ENGINEERING INVENTIONS.

An apparatus for cooling car axle boxes has been patented by Mr. Jerome Eugene Tourne, of New Orleans, La. It consists of pipe connections whereby the exhaust steam is made to flow to the several car axle boxes, and through which also a powerful current of live steam may be directed if desired.

A railway switch has been patented by Messrs. Hugh C. Cannon and Joseph P. Canty, of McArthur, Ohio. It has a radially swinging section, spring tongues, lever, bell cranks and pull rods, making a novel construction of frogless switch, designed to be more effective and reliable than similar devices have heretofore been.

MISCELLANEOUS INVENTIONS.

A holder for collars or cuffs has been patented by Mr. Theodore Gentzsch, of Brooklyn, N. Y. It is a simple holder, quickly and easily applied, and will securely attach either a collar or cuff to the proper band of a shirt.

A peach stoner has been patented by Mr. James H. Smith, of Little Rock, Ark. It is strong and simple in construction, and designed to work with great rapidity and certainty, being calculated to stone from three and a half to four bushels of clingstone peaches per hour.

A combined mitten and sleeve for garments has been patented by Mr. George M. Wright, of Shelbyville, Ind. It is made of rubber or similar material, and consists of a sort of glove, so formed and attached to a sleeve that it may be folded back upon the sleeve to constitute a cuff.

An adjustable chair back has been patented by Mr. George J. Shults, of Avoca, N. Y. Its construction is such that by loosening certain nuts the side bars may be elevated or depressed, and the adjustable section may be conveniently clamped in any position to which it has been moved.

A scroll saw has been patented by Mr. William M. Moore, of Empire City, Col. It is cylindrical, being a round bar with cone shaped and spirally arranged teeth, and spiral grooves impressed into the bar, so that it may be made to follow a great variety of curves running in different directions.

A straw board lining machine has been patented by Mr. Ebenezer Spooner, of New York City. It is for pasting thin paper on sheets of straw board, and is so made that the paste is automatically applied to the web of the paper, and the board and lining material carried forward so that excessive moisture is extracted, and the boards cooled before delivery.

A broom holder has been patented by Mr. Alberto Finks, of New Berlin, N. Y. It is formed of a metal plate, that may be quickly struck or stamped out at one operation, and then bent to proper shape, so that it will rest close against the wall, making a device into which the broom handle can be easily forced, and thus be held out of the way.

A cigar perforator has been patented by Mr. Leman C. Miner, Jr., of Brooklyn, N. Y. Combined with a slotted and apertured casing is a needle working in guides therein, and a spring-actuated lever, having one of its arms projecting through the casing and the other connected to the needle, with other novel features, to facilitate giving cigars a free draught.

A medicated calcimine has been patented by Mr. Thomas E. Costello, of Brooklyn, N. Y. It consists of whiting or Paris white, corrosive sublimate, salicylic acid, and solution of Irish moss, to be applied with a brush in the usual manner, when it dries rapidly without showing laps or seams, and makes a good disinfectant and insect destroyer.

A horse detacher has been patented by Messrs. Walter L. and Philip M. Mitzel, of Felton, Pa. Combined with a singletree having spring-seated bolts at its ends is a retracting cord and a metal bar carrying pulleys for the cord and connected to the singletree and its ferrules, whereby the driver can readily disconnect the traces of a fractious horse from the singletree of the carriage.

A grain scourer has been patented by Mr. David Etnier, Jr., of Mount Union, Pa. Combined with a conveyer and cylinder, and fixed and rotating rubbers, is an annular hood or case surrounding the rubbers, and a brush fastened on the movable rubber, with other novel features, whereby the kernels of the grain will be freed from fuzzy or light particles and scoured properly for grinding.

A tool for making spiral springs has been patented by Mr. Johan T. B. Siden, of Nybo, Waldo, Sweden. It consists of a pair of tongs with its legs united at one end and having threaded jaws, in combination with a holder adjustable in a keeper having a sliding connection with one of the legs, to facilitate the winding or coiling of hardened steel wire into cylindrical or conical springs.

A photographic print washer has been patented by Mr. John T. Long, of Menomonee, Wis. It is a rocking tray, pivotally supported in the lower part of the frame, with forked arms for engaging studs projecting from the side of the print-washing tray for communicating an oscillating motion from the rocking tray to the swinging tray, with automatically operated valves, etc.

