and reaction are equal and opposite," as was propounded and demonstrated by the immortal Newton. We also perceive that the *space effects*, the *penetrative power* or the power of *performing work*, are *unequal* being in inverse proportion to the weights or in direct proportion to the products of the masses into the squares of the velocities.

Henry F. Walling.

New York, Feb., 1867.

### Patent Law Amendment.

Messrs. Editors:—I am at a loss to know why Congress repealed section 6th of the patent law of 1842. It was certainly not done in the interest of inventors. The way the law stood, as I understand it, parties unauthorized by patentees or their assignees could not stamp a patented article nor use it unless stamped, without making themselves liable to a penalty of not less than $100 and costs. As it stands now, no one is required to stamp a patented article. For anything I can see in section 5th, persons may use patented articles provided they are not stamped. If patented articles are not stamped there is no very great inducement to stamp unpatented ones.

The two sections together are a protection to inventors to the extent of the penalty attached. As the law is now it amounts to very little. If you take the same view of the matter I do you will use your influence to have section 6th re-enacted, but I am no lawyer.

You may be pleased to know that I am doing very well, for a poor man, with my patent obtained through your Agency. I made a trip this month with my bee hive, and in four days I cleared $150, and I have done better in less time.

Jas. S. Marshall.

Greenville, Pa., Jan. 29, 1867.

[We think the amendment to which our correspondent refers is a very good one. If patentees fail to stamp the date of their patents on the articles offered for sale, or upon the packages so as to give public notice of the existence of the patent, they cannot recover from infringers.—Eds.

### Proving Guns by Measurement.

Messrs. Editors:—In the London *Mechanics' Magazine* of Dec. 21, 1866, appears an account illustrated by engravings of an instrument for "proving guns by measurement," by Mr. Joseph Whitworth. This instrument is identical, both in form and principle, with the star gage, which, for at least a quarter of a century, has been used in this country by the Ordnance officers of the Army and Navy for proving guns by measurement, but it is described by Mr. Whitworth as designed by him.

The star gage is believed to be of French origin, though it has been much improved since its introduction into service in this country, but the "Calibre Star," described by Tousard, and referred to in an order of the Duc de Choiseuil, dated March 31, 1766, in relation to the inspection and proof of French cannon, is undoubtedly the original of the present instrument.

As the star gage is fully described both in the Army "Ordnance Manual" and the "Instructions for the Inspection and Proof of Cannon," for the Navy, as well as in various works on Ordnance and Gunnery published in this country, it is not necessary to describe it here; but any person who will take the trouble to compare any one of the above cited descriptions with that of Mr. Whitworth, will see at once that the instruments are the same.

How then can Mr. Whitworth claim this instrument as having been designed by himself? Can it be possible that so distinguished a mechanician and artillerist as he, could be ignorant of the existence of an instrument that has, for so long a time, been considered as almost absolutely essential for the measurement of guns? Or has he really made an invention which is already a hundred years old! U. S. N.

Washington, D. C. Feb. 7, 1867.

### A Substitute for Writing Ink.

Messrs. Editors:—Not long since, I read in one of your papers a dissertation relative to the qualities of writing ink. I will simply state to you, that for the last twenty years, I have been doing a large amount of writing, and that during that time, I have used common India ink, simply disolved in water. It being composed of carbon, and little else, it will keep in any climate or place from year to year, perfectly sweet. Even freezing does not injure its good qualities, a simple cover is all that is required to prevent evaporation and keep the dust from falling into it. I have never used any kind of ink that would flow from the pen with that ease and agreable freeness that this *hydrate* of *carbon* does. The stroke of the pen made with it is quite black if desired, and will endure unchanged to all time provided the paper or parchment remain sound, and even papers that have been burned and not fallen to pieces, with this kind of writing upon them, remain quite plain to read. F. S.

[Ordinary writing ink is a modern invention. The ancient ink was such as our correspondent finds best. It is still used by the Chinese and Japanese.—Eds.

### Inventions Patented in England by Americans.

[Condensed from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

3,892.—Coating for Paper and other Matepials designed to receive Lead Pencil Marks which may be Repeatedly Expunged with Moisture.—Sylvester Schoonmaker, New York city. Dec. 24, 1866.

3.—Bench Planing Machine.—Joseph Jones, Newark, N. J. Jan. 1, 1867.

36.—Water Delivery Nozzde, empoyed in the Extinction of Fire.—William Barbour, Lawrence, Mass. Jan. 5, 1866.

46.—Auger.—Amasa C. Kasson and Nelson C. Gridley, St. Louis, Mo. Jan 7, 1867.

70.—Elliptic or other Elastic Springs.—Edwin M. Chaffee Providence R. I. Jan. 11, 1867.

[Reported for the Scientific American.]

## MANUFACTURE OF BEET SUGAR.

BY JOSEPH HIRSH, PH. DR.

