

AN ENGLISH ECONOMIST ON RAILROAD REFORM.

The conveyance of letters by post is one of the few industrial enterprises which can only attain its highest perfection by being placed under governmental control. The regularity and precision which are absolutely indispensable for the proper working of the postal system, together with safety and expedition in transmission and delivery of mail matter, and the faculty of realizing an immense revenue with a minimum and essentially uniform rate of tariff, are advantages which, on such a grand scale, could never be attained by individuals nor corporate bodies. Such success attending the working of the postal system, it is quite natural that the idea should suggest itself of putting the coadjutor of the post—the telegraph service—on the same basis. In Belgium, the system has always been under the control of government, one tariff, and that a very moderate one, being charged for the transmission of despatches throughout the kingdom. In Switzerland, likewise, the telegraph lines are the property of the state. A strong movement has recently been made in England to make the British lines government property, the experience gained in the two continental countries before referred to being urged as proof that under a general and more economical system, the lines can be and have been worked at rates greatly reduced below those charged when owned by private companies, and yet with a large profit to the government. The measure has of course met with determined opposition from the existing telegraphic companies, but what its fate has been, we are unable to say. A resolution looking to substantially the same end as the English movement was some time since introduced into Congress but we believe no action has ever been taken upon it.

An English economist has issued a pamphlet in which he proposes to make even the railroads of the kingdom government property, to be regulated and managed as is the postal service. We have on several occasions stated the purposes of an organization in this country for making the freight railway lines the property of the different States, but Mr. Brandon, the author of the plan under consideration, goes still further than either what Mr. Quincy of Massachusetts, or the American Cheap Freight League has proposed. In a pamphlet entitled "How to make Railways Remunerative to the Shareholders, and Beneficial to the Public" the writer seeks to show that the public have not yet obtained the full benefits to be derived from railway traveling, as well as that the shareholders might reap advantages in proportion to those conferred upon the public by the adoption of a better system. These desiderata, it appears to him can only be accomplished by the government taking up all the railways in the kingdom. He estimates that the average profits of the British railways are 4 2-5 per cent, and suggests that railway shares should be exchanged for government railway stock, bearing 4 2-5 per cent, guaranteed interest, the price at which to convert the shares being the average price for the past seven years. Government is to unite the whole of the railways under one general management, so that they should become a recognized branch of the public service available for the whole population.

Further: Mr. Brandon proposes to establish one uniform price on every road, carrying passengers one journey of any distance in one direction for the equivalent of twelve, twenty-five and fifty cents, for third, second, and first class passengers, respectively, estimating that at these rates six times the number of passengers would be carried, at small, if any additional expense. He calculates—with an exactness which is certainly surprising—that 755,879,586 passengers would travel annually with single journey tickets; of these one-seventh would be first-class, two-sevenths second class, and the remainder third class passengers, yielding an aggregate income of \$133,000,000. The fares for single journeys are to be paid by government stamps, which are to be issued like postage stamps and delivered up on the completion of the journey; a passenger not provided with a ticket to pay double fare. Mr. Brandon regards his scheme as the completion of the postal system, and refers to the advantages already derived from the letter, book, and sample post, and to be anticipated from the annexation of the telegraph as evidence of the benefits derivable from the development of his project.

Editorial Summary.

"BDELLATOMY" is the name given to a curious practice lately introduced into Germany, whereby the efficiency of a leech in blood letting is greatly increased. This result is effected by making an incision in the side of the animal, which serves as an outlet, while, unconscious of the rupture, the leech continues vigorously sucking until the patient has parted with an ounce or even double that quantity of blood from a single application. The cutting is made preferably on the left side of the leech, and at the moment when the gormandizer has nearly filled himself to repletion. The operation must not be regarded as an act of cruelty, but quite the reverse, as serving a good turn for the animal in allowing him the means for prolonging his rich feasting almost indefinitely. After being removed from the patient, if carefully treated, the leech can be kept until the wound is healed, and in this way several incisions may be made in one animal.

