being used to secure a resistance of about 220 ohms. It will have about one-fourteenth of a horse power.

(3402) W. B. Y. asks: Will you please tell me how to make gold and silver alloy, that which is most fusible, and will make the brightest and smoothest castings? A. Silver melts at about 1800° and gold at about 2300°. You can make any mixture to suit the color desired, or you can add a little copper to make a cheaper alloy of a deep gold color. Any of these alloys melt at about 2000°. For details of the alloying of gold and silver with other metals, see the "Practical Gold Worker," \$1.25, or "The Silversmith's Handbook," \$1.25.

(3403) L. H. P. asks: 1. What kind of acid or chemical is used to write a name on a steel knife blade, and not be defaced by time or use of blade? A. Use nitric acid and water equal parts to etch your knife blade. 2. Is there a good treatise on dairy work, and what is its price? A. We can mail "Handbook on Milk Cows," for \$1, and Stewart's "Dairyman's Manual," \$1 mailed.

(3404) G. L. asks: Will you please tell me the best way to get rid of worms? We have a beautiful lawn for tennis, but the worms make it almost impossible for us to keep it in good shape. I was advised to try lime, and to put it on when the worms are out at night. We have tried it, and I am sorry to say not very successfully, as it does not kill them unless they get a great dose. It occurred to me that you may be able to tell me what will do it and not kill the grass. A. Reply by Prof. C. V. Riley.—Your ascribing the injury to worms which you say are out at night would seem to indicate that the depredators are the common earth worms or angle worms. Grass lands, however, are frequently injured by the larvae of May beetles, though these do not ordinarily leave the soil. One remedy for angle worms and also for white grubs is to thoroughly wet the ground with the kerosene emulsion, the formula for the preparation of which has been published in the SCIENTIFIC AMERICAN. A few years ago very successful experiments were conducted with this emulsion on the lawns of the Capitol grounds, and an account of the results is given in the periodical bulletin of the Division of Entomology, *Insect Life*, vol. 1, No. 2. This report will give you the necessary details for the application of the emulsion. The larvae of May beetles feed on the roots of grasses, and are very injurious to lawns. The earth worms, on the contrary, feed on the earth and the vegetable humus in the soil, and are constantly carrying the soil, through their excrements, from the lower layers to the surface, and as has been shown by Darwin, they are by this means of positive advantage to lawns under certain circumstances. When, however, they interfere with any special object, as in your case, they must be considered hurtful, but beyond the use of lime and kerosene emulsion, as here indicated, I do not know any way of getting rid of them. Heavy rolling will doubtless tend to neutralize their effects, and large numbers of them may be captured at night by means of lanterns, especially after a good rain. They come out of their burrows, under such circumstances, and may be killed in large numbers by any one who is at all quick and active.

(3405) Serouky says: As I incessantly meet with the following difficulty in developing dry plates, will you oblige me, through the columns of your valuable paper, with the information as to the cause and remedy? In developing, the image is slow to make its appearance, indicating under exposure, then comes up gradually until it reaches a certain stage, when fog seems to take hold, and the image continues to develop slowly but uniformly, indicating over exposure, and the result is a flat negative. The trouble is not in the light, and I am convinced that it rests in the exposure or development. I have tried less exposure and the result is under-exposure with heavy contrast. Hence my opinion of its being in the development, and yet I follow strictly the formula coming with the plates. A. If you use the eikonogen developer made up:

Eikonogen..... 1 oz.
Sulphite of sodium..... 1 "
Water..... 30 "

and pour this on the plate without the addition of any carbonate of potash or carbonate of soda, as is usually specified in the plate formulas, and then get the foggy and flat negatives that you describe, the cause is probably due to a poor grade of emulsion on the plate, or to a leakage of weak light through the bellows of the

camera. If the emulsion is defective, the rabbit edges of the plate which are not exposed in the camera will fog over just the same as the exposed portion. Old plates poorly packed in ordinary pasteboard boxes separated by strips of card board will fog, because of the deleterious chemicals in the separators. If the plate is under exposed, simply add a few drops of a carbonate of potash solution (1 ounce dissolved in 3 ounces of water) to the above solution and try a fresh box of plates. We have had plates act precisely as you describe and obtained passable but foggy negatives by leaving them in the developer for some time. The edges protected by the rabbits of the plate holder fogged over. We proved the fault to be a defective emulsion on the plate. Another box of the same manufacturer's plates worked under the above developer as beautifully as could be desired.

