## ENGINEERING INVENTIONS.

A switch lock has been patented by Mr. Hobert B. Potter, of North Adams, Mass. Combined with a switch-throwing lever is a sliding bar for locking it, a rack on the bar and a pinion engaging therewith, a lever with chain links for turning the pinion, and other novel features, to lock a switch and prevent its being turned, and to set a signal as desired.

## AGRICULTURAL INVENTIONS.

A plow has been patented by Mr. Thos. E. Jones, of Center Star, Ala. The construction is such that the plows used may be shovel plows, turn plows, or scrapers, or a single plow may be used, so the plow may be used for the several operations necessary in preparing the ground and cultivating the crop.

A farm gate has been patented by Mr. Edwin H. Penfield, of Santa Barbara, Cal. The body of the gate is hinged upon an upright rod that passes through the upper and lower bars, and is held in cross pieces secured to posts set in the ground diagonally to each other across the line of the fence, the gate being opened and closed by a suitably arranged pivoted lever, cord, and pulleys.

## MISCELLANEOUS INVENTIONS.

A combined square, miter, and circle scriber has been patented by Mr. William F. Seargeant, of Marshall, Mo. It consists of a graduated blade, with a beveled or miter point, mounted in a slotted stock, in the heel of which is a screw point, while an adjustable block, also carrying a point, is mounted in the slot formed in the stock.

A beehive has been patented by Mr. William M. Myers, of Hannibal, Mo. It may be made of earthenware, wood, or metal, but preferably of earthenware, as having no cracks or crevices in which moths can lay their eggs, the invention covering novel features in the construction and combination of various parts of the hive.

A creamer has been patented by Mr. Nathan Yingst, of Reistville, Pa. This invention provides a simple form of cabinet in which milk may be thoroughly and quickly cooled and the heat thereof carried directly out of the casing, each of the parts being especially formed with a view to conveniently and expeditiously cleansing the same.

A filter has been patented by Mr. Jos. C. Higgins, of New Brunswick, N. J. The special design of this filter is such that the sand or other filtering material will not be packed while being cleaned, but kept loose and disintegrated during the cleaning operation, while the filter is simple in construction and effective in operation.

A knitting machine has been patented by Mr. Freeman A. Calley, of Pawtucket, R. I. The construction is such that the machine may be conveniently adjusted to knit with one or two threads, and the length of stitch can be easily regulated, with other novel features, the invention being an improvement on a former patented invention of the same inventor.

A washing machine has been patented by Mr. Fredrick E. Richardson, of Uniontown, Ia. It is of that class of machines having a collapsible cage for receiving the clothes, and its construction is such that the clothes are forced through the suds in the tub or box in different directions and thoroughly agitated, without being rubbed, pulled, or beaten.

A flying target has been patented by Mr. Franklin J. Curran, of Stanford, Ky. It may be formed of glass, clay, or other fragile material, and is formed with peripheral notches, each pair being arranged a distance apart less than half the circumference of the target, and the target having circular ribs or ridges so that the shot will not glance off.

A machine for winding wire upon hose has been patented by Mr. Joseph A. Coultaus, of Brooklyn, N. Y. Its construction is such that as the hose is fed through an aperture it is automatically turned, and the wire feed is arranged to automatically wind wire spirally around the hose, the apparatus being designed for various sizes of pipe or hose, to give them a protecting covering.

A lock for pocket books has been patented by Mr. Gustave Hood, of Newark, N. J. It has a sliding plate and outer stationary plate, both having rounded corners, with various novel features of construction to make such a lock which shall be neat in appearance, occupy but small space, conveniently operated, and leave no projecting parts liable to wear or tear the pockets.

A safety lock for fire arms has been patented by Mr. Henry C. Waldecker, of Austin, Minn. A locking rod has its operating plate projecting beyond the face of the butt, and has an arm or projection, and a locking bolt is arranged to engage such projection and lock the operating plate, to prevent the premature discharge of guns by keeping the trigger locked until the gun is placed against the shoulder for firing.

A signal lantern has been patented by Mr. George Wells, of Annapolis, Md. It has an outer opaque cylinder or mask which normally rests around and in front of the lamp, and which is lifted away from the lamp by the elevation of each or all of several colored cylinders, to provide lights of different colors by means of concentric sliding glass cylinders, alternately slid over or around the flame.