METEOROLOGICAL.—Those who have lamented the supposed extraordinary amount of rain that has fallen this year, will be surprised to learn that for the first six months of 1868, the amount of rain and melted snow in this latitude was 4.75 inches less than last year, though being in excess of the average for thirty years past, of 3.03 inches. In the mere number of rainy days, however, this season has been remark-

able, statistics proving that considerably more than half the number of days during this period were rainy, the wind blowing meanwhile from some point in the east on 133 out of the first 172 days of the year.

ONE of the most interesting cases of chemical synthesis recently published is that in which Mr. W. H. Perkins has succeeded in producing artificially the odoriferous principle of new hay. Naturally, the delicious fragrance of freshly mown grass is due entirely to the presence of the species of graminæ known to botanists by the name *anthoxanthum odoratum*, but ordinarily called sweet-scented vernal grass. The same substance constitutes the flavoring principle which the Germans employ in making their favorite beverage, May wine.

It has been found by experiments that a stream of electricity derived from a powerful electro-magnetic machine, driven through a solution of brown unrefined sugar, will bleach it, electricity being thus made to perform the function of charcoal. It appears that one of Wilde's electro-magnetic machines, driven by a 15-horse power engine, has been set up for this object in a sugar refinery in Whitechapel.

EUROPEAN PATENTS are obtained through the SCIENTIFIC AMERICAN office in Great Britain, France, Belgium, Holland, Prussia, Russia, Saxony, Austria, Bavaria, Würtemberg, Italy, Spain, and in Provinces wherever patents are allowed. We invite careful attention to our facilities for procuring *Foreign Patents*. We have offices in London, Paris, Brussels, Berlin, through which we are able to prosecute claims with the utmost dispatch, and at prices less than are usually charged by other solicitors. Parties having applications to make will find it for their interest to consult with Munn & Co.

FISH CULTURE.—Seth Green is breeding fish in Western New York and at two or three points in New England. He is now at Holyoke, most actively engaged in propagating shad, and writes: "I am hatching about seven million shad every day." The Connecticut River, at this rate, will in two or three years, be thoroughly stocked with this superior fish. Mr. Green's example could be followed with great profit by others, who, with a little time and study, might acquire the whole art of fish breeding. There is no reason why the Hudson, Potomac, and numerous other rivers extending from the coast should not abound in shad.

THE NORTH GERMAN MERCANTILE NAVY.—The mercantile navy of the three Hanse-Towns consists of 795 ships of 204,589 tons burden; the Grand Duchy of Mecklenburg-Schwerin, 447 ships with 52,452 tons; the Grand Duchy of Oldenburg, 190 ships with 26,863 tons. The fleet of these five States comprises in all 1,432 ships with 287,904 tons. The complete mercantile navy of Prussia alone numbers 5,413 ships, with 321,987 tons. The united mercantile fleet of the North German Confederation consists of 5,845 ships with 609,891 tons.

THE PRODUCTION OF PHOSPHORUS by a direct process from phosphate of lime, is the invention of two French chemists. Apatite, bone, or any other natural phosphate of lime, is mixed with twice its weight of sand, both being powdered. To the mixture is added 25 per cent of the weight of phosphate of charcoal dust, the whole being heated in a retort to an orange-red heat. At this temperature phosphoric acid is set free, and being reduced by the charcoal, the phosphorus is collected in the ordinary manner.

THE ALBERT MEDAL, which was instituted to "reward distinguished merit in promoting arts, manufactures, or commerce," has this year been awarded by the Council of the Society of Arts to Joseph Whitworth, of Manchester.

Hydrophobia Cured by Salivation.

A new remedy for this most distressing of maladies, comes from Northern India, and is attested by the medical officer at the Hooshiarpur Charitable Dispensary. "The patient on admission was suffering from violent and frequent attacks. He was tied on to a chair, surrounded with blankets, leaving the head free, a large vessel of boiling water was placed under him, and a mixture of equal parts of mercury and sulphur well rubbed together were placed in a broken piece of chatty over a charcoal fire, and put alongside of the vessel of boiling water; 15 grains of calomel were given at once, and 5 grains repeated every hour, the mercurial vapor bath being kept up till all symptoms subsided. In about four hours the man was perfectly calm and free from bad symptoms; he was removed from the chair and placed on a bed. The after treatment was simply tonics, nourishing food, and gargles, etc., to remove salivation. On the 13th he was discharged cured."