A safety mechanism for torpedo tubes has been patented by Mr. Emil Kaselowsky, of Berlin, Germany. This invention provides a mechanism designed to obviate the dangers of admitting compressed air to the tube to discharge the projectile before the cover has been removed, furnishing also the means for releasing or withdrawing the brake blocks or retaining studs.

A wheel and axle has been patented by Mr. John Pettinger, of Santa Barbara, Cal. In combination with a fixed axle are sleeves turning loosely therein and carrying hubs, with a continuous tubular spindle passed through the sleeves and turning freely therein, with other novel features, making a construction that is very cheap, and in which extreme lightness is combined with the greatest strength.

A stove grate has been patented by Mr. Horace Hatchman, of St. Louis, Mo. It consists of an oblong frame in connection with a series of grate sections or fingers supported at their lower ends by hooks on a cross bar of the frame, and at their upper ends by arms projecting from the upper bar of the frame, being applicable to both heating and cooking stoves, and showing the fire all around if applied for such purpose.

A yard for ships has been patented by Mr. Duncan Campbell, of Fort Cauley, Auckland, New Zealand. It is a tubular yard formed of sheet metal, slotted in the upper and lower side, with a central connecting web or plate extending throughout the entire length of the yard, the ends having removable caps, and rods extending through the upper and lower part of the yard, opposite the slots, to receive double eyes attached to the sails.

A machine for making sheathing paper has been patented by Mr. William H. H. Childs, of Brooklyn, N. Y. It has two rollers, with one or more pieces closely fitting on their upper and inner surfaces, forming with such surfaces a trough or hopper arranged at intermediate portions between their ends, with other novel features, whereby the coating material may be applied more conveniently, as desired, to any part of the paper.

A cordage spinning machine has been patented by Mr. Elisha M. Fulton, of New York City. This invention covers a combination with a spinning or twisting and spinning mechanism of a series of chains, one in front of the other, instead of a single chain, as heretofore, for passing the sliver to the spinning mechanism or its flier, the chains being armed with pins to comb, draw, and take hold of the sliver, and made to travel at different velocities, in order to work a heavier sliver and give more perfect control of the draught. The invention also facilitates the running of the spinning mechanism at a high rate of speed, while producing a uniform cord.

Business and Personal.

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

NEW BOOKS AND PUBLICATIONS.

DESIGNING WROUGHT AND CAST IRON STRUCTURES. Part III. Notes, calculations, tables, and working drawings for a rolled iron girder and flitched beam, with comparisons of strength by various rules. By Henry Adams, M. Inst. C. E., etc., Professor of Engineering at the City of London College. London, 1886. Demy 8vo. 30 pp., with one large plate. Published by the author.

Part III. consists of two subdivisions: The first treating of the method of designing girders to support masonry walls. Relation of depth of girder to its strength; the weight relative to area of section, strength of girders by various rules compared, and a masterly description of the method of arriving at correct results by the modulus of section determined by the moment of inertia. Second division treats of a special case of a flitched beam of Canada oak, and cost of painting. It is practically a series of studies upon wrought and cast iron construction, addressed to the architectural and engineering student, and particularly adapted to instruct the novice in the difficult art of constructional engineering. It is the best introduction to the study of the strength of materials we have seen, and the high character of its author will commend the book to the student's careful perusal. A typographical omission occurs on the formula given for the deflection of an I beam under a distributed load; it should read:

$$D=\frac{L^3Wc}{D^3B-d^3b}$$

the term d^3b having inadvertently been omitted.

* * Any of the above books may be purchased through this office. Address Munn & Co., 361 Broadway, New York.

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.

(1) C. W. T. asks (1) a cure for red hands, and also the manner in which it is to be used? A. Take 4 parts glycerine, 5 parts yolk of egg; mix thoroughly, and rub on after washing the hands. A little lemon juice will also assist to whiten the hands. 2. Does borax have an injurious effect if used in washing fabrics? A. It is much used for such purposes, and is not ordinarily injurious.