A fifth wheel gear for vehicles has been patented by Mr. John G. Ebken, of Pittsburg, Pa. Combined with a vehicle box is a hanger projecting downward, a bar secured to the bolster and having a roller running on the hanger, and secured to the bar and to the upper fifth wheel section, with other novel features, the invention being an improvement on a former patented invention of the same inventor.

A rotary ventilator has been patented by Mr. Edwin F. Briggs, of Brooklyn, N. Y. This invention covers a novel construction of the rotating wheel of the ventilator, whereby its central position is made more effective, with means for varying the angular positions of the vanes, and improvements in the frame and boxes or bearings for carrying the wheel shaft or spindle.

A billiard table leveler has been patented by Mr. Ernst A. Hornbostet, of Oskaloosa, Iowa. It is a device to be placed under the foot of each leg of the table to be leveled, when by turning a worm fitting in a socketed crank arm, the desired adjustment may be made, the device being also applicable for use in connection with printing presses and other heavy articles.

A telephone receiver has been patented by Messrs. John E. Dann and John Lapp, of Honeoye Falls, N. Y. Two horseshoe electric magnets are employed, arranged right and left from the diaphragm on its rear side, both armatures being connected with the diaphragm by rigid rods, so that both act simultaneously on the diaphragm to vibrate it as forcibly as possible, in order to give increased loudness of tone.

Telephone transmitters form the subject of two patents also issued to the above inventors. One of the forms is intended more particularly as an improvement upon instruments of the Reis type, having two small electrodes that are free to vibrate in connection with the diaphragm, and using a local circuit acting through the electrodes reversely to the main circuit, in order to neutralize the adhesion of the electrodes, and facilitate the required rapidity of vibration. The other form of transmitter is especially designed for the production of a loud-speaking instrument, capable of operating with a minimum expenditure of battery power or electromotive force, for which purpose a new and simple construction of the diaphragm is provided, with a novel mechanism co-operating therewith, the diaphragm having a central conical portion, the diameter of the base of which cone shall equal or slightly exceed that of the contiguous inner end of the mouth piece.

## NEW BOOKS AND PUBLICATIONS.

A REPORT ON THE TERMINAL FACILITIES FOR HANDLING FREIGHT OF THE RAILROADS ENTERING THE PORT OF NEW YORK. By Gratz Mordecai. New York: *Railroad Gazette*, 1885.

Mr. Mordecai's report was prepared for the *Railroad Gazette*, and gives a careful account of the terminal works and business of the different railroads centering in New York. As the problem of handling the immense amount of freight daily brought into a metropolitan port is one of large importance, this study of the facilities as they now exist will, it is hoped, lead to an improved arrangement of freight houses and yards which will add to the convenience of both carrier and shipper. The author advocates the establishment of a union terminal company for the handling of the greater portion of in-bound and out-bound freight, believing that such a system would give increased economy in time and labor. His report is well worthy the attention of railroad men.

TABLES FOR CALCULATING THE CUBIC CONTENTS OF EXCAVATIONS AND EMBANKMENTS. By John R. Hudson, C.E. New York: John Wiley & Sons, 1886.

The formula developed by Mr. Hudson is quite as accurate as the "prismoidal formula," to which engineers usually have recourse in calculating the cubic contents of excavations and embankments, and has the advantage of being much shorter and simpler. It is particularly adapted to use with tables, and therefore permits greater ease and rapidity in the calculations. Two sets of tables are given: one showing the cubic contents of a level cross section for a given center cut or fill, and specified road bed and side slope; the other, the corresponding contents of the side triangles to be added or subtracted as they are above or below the level cross section. With these tables and a cross section book, one can easily and quickly calculate the cut or fill on each 100 foot section of proposed road, and can be very confident that all the work is accurate, for the tables have been prepared with great care.

Barrowcliffe's Table of Trade Discounts has been prepared with special reference to persons who are much occupied in setting such a price upon goods that it will allow a certain trade discount and still leave a profit over and above the original cost. The table gives the fractional amount to be added to the net selling price so as to permit a discount of from one to ninety-five per cent, and will be found useful to persons who have much of this sort of work to do.

