RECENTLY PATENTED INVENTIONS.

Engineering.

CANTILEVER BRIDGE.—Thomas C. Clarke, New York City. By this improvement it is designed to facilitate the construction of bridges of longer span than has heretofore been attempted, and with this view suspender girders are used, the members of which take up the compression which comes from the ties supported by the towers. The stays are also arranged upon converging lines to enable them to resist wind pressure, and an expansion joint is provided by which the bridge members are allowed to expand or contract without interfering with their proper action. The bodily movement of the girders from unbalanced loads is resisted by a peculiar arrangement of the stays.

DAMPER REGULATOR.—John H. Blake, New York City. A regulator to be connected with the boiler, and so affected by the boiler pressure as to automatically regulate the furnace dampers so as to keep an even pressure upon the boiler, has been designed by the inventor. The improvement may also be used for other purposes, such as operating pumps, mechanical stokers, etc. Weights are so arranged that when the pressure in the steam chest becomes too low an indicating piston will be moved to open a port and operate the damper, an excessive pressure opening another port whereby the damper is moved in the opposite direction. A novel mechanism is employed to effect a differential movement so as to move the damper only the required distance to maintain the proper boiler pressure.

Railway Appliances.

NUT LOCK FOR RAILS.—Henry Cohen and John W. Tharp, Memphis, Tenn. The screw bolt uniting two fish plates has a locking plate on its projected end, a radially grooved nut bearing on similar grooves in the plate. In the opposite face of the locking plate is a channel adapted to receive a locking pin, connected with which is a wing plate, the pin being inserted in a hole produced by the junction of the groove in the locking plate and a radial groove in the face of the nut. If the winged pins are made of rigid metal, the nuts may not be moved until the pins are taken out, but the pins are preferably of lead or other soft metal, when a lever wrench will split them and allow the nuts to be unscrewed.

CABLE RAILWAY PULLEY.—Carles A. Johnson, New York City. A main rim of the pulley, having flanges and elongated slots, holds within its flanges an auxiliary grooved rim made in readily removable sections. The pulley is especially designed to carry the traveling cable, and is arranged to prevent the rapid wear of the rim, while a worn-out rim may also be conveniently removed, a new one substituted without discarding the remainder of the pulley or disturbing its position in the journals. The removable sections of the auxiliary grooved rim are made of a hard metal, to prevent rapid wear.

Mechanical.

BENCH VISE.—Thomas B. Jackson, Salem, Oregon. On the under side of the work bench is a guide strip along which moves a sliding shoe connected by a diagonal brace with the lower end of the movable jaw, in which is swiveled the horizontal screw stem. The middle portion of this stem works in a screw-threaded plate in a front standard of the bench, and its inner end swivels in the brace near the sliding shoe. By this construction yokes or slides passing around guides are dispensed with, the shoe moving freely along the guide strip in such manner as to never get cramped or stuck and all the parts being readily accessible.

TENSION DEVICE FOR LOOM SHUTTLES.—Etienne Domenge, Paterson, N. J. In weaving silk it is necessary to regulate the tension of the threads with great nicety, which is the especial object of this improvement. The swinging flies have the usual thread loops, and the springs of revoluble spring drums connect the drums and flies, while spring-pressed studs serve as supports for the drums. Adjacent supports for the studs have squared holes in which enter squared heads on the studs. The device is applicable to the ordinary shuttles and shuttle guards, and facilitates the quick and perfect adjustment of the tension.

HACKLING AND PREPARING FIBERS.—Theodore B. Allen, Brooklyn, N. Y. A machine especially adapted for treating sisal fiber for rope making has been patented by the inventor. It comprises a machine which finally hackles the fiber and delivers it in the form of a large, properly treated sliver, and an initial hackling and combing machine delivering to the final machine, which consists of two ordinary differentially moving hackling chains or belts having the usual drawing and feed rolls. A table is arranged as an inclined trough in connection with the final hackling machine, between it and the combing cylinder, to support the fiber which passes continuously from the cylinder to the feed rolls of the hackling machine.