(3406) S. A. D. asks: 1. What is the ferro-prussiate paper used for in photography, and how is it used? A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 584, for full particulars. 2. How long (about) must a Harvard dry plate be exposed on a medium bright day? A. One second exposure with f-32 stop in an 8 inch equiv. focus lens, on an ordinary open landscape should be sufficient. Much depends on the subject, the time of day, the lens, and the size of the diaphragm used. 3. How long after the exposure must the developer be applied? What is next done with them? A. After exposure, if the plates are removed from the holders and packed, film sides in contact with each other and surrounded with waxed paper, then placed in a box, they may be preserved for two years before developing. In general it is advisable to develop the exposures as soon as it is convenient to do so. After the plate is developed, the image is fixed by immersing it in a bath of hyposulphite of soda, one ounce to six ounces of water. Then it is washed for an hour and dried. From the negative in a printing frame the photographs are printed on and sensitized in the sun.

(3407) O. S. P. asks: 1. What makes black spots on photographic negatives? Red spots on the prints? A. Blackspots may be caused by particles of iron settling on the film when japanned iron developing trays are used, or to particles of foreign matter being embedded in the film. Red spots on prints are due to too weak a toning bath, or to insufficient toning, or to failure to move the prints around in the bath. 2. What is the best material for dusting and polishing camera lenses? A. Use an old clean cambric handkerchief to remove dust, brushing the lens lightly with it. 3. What will take photograph stains off the fingers? A. If the stains are caused by the pyro developer, they can be removed with a dilute solution of citric acid. 4. What causes reddish brown dust to appear on negatives when drying? A. The reddish brown dust is probably a precipitate of iron deposited on the film, provided the plate was developed with the ferrous oxalate or iron developer. It may be removed by immersing the plate in dilute solution of sulphuric acid and water.

(3408) W. F. asks: 1. How to compute the horse power of an engine? A. Multiply the square of the diameter of the cylinder by 0.7854, and this product by the mean pressure in the cylinder. The mean pressure, assuming the usual practice in small engines at five-eighths cut-off, will be 0.92 of the boiler pressure. Multiply the last product by the speed of the piston in feet per minute and divide by 33,000 for the horse power. 2. How much power would an engine have that has a 3x5 inch cylinder, with 50 pounds pressure per square inch on the piston head, and making 100 revolutions per minute? A. For your engine this

$$\frac{3^2 \times 0.7854 \times 100 \times 0.92 \times 5 \times 100}{33000} = 1.6 \text{ h. p.}$$

3. Give the ingredients of a crucible for melting brass. A. For a crucible use finely pulverized plumbago well kneaded with 10 per cent of pipe clay or porcelain clay, and baked at a red heat after drying. 4. What is Stourbridge clay? A. Stourbridge clay is used also for crucibles. It comes from England. 5. How much heavier is common brass than common pine wood? A. Brass weighs 16 times the weight of the pine pattern. 6. About how many pounds of brass could I melt with a good sized fan run by hand? A. If you use a properly made furnace, you may melt 100 pounds. In a forge with loose brick chamber you may melt 5 to 10 pounds. 7. What should the diameter and weight of a fly wheel be for an engine with a 3 inch by 5 inch cylinder? A. Fly wheel 20 inches diameter, weight 40 pounds. 8. What would be the safe carrying pressure per pound on the piston head of a cylinder $\frac{1}{2}$ inch thick? A. 100 pounds on cylinder of size mentioned. 9. What is granulated lead, and how is it made? A. Make granulated lead by pouring melted lead into water in a small stream. 10. How can I purify common lead? A. Purify lead by melting and pouring off from the ladle just before it sets.