The Loss of Power by the Crank.

The crank is simply a mechanical medium of transmitting motion, or rather of transmitting the direction of power. No loss of the power has ever been discovered by the use of this means, and no real advantage gained by the substitution of other means of changing rotary into rectilinear motion, or vice versa. Practically, the speculative objections against the crank with the experiments based on them have never produced any device superior. The continued battle carried on against the crank, as a means to the end in view, has always ended in the discomfiture of the aggressor; the best method would seem to be to produce a new device and prove its superiority to the crank. The discovery will be welcomed by every earnest and honest mechanic.

Modern Gunnery and What it can do.

Some interesting practice was carried on the other day at Shoeburyness with the twelve inch muzzle loading rifled gun of twenty-three tons, firing common shell of six hundred pound weight, with the ordinary charge of sixty pounds of powder. The gun is mounted on a wrought iron carriage and platform, placed on a turn table in rear of a wooden structure representing an iron fort, through the portholes or embrasures of which the gun is laid and fired. The object was to ascertain how quickly the gun could be loaded, aimed, and fired by an ordinary detachment of one officer, one non-commissioned officer, and seventeen gunners. The gun was carefully laid each round at a small target one thousand yards' distance, and five rounds were fired in seven minutes and thirty-nine seconds, or at an average of one minute and thirty seconds for each round. The practice was excellent. We leave our readers to imagine what would have been the effect produced on an enemy's ironclad had she been under the above fire with Palliser projectiles fired with battering charges. She would have them struck every time, and in less than eight minutes would have received from one gun alone the impact of 3000 lbs. of iron, representing a total "energy" of 24,300 foot tons.

A Great Tunnel.

The project has been revived in England of tunneling the channel to France. Evidence has been obtained that the soil over which the sea flows is white chalk, gray chalk, and green sand further below. This fact was ascertained by borings on the English and French coasts, the two points on each side of the channel being not more than twenty miles from each other. It is but reasonable to suppose that the same material will form the submarine soil from coast to coast. The chalk can be easily worked, and the expense is placed at \$50,000,000, gold, twice the cost of the Abyssinian war.

The project of bridging or tunneling this ugly channel is, to say the least, a very doubtful one, but extensive docks might be erected, and much larger and more comfortable steamers put on than the miserable, sea-sickness engendering tubs at present in use. With properly constructed vessels and docks, cars might be run on to boats and easily transported across the channel. The present system seems to us a needless cruelty.

THE peat speculation is unprofitable in Connecticut. The *Hartford Times* says: "Losses have occurred in this and Tolland counties to the extent of about \$150,000 in this speculation, and large sums in other parts of the State."

Recent American and Foreign Patents.

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

MECHANICAL MOVEMENT.—James See, Mitchell, Ind.—The object of this invention is to furnish a device by which the application of motive power to machinery may be so regulated, controlled, and directed, in conjunction with a set of weights, levers, and ratchets, that a great saving of power shall be effected thereby, enabling the operator, by any given amount of power at the main shaft, to obtain results at the point where the power is to be used, exceeding, by nearly one hundred per cent, the results of any other apparatus hitherto invented for a similar purpose.

PAPER RULING MACHINE.—Wm. S. Wilder, New York city.—This invention has for its object to furnish a simple, convenient, and accurate paper ruling machine for ruling bill heads, etc.

CULTIVATOR.—Major E. Hanover, David D. Bailey, and Fordyce M. Harwood, Lamolite, Ill.—This invention has for its object to furnish an improved cultivator, easily and quickly adjusted, and effective in operation.

NAIL EXTRACTOR.—J. B. Breathill, Arrow Rock, Mo.—This invention has for its object to furnish an improved nail extractor which shall be simple in construction, durable, and cheap.