WIRE SPLICER.—John D. Thomas, Scranton, Pa. A device to facilitate the quick and effective splicing of broken trolley wires without solder is here provided, thereby saving time and preventing delays on the road. It consists of a spindle-shaped tube in the sides of which are apertures where are fitted serrated wedges or dogs, adapted to force the wire with great pressure against the inner surface of the opposite side of the tube.

Miscellaneous.

SAFETY DEVICE FOR ELEVATORS.—Frank H. Shurtz and Henry G. Swan, San Francisco, Cal. The elevator cage has lugs traveling in a vertical guide at each side of the shaft, pivoted angular blocks being located one above another for the entire height of each guide. The blocks are engaged by a chain supported by a spring-pressed bolt, and means are provided for automatically releasing the bolt from the chain in case of accident to allow the blocks to drop into the path of the lugs of the cage, whereby the cage will be instantly locked in place. The blocks may be readily reset and the attachment readjusted without the help of skilled labor.

FIRE GRATE.—Abraham Stroh, Freeland, Pa. This is a grate adapted for use with boilers and stoves of every style, its construction being such that the grate openings can be set or varied to have any desired air space opening, providing for the burning of the smallest or largest size coal or other fuel. It has stationary skid bars with lateral members and rider bars with lateral members held between the skid bars, the riders having longitudinal movement between the skid bars. Every piece of the grate is free to move loosely, so that there will be no crowding or straining, and the several parts can be easily assembled, and any portion readily renewed, if it should wear out or be broken.

FUSE LIGHTER.—William C. Matthews, Denver, Col. This device consists of a metallic tack, dipped in a mixture of gunpowder, glue, and water, which, when dried, forms on the tack a combustible body, or the mixture may be moulded around the tack, the whole being then covered with paraffine as a protection from moisture. The point of the tack is left exposed, and this point is thrust into the end of a fuse to be lighted, the match being applied to the head coated with a quick combustible.

GRAPPLE.—John C. Manning and Albert C. Wilson, Marshfield, Oregon. This invention consists of a pair of tongs with upwardly and outwardly curved handles connected by links, the middle link being attached to the hoisting rope. The device is of simple and durable construction and adapted to firmly grapple and hold an article while lifting or moving it from place to place.

FENCE POST.—William M. Black, Urbana, Ohio. This post is ordinarily all of metal, although portions may be made of wood, the body being U-shaped in cross section, with the lower end bolted to anchor tie plates. It is especially designed for use as a corner post or gate post, and may be adjusted in the direction of any side, and when used in a wire fence may be braced against any tension, the adjusting mechanism also facilitating the bringing of slackened wires of the fence under proper tension.

INTERIOR HOUSE FINISHING.—George Knower. Chelsea, Wis. This invention provides battens of peculiar construction, for use in connection with a padding of paper material, in making arched wooden ceilings, etc., so that on the shrinking of the lumber the padding and battens keep the joints closed and water and air tight. The improved ceiling is readily put up, is not expensive, and may be made highly ornamental.

WAGON BRAKE.—James Vanderveer, Middle Village, N. Y. This is a strong, simple and inexpensive device, readily applicable to any form of vehicle, but especially suited for farm and other wagons which carry heavy loads. Combined with the brake lever are toggle levers, one of which is pivotally connected with the brake lever, while a link pivoted to the toggle levers at their junctions is pivotally connected with a hand or foot lever. A shifting lever secured to the axle of the vehicle prevents any strain on the body of the wagon or the springs when the brake is applied.

QUILTER FOR SEWING MACHINES.—William H. Chapman, Bradford, Ark. An attachment readily applicable to an ordinary sewing machine is supplied by this inventor, being a simple and inexpensive quilting frame, enabling the quilt to be conveniently handled and turned in any direction, so that seams may be run straight or in such curves as desired. It comprises a track, carriage and quilting frame, with horizontally arranged link connection between the carriage and frame to support the latter and permit it to turn freely, springs normally holding the frame in alignment with the carriage.