The production of sugar from beets, and the establishment of a branch of industry which has now attained huge proportions, is not, cannot be, traced to a mere accidental discovery, but is the legitimate result of careful and long-continued observation, study and diligence, ever combatted by a cold northerly climate. A detailed account of the advance in the manufacture would show progress made step by step against the greatest prejudices, while ridiculed and pronounced hopeless even by such men of science as Liebig. Yet, in spite of almost insurmountable difficulties, the world did move; and while France in 1829 produced 80,000 pounds of beet sugar, the supply in 1858 was increased to 98,452,182 pounds, or 492,260 tuns, made in 600 manufactories.

Only so late as 1747, the German chemist, Markgraf, published the results of his experiments with different roots, especially the beet and sugar beet, in which he proved the presence of crystallizable sugar, unknown or doubted until then. His discovery remained a scientific curiosity merely, without bearing any practical results; and it is to his talented disciple, Francis C. Achard, that the credit belongs of examining anew all the plants which, in the cold northerly zone of Europe could be raised with profit for the production of sugar, and of being the pioneer in the art, by erecting in the year 1796 the first large establishment for the production of beet sugar, situated in the county of Cuneva, in Silesia. In 1799 and 1812 he published his first complete treatise on beet sugar, which was so precise, distinct and plain, and moreover was treated in such a thorough practical manner, that it aroused the attention of the English sugar merchants, and caused them to make him the generous offer of 50,000 Prussian thalers, on condition that he would discontinue his experiments with beet sugar, and so kill this industry at its birth. Nobly refusing this offer, the sum was subsequently quadrupled, in the hopes of inducing him to publish another work setting forth that his enthusiasm for the beet sugar manufacture had carried him too far, and that experiments on a large scale had not realized his expectations. This offer was also declined. The English merchants had now become thoroughly alarmed at the progress the new manufacture was making on the continent, and made one last effort to crush it, by engaging Sir Humphrey Davy to write a work in which he sought to prove that beet sugar was bitter. But even this very learned treatise was of no avail, for all over Europe beet sugar was consumed, and its bitterness was pronounced to exist only in England. Napoleon's continental blockade, at the beginning of the presentcen tury, stimulated the new industry; and though the enterprise was encouraged by all the crowned heads of Europe, yet the main practical and successful aid was given by Napoleon I., to whom belongs the honor of being the second founder of the beet sugar industry.

The discussion of the beet sugar manufacture should be preceded by that of the beet itself, and its cultivation. The sugar beet cultivated in Europe is known under several varieties, the favorite one being the Silesian. A cross section of this beet exhibits a white, dense structure, in a few of its varieties, having concentric rose-colored rings about three eighths of an inch wide. Its juice has a concentration of 8° to 9° B, and contains but a small proportion of impurities. A second variety of beet is the Burgundy, which grows out of the ground, has a loose porous texture, a great deal of highly diluted juice, and on this account is undesirable for the production of sugar. The properties of a good beet are the following: uniform shape, and if possible without branchings or forks, as these are likely to retain impurities from the field, impart them to the juice, and impede the production of crystallizable sugar. The beets should not weigh less than one pound, nor more than five, smaller ones being washed and ground only with difficulty, while those larger generally have a too diluted juice. The beet should further have a firm, uniform texture, should make a loud cracking noise on breaking, and should sink in water. Those that break readily are easily ground to pulp, a necessary property, while half dried old beets are somewhat elastic, and therefore difficult to be reduced. It is also desirable that the beet should be white, although this is not necessary. The juice should be sweet, concentrated, and contain few impurities, its concentration varying from 4° to 12° B. The beet should not grow above the ground, as that portion has a loose texture, a thick skin, a watery juice, is rich in salt and poor in sugar, and freezes easily during cold winter nights. To obtain these results the ground should be well plowed, manured a year before planting (the best previous crop being wheat, although beets may be grown successively for a number of years without exhausting the ground). Nitrogenous manure is to be avoided, as it increases the nitrogenous protein substances of the beet, consuming its entire vital power while its proportion of sugar remains small. The best time for sowing is between the latter part of March and the first of May. The sowing is made diagonally through the fields, as this uses space more economically than the square way of planting. The seed should be not over one year old, and is to be put in the ground abundantly to insure a full harvest. Rainy seasons are dreaded, as too much moisture produces large beets containing a watery juice, many salts, and but little sugar, while dry seasons commonly produce good beets. The time of harvest lasts from September to October, the latest crop being always the sweetest. When pulled the loose dirt is shaken off, the leaves and side branches are cut off, and remain to act as manure for a future crop. The yield per acre varies from 12,000 to 18,000 pounds, the average being perhaps 15,000, which is equal to about 1,200 pounds of raw sugar.

