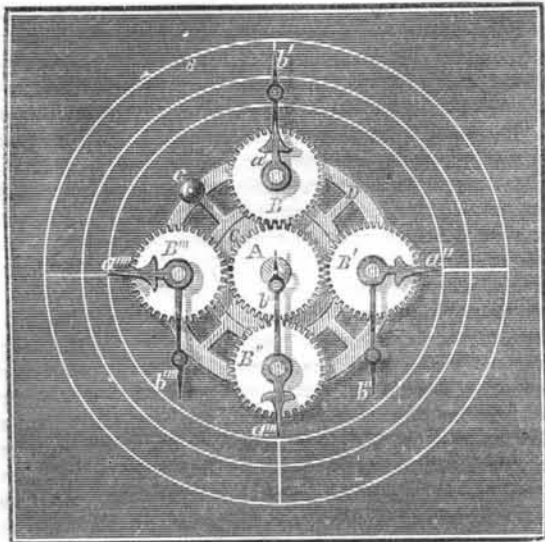


gas be generated alone, which may be employed for chemical distillation, for the desulphurization of ores, and other suitable purposes.

THE WHEEL QUESTION.

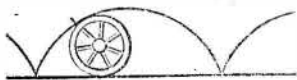
W. E. H. was one of the earliest to send us a model illustrative of the views of the two revolution philosophers; but when the engraving of the model was ready we found that we had mislaid his letter. We have therefore been obliged to delay the publication of the engraving until we could communicate with him.



Above is the view of his model. A is the fixed wheel, set on a fixed disk, C; B the movable wheel, carried on a movable disk, D, which is turned by button, c. A long pointer, *b'* is attached to the center of the movable wheel, B. The axial line of the movable wheel we have for the convenience of the eye, enlarged into the form of the short pointer, *a'*: instead of a pointer, a dot or other figure might be used. This short pointer our correspondent wishes us to say, is not on the model. B' B'' B''' are the several positions of the movable wheel in passing around the fixed wheel. The following is the letter of W. E. H.:

MESSRS. EDITORS:—A wheel may properly be said to revolve on its axis, when each point in the circumference of the wheel is successively in every direction from that axis; i.e., if the wheel is vertical each point of the circumference in succession is above, on one side, below the axis, on the other side, and again above: if the wheel is horizontal each point is successively east, south, west, north of the axis or in reverse order. In the case before us, the spokes of the wheel or an index placed upon it would point in order to all the figures on a large clock dial surrounding it. That this is the true and only idea of a revolution, seems to me evident from a simple illustration.

A wagon wheel is said by every one to revolve on its axis (or axle if you choose) when the wagon is drawn forward. This was your illustration on page 67 of the last volume. Why "revolve?" Because each point of the tire in succession is above the axis on one side of it, below it, etc. The actual path described by such points is a cycloid never returning into itself. I give a diagram which will make this clear to unscientific readers.



I refer, also, to Watt's sun-and-planet wheels, designed by him to take the place of a crank and in the use of which he mentions as an advantage, the fact "that one stroke of the engine produces two strokes of the wheel, while with a crank, one stroke of the engine gives but one revolution to the wheel." I regard this device of Watt's as the converse, so to speak, of the question under consideration.

Referring to the engraving I take this ground: 1st. That the long index shows clearly that the movable wheel makes two revolutions while rolling round the fixed wheel. 2d. That the short index, if it shows anything, shows that the bearing (not axis) of the movable wheel makes one revolution. 3d. That the two revolutions of the movable wheel are made on the bearing, the central line of which is the axis. I add also the suggestion prompted by the addition of the second index that the question is not how many more revolutions the wheel makes than its axis, but how many it makes on the axis.