(3409) Reader asks: Is there such a thing as an effective hair invigorator, and has there ever been any article on this subject published in the SCIENTIFIC AMERICAN or SUPPLEMENT?

- A. Quinine sulphate..... 20 gr.
- Tincture of cantharides..... 2 fl. dr.
- Fluid extract of jaborandi..... 2 "
- Alcohol..... 2 fl. oz.
- Glycerine..... 2 "
- Bay rum..... 6 "
- Rose water..... 15 "

The quinine is dissolved in the alcoholic liquids by warming slightly, then the other ingredients are added.

Astringent Hair Tonic.
Tannin..... 1 dr.
Tincture of myrrh..... 1 fl. oz.
Glycerine..... 5 "

From "Scientific American Encyclopedia of Receipts, Notes and Queries." In press. See also SUPPLEMENT, Nos 388, 436, and 396.

(3410) J. C. B. writes: Can you explain the working of a small toy sampan or boat sold here in Japan? The bottom of the sampan seems to be made of thin copper, and a reddish paste is sold with it, which is smeared over the stern of the boat, and when the

little craft is put on water, it gayly sails away. The paste smells like a mixture of camphor and ammonia. Can you tell its probable composition and what reaction occurs when it unites with water? A. The principal agent in the above composition is undoubtedly the camphor, which acts by modifying the surface tension of the water, as in the familiar camphor motions. Its exact composition cannot be deduced from a mere description. It would be an interesting subject for experimenting.

(3411) J. J. C. asks: 1. How to prepare nitrous oxide gas. A. Nitrous oxide is prepared by heating ammonium nitrate in a suitable flask. 2. Will No. 16 German silver wire do for the resistance wire in a Wheatstone meter bridge? If so, what is the highest resistance it will accurately measure with a hundred ohm coil for the third resistance? A. No. 16 German silver wire will answer. You can probably measure resistances up to 500 ohms with a meter bridge, using wire of the size given. 3. What should the resistance of a motor be to be run by 16 cells with each an E. M. F. of 1.83 volts and an internal resistance of one-fifth ohm? A. The resistance of the motor should be the same as that of the battery. The power in watts is obtained by multiplying the E. M. F. in volts into the current in amperes. 4. Will German silver wire do as well for the 50 and 100 ohm coils in the tangent galvanometer described in "Experimental Science," as copper? A. It is best to use copper coils in a galvanometer, and if resistance is needed, to insert it in the circuit outside of the instrument.

(3412) C. A. M. writes: 1. Please give the chemistry of a blue print made from a citrate of iron, ammonium and prussiate of potash solution. A. The action of light reduces the ferric salt to a ferrous salt, which latter produces a blue color with ferri-cyanide of potassium. 2. Please give directions for making a photographic camera, or name some good books giving full directions. A. See SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 625, 670, 507, for photographic cameras. 3. In the SCIENTIFIC AMERICAN of August 29, 1891, query 3313, it says, "Incessant vigilance and putz pomade are to be recommended as a preventive of rust on bicycles." As I understand it putz pomade is very bad for nickel. We had some nickel plated water cocks, and on using the pomade the nickel was soon worn off. A friend who works in a large nickel plating establishment has told me never to use putz pomade on silver or nickel plated goods. A. Putz pomade is recommended and sold by the bicycle trade. It should be used sparingly. Careful wiping is the principal point in the preservation of the plating. 4. Will wood alcohol dissolve shellac, and make a colorless film on applying to wood? A. Wood alcohol dissolves shellac, is nearly colorless as a wood varnish, but sinks into the pores of the wood. 5. On page 70, SCIENTIFIC AMERICAN of August 1, 1891, you say that mineral oils are better than sperm oil for lubricating. Please name a good mineral oil for a bicycle, its expense, where obtained, and whether it will need thinning down, and if so, with what? A. Cylinder oil or sewing machine oil, which can be had from sewing machine agents, is good, and requires no thinning.

(3413) F. E.—Bromide prints may be toned a sepia color, if, after development, and before fixing, they are slightly bleached with a solution of bichloride of mercury. After washing fix in a solution of hyposulphite of soda 1 ounce, water 6 ounces.

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