MACHINE FOR SAWING STAVES.—Miller J. Hine, Equality, Ill.—This invention has for its object to furnish an improved machine for sawing staves, which shall be simple in construction, effective in operation, and convenient in use.

LATHING MACHINE.—O. C. Macklett, Saint Paul, Minn.—This invention has for its object to furnish an improved machine by the use of which laths may be attached to the scantlings and joists more rapidly and accurately than is possible when the lathing is done in the ordinary manner.

CHURN AND ICE CREAM FREEZER.—Charles Higley, Port Byron, N. Y.—This invention has for its object to furnish an improved machine so constructed and arranged that it may be used with equal facility as a churn and as an ice cream freezer, and which will do its work in either capacity more thoroughly and quickly than it can be done with the machines ordinarily used for these purposes.

HANDLE FOR SAD IRONS, ETC.—Stephen H. Cummings, Norway, Me.—This invention has for its object to furnish an improved handle for sad irons, tailors' goose, stove cover lifters, and other metal articles, which it is necessary to handle hot, and which shall be so constructed as to prevent the hand piece from becoming hot, and protect the hand from the heat radiated by the object being held.

VARIABLE CUT-OFF FOR STEAM ENGINES.—James McPherson, Brooklyn N. Y.—This invention relates to a new variable cut-off for steam engines which is connected with the governor, so that it will be automatically adjusted as the pressure of the steam comes above or below a certain desired degree.

HOP PRESS.—Henry Taylor, Middletown, Wis.—This invention consists of a stout frame, composed of two vertical posts and two horizontal beams, which compose the sides, top, and bottom walls of the same, the posts being jointed to the bedplate or beam in a manner to allow them to be spread out after the bale has been formed, to facilitate the release of the same, and provided with removable side planks, a follower, and operating screws.

COW-MILKING MACHINE.—L. O. Colvin, New York city.—This invention consists of a simple, cheap, and effective apparatus for operating the milking device, so arranged that the latter may be readily applied to the udder of the cows, while standing in any position within the stall, wherein the machine is arranged, and which may operate the milking device in a manner to assimilate the action of a sucking calf, either when the cow gives down her milk freely, or when she refuses to give it freely, as is sometimes the case.

EXPANDING REAMER FOR PETROLEUM AND OTHER ARTESIAN WELLS.—A. J. Salisbury, San Buenaventura, Cal.—This invention relates to a method of expanding branches of a well reamer by a positive downward thrust of the superincumbent shafting by which the reamer is actuated in the operation of reaming, and consists of a toggle joint attached to and between the said branches at certain suitable distances from the points of the cutter and operated by the direct vertical thrust of the shafting to which the reamer

is attached, acting upon a shank pivoted to the toggle joint, together with other devices perfecting the whole.

WRENCH.—Wm. Bradshaw and Chas. Lyon, Delphi, Ind.—The nature of this invention relates to the class of wrenches generally called "monkey wrenches."

WATER CLOSET.—George Conron, New York city.—The object of this invention is to provide a simple and effective water closet, whereby the hinged pan and other complicated devices, which are expensive and liable to get out of repair, are dispensed with.

MOWER AND REAPER.—Darius Babcock, Warsaw, Ill.—This invention relates to a new and improved method of constructing machinery for mowing and reaping, whereby the same is more economically done, and whereby also the machines are made more certain in their action and are rendered more durable and less likely to get out of repair.

BROADCAST SOWING MACHINE.—Alfred B. Beaumont, Grand Rapids, Mich.—The object of this invention is to perform the sowing of grain or fertilizing material in a regular and rapid manner. The machine is provided with devices for adjusting the quantity of material sown as well as the direction and distance to which it is projected.

MEDICAL COMPOUND.—A. J. Hobbs, Van Wirt, Ga.—The object of this invention is to provide a vegetable medicine for treating gonorrhoea, syphilis, and other venereal diseases, and also for the treatment of uterine affections, and other disorders of the female genital organs. It is also a valuable tonic, to brace the system when reduced by excessive venery or debilitated by chills and fever or other malarious fevers. It is also an excellent palliative for rheumatism and kindred disorders.