Messrs. Otis Brothers & Co., of New York city, have recently published a large and handsome descriptive catalogue of their standard hydraulic passenger and freight elevators, steam and geared belt elevators, and steam hoisting engines and hydraulic hoists. The dimensions to which their business has grown from the limited proportions indicated by the small factory they occupied in 1852 fully accord with the increasing use of these conveniences for reaching the upper floors of high buildings.

The Pope Manufacturing Company, of Boston, in their "ninth annual greeting," just issued, present a catalogne of their productions which shows that special improvements are constantly being made, although their bicycles and tricycles had formerly seemed to lack nothing necessary to make a perfect machine. The use of these means of locomotion appears to be steadily on the increase.

### *Received.*

THE PRACTICE OF THE IMPROVEMENT OF THE NON-TIDAL RIVERS OF THE UNITED STATES. By Captain E. H. Ruffner, U. S. A. New York: John Wiley & Sons.

BUILDERS' BLANKS FOR ESTIMATING MATERIAL AND LABOR. By I. P. Hicks, Atlantic, Iowa.

TEMPERANCE TEACHINGS OF SCIENCE. By A. B. Palmer. Boston: D. C. Heath & Co.

DRAINAGE FOR HEALTH; OR, EASY LESSONS IN SANITARY SCIENCE. By Joseph Wilson. Philadelphia: P. Blakiston, Son & Co.

## 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) G. F. S.—There is no difference whatever in the action of the pump or the pressure upon the valves or sides of the chamber, whether the pistons be pointed or flat. The sectional area at the sliding surface is the real measure of the pressure.

(2) H. C. D. writes: 1. Do you think it will be as economical to use a 30 horse power boiler for 20 horse power work as it would a 20 horse boiler? A. It is economical to use a 30 horse power boiler for 20 horse power work. 2. The gas company in this city have reduced the price of gas from $2.50 to $1.50 per M., but the reading of the meters after the reduction was much larger than before, so that it almost counterbalanced the reduction. A daily paper stated that they had increased the pressure, but I claim the reverse. Can you explain where the hitch comes in—in the pressure or the quality of gas furnished? A. By impoverishing the gas and increasing the pressure you are made to burn more gas for the required light, and by this means the company loses but little, and you are scarcely a gainer. The hitch is in both quality and pressure. 3. Is the lye sold in 1 pound iron boxes a preventive of scale in boilers? A. Yes.

(3) T. M. N.—Two balls of different weights or a solid and a hollow ball will drop in equal times in a vacuum. In air the friction will most retard the ball that has least density or is lightest in comparison with the area of its diameter.

(4) L. B. writes: I wish to run a light upright saw with a crank and pitman. Is there any way (patented or not) whereby I can get two down cuts of the saw with one revolution of the crank? A. Only by a cam or its equivalent. See Brown's "507 Mechanical Movements," which we can send post paid for $1.

(5) E. H. B. asks a simple, practical way for testing Russian iron, so as to distinguish readily between the genuine article and the many inferior imitations that are in the market. A. The genuine article is known by its fine black luster and small granulation of the surface in reflected light. Otherwise, by its toughness in bending with and across the grain.

(6) J. W. S.—Choke bore is a very slight decrease of diameter at the muzzle of shotguns, for the purpose of preventing the excessive spread of the shot. When properly made, it commences from ¾ inch to 1 inch from the muzzle. Rifles are not choke bored, but slightly taper bored. A load rides easiest at about two-thirds the distance from fore toward the after wheels.

(7) C. F. U. asks: Which is most economical of fuel—a boiler made after the pattern of a locomotive boiler, without jacket, with shell exposed to the atmosphere, or a common stationary boiler incased in a brick wall with brick furnace? A. We consider the brick-set horizontal tubular boiler the most economical in fuel, and most satisfactory in steaming qualities as well as safety.

(8) J. C. B.—For a soap to clean clothes without rubbing: Take 2 pounds sal soda, 2 pounds yellow bar soap, and 10 quarts water. Cut the soap in thin slices, and boil together 2 hours; strain, and it will be fit for use. Put the clothes in soak the night before you wash, and to every pailful of water in which you boil them, add a pound of soap. They will need no rubbing, but merely rinsing.

(9) C. W. R. asks how to make a good pomade for the hair. A. Take of castor oil 1 pound avoirdupois, pure white wax 4 ounces, melt them together, and then add oil of bergamot 2½ drachms, oil of lavender (English), ½ drachm, essence royale. Stir the mixture while cooling.