KEYHOLE GUARD.—George Hisgen, Fort Plain, N. Y. This is a strong and simple lock attachment to lock the key or bolt in place, and at the same time form a guard for the keyhole to prevent opening the door by unauthorized persons. It has a slide with V-shaped offset, an arm engaging either the bolt and passing over the keyhole or engaging the key, there being a guideway for the slide, and a knob to move it with its offset and arm into or out of the door lock casing.

ICE CREAM FREEZER.—James K. Patterson, Crete, Neb. The cream cylinder of this device has at one side a pivoted scraper, and below is a pivoted cream pan projecting beyond, a hopper delivering to the projected end. With a refrigerating compound in the cylinder and cream in the hopper, the cream is deposited upon the cylinder as the latter is revolved, where it is immediately crystallized and removed by the scraper.

HAMMOCK SUPPORT.—Nelson G. Reynolds, Bangor, Mich. This support has oppositely arranged diverging legs and braces when in position for use, the legs having at their upper ends hooks from which the hammock is suspended. The device may be folded into very small compass when not in use, and is very strong, light and easily operated.

BRACE FOR USE IN EXCAVATIONS.—George S. Miller, Council Bluffs, Iowa. This device comprises two bars, one having a head and the other a series of apertures, a yoke being pivoted on the head, and a stop pin passing through one of the apertures, a link locking the two bars together. The improvement is designed to afford a simple and sure means of supporting planks in excavations, such as ditches, canals, etc., the brace being readily extensible for varying widths.

SUSPENDER END.—William Bloomberg, New York City. This is an improvement in straps adapted to be secured to the buckles to carry button pieces to connect with the drawers, the suspender end strap being made with an integral tongue to fasten the device to support the drawers, the strap and tongue being readily applied to the suspenders, and being very cheap and durable.

DISHCLOTH HOLDER.—Clara Abell, Baldwinsville, N. Y. This is an elongated wire frame, with tin backing, there being a spring coil or double loop at one end of the frame and hooks at its opposite end, thus forming a light and convenient device for holding the cloth when used in washing articles, without danger of scalding the hand by the hot water.

DOLL.—Frederick B. Schultz, New York City. This is a simply and strongly made jointed doll, in which springs are arranged in the body and connected by swivels with chains for holding the parts together, whereby the several parts may be turned without danger of disconnecting or breaking the jointing devices.

FINGER OR TOE NAIL CUTTER.—Edmund T. Mason, New York City. This is a manicure device which may be readily manipulated by one hand to cut and shape the nails. It may be conveniently carried in the pocket or suspended from a watch chain.

SPITTOON CARRIER.—Gerard B. Nagle, Revelstoke, Canada. A pair of tongs is pivoted on the end of a handle of suitable length, on which also is arranged an opening and closing device connected with the tongs, that the latter may be conveniently used to clasp the spittoon, when it may be readily lifted and carried away for emptying or cleaning.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

NEW BOOKS AND PUBLICATIONS.

PHARMACEUTICAL PREPARATIONS, WITH THERAPEUTIC NOTES, FORMULÆ, DOSES, ETC. Philadelphia: John Wyeth & Brother. 1893. 8vo. Pp. 224.

This little book, though published in the interests of the trade, contains a vast amount of information which cannot but be of value to all physicians, pharmacists and chemists. The reading pages are written by practical chemists and the subject is frequently illustrated by graphic symbols, formulas, etc. Some of the new remedies are described by well-known physicians. Messrs. Wyeth are to be congratulated on the production of such a creditable work.

The Royal Edition of the *Architect, Builder and Decorator* for August contains several superb photographs of pleasing residences. The designation of "royal" is merited. In excellence of contents and beauty of typography the *Architect, Builder and Decorator* has no rival.

SCIENTIFIC AMERICAN BUILDING EDITION.

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Notes & Queries

HINTS TO CORRESPONDENTS.

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.