CARS, WAGONS, AND OTHER VEHICLES.—Thomas Stone, Plainfield, Ind.—The object of this invention is to accomplish the discharging of the contents of a wagon box, when such contents are of a loose character as sand, coal, and the like. The invention consists in forming the bottom of the box of shutters or leaves extending across the box and pivoted to the same by means of journals or gudgeons working in holes in the wagon box.

HAY LOADING DEVICE.—N. B. Douglas, Cornwall, Vt.—This invention relates to a new and improved device for raking up and loading hay upon wagons, and has for its object the obviating of hand labor in pitching hay on wagons. The invention consists in a peculiar construction and arrangement of parts, which form an attachment capable of being applied to the rear part of any ordinary farm wagon, and so as to operate in the most efficient manner.

SEWING MACHINE.—A. Q. Allis, Dayton, Ohio.—The nature of this invention consists in the arrangement of a coil spring as the moving power of a sewing machine for ordinary domestic use, in order to dispense with the treadle for operating the machine with the foot, as usual, together with a device for regulating the motion.

LETTER POUCH.—P. Davis, Newport News, Va.—This invention relates to a new and improved letter pouch, and it consists in forming the same with a flap and a band or a slit to receive the end of the flap. The exterior of the pouch is ruled or lined off at equal distances apart, and the several spaces are numbered, and the names of the places or addresses written or printed upon them.

HORSE RAKE.—C. E. Murray, Sugar Valley, Pa.—This invention relates to a new and improved revolving wire tooth horse rake, and it consists in a peculiar means employed for holding the rake and revolving the same at proper intervals, in order that it may discharge its load, and also in a certain means to allow a vertical play to the teeth, to admit of them conforming to the irregularities of surface over which they may pass.

REEL FOR BOLTS.—Joseph G. Harris, Gravois Mills, Mo.—This invention relates to a new and useful improvement in the construction of reels for bolts. The object of the invention is to admit of the bolting cloth being stretched uniformly at the inner sides of the ribs of the reel, whereby all obstructions to the free passage of the flour through the bolting cloth are avoided, and the flour separated from the bran and coarse particles of the meal by a sifting process solely, and not by the raising of the meal and falling of the same within the bolt as it rotates, as is now the case, owing to the ribs which are at the inner side of the bolting cloth catching the meal and operating upon it in that way, and which leaves more or less fine bran to be forced through the bolting cloth that would otherwise pass out with the coarser portion at the tail of the bolt. The bolting cloth also is liable to become choked and clogged up with this fine bran.

TIE OR FASTENING FOR SHEAF BANDS, BAGS, BALE HOOPS, ETC.—Edward Truslow, New York city.—This invention relates to a new and improved tie or fastening for sheaf bands, bags, bale hoops, etc., and it consists in bending or forming a piece of sheet metal, or casting a piece of metal in such form that a string, wire, or metal hoop may be secured in it with a very simple manipulation, one end of the string, wire, or hoop being attached to the tie previously to its application to the article to be bound or tied up and the free or disengaged end secured in the tie or fastening after it is passed around the article to be bound or tied up.

VENTILATING AND HEATING BUILDINGS.—E. L. Roberts, New York city.—This invention is designed to accomplish perfect ventilation in all parts of a room or building, whether large or small, and a uniform heating of the same at all times and seasons, by causing a constant, steady, and uniform flow of fresh air into and through the room in a manner to be diffused throughout the whole space, and take up and carry off all impure and noxious air or vapor that may be discharged into the room from any cause.

WHIP.—Dexter Avery, Westfield, Mass.—This invention relates to a new whip, and consists in forming the outer covering of the same by threads, which are interwoven like regular fabric, instead of being braided as usual.

MIXING MACHINE.—J. B. Peterson, Brooklyn, N. Y.—This invention relates to a new machine for mixing flour and other materials, and consists chiefly in the use of a revolving grate, upon which the material to be mixed is deposited, and when it is in minute quantities thrown off by centrifugal force. Besides this plate there are also suitable stirrers employed.