W. E. H.

We have understood W. E. H. to be among those who maintain that a movable wheel makes two revolutions on its own axis in rolling once around a fixed wheel of the same diameter. But he does not positively state so in the above explanation. He says, 1st. that the movable wheel makes two revolutions. Does he mean on its own axis, or around the axis of the fixed wheel, or what? 2d. He says that the bearing (not axis) of the movable wheel makes one revolution. 3d. He says that two revolutions of the movable wheel are made on the bearing, (not axis.) Our correspondent has not clearly answered the question which he correctly propounds in the concluding sentence of his letter.

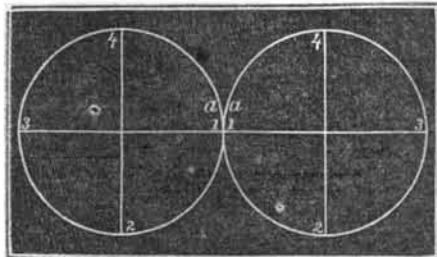
Whether the axis of B rotates or not, its position is changed by the passage of B around A. One position of the axis is indicated at *a'*, another at *a''*, another at *a'''*, and another at *a''''*. By observing these positions, and the movement of the wheel, B, in respect to them, as indicated by the long pointer, it will be seen that the wheel, B in passing once

around A, makes one revolution on its own axis. The other movements made by B—i. e., those not made on its own axis—need not be here noticed.

MESSRS. EDITORS:—I submit another style of proof from any yet advanced in support of the "dual theory." It has been effective among the "oneists" of my acquaintance, and I hope it will answer as well with you.

A wheel, say three feet in circumference, rolled three feet on a plain surface, will make exactly one revolution; but if (as in the problem) it is ALSO required to make the circuit of another wheel, it must necessarily make another revolution to do it, otherwise there is no difference between a plane and a circle.

Again, I have two movable wheels of the same size hung side by side, thus—



I find, in turning them toward each other at equal speed, that it takes just one revolution of each wheel to bring the points, 1, 1, again together; consequently if one was stationary, it would take just two revolutions of the other around it to bring about the same result. Be kind enough to show the fallacy of these two propositions, or surrender at once to the victorious "dualists."

F. L. B.

Boston, Mass.

We think there may be a difference between a plane and a curve, whether the wheel makes a second revolution or not. Because two wheels of the same size each revolve once in returning to a given point, it does not consequently follow that if one wheel were fixed, the other wheel would have to revolve twice around the fixed wheel in order to reach the starting point.

We have received a model which shows two revolutions of a shaft produced by one revolution of the movable wheel. Also a model which shows one revolution of a shaft by one revolution of the movable wheel. Also a model which the sender think shows two revolutions of the movable wheel when a rod is set in a particular way, and one revolution when set in another way. We have also received a variety of novel diagrams upon the subject, one of which shows how four revolutions of a shaft attached to the axis of a movable wheel may be produced by one revolution of the wheel upon its axis. We shall shortly present diagrams of some of these devices.

Composition Fuel.

The mixture of tar, coal dust, sawdust, tan bark, peat, and other inflammable refuse stuff, and the pressing of the same into blocks, for the purposes of fuel, is very common, and several patents have been issued for variations of such mixtures. Washington Stickney, and Nathan B. Chase, of Lockport, N. Y., have lately obtained one of these patents, and they say: "The coal consists of screenings and other fine portions, which accumulate in great abundance in coal yards, and hitherto have been considered comparatively valueless. The tan bark used (commonly called spent tan bark) is also comparatively useless and very abundant. These, with other ingredients, hitherto considered of little or no value, are so combined as to form a cheap and convenient fuel, and may be compressed, by mechanical power into blocks convenient for use. The coal tar cements the whole, making a solid mass, which may be readily ignited, and is well adapted for common fuel, especially for summer use.

"The above ingredients are combined in the following proportions, to wit: Coal, 2 parts; tan bark, 2 parts; sawdust, 2 parts; peat, or other fine woody or vegetable matter, 1 part, coal tar or pitch, 1 part, or sufficient to cement the whole; or they may be combined in a greater or less proportion of either, securing substantially the same result. The whole mass may be easily ignited with shavings or paper, or more readily by the application of a small quantity of benzine and a match."