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

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(5377) E. F. P. writes: 1. I read that 1,800 volts were used in the execution of a New York murderer. According to that, it would be fatal to grasp the terminals of a battery of 1,800 Daniell cells joined in series. Would it? Again, as the voltage of a cell is independent of the size of the plates, if each of the above mentioned cells was no larger than a lady's thimble, the series should be equally fatal. Would it be? If not, why not? A. A constant voltage has very little effect on the human system. Sudden changes in potential in dynamo circuits, perhaps partly in themselves and partly by the production of induced currents, are the fatal elements. The batteries described would have very little effect, and would be perfectly safe. 2. I have a six-cell plunge battery that must have a voltage of nearly 12. Why do I experience no sensation whatever when I grasp its terminals? A. See answer 1. 3. Can a good D'Arsonal galvanometer be made to show the induction currents generated by moving a coil of copper wire through the field of a permanent magnet? If so, how should things be arranged so as to show the effect to an audience? A. Use very fine wire, so as to get as many turns as possible, and connect its ends to the galvanometer. Sweep the coil rapidly across the field close to the magnet poles. Be careful not to shake the galvanometer. 4. What advantage, if any, can be obtained by using a storage battery if (a dynamo being unobtainable) it must be charged by means of a primary battery? Would it not be better always to use the primary battery direct? A. A small primary battery can charge in a given number of hours a storage battery, so that a very heavy current can be taken therefrom for a less number of hours. It is virtually a concentration of many hours' action of the primary into a few hours' action of the secondary battery. 5. In computing the energy of a moving cannon ball or railway train I am directed to use the formula $K=\frac{Wv^2}{2g}$. Now, why use $2g$, since that quantity is exclusively an element of the laws of falling bodies? Isn't it possible to compute the energy of the ball or train referred to by a process entirely independent of gravity considerations? A. Energy is always referred to gravity considerations, and is expressed in foot pounds or other unit of vertical height and weight. The formula given reduces energy of motion to energy of position; position referring to height or advantage of position with respect to gravity.

(5378) E. W. L. writes: I am making a pocket battery, ¾ inch in diameter inside and 3 inches long, to hold 1 ounce of electropoion fluid. I want to know which is the cheapest and best way to protect the zinc so that it will last longer. I want it to heat a No. 40 platinum wire to incandescence, the wire having a small loop, and about ¼ inch long, the length to be heated being ⅛ inch. It is not to be heated steadily, but for a few seconds at a time, and will the battery do it and how long? The size of zinc and carbon is to be ⅛ inch in diameter and 3¼ inches long. A. Amalgamate the zinc with mercury. A very small quantity will suffice. The battery will exhaust itself when not in use. It

should give a good current for 5 minutes when fed. The zinc is very small.

(5379) C. A. K. says: Will you kindly answer the following? 1. Ocean steamships on their trip east make better time than on the trip west. Is it due to ocean currents, offshore winds, or do they make the trip on the arc of a great circle? A. The ocean steamers follow great circle sailing as nearly as possible both ways. It is the prevalence of westerly winds and the easterly set of the Gulf Stream that counts favorably to the eastern trip. 2. To settle a dispute between two friends: A claims that Florida is larger than England, Wales, Scotland, and Ireland combined, B claims it isn't. Please give number of square miles of each. A. B is correct. Florida has 59,268 square miles; England, Wales, Scotland and Ireland 120,879 square miles.

(5380) L. I. S. says: Do you know of any method by which black sheet iron drums could be soldered with ordinary soldering copper without first resorting to galvanizing, or any other method by which same could be made watertight? A. By removing the scale at the joints by acid, or scraping, the iron can be tinned with a copper, sal ammoniac being used as a flux and tin as solder, and when made up, soldered, or perhaps a better way for riveted and lapped joints, dip the drums in hot coal tar or thin asphalt varnish long enough to allow the tar or varnish to penetrate to the seams, then drain and cool.