HAMMER.—Peter C. Havelly and Wm. W. Coggeshall, Rensselaerville, Pa.—This invention relates to a new and useful combination of certain tools with a hammer, whereby a very convenient combination tool is obtained, for carpenter's use; one which will facilitate labor by diminishing the loss of time in taking up and laying down different tools in the prosecution of carpenter's or joiner's work, and which, in many cases, will allow of one workman performing alone what now requires the aid of an assistant.

CLOTHES DRYER.—J. R. Watkins, Maine Prairie, Minn.—The object of this invention is to furnish to the public a simple, cheap, and durable device for confining and holding the arms of a clothes dryer, and for supporting the same from the vertical walls of the room or building where the instrument is in use.

MILL STONE DRESSING MACHINE.—Azul Lane, Addison, N. Y.—This invention consists in the arrangement of a horizontal shaft which forms the axle of the pick handle, and which is provided with pinions on each end in a pair of sliding head blocks, which are caused to move back and forth on a platform; the latter also serve as guides for the head blocks, the motion being communicated to the said pinions by a hand wheel on the end of the shaft or by a worm gear on a counter shaft.

KEY BOARDS TO PIANOFORTES AND OTHER MUSICAL INSTRUMENTS.—J. S. Allen and A. P. Wilkins, Allen's Grove, Wis.—The present invention consists in adding to the ordinary key board now in use, two or more rows, or series of shorter keys, which are placed immediately behind the long keys, and in the same line horizontal therewith, through, and by means of which short keys a tone an octave higher or lower, as the case may be, than the key directly in front of it, can be sounded, and thus if two additional keys are used, enabling a tone to be produced two octaves higher than the original and front key of the series.

LUBRICATING DEVICE.—Lucius A. Dodge, Keeseville, N. Y.—This invention consists in providing a chamber within the stock to which the forging roller is received, and on which it is carried around the above axles provided with openings for supplying it with oil, and provided also with passages communicating with the axis of the said forging roller, and with packing of absorbent material, and set screws for compressing the said packing so as to regulate the flow of the oil.

MACHINE FOR MAKING HORSESHOE NAILS.—George D. Walcott, Jackson, Mich.—This invention consists in a novel construction and arrangement of parts, whereby, in connection with a heater or furnace, a machine is obtained which will work up into horseshoe nails a rod of any proper or desired length without any other work or labor than the introducing of the rods to the machine and the keeping of the fire in proper order.

ADJUSTABLE LEVEL.—Homer Lewis, Bennington, Vt.—This invention relates to a new adjustable spirit level, in which both the horizontal as well as the plumb ball can be regulated so as to be set when not true.

BEER HOPPING APPARATUS.—W. S. Haight, Waterford, N. Y.—This invention relates to a new apparatus for hopping beer, and for extracting beer from hops, and consists in the application of a stirrer in the extractor box, and of suitable pipes for drawing off the liquid and for preventing its overflow; also in the arrangement of a valve in the lower part of the apparatus for discharging the spent hops.

MACHINE FOR DRYING AND FINISHING TUBULAR FABRICS.—O. C. Sweet, Albany, N. Y.—This invention relates to a machine for drying, stretching, brushing, heating, and calendering knit or other tubular fabrics, and consists in such an arrangement of all the parts, that the said fabric is completely finished and wound upon a roller, after having passed through the machine, provision being made that the straight direction of the meshes is retained, and that the fabric is not twisted or laid spirally, whereby the value of the article would be greatly diminished, and whereby it would be made to shrink when washed.

ICE PITCHER.—C. C. Foote, New Haven Conn.—This invention relates to a new ice pitcher, which is enameled on the inside, so that the metal cannot be scratched or injured by the ice, while the taste and quality of the water cannot be spoiled by the corrosion of the metal.

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 \$1.00 a line, under the head of "Business and Personal."

All reference to back numbers should be by volume and page.