The thorough cultivation of the beet is the first condition of success, as a poor beet opposes too many difficulties to its economical employment. The best ground for beets is black mold, humus or sandy or limey loose ground; clayey soil, as it retains too much moisture, is less desirable. The beets, after harvesting, must be preserved from frost, by storing in ditches three feet deep and three feet wide, in which the ground is pounded firmly, covered with straw or boards about four inches, then with a layer of earth about six inches high. At distances of six feet bunches of straw are placed in the ditches, to act as escape tubes for the vapors arising from the beets. These ditches are generally made 60-120 feet long, the piles of beets reaching three feet above ground. Occasionally these piles are made entirely above ground and covered with a layer of earth ten to twelve inches high. Thus preserved the beets will keep until March. In Russia, occasionally, wooden sheds are used, under which, upon strips of wood or in baskets, the beets are piled four to six feet high; this mode of keeping is cheapest in the end, although the first cost is considerable.

The production of juice in a pure state necessitates the thorough washing of the beet, for which purpose a drum is employed, made of wooden strips, about ten feet long and four feet in diameter. The drum lies somewhat inclined to one side, in a tank filled with water, into which it reaches to the depth of a foot. The beets fall from a large hopper into the drum at one end, passing out at the other upon an inclined plane, whence they are conveyed by a large archimedean screw, traveling in an upward direction against a continuous current of fresh water, until the cleansing is completed.

After washing, the decayed portions, beet tops and rootlets, parts containing juice poor in sugar and rich in salts, are removed by revolving knives, and what remains is thence conveyed to the crusher or rasping cylinder, revolving six hundred times per minute, and is rapidly reduced by it to pulp, and in this condition is removed to the presses. The rapidity with which this operation is completed corresponds to the the acuteness of the angle between the direction of pressure of the beet, and the tangent of the cylinder at that point; for if that angle is a blunt one, the saws will simply scratch and not cut the beet, hence the pressure must always be directed against the lower side of the cylinder. During the operation of crushing, a continuous current of water cleanses the cylinder, dilutes the juice, and facilitates its removal from the pulp. The latter contains now forty per cent. in volume, or about one per cent. of its weight, of air. The cylinder and pulp box are cleaned every six hours, to prevent oxidation of the juice.

The pulp, as fast as made, is spread on cloths made of raw silk, the whole being supported by perforated plates of sheet iron. These charges, to the number of thirty or more, are placed under a dydraulic press, and a pressure is applied at first of from fifteen to twenty atmospheres to the square inch, gradually increasing to one hundred and twenty to two hundred atmospheres.

The pressing surface is generally twenty-four inches, and each press cloth is charged with sixteen pounds of pulp. The pressure is regularly increased for from eight to fifteen minutes, remains thus for some five minutes, and is then released; the juice expressed during this operation ranges from eighty to eighty-four per cent. of the weight of the beets.

Beside silk, wool, horsehair and hemp, are used for press cloths. Frequent washing of these is necessary, ammonia commonly being added to the water to neutralize acidity, and dissolve slime; soda and lime were formerly used for this purpose, but it was found that these soon weakened the fiber of the cloth. The pressed cakes are used as cattle feed.

Another method of separating the saccharine juice from the pulp, first introduced by Schöttler, is by placing it in a metallic cylinder finely perforated and caused to revolve at the rate of one thousand revolutions per minute. The centrifugal force causes the juice to be expressed, but a great amount of fine pulp is driven out with it through the meshes, causing trouble in the subsequent operation of defecation. By this method, also, an immense amount of froth is produced, which has to be run separately into a vat, and condensed with steam. A charge for a centrifuge is two hundred pounds, and this is exhausted in fifteen minutes, or thirty charges can be made easily in an hour. Among other methods which have been used may be mentioned ordinary rollers, pressure with compressed air or gases, there have been tried, though with but little success. The method of maceration lately come into use, recommends itself for its completeness and simplicity, also in that it does away with expensive pumps and presses. In the cells of beet pulp, in contact with water for some time, an endosmotic process is carried on, the water entering the cells and giving out the saccharine juice, until the liquid within and without possesses an equal density. If, then, one hundred pounds of beets, reduced to pulp containing ninety-six pounds of juice, are mixed with an equal weight of water, endosmosis will produce a juice of half the original strength, but double the quantity. If this be withdrawn, and the same proportion of fresh water be again added, the juice contained in the cell of half the original strength is again reduced, possessing then one quarter of the original strength. If a juice contains eighteen per cent. of sugar, which is a fair average sample, the progress of this reducing process for six consecutive times leaves a juice in the pulp of but one quarter per cent. of sugar, or one almost free of saccharine matter. The juice obtained by all these dilutions is too watery for economical evaporation, and must be concentrated by the same process by which it was diluted.

The juice obtained from the first dilution of the original juice of sixteen per cent., contained eight per cent of sugar. If this now be brought in contact with its weight of fresh juice of sixteen per cent., a mixture will be the result containing twelve per cent. Continuing this process six times as before, the final resulting liquid will contain 15.875 per cent. of sugar, or almost its original concentration. These results, however, are not always to be obtained completely in practice.