(5381) G. F. K. asks: Having heard so much in regard to the use of oil on water during a storm at sea, I would like very much if you could inform me what action the oil has in stopping the force of the waves, or in other words, what is the nature of oil with water? A. Oil forms a film over the waves, which prevents them from breaking, reducing them to the condition of smooth swells. It operates by preventing the dangerous breaking at the crests.

(5382) D. W. C. writes: In your SUPPLEMENT of August 26, page 14717, is an article entitled, "The Distribution of Refrigeration in Cities from Central Stations." I would like to know if it would be practical for a hotel having 40 horse power (water) always at control to refrigerate a room for cold storage and to manufacture its own ice, 300 pounds daily. Also what ice plant would best be suited for a hotel with the above power, say for the manufacture of 500 pounds daily? A. The operation of a refrigerating apparatus for the production of ice and for cooling storage rooms from a distant source of power is practicable, either by compressing air at the power station and transmitting through pipes to the cold rooms, and there expanding into the rooms, or through coils immersed in brine for freezing in pans, as used in the ammonia process for making ice. The operating of cold rooms by compressed air is much in use in England and on ships in the meat and fruit trade, also on some of the United States war ships. There are no refrigerating plants as yet in use in the United States, to our knowledge, that are operated by compressed air, although several projects have been named. The economy of the ammonia processes has probably stood in the way of progress in the air process, but where ample water power can be had, the economy of compressed air cooling becomes a most economical one. The transmission of electric power from a distant water power station is practicable for operating a refrigerating plant with air or ammonia. Address Delamater Iron Works, 81 South 5th Avenue, New York, as to compressed air plant, and Pictet Ice Machine Co., 26 Cortlandt Street, New York, as to ammonia plant.

(5383) W. M. P. asks: 1. How would you proceed if obliged to stop your engine, when steam was blowing off at the safety valve, and a heavy fire in the furnace? A. Open the fire door wide, throw a covering of coal thinly over the fire and start the pump feeding the boiler. If the gauge pressure continues to rise, slightly lift the safety valve. 2. State the most economical point in the stroke at which to cut off the steam in the cylinder, and demonstrate it by an example. A. The most economical point of cut-off in a steam engine varies with its kind and with the initial pressure. The least volume of steam in pounds of water evaporated in the boiler per horse power per hour is assumed as the measure of economy. The terminal pressure in the cylinder indicates in a measure the point of cut-off for various pressures. If it approximates near to the atmospheric line with an initial pressure of 100 pounds, one-sixth cut-off would be the economical point, while with steam at 80 pounds one-fifth cut-off, 60 pounds one-fourth cut-off, 50 pounds three-tenths cut-off, and so on.

(5384) J. B. B. asks: 1. How are close coiled spiral springs wound so they have such strong tension? A. The tension of helical coiled springs is due to the torsional resistance of the steel. The twisting of a small steel wire will illustrate the difference between the bending and torsional resistance. 2. How are steel letters for marking tools, etc., made—by cutting or stamping the annealed steel and then tempering? A. Steel stamping letters are made by punching the central parts with small punches suited to the various forms of the letters, by engraving and by filing the outside to the proper form. 3. What acids are used in etching German silver, brass, nickel, aluminum and steel? A. Use nitric acid diluted with water for all but aluminum, for which use acetic acid saturated with common salt. 4. Where can the report be obtained of the aeronautical congress held in Chicago, of which you made mention last week? A. The report of the aeronautical congress is not yet published. Address the secretary, Professor A. F. Zahm, Notre Dame University, Indiana. 5. Is there a practical gasoline road wagon, suitable to carry two persons at a speed of from four to twelve miles per hour over ordinary roads, now in use? and if so, give name and address of the makers. Also cost of machine if known. A. Road wagons run by gasoline engines are not yet on sale. They are as yet in the experimental stage.