C. J. H., of Ohio.—You are entirely mistaken in asserting that the appearance of solidity in the stereoscope is due to one lens having a shorter focus than the other, or that this causes one picture to appear before the other. The two lenses of a stereoscope are, and ought to be perfectly alike, but the pictures are different. The statement of the correspondent, page 391, Vol. XVIII, which you criticize is perfectly correct.

A. B., of N. Y.—The answer to A. J. G., of Conn., page 327, was not to the question of the cause of the appearance of solidity in the stereoscope, which is well settled at present, but to his question why a single photograph will often show this appearance as well, especially if seen through a magnifying glass.

W. D. B., of Mass., asks why the air in an air-chamber of a force pump or ram is not absorbed by the water under pressure. It is in many instances so, the air-chambers become entirely filled with water, and several patents have been taken out, to prevent or supply this waste of air. In some circumstances however, (turbulent water supply, leakage of pumps etc.) air bubbles are incidentally carried along with the water, and thus keep the air supply in the chambers.

D. W. D., of Troy.—A large body of the same material and form, will fall faster than a smaller one, as it offers to the resistance of the air a lesser surface in proportion to its mass. In vacuo a cannon ball fired upward would fall with exactly the same velocity as it ascends, the resistance of the air however, makes the velocity of descent less than that of ascent.

F. B. C., of Mass.—When gas is burned so as to give light, it will give less heat; when you burn it mixed with air (as is done in the Bunsen burner and in good cooking stoves) so that it gives little light it will give more heat. You may easily verify this, by trying to boil water over a common kerosene burner, or over a Bunsen burner, using exactly the same gas supply, it will take in the first case, more than twice the time that is required in the second.

J. E. H., of Wis.—If you study the subject of atmospheric pressure thoroughly, it will "patch up" your notions on that subject in such a way, that you will see that "Galileo and the Scientific" are right and that you are all wrong.

J. T., of New Jersey, sent us sometime ago, a "document," in which he imagines to have demonstrated that there exists no gravity between the celestial bodies; we have now received an explanation of the tides founded on a "directly conflicting strain," in the motion of the earth. We advise our correspondent to study first the admirable theory of gravitation, as established by the greatest minds, after the most extensive research and profoundest study, before he sets up criticizing Newton and La Place.

W. A. S., of Syracuse.—The prescription for tinning and soldering iron which you sent us is old, and at present known to almost every tinsmith; it was published in the SCIENTIFIC AMERICAN by a correspondent page 71, vol. XVIII. An improvement was made in it, in 1860 by Scheffer, in Germany, which consisted in changing it into a dough by the addition of starch, so that a sufficient quantity may be placed on the surfaces to be tinned or soldered, without which the operation often fails. We think it will give very poor results when used for mending knifeblades, it is only a tin solder.

W. H., of Pa.—Your inquiry about a fire-proof roof over boilers is partially answered by an article on such a covering, appearing elsewhere in this paper. The different low water indicators have all a tolerable fair degree of reliability, but should never entirely be depended upon. A watchful sober engineer is not only the most reliable safeguard against low water, but also against excess of steam pressure.

G. W. J., of Ind.—You misunderstand and misquote our article on page 393, vol. XVIII, on long and short screw drivers; we did not say that "all the advantages gained by a long screw driver is obtained by moving the handle out of the line of the axis of the screw," but we said: "the long screw driver admits of considerable play from side to side without releasing the screw, while the short one admits of very little;" every one knows the annoyance of this slipping of screwdrivers with short handles, and the ease of turning those with long and heavy handles, and the steadiness of their position.

R. M., of Cal.—We agree that the fine bone dust as used for making opaque glue is not exactly the thing, but the addition to the glue of carbonate of soda, sulphate of zinc, and oxalic acid, which in fact form an oxalate of soda and sulphate of zinc, which you mention, is of very doubtful utility; probably you have not tried it.

H. D., of Pa.—You will find the information you seek about nitro-glycerin on page 87 of our last volume. It is a dangerous substance in the hands of inexperienced persons.

J. B. of Ohio.—The idea that a little quicksilver put into a millpond, would cause the dam to break is entirely erroneous; it will simply sink in the interstices of the bottom, and there remain. It would take an enormous amount of quicksilver by its pressure and weight at the bottom, to injure even a very small dam.