The process of maceration now chiefly employed on a large scale is that introduced by Schuetzenback, and consists in placing the beet pulp in vats provided with an agitator, to keep it constantly in motion. The vats have a false perforated bottom, for the complete removal of the liquid, and a corresponding perforated top, the holes of which serve as distributors of the exhausting medium. Twelve tubs form a battery, and the transmission of exhausting liquor between the different exhausters is effected by means of a rotary pump. The motion of the agitator should be about twenty-two turns a minute, neither fast enough to make much froth, nor so slow that the pulp will float. This process furnishes eighty-nine per cent. of beet juice.

## Recent American and Foreign Patents.

*Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.*

Hydraulic Clothes Boiler.—M. W. Staples, Catskill, N. Y.—This invention relates to the manner in which a circulation of water through a clothes boiler is produced in the process of washing clothes.

Marking Roller.—L. R. Witherell, Galesburgh, Ill.—The object of this invention is to provide a simple and expeditious method by which the trade brand of merchants, dealers and manufacturers may be affixed to their goods and wares and boxes, barrels, and packages may be accurately and expeditiously marked without the use of the marking brush or stencil plate as now used.

Corn Planter.—John N. Arvin, and Joseph M. Whitmore, Valparaiso, Ind.—This invention relates to an improvement on the arrangement of a machine for planting or dropping indian corn automatically in regular checks without furrowing.

Nursery Planter.—J. Warren Clark, Iowa City, Iowa.—This invention relates to the planting of hedges or any small plants in rows, as practised by nursery men or horticulturists. It consists in providing a box wagon made tight to hold water mixed with earthy matters or compost, forming such a puddling compound as is usually applied to young plants and trees when set out to insure their vitality and growth, having connected with it an apparatus for running a narrow furrow or trench in the earth and conducting the fertilizing compound directly into said trench behind the plow or coulter employed for opening it.

Hammer.—J. Yerkes, Fox Chase, Pa.—This invention consists of a cast iron hammer with claws which are produced by splitting or sawing in such a manner that the edges of said claws are rendered sharp and capable of taking a firm hold of nails or other articles.

Cultivator.—W. J. Oxer, Williamsport, Ind.—This invention consists in the combination of peculiarly shaped iron bars to form the frame of the cultivator as herein after more fully described.

Evaporator.—H. C. Gilbert, Cambridge, Vt.—This invention has for its object to furnish an improved means by which the evaporating or drying pan may be removed wholly or partially from over the fire.

Nursing Couch.—James H. Cogshall, Lexington, Mich.—This invention has for its object to assist the mother in nursing her child by compelling her to sit upright, and at the same time giving that support to the muscles of the arm which she required.

Gate Latch.—W. T. Wells, Decatur, Ill.—This invention has for its object to furnish an improved adjustable gate latch constructed without springs and so arranged that the holt will be thrown quickly into the catch, that it cannot be opened by cows or other cattle, that it may be readily adjusted to accommodate the position of a shrunken or sagged gate or post, that it will not be liable to get out of order, and that it will be easily attached to the gate.

Belt Lap Cutter.—Charles E. Robinson, Concord, N. H.—This invention consists in attaching the knife to a grooved sliding block working in grooves in the top leaf or upper part and provided with a handle of the machine in the combination of a rubber or other elastic seat with the lower leaf or part of the machine, and in hinging the lower and upper leaves or parts to each other.

Hydraulic Punch.—Joshua B. Barnes, Fort Wayne, Ind.—This invention has for its object to furnish an improved punch by means of which more work, with less power, and in a less time can be performed than can be done with the ordinary punch; and which can be used upon a boiler, inside or outside whereever it can be got upon a flange.

Wheat Drill.—Jacob Slauder, Osborn, Ohio.—This invention relates to an improved machine for sowing wheat and other small grain or seed in drills, and consists in arranging positive gearing in connection with the driving wheels of a truck and an endless screw for feeding the wheat or other grain with certainty and regularity in just the desired quantity from a hopper.

Machine for Bending Skelp for Tubing.—John Peace, Camden N. J.—This invention relates to the manufacture of metal pipes or flue tubes, and consists in an arrangement of dies for clamping and bending the skelp or iron plate into shape preparatory to welding the edges or laps so formed for making the tubes or flues.

Horse Power.—Theophilus Harrison, Belleville, Ill.—This invention is designed to obviate the great loss of power caused by friction, in transmitting the power of the horse or horses to the machinery to be driven. In the single pinion horse powers a great deal of friction is produced by the pressure of the master wheel on its pin or axis; and in the double pinion powers, as well as others designed to obviate the friction above specified, the arrangement of the gearing together with its complexity, produces as much friction as is saved by the relieving of the pressure of the master-wheel on its pin or axis,

WASHING MACHINE.—J. S. Gochnauer, Goshen, Ind.—This invention relates to a washing machine which is composed of a yielding bed of conical rollers in combination with a corresponding conical roller rubber consisting of two wings which are hinged together and to which a revolving motion can be imparted by a vertical shaft which catches over the rod that unites the hinges of the two wings.

