NEW BOOKS AND PUBLICATIONS.

RUSSIA UNDER THE TZARS. By Stepniak. Rendered into English by Wm. Westall. New York: Charles Scribner's Sons, 1885.

In this vivid picture of the galling despotism of the Tzars, the well-known Nihilist has struck a vulnerable point in the Russian autocracy. Such a burning account of atrocious wrongs must claim the attention of Christendom. It is an appeal to the power of public opinion. The Russian government, though entirely oblivious to the tears of a whole province, is curiously sensitive to foreign criticism. It is this sole vibratory chord which Stepniak has touched. His account of the present tyranny is accentuated by a brief sketch of Russia's ancient liberty. The description of the village *Mir* and provincial *Vetche* are interesting studies in social economy. The contemptible detective service which the government has stooped to organize, and the mockery of Russian law, are introductions to the horrors of Siberia and the fortress of Peter and Paul. But the main portion of the book is devoted to the evils which fall even on those obedient subjects who are innocent of the love of liberty. In Russia it is a crime to be suspected. No one can be free from the dread of administrative exile. The censorship of the press and the discouragement of education, so essential to autocratic rule, are formidable barriers to the progress of civilization. Coming just at this time, when the eyes of the world are fastened upon Russia, this book will interest many readers, and, it is to be hoped, will accomplish something for her liberation.

THE DISTILLATION AND RECTIFICATION OF ALCOHOL, AND THE PREPARATION OF ALCOHOLIC LIQUORS, ETC. By William T. Brannt. Henry Carey Baird & Co., Philadelphia.

The distillation and rectification of spirits properly occupies the major portion of this volume, and is treated in a simple but comprehensive way, bringing the whole subject within the understanding of any one of ordinary intelligence. Yet we doubt whether this portion of the book will be so much appreciated as will be the chapters on the preparation of liquors and cordials, which explain how easy it is to fabricate from pure spirits a wide variety of liquors, such as Cognac and other brandies, Hollands gin and Schiedam schnapps, Scotch, Irish, old Bourbon and other whiskies, cordials, bitters, etc. The thousands of imitations of "genuine imported" or "old stock" liquors in the market render it not easy for even an expert to judge of the various qualities; but the importance of extreme care in this respect may be judged when we note that among the materials used in these liquors are, besides a wide variety of nut shells, allspice, cinnamon, etc., such additions as turpentine, spirits of niter, citric and acetic acids and acetic ether, fusel oil, creosote, and many others of the same kind. It is difficult to estimate the consumption of these fabricated liquors or their effects upon the individuals who take such compounds into their stomachs; but it is safe to say that if every one who has heretofore helped to increase their sale could be made aware of the facts, there would be a decided "drop" in the liquor market.

APPLIED MECHANICS. By Gaetano Lunza. John Wiley & Sons, New York.

As a text book for students of engineering, this volume, by a Professor in the Massachusetts Institute of Technology, Boston, will prove a most useful assistant. It is largely a treatise on strength and stability, and the topics are arranged in such manner as was deemed most convenient for the classes of the institution in which the author taught. The contents embrace chapters on the composition and resolution of force, dynamics, roof and bridge trusses, center of gravity, strength of materials, continuous girders, equilibrium curves, arches, and domes, and theory of elasticity and applications. The reported tests of iron, steel, and timber, for a wide variety of uses, embrace a large number of the most carefully made trials of recent date, and the explanations and criticisms thereof are such as to increase the practical value of the information thus afforded.

TWENTY YEARS WITH THE INDICATOR. Vol. II. By Thomas Pray. John Wiley & Sons, New York.

This work, as was the first volume by the same author, has been compiled from a very extensive practice in testing engines of almost every kind and for nearly all varieties of work for which they are employed. The indicator in the hands of an intelligent engineer is a simple device, which should be easily managed to give valuable readings as to the working of an engine and the economical use of steam, but there are many who fail to employ it rightly, or correctly deduce from the cards the evidence they give, and to all such this volume details experiences likely to be of practical service.