(10) H. P. G.—See Henderson's formula for making gelatine emulsions in the SCIENTIFIC AMERICAN of November 8, 1884, page 293. For sensitizing albumen paper, see Newton's solution, page 65, SCIENTIFIC AMERICAN of August 2, 1884.

(11) B. O. asks how to make mocking-bird food. A. Hempseed 3 parts, toasted wheat bread 2 parts, maw seed 1 part, ox heart 1 part. Boil the ox heart well in water, cut it small, and place it in a pan in an oven, where it must be allowed to become perfectly dry and crisp. All the ingredients must then be thoroughly mixed and ground in a mill to coarse powder.

(12) G. B. M. writes: 1. Can you give me a formula for mixing paint suitable for painting wire cloth green—one that will dry quick and hard and not easily crack off, and be glossy as if varnished? A. It will be found most satisfactory to purchase your paint ready prepared from some reputable house rather than to attempt its manufacture yourself. A mixture of three-fourths zinc white with one-fourth white lead, to which a little drier has been added, will be found to answer quite well. Coloring matter to suit is ground in with the above. 2. How to mix and apply oil to prevent wire cloth from rusting by long standing? A. Use raw linseed oil.

(13) W. A. K. asks: 1. Are the glass tubing and rods, etc., used by traveling glass blowers any different or more easily melted and worked than ordinary glass? A. The glass referred to is ordinary lead glass, and is similar in composition to the common white glass made in this country. 2. What metal would best resist the corrosive action of gas, the metal being used for lining cornice, water troughs, and water conductors upon gas works? A. Cast iron or lead is much better than tin. You might coat the tin with asphalt.

(14) W. J. H. desires (1) a recipe for making bay rum in small quantities. A. Take 2 pounds of leaves of the Myrtus acris, ½ pound cardamoms, 2 ounces cassia, 1½ ounces cloves, and 9 quarts rum. Distill 1½ gallons. Bay rum may be colored with tincture of saffron or with a mixture of equal parts caramel and tincture of turmeric. 2. Also a recipe for office mucilage. A. Mix 3 ounces gum, 1 ounce acetic acid, 1 ounce white sugar, and sufficient water.

(15) J. D. B. asks if one's eyes are open or shut when walking in sleep. A. Both conditions are known, but principally with the eyes open.

(16) L. T. R. desires some simple method of detecting the adulteration of spirits of turpentine by the mixture of petroleum naphtha. A. Test its bloom by dropping on a black glass plate, or test its solubility in absolute alcohol. The turpentine dissolves in this reagent, while the petroleum naphtha does not.

(17) C. S. A. writes: I have some pieces of steel that have been nickel plated, then soldered to a piece of tin. I find the nickel of the steel piece very much stained from the muriatic acid used in soldering. Is there any liquid article or compound that will restore the nickel to its former brightness? A. The nickel plating is porous. The soldering acid penetrates to and oxidizes the steel, which stains the nickel plate. We have not succeeded in recovering the luster of nickel plate that has been thus treated. Soldering should have been done with resin, and cleaned with turpentine or alcohol.

(18) H. M. N. writes: In Newton's law, "all bodies are attracted to each other directly as their mass, and inversely as the square of their distance;" do you understand the "distance" to be the distance between the centers of gravity or the distance between the most adjacent particles? A. If the mass of the body is intended, then its center of gravity is the measure of the distance. If the atoms of a mass only are considered in their relation to each other, then each atom is the measure of any distance.

(19) E. A. W.—The Wilkes exploring expedition, as also several English expeditions, has skirted the Antarctic polar land, and found it impenetrable. The north pole has elicited more attention from the scientific world from its nearness and interesting detail of distribution of land and water, as well as the evidence of an open polar sea, which does not seem to be the case at the south pole.

(20) A. D. O. asks how to find the azimuth of a place. A. Obtain the true meridian by corrected observation of the pole star, and from this take the departure with a theodolite or compass if the place is in sight. If not, make a triangulation or series of triangles reaching to the place sought with a theodolite. This will require a trigonometrical computation and geodetic correction for establishing the true azimuth.