(2) J. R. J. writes: I have a pair of engines 2 inches stroke, 1 inch bore, of which I want to make a locomotive; will you give the dimensions, to wit, length, diameter, and thickness of copper plate of boiler; length, width, height, and thickness of copper plate of fire box; length of smoke box, and number of tubes; to burn charcoal; size of rivets; width, depth, and thickness of bed plate and frame of cast iron; diameter and gauge of one pair of driving wheels for highspeed; diameter of leading and trailing wheels; diameter of driving shaft? A. Length of boiler 16 inches, diameter of boiler 4 inches, thickness of shell $\frac{1}{8}$ inch, heads $\frac{1}{8}$ inch, fire box 3 inches wide, 4 inches long, 4 inches high, smoke stack 6 inches above top of boiler, 20 tubes $\frac{1}{2}$ inch, rivets $\frac{1}{8}$ inch. Bed frame of small angle iron or $\frac{1}{4}$ inch by $\frac{1}{8}$ inch flat iron. Drivers 5 inches, truck wheels 2 inches, shaft $\frac{1}{2}$ inch.

(3) G. C. S. asks why a gas engine has explosions at one end of its cylinder only, and why not at both ends? A. Principally on account of the complication of mechanism required to secure the double action.

(4) J. E. W. desires a receipt for making a low priced red paste, soluble with water on a brush, to be used with a stencil. A. Take of shellac 2 ounces, borax 2 ounces, water 25 ounces, gum arabic 2 ounces, and of Venetian red a sufficiency. Boil the borax, shellac, and some water until they are dissolved, add the gum arabic and withdraw from the fire. When the solution has become cold, complete 25 ounces with water, and add more red to bring it to a suitable consistency.

(5) W. K. McL. writes: I would like to get a recipe for making a liquid glue or cement for use in a printing office for padding bill headings, note heads, etc.? A. Soak highest grade of glue in water for 10 minutes, and then dissolve to thin consisteney; for every fifty pounds of glue add 9 lb. of glycerine. Color with aniline or cochineal, dissolving the coloring matter in a little alcohol before adding to the glue.

(6) E. S. writes: I have a small gas pressure governor containing mercury, which is exposed to the air. Will a thin layer of glycerine on the surface of the mercury be a good way to prevent or retard the evaporation of the latter. Can you tell me of something better than glycerine for the purpose? A. Glycerine is excellent. We can recommend nothing better.

(7) W. A. J.—You cannot effectually restore the depolarizers in a Leclanche battery, as natural binoxide of manganese is used in them. You can boil out the porous cups first with water and then with weak hydrochloric acid, and finally wash in running water.

(8) J. L. P. asks: 1. What fluid or liquid boils at the lowest temperature, and at what degree Fah.? A. The range of boiling points is very extended; hydrogen has been liquefied, and its boiling temperature is several hundred degrees below 0° Fah. The liquid paraffine pentane boils at 100·4° Fah., and a liquid could be found for almost any desired boiling point. 2. What proportion of its bulk will mercury or quicksilver expand if its temperature be raised 100° Fah., say from 20 to 120? A. In absolute expansion about one ninety-ninth of its bulk. 3. Can mercury be kept any length of time in any receptacle other than glass? A. It can be kept in receptacles of iron, wood, gutta percha, paper, and many other materials. 4. Will it evaporate? A. It evaporates a little at the higher summer temperatures. 5. By what law is it possible for a cat, if suspended by her four feet or paws one or more feet from the ground, and suddenly released, to make the turn, and alight square on the feet every time? A. The cat turns by her own muscular force.

(9) Timothy writes: 1. There is a chemical combination with which paper may be saturated, and if the latter is then exposed to a current of electricity, decomposition takes place and a blue mark shows the point of contact. Does the paper require to be moist when the current is applied, or will decomposition take place on dry paper, and about how strong a current is necessary? A. The first compound consists of one part saturated solution of ferrocyanide of potassium, one part saturated solution of nitrate of ammonium, and two parts of water. Some moisture is necessary, but the paper may be practically dry. 2. Is there any chemical combination that will produce a black mark or any other color by electric decomposition? A. A solution of iodide of potassium produces a mark that verges on black, but that is temporary only. For either solution use a current of three or four volts E. M. F.

(10) B. W. E. desires a receipt and method of pickling oysters or shrimps so that they will keep well and for long periods when put up in glass jars or tin cans. A. Take 100 large oysters, 1 pint white wine vinegar, 1 dozen blades of mace, 2 dozen whole cloves, 2 dozen whole black peppers, 1 large red pepper broken into bits. Put oysters, liquor and all, into a porcelain or bell metal kettle. Salt to taste, heat slowly until the oysters are hot, but not to boiling. Take them out with a perforated skimmer, and set aside to cool. To the liquor which remains in the kettle add the vinegar and spices. Boil up fairly, and when the oysters are almost cold, pour over them scalding hot. Cover the jar in which they are, and put away in a cool place. Next day put the pickled oysters into glass jars with tight tops. Keep in the dark, and where they are not liable to become heated. Treat the shrimps similarly.