STEAM USING, OR STEAM ENGINE PRACTICE. By Charles A. Smith. The *American Engineer*, Chicago.

This work is a companion volume to "Steam Making," by the same author, the two books forming a valuable addition to the literature of this subject. The book is a great deal more practical than theoretical, the chapters on valves and valve gear, and on different varieties of engines, with the illustrations of details and citations of experiments, containing a great deal of interest and value.

THE PHŒNIX BRIDGE COMPANY, of Phœnixville, Pa., have recently issued a handsome illustrated album of designs of bridges, with detailed descriptions. The list of wrought iron bridges, viaducts, and piers built by the company covers some of the most important work of this character ever built in the United States and Canada. The distinctive features of American bridge work—elaborate bracing, no extra use of material, and, consequently, light and graceful forms of structure as well as great strength—are well shown in the views of their bridges here given. David Reeves is the President of the Company, and Adolphus Bonzano Vice President and Chief Engineer.

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

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

Minerals sent for examination should be distinctly marked or labeled.

(1) W. M. B.—The wood of pickle kegs may be protected by coating it with paraffine. Bottles, however, are the best vessels in which to preserve pickles. A beautiful green color entirely destitute of any poisonous qualities may be made by dissolving 5 grains saffron in ¼ ounce distilled water, and in another vessel dissolving 4 grains indigo carmine in ½ ounce distilled water. After shaking up each thoroughly, they are allowed to stand for 24 hours, and on being mixed together at the expiration of that time a fine green solution is obtained, capable of coloring pickles, etc.

(2) C. H. R.—An oil cloth should never be scrubbed with a brush, but after being swept, should be cleaned by washing with a soft flannel and lukewarm or cold water. On no account use soap or water that is hot, as either would have a bad effect on the paint. When the oil cloth is dry, rub it well with a small portion of a mixture of beeswax softened with a minute quantity of turpentine, using for this purpose a soft furniture polishing brush. The following is also used to keep oil cloths looking well: Wash them once a month in skim milk and water, equal quantities of each. Rub them once in three months with boiled linseed oil. Put on a very little, rub it well in with a rag, and polish with a piece of old silk.

(3) H. V.—There is probably no special book treating of the separation of gold and silver from their ores by means of electricity. In a small way gold and silver are thrown down from solutions containing them, as in the plating processes, but such a line of operation would hardly meet with success in treating ores. The same is true of mercury; the general process of obtaining mercury from its ores is by distillation. We would suggest that you consult some of the many books on metallurgy.

(4) G. D. writes: Please inform us how many lines of nonpareil type, 13 ems pica width, it takes for 1 square. Also how we can find the number of squares in nonpareil, when the matter is set in bourgeois same width? We have county printing to do, and they pay at so much a square, nonpareil type. We don't have nonpareil enough to set it in, and have to use bourgeois, and we are unable to find any rule, or any one who knows how to measure it? A. A printer's "square" for measuring advertising space in a newspaper is a term of variable meaning, always requiring fuller definition to express its exact quantity of space. It is customarily used in connection with the particular type and measure of the paper, as "a square of 12 lines agate," or nonpareil, or any other kind of type, and really means only a space of that extent, not in any way a mathematical square of space in the paper. It first came into use as designating a small space for a business card, and has been largely used by printers, more especially in small country papers—the "square" being generally stated to mean a particular space varying from about 10 to 14 lines, and of the size type used for advertising in the paper, from agate to long primer. Your square of nonpareil should mean a definite number of lines, and then measure by this rule the space occupied by any other kind of type, larger or smaller.

(5) D. W. L.—With a well made boat, on smooth ice, an ice boat will travel much faster than the wind. For example, a twenty mile breeze will drive the boat with a velocity of 40 miles per hour or more.

(6) C. E. A.—A good quality of printer's ink brought to the proper consistency with linseed oil is the best article to use with pad for rubber type. Nigrosine black dissolved in water and mixed with sufficient glycerine is likewise employed, but it is not as good as the former.