(5385) G. R. C. writes: In a residence which I am building I desire to put in water closet and bath room. Our city has water works but no sewerage. How can I arrange a cesspool so that it will be perfectly safe? Our soil below the surface is hard clay, with no vein of sand or gravel, but we find water at a depth of about twenty feet. A. A city with waterworks and no sewers is in something of a dilemma in the manner of disposal of the larger quantity of sewage natural to a water supply system. If there are no wells it is safe to dig cesspools as deep into the water stratum as practicable for present use. If neighbors have wells drawing from the water stratum, then cesspools are more or less dangerous. If made, they should be shallow and tight and arranged for the convenience of pumping into tank carts for removal to a safe distance.

(5386) 7. B. B. writes: Why in two different formulas for waterproofing woolens there appears to be the divergence in application I now describe, thus: 1. *a* soap and *b* alum solutions. In this case the woolen is dipped first in *a* and afterward in *b*, the result being an insoluble combination in the fiber of the material treated. I understand the *rationale* of this. 2. *x* acetate of lead solution, *y* sulphate of alumina solution. I would have thought that in this case, as in case 1, the woolen would have been treated to an alternate dipping in each solution, allowing the combination and the resultant insoluble crystals to form in the fabric; but in this case the direction is to combine the two liquids, decant the supernatant acetate of alumina, leaving the insoluble carbonate of lead and soak the fabric in the acetate of alumina, leaving it to dry out. Will you please say how or why it is that the exposure to wet does not wash out the soluble crystal, if it would not be better to dip (and partly dry) the fabric alternately in case 2 as in case 1, or if you can advise that process 2 as above is really good, whether it would require oft renewing? It is certainly the cleaner process of the two, if it will only stand good, as long as process 1. A. The *rationale* of the first process is to fill the texture of the goods with alum soap, which is insoluble in water, and hence must be precipitated as described. The second process saturates the goods with a combination of aluminum with a weak acid. This salt is supposed to decompose and in a certain sense mordant itself within the fabric. Properly executed, the first process would seem most efficacious.

(5387) W. H. U. writes: 1. In using a warm cyanide solution with a gold coin or an anode, I get a slight coating on copper cathode followed by a deposit of brown incrustation which prevents all additional deposit, battery 5 Crowfoot cells. What is the trouble? A. Use a pure gold anode and connect your battery in quantity. 2. Approximately how much metal (brass or copper) can be deposited with dynamo described in SUPPLEMENT, No. 793, in a day's run, 10 hours. A. Allow one-quarter of a grain per second. 3. Is there any patent on storage battery recently illustrated in SCIENTIFIC AMERICAN? A. In our SUPPLEMENTS you will find many articles on this subject. No very prominent invention has been recently illustrated. 4. When a storage battery has been charged for some time, will it develop a current instantly or does it require time to get in full action? A. Practically speaking, it will.

(5388) D. B. H. asks: 1. Is the making of electrical instruments, galvanometers, etc., embraced in the machinist's trade, or is it a trade in itself? A. There are some special trades in mechanics that designate certain branches to which the term "machinist" is not generally applied, as watch and clock makers, electrical instrument makers, philosophical, optical, and mathematical instrument makers. The term "mechanician" has been very properly applied to persons pursuing the finer branches of the mechanic arts. 2. Does it require a steam engine of one horse power to run a generator of 746 watts to its full capacity? A. Yes.

(5389) J. R. C. says: Kindly state in your columns at what height an observer must stand to see an object thirty feet high, which is sixty-one miles distant across the water. A. The depression of the horizon for an object 30 feet high over the sea is 7¼ miles, which must be deducted from the total distance, which leaves 53¾ miles as the total distance to which depression of the horizon is due, which amounts to approximately 1,700 feet, including refraction. Different barometric and hygrometric conditions of the atmosphere make the total height somewhat variable.

(5390) J. J. P. asks: How much power will be required to run a sixteen foot boat, forty inches beam, seven miles an hour? What size propeller should be used? What speed could such a boat make against a current of five miles an hour? A. Three horse power. Engine cylinder 2¾×3¾ inch. Propeller 20 inches diameter, 300 revolutions per minute. The speed against or with the stream would be 2 miles or 9 miles.