J. B. F., of R. I. asks: "Has the common suction pump any advantage over the lifting pump? Suppose we have two pumps by which it is required to raise water a certain distance. One is an ordinary suction pump, the barrel and pipe of a given size the other is a lifting pump, where the piston is placed in the water, barrel and pipe the size of the other, lever of both to be alike. Now can not a given quantity of water be raised

with less power by the suction than by the lifting pump?" Where the valve box of the pump is placed under the water the whole weight of the column of water must be lifted by the mechanical means employed; i. e. by the direct application of the power. This is what our correspondent calls a "lifting" pump. In the "suction" pump the pressure of the atmosphere can raise the water about 30 feet without mechanical power. The conclusion is obvious.

J. A. W., of —, believing boiler explosions and ruptures to be occasioned by unequal tension of the iron—unequal expansion and contraction by unequal heating—proposes that the boiler, after being put together, and before the calking is done, should be subjected to a red heat that the plates and rivets may accommodate themselves to their positions; after which the calking should be done and the hydraulic test for leakage applied. The plan of heating or annealing boilers is not new, but we do not yet understand that it has proved to be of real benefit. We cannot see how the equal heating of a new boiler can prevent the after action of an equal expansion and contraction.

A. K. S., of Ohio.—The question of wages paid to mechanics and that of the fees charged by professional men are so different in their character that a discussion of the subject could be of no practical value. The work of a mechanic is usually of much more value to the community than the services of a professional man, but circumstances change the character of the service. There can be no fixed rule of comparison.

A. P. S., of Me.—"Is it possible to separate cotton from wool or hair after they are interwoven? Can it be done by rotting it? If so how?" It is not possible by any process known to us to separate cotton from woolen fiber sufficiently clean for any purpose except chemical analysis. A lens and a pointed instrument are the means for effecting such separation on a small scale.

J. W. K., of La.—"In smothering the flame of some burning tallow, contained in an open vessel, the flames were extinguished below, but continued to burn near the ceiling for some moments, finally exploding with a report like the discharge of a pistol. Will you please give an explanation of the above?" Flame is incandescent gas. When tallow is sufficiently heated, an extremely inflammable gas is generated, which when mixed with proportion of atmospheric air is highly explosive. The continuation of the combustion after it was extinguished below, the final explosion is thus accounted for.

J. C. B., of Ky.—The conversion of cider into vinegar may be hastened by leaching it through beech shavings, grape stalks, birch twigs, or cobwebs previously soaked in vinegar and placed in properly constructed tubs, the apartment in which the operation is performed being kept at a temperature of from 80° to 100° Fah. Skum and other impurities not dissolved in the vinegar may be removed by filtering. To make a pale bright colored vinegar from dark sorghum, you should first decolorize the sorghum molasses by passing it through bone black.

E. A. T., of Ill.—"Isochrone," or equal timed, is applied to the pendulum, when it does not oscillate in the arc of a circle but in a cycloid. In the first case oscillations in a large arc will occupy more time, in the second case, it is indifferent if the oscillations are small or large; it was invented by Huygens in Holland two centuries ago. The same word is applied to the hairspring or spiral attached to the balance of a watch, when it is so constructed that the so-called amplitude of the oscillations have no effect on the time occupied by them. This was the invention of Breguet in France, at the end of the last century.

J. A. P., of Wis.—That a person standing on a swing can start himself by pitching his body, is simply due to the fact that by pitching his body backward he moves his center of gravity backward, and as the center of gravity in a swing as in a pendulum will always tend to move under the point of suspension, the swing will move forward; for the same reason when pitching his body forward the swing will go backward, and so he may augment the pendulum motion by pulling the rod, as which he keeps in his hands apparently against the direction of the motion, and he may counteract this motion by pulling apparently in the same direction as the swing when moving.

A. T. C., of Mo.—There are several varieties of hickory which explains why some trees put forth their leaves earlier than others. The difference in the varieties is only known to a practical botanist.

Business and Personal.

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