(7) A. S. writes: Do you know of any paint that can be applied to posts, that horses will not touch? A. We do not know of any but such as it would be objectionable to use.

(8) R. F. E., Jr.—The Carre ice machine is made by the Richmond Iron Works, Philadelphia. The medium used is simply a strong solution of ammonium hydrate, the principal point throughout the operation being that as the liquid ammonia is rendered gaseous it absorbs the sensible heat from the water to be frozen.

(9) R. H. D. asks: In what proportion to mix tincture of cantharides and glycerine for the prevention of baldness? A. An excellent hair tonic consists of as follows: Scald black tea, 2 oz., with 1 gal. boiling water; strain, and add 3 oz. glycerine, tincture of cantharides, ½ oz., and bay rum 1 qt. Mix well by shaking, and then perfume.

(10) H. J. C. writes: 1. The gas carbon dioxide (CO_2) is present in air to extent of nearly 4 per cent, and is soluble in water (1 liter of water at 15° dissolving about 1 liter CO_2). Notwithstanding this, it is found that even after long rains the amount of CO_2 in the air at any particular locality remains practically unchanged. What is the reason? A. Ordinary rain contains carbon dioxide which it has dissolved out of the air. The amount absorbed by the rain could not but be infinitely small under ordinary circumstances, and moreover the sources of its origin are constant. 2. How would you define flame? A. Burning vapor or gas. See also Webster. 3. At low temperature the gas nitric peroxide (N_2O_4) condenses to an almost colorless liquid. Upon increasing the temperature the color deepens to yellow and brown. Why? A. The various shades assumed by the nitrogen peroxide are due to impurity or dilution, for as a liquid it is colorless, but as it expands by the heat it takes more air, becomes more oxidized, and therefore colored to a greater degree, just as the iron oxide, which is black when anhydrous, as in certain varieties of hematite, but, as it becomes hydrated and mixed with water, it changes to red. and so on through various shades to the light yellow ochers. The colors are properties of the substances.

(11) J. B.—Rubber is generally pressed in iron moulds. A little soapstone is first thrown into the mould to prevent the rubber from adhering to the mould. Full information on the India rubber industry is given in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 249, 251, 252.

(12) F. N. O. asks for the preparation used to stick together the edges of paper in making scribbling blocks. A. Ordinary glue to which about 5 per cent of glycerine has been added is frequently used. A solution of rubber in carbon disulphide is also used. A little aniline is added to the solutions in order to produce the color.

(13) J. T.—The so-called "magic tooth paste" consists of white marble dust, 2 oz.; pumice stone in impalpable powder, 1½ oz.; rose pink, ½ oz.; otto of roses, 7 or 8 drops. Mix with sufficient honey to make a paste. This will rapidly clean the teeth, but it is not adapted for free or frequent use.

(14) D. H. asks if there is any preparation that will stop cracks in a stove, so as to prevent the smoke from escaping, where the heat is great, as in the back of an ordinary grate? A. Take equal parts of sulphur and white lead, with about a sixth of borax, incorporate them so as to form one homogeneous mass. When going to apply it, wet it with strong sulphuric acid and place a thin layer of it between the two pieces of iron, which should then be pressed together. An excellent cement consists of glycerine and litharge stirred to a paste.

(15) A. H. W. asks: What substance is the best for securing the rubber tire to the rim of a bicycle? A. Rubber cement is used, although the tire is sometimes vulcanized on.

(16) C. S. T.—Oxygen gas is given off when potassium chlorate and manganese dioxide are heated together. This operation is generally conducted in a flask to which a delivery tube is attached, and the gas passes through into a convenient receptacle, bubbling up and replacing the liquid already in the vessel. Any text-book on chemistry will show the manipulation better than we can explain it.

(17) P. W. T. writes: How can I stick glass to wood so as to cut it? It must be so that water will not affect it. Also, how can I take it off again? What will polish glass? A. You will find in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158, a great number of waterproof cements, but one that can be easily removed complicates the condition. Will not sealing wax answer? It is not affected by moisture, and a little heat will make it fluid.—Glass can be polished by treating it with fuller's earth, rouge, and like substances with a rag and a little oil.