(11) F. P. P. asks: How much electricity will 1 square foot (surface) of zinc and the same amount of carbon give in a solution of salt and water equal to ocean water? How much carbon should be used to one square foot of zinc? Will copper work as well as carbon, and how much should be used? A. Using carbon, you will get about three-tenths volt, and 1 to 3 amperes through a low resistance circuit. Copper will give considerably less than carbon. Use as much carbon as zinc, or if you prefer it, use one-half the area, and bend the zinc around close to, but not touching, the carbon.

(12) J. G. C. asks (1) what ammonium fluoride is. A. It is a compound of ammonium and fluorine; it can be made by adding hydrofluoric acid to a solution of ammonia (aqua ammonia of commerce). 2. Is ammonium fluoride what is commercially known as white acid? A. "White acid" is the bifluoride of am-

monium, containing nearly double the quantity of fluorine that the neutral fluoride does. 3. I also wish to make a substance of about the consistency of ordinary paint, that, when coated over glass, will corrode or rough its surface. A. Mix "white acid" with powdered sulphate of baryta and enough water. For all operations involving the use of fluoride of ammonium or of hydrofluoric acid, you must use vessels of lead or gutta percha.

(13) W. H. M. asks: 1. Is the sun always direct south at twelve o'clock? A. No. Only on 4 days in the year. It is fast or slow, varying from 0 to 16 minutes. See your almanac. 2. Has perpetual motion been discovered yet? A. No.

(14) N. D. writes: I see by the New York *Tribune* that Congress has "refused money to sheathe with copper the bottom of the new steel vessels." How can copper be fastened to bottoms of steel or iron vessels? A. A wooden skin is bolted on over the iron or steel hull, and the copper fastened to the wood, it being necessary to completely isolate the copper from the iron, to prevent galvanic action.

(15) E. M. W. asks how to clean a violin bow that has become greasy and will not hold resin. A. Rub carefully with best yellow soap on a small piece of flannel, then wipe dry with a piece of calico or linen; in an hour afterward it will be ready for the resin; or use a solution of borax and water.

(16) A. V. C. desires formulas for embalming fluid (face tint) and chemical razor, such as are used by undertakers, the last named being a preparation for removing hair. A. The face tint consists simply of an embalming fluid, for which there are numerous receipts, one of which is to mix together 5 pounds dry sulphate of aluminum, 1 quart warm water, and 100 grains arsenious acid. See articles on embalming in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 51 and 155. The chemical razor is an ordinary depilatory, consisting of sulphide of barium or calcium.

(17) J. R. T. asks how to get a red color on yellow brass castings after they are cast, without using any acid; also a good flux for brass. A. The peculiar orange or red color is due to the quality of the metal and manipulation after pouring. Yellow brass will not produce the color to any extent. A composition of tin and copper, such as used for valve work, will come out of a brilliant color by dipping in water a few minutes after pouring. A little pulverized charcoal is all that is useful as a flux substitute in brass melting.

(18) T. E. K. asks: 1. What can be done to Russia iron when it rusts or to prevent it from rusting? A. Rub down the surface with plumbago and linseed oil. 2. How is starch made to give linen a gloss? A. See answer to query 15 in our issue of February 26.

(19) C. F. B. asks: What will remove dandruff from a person's head without injury to the skin or hair? A. Take a thimbleful of powdered refined borax, dissolved in a teacupful of water; first brush the head well, then wet a brush and apply the mixture to the head. Do this every day for a week and then at longer intervals. Thorough cleanliness and frequent, but not violent, brushing, at least every night as well as morning, will generally keep the head free from dandruff.

(20) C. S. F. asks what gumwood is good for, also if it is subject to dry rot or attack by worms? A. It may be used for water pipes, as in the salt works at Syracuse; it is also good for hatters' blocks, wheel naves, and cog wheels. The wood is close and tough and resists splitting, though it decays sooner on exposure to the weather than elm.