MODE OF TREATING INDIA-RUBBER.—Stephen Bourne, Headstone, Drive Harrow, England.—The object of this invention is to deprive india-rubber and the goods or articles into the composition of which it enters of the odor attaching to india-rubber itself and the various solvents or other substance or substances with which it is combined. And for this purpose, the invention consists in exposing the india-rubber or its various compounds to contact with charcoal and heating them together to such an extent as the different descriptions of goods may bear without injury; charcoal especially animal, having the power of absorbing the offensive smell or odor usually partaining to this material as well also as its ability to impart flavor to liquids and other substances with which it may come in contact.

WHEELS FOR VEHICLES.—Jacob F. Morris, Lansingburgh, N. Y.—This invention has for its object to furnish an improved means for oiling the axles of vehicles, by the use of which the vehicle may be run for weeks with one application of oil, and kept at all times properly lubricated without the waste of oil.

COVERING OF HOOP SKIRT SPRINGS.—William S. Ryerson, Philadelphia, Pa.—This invention has for its object to protect the covering of the hoops or springs, and preserve them from becoming worn, and thus promote the durability of the skirt.

SMUT MACHINE.—William E. Tickler, Ezra T. Marsball, and Daniel M. Marshall, Pierceton, Ind.—This invention relates to improvements in smut machines, whereby the work of cleaning grain is executed in an efficacious and rapid manner.

DUST AND DIRT RECEPTACLE.—Chesmon Butterfield, West Waterville, Me.—This invention relates to a dirt receptacle to be used in the floor of a room, which receptacle is provided with a cover or slide, in connection with a bottom, so arranged and connected together that when the one is opened the other may be closed.

BOILER FURNACE.—Thomas H. Clark, Indianapolis, Ind.—This invention consists in causing the products of combustion to be equally distributed under the boilers set in a furnace for the purpose of generating steam, and in preventing them, when several boilers are set in an arch, from passing away diagonally from those boilers which are most remote from the chimneys.

CONSTRUCTION OF PAPIER MACHE FOR CASTING STEREOTYPE PLATES.—William Nelson, Boston, Mass.—The invention relates to the construction of papier mache matrices for casting stereotype plates, whereby a superior matrix is obtained for the purpose.

WAGON JACK.—Charles T. Close, Brooklyn, N. Y.—The wagon jack embraced in this invention consists of two legs pivoted together at one end, with a cam lever handle pivoted to the lower end of one leg, so that if the jack, by one leg, be properly placed under the wagon axle, by swinging the handle up the axle will be lifted.

TENT BEDSTEAD.—Rev. A. D. McCoy, New Orleans, La.—This invention consists principally in the combination with a camp bedstead of an upright framing for the reception of a canvas covering, this framing being so put together as to be readily set up and taken down.

FLOATING ANCHOR FOR KEEPING A VESSEL'S HEAD TO THE WIND.—George L. Baker, Astoria, N. Y.—This invention has for its object to furnish an improved apparatus, by means of which a vessel that has lost her rudder or become otherwise disabled or unmanageable in a gale of wind, may be held with her head to the wind, and thus prevented from getting into the trough of the sea and foundering.

BEE HIVE.—C. P. Lloyd, Portsmouth, Ohio.—This invention relates to a bee hive of that class which are provided with removable boxes, and it consists in having the sides of said boxes of glass, and each box provided with a slide and a series of movable comb frames, whereby any one of the boxes may be removed from the hive and the condition of the bees examined without any risk of being stung or without killing or injuring the bees.

BEE HIVE.—Charles McGrew, Bloomington, Ill.—This invention consists of a bee hive, constructed in such a manner and provided with vessels for the reception of water or other liquids, located in such a position that the bee moth will be entrapped and the bees protected from the ravages of that insect.

SHAFT COUPLING.—H. K. Smith, Norwich, Conn.—With this coupling shafts can be readily secured together or detached, and, when coubled or fastened perfectly centered.

CULTIVATOR.—Edwin Children, Lancaster, Wis.—This invention relates to a cultivator of that class which have their plows connected to a frame mounted on wheels and provided with a pivoted draft pole. It consists in a novel means for raising the plow beams and retaining them in an elevated position; and also in an improved arrangement of the draft pole and means of attaching the plows to their standards, whereby advantages are obtained.

PIPE TONGS AND CUTTER.—John Peace, Camden, N. J.—This invention consists principally in combining with one jaw of the tongs a double ended adjustable steel socket having a series of air spring edges; also in combining with the steel socket a bridle of suitable shape to fit about the tongs, to adapt them for the cutting off of pipes.

MANUFACTURE OF CAST STEEL.—V. Gallet.—Dated June 14, 1866.—The inventor of this process takes iron, by preference such as has been submitted to one rolling operation only in which state it is termed "puddle bar," and coats it with a paste made by mixing water with the following ingredients: Limestone, 30 parts; vegetable mold, 3 parts; carbonate of potass, 8 parts; oxide of manganese, 6 parts; resin, 6 parts; soot, 10 parts; charcoal, 34 parts; common salt, 3 parts. The iron coated with this composition is melted in a crucible, and cast steel is in this way obtained from iron in one operation.