(18) J. D. asks: 1. Is there any way of restoring the yellowish unbleached color to bleached cotton cloth without weakening the fabric? A. No. 2. Will anything remove ink stains from the dark colored leather of portfolios or book bindings without destroying color? A. Any bleaching agent that you might use will probably affect the coloring matter of the leather. Cannot the spots be washed off?

(19) W. A.—To clean marble from discoloration: Try 2 parts sodium carbonate, 1 of pumice stone, and 1 of finely powdered chalk. Mix into a fine paste with water. Rub this over the marble, and the stains will be removed; then wash with soap and water.

(20) F. V. S. asks how to make a permanent light shade of copper on brass; it looks very pretty and bright when first done, but seems to get much darker; have tried lacquering it, but that does not help it. A. Try dipping or boiling in a saturated solution of sulphate of copper in water, till the desired color is obtained. 2. How to mix kerosene and aniline colors. I have dissolved the anilines in alcohol and also water, but they will not mix; also how to mix shellac with kerosene? A. The best way to do is to purchase the so-called aniline fat colors. These are then directly soluble in kerosene. Shellac is not soluble in kerosene, but by first dissolving it in coal tar benzol, and then mixing this solution with kerosene, your object can be obtained.

(21) C. S. asks how to make a glue or paste which when dry sticks well, retains a pliable condition, and in bulk. corked tight, remains in a liquid state. A. Take a wide mouthed bottle, and dissolve in it 8 ounces best glue in ½ pint water by setting it in a vessel of water and heating until dissolved; then add slowly 2½ ounces strong nitric acid 36° Baume, stirring all the while. Effervescence takes place under the generation of nitrous gas. When all the acid has been added, the liquid is allowed to cool. Keep it well corked, and it will be ready for use at any moment. This preparation does not gelatinize nor undergo putrefaction or fermentation.

(22) C. C. H.—The strength of a ¼ inch belt 6 inches wide, laced, is about 700 pounds. If riveted, about 1,200 pounds; solid, about 2,000 pounds. The amount of horse power a belt will transmit depends so much on speed and size of pulleys as well as tightness that no data can be given for the amount of work a belt can develop, without considering all of the conditions. Threeply rubber belts have a tensile strength of about 600 pounds per inch in width, 4 ply about 800.

(23) W. A. S. asks: 1. Is a one dollar bill issued in 1862 worth any more than its face value? If so, how much? A. It is not worth any more. 2. Is there any operation by which the size of the nose can be reduced? If there is, what is it? A. The size of the nose cannot be reduced in any rational way.

(24) C. C. C.—There are tides in our great lakes, but small, because the lakes are small compared with the ocean.—We have no experience with annealing in ice or soap water. Have always found plain water at ordinary temperature as good as could be desired for black heat annealing.—The more surface you have in the body of a plain cylinder stove, the more radiation.

(25) A. H. P. writes: How can I best keep screw on small steam launch from fouling with weeds? It is a double keel from midship, with curved water way. The wheel is placed within same, and not below said keels. I have not tried this one yet, but very much wish your opinion. We had a steam catamaran, and it fouled badly last year in our creek in getting to the lake. A. This has given a great deal of trouble to the steam canal boats. We fear there is no hope for you unless you invent something.

(26) M. B. asks: What is the cause of bunions or enlarged joints, and what is the best way to get rid of them? A. Bunions are caused by boots or shoes that are too short, producing an enlargement of the joint of the great toe. This enlargement, once produced, will remain permanently on the feet of adults, but all soreness may be removed by the same treatment as used for corns. Only comfortable fitting foot wear will prove a permanent relief.