(21) H. J. H.—As you are a machinist and blacksmith, it is supposed that you know how to weld steel and iron together. The welding of two pieces of cast steel is a very difficult and uncertain matter, and depends very much upon the grade of steel, the low grades or coarsest steel giving the best results. The welding can be facilitated by placing a thin piece of good iron in the weld between the pieces of steel, using borax only. The piece of iron may be welded to one piece first, then give the iron facing the strongest heat. Work the steel well under the hammer after the weld is completed, to fine the grain.

(22) C. W. W. writes: In a target pierced by 12½ inch projectile, what becomes of iron occupying space through which projectile passed? A. It is torn and bent back if the iron is tough; or a piece punched out and carried with the ball from brittle plates.

(23) A. D.—Suction is not strictly a scientific term, yet it is in common use in mechanics, hydraulics, pneumatics, etc., as applied to the act as well as the appliance for producing decreased atmospheric pressure. Custom has sanctioned its legitimate use. See Webster unabridged.

(24) D. L. V. N. writes: We received a new church bell, 400 pounds weight, hung in such a shallow yoke that about two-thirds of its weight is below the axis. The result was the bell was hard to ring, and strokes of hammer too close or in too quick succession for such a large bell. We bolted 25 pounds of iron on the upper portion of rope wheel, which has improved it greatly. There is a bell of same weight near here which strikes less rapidly (rings easier), and consequently has more prolonged and sonorous sounds. Why is there this difference? Should we add more weight to top of wheel? A. The weighting of the wheel to balance the bell is admissible, but tends to deaden the sound. Better send to the makers of the bell for a proper yoke. The sonorousness of bells depends so much upon their composition and form that we could not tell you, in exact terms, why or what is the cause of the difference. The bell founder may have made a blunder in the form of the bell as well as in the yoke.

(25) G. B. E. asks the mixture with which to brown gun barrels. A. Chloride of antimony mixed with a little olive oil. Add a few drops of nitric acid to sharpen its action, if required. Another: sulphuric acid ½ ounce, sweet spirits niter ½ ounce, blue vitriol 2 ounces, alcohol 1 ounce, tincture of the chloride of iron 1 ounce, water 40 ounces; add alcohol last.

(26) R. B. R. asks the best and simplest method of keeping cistern water as soft as possible. A. Paraffine rubbed on the dry walls and bottom of a cistern and melted into the cement with a hot iron is the most effectual method of keeping the water soft or free from lime. Cisterns, when plastered with pure Portland cement, generally give satisfaction.

(27) B. J. asks how they get the different tones in a single bell chime whistle. A. By dividing the bell into two or three parts which are unequal. This is the subject of a patent.

(28) L. L. asks: 1. What would be the expansion of an inch bar of wrought iron five feet long under a temperature of 300° steam heat? A. $\frac{13}{100}$ of 1 inch. 2. What would be the difference between the expansion of the above bar of wrought iron and a cast iron pipe of the same length under the same temperature? A. $\frac{1}{150}$ of 1 inch. 3. What, if any, would be the difference between the expansion of cast iron and homogeneous steel casting? A. Slightly less than $\frac{1}{100}$ of 1 inch.

(29) J. H.—Scrap brass varies so much in its composition that we cannot give you any intelligent answer how to use it in casting without inspection. The bright yellow brass may be from 6 to 8 ounces zinc to the pound of copper. By melting 1 pound of copper with 1½ pounds of such yellow brass, you will make what is called a 3 to 4 ounce brass, which is very rich in color. For dark colored scrap we cannot advise, as it probably contains lead and iron.

(30) T. H. C. asks: 1. Has a miner any legal right, after going below the surface, to undermine a neighboring claim? A. It will depend entirely upon the nature of the deposit he is working. If it be a true fissure vein, the United States Mining Law gives him the right to follow it as far as he chooses between the two vertical planes determined by the end lines of his claim; provided, however, that his surface lines include the highest point or apex of the outcrop of the vein. If he is working a deposit or seam, he is limited by the vertical planes passing through both his side and end lines. 2. What is the difference between the rules governing the mining of coal and the different metals? A. As coal is always a regular member of the geological formations, a seam, and not in any sense a vein—though the latter term is often improperly used—the miner is always limited by the vertical planes passing through his surface lines. He is open to an action at law if at any time he removes the coal from beneath a neighbor's property.

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**March 30, 1886,**

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