(5391) C. T. B. says: Perhaps your correspondent T. D. D., Notes and Queries 5319, of September 19, 1893, would be interested in the article by George H. Knight, in the *Cosmopolitan Magazine* for September, page 620, relative to the practically continuous railway rails being laid at Cambridge, Mass., for an electric railway.

(5392) S. H. writes: I wish to convey hot mineral water from the hot springs to my house. The distance is about two miles and one-eighth, with about 50 feet fall. I wish to know if you know of any one who makes an auger that will bore pump stocks from 8 to 10 feet long, and cleanse themselves, size 2 inch bore. A. Ames Manufacturing Co., Chicopee, Mass., manufacture pump augers and reamers for making wooden pipe and pumps.

(5393) D. B. K.—Your boiler for 12 gallons capacity should be made of ⅛ inch iron. The fire box should be ventilated by tubes, like other vertical boilers.

(5394) A. V. L., Texas, asks: What is the theory upon which the rain makers carry on their operations? Is there a sound basis to the theory, or rather, in which instances, if any, have they actually succeeded in bringing down a copious rain? The experiment was tried here last year, but did not succeed, and it is said that preparations are now being made for another trial. Many people seem to regard it as a piece of foolish nonsense and waste of money. A. The theory, as far as we understand it, is based upon the possibility of producing condensation of the moisture in the upper atmosphere into clouds, which are composed of minute vesicles of water, or, if clouds are in sight, to develop an enlargement of the water vesicles into raindrops by the intense vibration of the upper atmosphere, or perhaps, by the intense heat of the exploding gas, to create an upward current from a nearly saturated under current into a colder current, where, by contact with cold air, its moisture would be condensed and fall as rain. Where the conditions are favorable, as in a nearly saturated atmosphere, the experiments seem to have been successful in producing a shower. When the atmosphere was of a low degree of humidity, failure was the result. The idea was derived from the fact that rain has followed some of the great battles of the world, or, more probably, that some of the great battles were fought just before a storm.

(5395) J. W. V. asks: What can I use to keep planished copper and brass bright and what will clean them without much rubbing? Also what kind of a solution do the silversmiths use to clean their ware with and to keep it bright without rubbing? A. For keeping copper and brass utensils bright, there is nothing better than tripoli, rottenstone, or rouge, wet with a solution of oxalic acid in water, about one ounce to the pint, using a linen rag for a rubber. When polished, wash in hot water and wipe dry. This saves much rubbing, over the polishing material alone. Silverware cannot be kept bright without rubbing, which for plain goods needs nothing but wiping with a wash leather and Vienna lime or the finest chalk, such as used for cosmetics. For frosted and chased ware, a soft brush should be used charged with Vienna lime or fine chalk.

(5396) E. T. M. writes: 1. Will a windmill 8 feet diameter draw water from a distance of 40 feet horizontal by 25 feet vertical through 1¼ inch pipe, and force same through 1 inch pipe to height of 30 feet? A. The windmill will easily pump water through the pipes as stated. 2. Is there any kind of turbine or other wheel by which I could run a sewing machine with a fall of 25 feet water, something cheap and safe? Bottom of tank would be about 25 feet above sewing machine and water not plentiful enough to waste. A. A small water motor as made by the Backus Water Motor Company, Newark, N. J., will run the sewing machine. Address them for prices. 3. Do you know probable cost of such a small turbine for this purpose, or is there any other clean, safe method of running the machine whereby foot power could be avoided, and would a small gasoline engine be cheap and safe to pump the water distances mentioned in 1 and run the machine, not at same time, but each alone? A. A gasoline engine, i placed no higher than 25 feet above the water, will do the pumping and run the sewing machine. Address advertisers of gasoline engines in SCIENTIFIC AMERICAN.

(5397) R. G. M. says: I take the liberty of asking for directions for polishing horn. A. Use finely ground pumice stone and water, applied with felt polishing wheel; finish with rottenstone applied in the same way, or having scraped the work perfectly smooth and level, rub it with very fine sandpaper, repeat the rubbing with a bit of felt dipped in finely powdered charcoal with water; and lastly with rottenstone or putty powder and finish with a piece of soft wash leather, damped with a little sweet oil; or still better, rub it with subnitrate of bismuth by the palm of the hand.