METHOD OF TREATING PERMANENT INFLAMMABLE GASES, WHEREBY GREATER HEAT IS OBTAINED THEREFROM.—B. F. Stevens.—Dated June 15, 1866.—This invention consists, essentially, in mixing steam with gas obtained from the distillation of wood, resin, petroleum, peat, and other hydrocarbon substances in the manner hereinafter described, and empleying this mixture for the production of heat.

MANUFACTURE OF PIGMENTS.—J. E. T. Woods.—Dated June 18, 1866.—The patentee proposes to utilize the condensed or deposited fumes of lead from lead furnaces, such deposit being known as lead soot or sublimated lead, by converting the same into a chloride of lead. One method of effecting this object is to treat the sublimated lead or lead soot with heated muriatic acid, or to treat the lead soot in combination with a saline chloride, such as the chloride of sodium or common salt, whereby the chlorine having a greater affinity for the metallic than the earthy base, will form a chloride of lead, which, being dissolved in water, and the lead precipitated therefrom, will leave a white pigment suitable for various useful purposes to which pigments are applied.

TREATMENT OF ANIMAL CHARCOAL USED BY SUGAR REFINERS OR OTHERS, IN ORDER TO ITS RE-USE.—W. B. Patrick.—Dated June 18, 1866.—In carrying out the improvements the charcoal, while still in the filter, after it has lost its power by use, is first washed, by causing hot water to flow through it. It is then dried, or partially so, by causing hot air to pass through or among it, aided by force or exhaustion. It is then allowed to remain for fermentation in the filtering vessel, with the taps or valves opened to the atmosphere for twenty-four hours or more. When fermentation has taken place carbonic acid gas is admitted to act on the charcoal for the purpose of rendering soluble or neutralizing the lime or alkaline matters which have combined or mixed with the charcoal in its use. Hot water is again passed through the charcoal, to cleanse it of matters rendered soluble by the action of the gas.

STAIR ROD.—W. B. Gould, New York City.—In this invention the stair rod at each end is held in a socket secured to the stairs at the proper points, and provided with an adjustable yielding bearing surface for the end of the stair rod, whereby the rod, without disturbing or detaching the sockets, can be placed within or removed from them with ease and facility.

SCISSORS SHARPENER.—A. W. Gifford, Worcester, Mass.—With this sharpener the blades of scissors can be sharpened with ease and dispatch and without injury.

PROCESS OF UTILIZING WASTE VULCANIZED INDIA-RUBBER, AND MANUFACTURING HARD RUBBER THEREFROM.—G. T. Bousfield.—Dated June 19, 1866.—The first part of this invention has for its object to avoid the expensive and dangerous modes of treatment usually adopted, and to restore to the rubber those properties of which it has been deprived by the process of vulcanization to which it had been previously subjected. This the patentee accomplishes by adding to the rubber (after it has been suitably comminuted) a portion of some vegetable oil, which having no solvent action on the rubber, simply restores to it those properties and that capability of being vulcanized which it possessed in the crude state.

APPLICATION OF ELECTRIC LIGHT FOR GIVING EVIDENCE OF BUOYS OF EVERY DESCRIPTION. A. Miroude.—Dated June 20, 1866.—This invention consists in the employment of the electric light for lighting buoys without requiring any communication from the shore, by which they can be increased in number and placed as far from the land as the sea or river navigation requires, the object being to light buoys by means of the light produced by electricity in the apparatus known as Geissler's tube, and is carried out by placing in the buoy to be lighted, whatever may be its dimensions and form, a receiver or battery (of a size and weight in proportion to the size of the buoy), producing an electric current; then a Ruhmkorff induction bobbin; and lastly, at its upper part, the lamp is furnished with several glass tubes or spheres, known as Geissler's tubes.

COTTON BALE TIE.—Joseph Knight, Louisville, Ky.—This invention relates to a new and improved device for fastening iron hoops or straps upon cotton and other similar bales, and consists in a flat loop of plate iron made square at one end and diagonal at the other, through which the ends of the strap are passed, and the outside end is bent in a peculiar way on the diagonal side of the loop and secured by slipping it under the body of the hoop above the loop.

DRESS HOOK.—Andrew Bennett, Brooklyn, N. Y.—This invention relates to such a construction of a dress hook that the same cannot be spontaneously disengaged from the eye, while it does not require much more than the usual force to unhook the same, if required. The invention consists in the use of a spring, which is formed by an extension of the wire of which the hook is made, whereby the aforesaid results may be obtained.

ROCK DRILL.—G. F. Case, New York City.—This invention relates to that class of drills in which diamonds are employed as the medium for cutting the rock, and it consists in arranging the diamonds in the head of the drill in two or more rows, and also in so setting them as to cut the entire surface of the rock embraced by the drill head.