(21) J. H. M. asks how to mix a good bright acid dip for brass work previous to lacquering. A. Clean the articles in strong nitric acid for a few seconds, or 2 parts nitric, 1 part sulphuric, 1 part salt. Wash in hot water.

(22) J. A. W. writes: Can you recommend something, as a liquid, or in any other form, which can be rubbed on a horse to keep off horse flies? A. Procure a bunch of smartweed, and bruise it to cause the juice to exude. Rub the animal thoroughly with the bunch of bruised weed, especially on the legs, neck, and ears. This remedy is said to be good against flies or other insects for 24 hours. The process should be repeated every day.

(23) J. W. H. writes: Are intermittent springs a reality or a myth? If a reality, what is the probable cause? A. Intermittent springs are a reality, and are caused by peculiarities in the underlying rock formation, by which water accumulates in cavities with a siphon outlet, so that the cavity fills and starts the siphon, which runs until the cavity is emptied or the action broken. Other intermittent springs depend upon the rains, perhaps, falling in distant districts for their flow. Their times are not measured with regularity.

(24) R. C. P. writes: I inclose you herewith specimens of mineral for your examination, found in this town while drilling for an artesian well, at a depth of about thirty feet. A. They are pieces of the drill point which have broken off and become rounded by the attrition.

(25) J. C. asks: The magnet in the tube of ear piece to the Bell telephone appears to be wound by two or three wires twisted together and treated as one. What is reason for this, and how are ends of the wires joined if this is the case? A. The bobbins are wound with a single wire, but its end is attached to several terminal wires to guard against breakage.

(26) A. O. W. asks who the inventor of the spectroscope was. A. In 1860, Professor Robert W. Bunsen and Gustav Robert Kirchoff, both of Heidelberg University, jointly invented spectroscopicanalysis. Any prism may be termed a spectroscope, but the modern spectroscope may be assigned to 1860, and to the above as inventors.

(27) E. N. B. asks whether a wheel mounted on a shaft having suitable bearing, and placed under a magnet of sufficient power to counteract the force of gravity, and all inclosed in an air tight receiver, and a perfect vacuum formed therein, would, after being started, come to a state of rest? A. The wheel would come to rest very quickly; currents of electricity would be induced by the motion, and this would involve an expenditure of energy.

(28) J. W. V.—A current is only produced in a secondary coil when the current in the primary undergoes some alteration. If the primary current is stopped or diminished in any way, a current is induced in the secondary in the same direction. If the primary current is started or increased, the current in the secondary is in the inverse direction.

(29) D. H. asks: 1. How much power is required to work a set of telegraph instruments one hundred yards distance? A. For telegraph instruments use about four gravity cells. 2. Would a dressing of wood ashes be beneficial to onions? If so, state when, how, and the quantity required to the acre? A. Wood ashes are an excellent dressing. Use from two to five tons to the acre. 3. When stable manure cannot be had, would pea vines plowed in answer as well? A. Pea vines plowed in would be a very poor substitute for manure.

(30) Young Blacksmith.—Ordinary malleable iron castings cannot be welded. The central part is not perfected in the annealing process. Malleable iron shears and other cutlery that is steel faced are made of good iron, and thoroughly annealed, so as to be homogeneous throughout the piece. Then the welding may be done in the ordinary way, with borax flux. The welding of cast steel of high grade is rather difficult, but can be done with borax. It is better to use double shear steel, which answers well for cutting tools and may be readily welded to iron or to itself with borax flux. Clock springs are tempered by dipping in a pot of lead heated to a cherry red, then in oil to harden. Draw the temper in boiling oil. See SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 95, 103, 105, 397, 221, 222, on Hardening and Tempering Steel.

(31) I. A. T. asks the correct mixture for making German silver. A. For fine German silver:

49 parts	Copper.
24 "	Zinc.
24 "	Nickel.
2½ "	Aluminum.

All by weight. There are alloys of many other proportions that are recognized as standard.

(32) A. F. D. wishes to know what the pressure of water would be at the lower end of a pipe line 5½ miles long with an average grade of 150 ft. to the mile. Also if hot water from hot springs would lose any of its heat in running through the above named pipe. A. There will be 354 pounds per square inch pressure at the lower end when the water is at rest or not being drawn. If pipe is left open for free running from the full orifice of pipe, the friction of the water will largely lessen the pressure. The heat lost will depend upon the size of the pipe and velocity of the water, as well as the protection it may have from radiation.

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April 12, 1887,

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