(5398) W. L. F. says: 1. Will you kindly let me know what I can use to remove rust spots from white marble? A. Turpentine, 2¼ tablespoonfuls; lye, 1½ gills; ox gall, 1½ ounce; pipe clay, q. s. to make a paste. Apply the paste to the stain and let it remain for several days. Iron mould or ink spots may be taken out by dissolving in 1½ pint rain water, 1½ ounce oxalic acid, ¾ ounce butter antimony, flour sufficient to make the mixture of a proper consistency. Put on with a brush, let it remain a few days, wash off. Grease spots may be removed by applying common clay saturated with benzine. 2. Also something to remove moss from brown stone where flower pots have been standing? A. Mildew stains on brown sandstone are very difficult to remove except by refinishing, but the appearance of the stone can be improved by scrubbing the mildewed stones with a strong solution of caustic soda in water.

(5399) W. R., California, asks how the magnetic variation of the compass needle is determined. A. If you have a theodolite, a simple observation of Polaris at its upper or lower culmination will give the variation on the needle circle when the zero circle reading is vertically collimated with the axis of the telescope. Polaris is now 1¼ degrees from the true pole and opposite to the star Mizar, which is next to the last star in the handle of the Dipper. When Mizar is on the meridian either above or below Polaris, the polar axis is in the vertical line. When Mizar is at right angles to the west, Polaris is 1¼ degrees east of the true pole, and *vice versa*, so that a good observation may be always obtained within six hours after dark, by allowing for the three different positions of Polaris. If a compass is used, a plumb line should be hung from 15 to 20 feet from the compass, so that both compass sights will cut the line of sight of the plumb line and the rear sight and plumb line also in line with Polaris. Allow for the position of Polaris if at east or west elongation as above stated. The plumb line can be illuminated at the points of sight by lanterns shaded from the eye. Chalk the plumb line to make it easily seen

(5400) W. F. W. says: Will you kindly inform a reader what is the fastest time made on railroads in England and the United States respectively. Also the fastest schedule time in each of the two countries, and what improvement in time has been made in the last forty years? A. The fastest schedule time in both England and the United States is about 50 miles per hour. About 90 miles in England and 112 miles in the United States are the fastest spurts. Probably 25 per cent is the schedule increase in 40 years.

(5401) G. H. N. asks: 1. What is the difference in winding dynamos and motors? A. There is no difference. 2. What is the difference in winding dynamos for high or low voltage? A. The difference in voltage will be made by increasing or decreasing the length of wire in the coils of the armature. 3. What is the difference in winding for steady or alternating current? A. The difference between direct and alternating current machines is so great as to render it impossible to fully describe it in the space available in Notes and Queries. We refer you to SUPPLEMENT, Nos. 733 and 446. 4. What electrical magazine can I subscribe for that is not printed for the advertisements it can get and that will give me useful information, keeping me posted as to new inventions, etc. The SCIENTIFIC AMERICAN and SUPPLEMENT contain all of the important electrical news and more practical information than most purely electrical papers.

(5402) W. M. G. writes: I am making a storage battery and would like to know if the plates of a storage battery could be made of type metal and if the same would in any way affect the action of the battery? A. You can use type metal for storage battery plates, but we think the alloy would be improved by the addition of pure lead, as type metal is rather brittle and apt to be easily broken. An alloy of lead and antimony is now in use for secondary battery plates.

(5403) B. A. C. writes: I wish to connect a small dynamo used to charge storage batteries to a windmill. There is an abundance of power, but there is an irregularity of speed. Now, will the dynamo charge the batteries while running under different rates of speed? A. You must arrange an automatic cut-out to throw off the dynamo current in case the speed is too high or too low. A considerable range of irregularity is permissible. An automatic governor might be devised to regulate the charging current.

(5357) For "fifth" root in above query read "sixth" root.

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September 19, 1893,

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