SODA-WATER STAND.—Abraham Van Winkle, Newark, N. J.—This invention relates to a soda-water stand which is composed of two or more tiers of sirup cans placed one above the other, instead of one row on each side of the stand, as heretofore constructed, in such a manner that the appearance of the stand and its convenience are enhanced, all the ornamental sirup drafts being shown at a glance and in convenient reach of the person having charge of the stand. The draft for drawing the soda water is placed at the end of the stand, and thereby the soiling of the plated sirup drafts by the spattering of sirup and water is avoided.

MUCILAGINOUS COMPOUND.—Victor Bloede, Brooklyn, N. Y.—This invention relates to a mucilaginous compound obtained by treating common wheat starch with a mixture of acids applied in such a manner and proportion that a perfectly white gum can be produced, fit for photographers and for other delicate work, or gums of a more or less dark hue, according to the work for which the gum is to be used.

FISH HOOK.—Benj. Lee, Jr., Williamsburgh, N. Y.—This invention consists in combining a spring with the stem of a fish hook, the object being to increase the strength of the hook without materially increasing its weight, as well also as to render it sufficiently flexible to resist sudden strains.

BURGLAR AND FIRE ALARM.—Josiah Holmes and Charles W. Nickerson Pittsburgh, Pa.—This invention relates to the construction of burglar and fire alarms, and consists in the arrangement of devices in connection with inflammable guard cords stretched throughout a building, whereby, when the guard cords are burned by fire or broken by the entrance of a burglar through a door or window, an alarm bell is started which will awaken and notify a person in charge of the building.

STEAM GAGE.—William Stamp, Susquehanna Depot, Pa.—This invention relates to the construction of gages for indicating the pressure of steam in boilers, and consists of a novel form and arrangement of a steel diaphragm or partition plate upon which the steam acts by expansion, and also the means of adjusting the moving apparatus of the dial to indicate the degree of pressure with minute accuracy.

WHITENING CURRIERS' SLICKER,—Daniel Peters, Keokuk, Iowa.—This invention has for its object to improve the construction of Daniel Peters and W. D. Wilson's slicker, patented April 19, 1864, and numbered 42,397,

The claims of the following notices were patented Feb. 5, 1867:—

MACHINE FOR HEADING BOLTS.—Philip P. Trayser, Baltimore, Md.—In this machine the heading tool is free to rotate upon its axis so that as the square head of the tool moves forward within the die it is adapted to turn or adjust itself sufficiently to become coincident with the inner surfaces of the die and thereby prevent the abrasion or cutting action by the tool, which occurs in machines of this class as heretofore constructed,

MODE OF FASTENING ROOFING.—J. C, Wands, Nashville, Tenn.—The material consists of a layer of wire cloth covered with any pitchy substance on the outside and with a coat on the inside to prevent its adherence to the sheathing of the roof. The breadths of fabric, felt or prepared paper are laid parallel upon the roof from ridge to eave, their edges lapping each other upon raised strips which are capped with metallic plates which fasten the lapped edges on the strips making a water-tight joint.

COTTON CULTIVATOR.—James C. Bethea, Blakely, Ga.—The sheath or standard is made of the same shape toward the front end to the rear to either of which the share may be attached so as to adapt it to throw the furrow to the right or to the left; the beam itself being shifted end for end to adapt it to the change.

COTTON-BALE TIE.—Henry Fassmann, New Orleans, La,—The buckle of this tie has two loops for securing the ends of the hoop and a ridge or ridges on one or both sides to press the hoop against the cotton and prevent its withdrawal. In use one of the hoops is first lapped around the bar of one loop and the other end of the bar is inserted through the notch in the bar and lapped over the bar of the loop whose notch it spans; the chamfered corners of the bar at the notch permit the oblique insertion of the hoop therein.

## Business and Personal.

*The charge for insertion under this head is 50 cents a line.*



## Answers to Correspondents.

*CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us: besides, as sometimes happens, we may prefer to address the correspondent by mail.*

*SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."*

M. C., of Conn., sends us the details of a supposed spontaneous explosion of a burning oil which he had purchased under the name of "Non-explosive Union Oil." His wife was filling lamps from a can, in the day time standing about six feet away from a coal fire burning in a stove. On removing the stopper which was a piece of potato the oil (vapor) in the can exploded and set fire to the lamp, etc. A previous stopper, a wad of newspaper, had fallen into the oil; except in this respect the oil was clean and in as good condition as when procured. M. C. is unable to find any cause of the explosion. We are unacquainted with the oil under the name given. If M. C. on re-examination of the case is still satisfied that the explosion did not originate from the fire in the stove or any other fire burning in the room, we recommend him to have examination of the oil and can made by a competent chemist. We have placed his letter on file for future reference if necessary.

D. U. S., of D. C., supposes a very long railway car going East. A track is laid on the top of the long car, and on this track is a short car going West at the same rate as the long car goes East. What is the motion of the short car in relation to a spectator at rest on the side of the railway. What the motion after the short car falls down on to the main track. A very good case for the juveniles.

J. V., of Ala.—The enamel on watch faces is a white glass or glazing which is melted on the metal in a muffle. Photographs may be made on any genuine enamel.