(27) T. H. De S. writes: Western manufacturers of cooking ranges say that they are obliged to make their wrought iron ranges of heavier material than their Eastern competitors, as the soft or bituminous coal is more destructive to the iron than the anthracite is, because of the excess of sulphur in it. Is this correct? Will not a range last equally as long when using soft as with hard coal? A. The bituminous coal of the Western States has much sulphur, which is destructive to grates and adjacent iron work. The competition among stove and range manufacturers in the Eastern States may also have much to do with the thinness of their castings.

(28) F. C. D. writes: I have a boiler with 39 1¾ inch tubes 20 inches long. This boiler furnishes ample steam for an engine with a cylinder 3x5. Can I heat a building with two rooms, one 15 feet wide, 10 feet high, and 43 feet long, and the other 12 feet wide, 7 feet high and 26 feet long, the boiler to furnish steam for engine at same time? Also, what is the best way to heat it—by radiation or by pipes near the ceiling? If by pipes, do you think that two rows of inch pipe would be sufficient, and if by radiator, how many would I need, and how large? I carry 80 pounds pressure on boiler. A. We recommend you to use exhaust steam for warming your rooms, with a live steam connection, so that you may have steam in the pipes when the engine is not running. Your boiler is large enough for ordinary weather, but in the zero weather you could not run the engine its full duty and heat with live steam. For exhaust you will require 200 feet of 1 inch pipe for the large room and 100 feet of 1 inch pipe for the small room. Let the exhaust blow freely through the pipes. Overhead heating by exhaust is much in vogue; long coils at the sides of the rooms give the best results for small rooms.

(29) F. A. P. asks how punches are tempered for punching iron cold. Have considerable trouble to have punches made that will stand the strain. A. Temper punches in the same manner as you would any tool that is required to be tough and hard. Your trouble probably is not so much in the tempering as in the relative size of the punch and hole in the bed piece. The hole should be larger than the punch according to the thickness of the metal to be punched, say about ⅛ the diameter of the punch.

(30) F. S. B. asks: 1. Why a tin pail will not rust when a piece of zinc is soldered in the bottom of the pail? A. We suppose that the prevention of rust is due to galvanic action. 2. Is there any preparation that will mend what is commonly known as agate ware, sold by hardware dealers? It cannot be soldered, and when broken or cracked it is worthless. A. We know of no successful method of repairing agate ware.

(31) R. W. W. writes: Please inform me if there is any instrument by which I can tell how much distance a man travels in a given time. My men travel on official business, and are paid by the mile; they go on horseback. A. The pedometer is an instrument for measuring a man's step; if the man steps approximately even, or comes down on his feet with the same force at each step, it gives fair results. We think that it would be difficult to so measure a horse's pace. For vehicles there is an instrument sold that is very perfect.

(32) J. P. McN.—Good solders are made from tin and lead in all proportions, from pure tin, which is the strongest, to equal parts of tin and lead, which last is an easy melting solder.

(33) J. J. L. writes: A and B have a dispute: A claims that two ships sailing in the same direction at the rate of one mile per minute, one being one mile behind the other, and a cannon on board the rear vessel capable of throwing a ball at the rate of one mile a minute, in case this is fired at the vessel in the lead the ball will hit the vessel fired at in one minute. B claims it is impossible for the ball to leave the vessel it is fired from. How is it? A. Leaving out the question of gravity, as is necessary, the ball will reach the forward vessel in one minute, because the cannon, being on a vessel that is moving one mile per minute, also moves one mile per minute, and if the ball is discharged from the cannon at a speed of one mile per minute, it will have a speed of two miles per minute in relation to the earth. Otherwise the ball could not leave the cannon, and the dispute is an absurdity.

(34) J. A. W. writes: 1. Does the studying of books on locomotive engineering assist one to learn to be such an engineer? A. Yes, it is very necessary if you would become an accomplished engineer. 2. Would Mexico or South America be a good location for one to follow such a trade? A. Better learn the art of engine driving in the United States, then you will be ready for an opening in any part of the world. 3. What kind of a trade could a young man of this country get or learn in any of those countries? A. There is little to be learned in Mexico or South America in the trades, but good