O. H. H., of N. J., sends the following interesting computations. A cubic mile of water in round numbers is equal to 147,000,000,000 cubic feet or 9,000,000,000,000 lbs. or 4,560,000,000 tuns."

J. C. A., of Conn., sinks a pipe perpendicularly into the earth 50 feet, and water is found at 25 feet. He appears to enquire if the water will not rise to the surface of the ground, by reason of the great length of the pipe. The length of pipe beyond the point where its end would constantly be in the water would be of no advantage.

J. C. M., of Me., sends a pencil sketch of a singular freak in the formation of ice. A common wooden pail had been left out of doors till a film of ice had formed about a quarter of an inch in thickness. The surface was ordinarily even except that two or three inches from one side rose a neatly formed flattened tube of ice. The tube was one and three-eighths inches high, one and one quarter inches in outside diameter, about quarter of an inch internal diameter.

W. S., of O.—Benjamin Pike, Optician No. 518 Broadway can supply you with microscopic photographs.

A. H., of N. Y.—The process for purifying black lead consists in mixing it with sulphuric acid to a pasty consistency and exposing to heat till a considerable part of the acid is decomposed. The mass is then washed with water which dissolves the impurities.

J. M, of Pa., thinks it extraordinary that there was a thunder storm in his town (Bareville) on the 2d inst. But we had also here on the same day a thunder storm and another on the 9th. Such storm in winter are rare. They are to be explained in the same way as the summer storms.

H. W. S., of O., suggests that the law of equal pressures in all directions should be extended to solids as well as liquids. He argues that the difference between liquids and solids is only in degree that all liquids have some cohesion, and no solid is perfectly rigid; and concludes that the law of equal pressures is applicable to all bodies due allowance being made tor the action of cohesion in individual cases.

R. B., of Ill.—The so-called marine soap, or the soap which can be used with salt water, is made of cocoanut oil and soda. Vegetable oils generally make soaps which are more soluble than those containing only animal fats. Palm oil is used in all parts of the world as a soap fat.

W. R., of N. Y.—We cannot see any greater difficulty in extinguishing a fire in the basements of buildings on the line of the proposed arcade railway, than in the lower stories of other buildings; in fact not so much. The areas leading to the tunnel, and the building, itself, would suffice for the escape of the smoke. It would not be necessary for the engines to be placed on the lower level, but they could be worked from the street, as at present.

J. F. D., of ——, has some old brass bearings, faucets, etc., which when melted will not fill the molds well and is too hard to work easily. He desires to know how to remedy it. We think the addition of a little zinc, say 20 per cent, would improve it. Plumbago crucibles are not injured by long exposure to a low fire. It is high heat that weakens them.

B. of R. N., Wis.—You are quite correct. Arsenic is recognized as a medicine and is used by most of the faculty under the form of what is called Fowler's solution. There are perhaps no well known poisons which have not been praised for their medicinal virtues. If you make up your mind to take no doses which contain a poison you may as well at once dismiss all the doctors. The root doctors and the Indian doctors, in respect to the poisons are just as bad as their more enlightened brethren

R. N. T., of Me.—There is as yet no successful electro-magnetic engine, and our knowledge must be much farther advanced to enable us to see how it is possible that electricity can supercede steam as a motive force. The electrical force equivalent to steam force costs about fifty times more, and in utilizing it for mechanical work there is a larger per centage of leakage.

R. B., of Vt.—The steam gun was invented by Jacob Perkins an American, who exhibited it in London where for a time it was the great sensation.

S. C. N., of Del.—Your opinion is just as good as ours, perhaps better on the probable advent of cholera this year. We do not entertain many subjects where mathematics and physical demonstrations are wholly inapplicable.

S. G., of Tenn.—The sources of zinc are very abundant in the United States, but very little of the American metallic zinc gets into market. It is found more profitable to use the ore for zinc paint.

N. L. N., of N. J.—There is no way known of bleaching printing ink. The black matter of the ink is carbon for which there is no solvent. Any corrosive substance which can destroy carbon, acts much more powerfully on paper and other organic matter. Writing ink is of a different nature altogether and its chlorine may be discharged by chlorine and almost any acid; oxalic acid is most commonly used.

R. B., of R. I.—The acid of the lime, lemon and orange is the same substance, citric acid. The acid cannot be manufactured profitably in your state.

S. N. D., of Ind.—We hear complaints from all quarters about the vinegar. It appears as if half of the manufacturers do not understand their business. A great deal of the vinegar now sold loses all its sourness in a few weeks and becomes offensive to the smell. We are told also that some of the vinegar makers have learned the art of increasing the sourness by putting in sulphuric acid. Those who are anxious on the subject should test the vinegar by a solution of chloride of barium; a white precipitate indicates sulphuric acid.

J. F. S., of Kansas.—To determine the efficiency of a water ram it is necessary to know the diameters of the pipe as well as their lengths. You will perceive therefore that your question cannot be answered.