Richardson's Process for Making Steel.

Many of the puddling furnaces of Great Britain have lately been improved by the addition of an apparatus for blowing air into them, resembling that used by Bessemer in making steel directly from the ore. The application of the improvement requires no alteration in the form of the common puddling furnace, for it does not essentially change the old method of puddling; but by introducing air through the iron rake or rabble used to stir the metal it reduces in quality or duration one particular stage of the process. Instead of numerous small holes in the blast pipe or tubular rabble, to subdivide the current of air, there is one broad slit or rectangular opening about half an inch wide, and three or four inches long, which is more easily kept free from slag. Two or three tubular rables are fitted to each furnace, to be used alternately, in order to prevent over-heating. Each one is connected to the air receiver by long flexible tubes of india-rubber. The air is turned on before the rabble is introduced, and remains on until it is withdrawn, in order to prevent the narrow aperture from being choked by cinders. By means of the blast rabble the time occupied in bringing the molten iron to a "boil" has been reduced from 30 or 40 minutes to

10. At the beginning of the operation the sparks thrown off indicate that silica is being separated from the mass, and as soon as the flame is clear the tubular rabble is withdrawn and the common rabble is substituted. A number of experiments have demonstrated that the whole process from the time an ordinary furnace is first charged until the mass is finished does not consume more than one hour and a quarter. The quality of the material produced is said to be superior, and in no case thus far has there been any failure to produce the desired results.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

From a recent report of the Commissioner of the General Land Office, it appears that the construction of railroads in this country, since their first introduction, has been at the rate of a thousand miles a year; that there are now completed no less than 37,000 miles, and in course of construction 17,800 miles additional, or more than one third the length of all the railroads in the world. To assist this wonderful development, Government has contributed over \$184,000,000, and 800,000 acres of land.

South Pass City, the headquarters of the last mining sensation, the Sweet water gold field, was first laid out in October, 1867. It has now eighty houses and eight places of business. Its population at present is but 700, but it is confidently expected that next summer will witness the advent of from twenty to thirty thousand eager searchers for wealth, and that South Pass City will experience a much more rapid and substantial growth than even Cheyenne City.

There is now in course of manufacture at a leather belting factory in this city, what is said to be the largest leather belt ever made. The width is 47 inches; length, 100 feet; weight, 18,000 pounds; and cost, \$2,000. It is composed of triplicate layers of leather, making a thickness of three quarters of an inch, and cemented and pressed so firmly together that it has the appearance of one solid piece.

A bed of hematite iron ore has been discovered at Sinking Spring, some four miles from Reading, Pa. Parties have already sunk a shaft which passes through a solid bed of ore twenty-six feet in diameter.

From this city, via Philadelphia and Pittsburg, to Cheyenne City, at the base of the Rocky Mountains, a distance of 1,917 miles, but three changes of cars are made, and five companies control the whole distance. Between New York and New Orleans, 1,500 miles, there are ten different roads, while between New York and Charleston, only 788 miles, there are also ten.

A railroad project to unite the capital of Mexico with the United States, by a line along the Gulf coast, has been referred to a committee of the Mexican Congress.

About four miles from the newly opened Japanese port of Hiogo, is quite an extensive deposit of coal. The methods of working the mines are of the most primitive description. Wherever the coal or shale has been seen cropping out from the hillside, a horizontal passage, never more than twenty-five feet long, has been run in. The miners, crouched to the ground in these burrows, with pointed hammers pick away at the sides, and very carefully assort with their hands each little piece of coal obtained, according to its quality. The Japanese Government is not insensible to the advantages of an improved mode of working the coal of Hiogo, and it is not impossible that before long some more systematic plan will be introduced.

Scarcely inferior in interest to Krupp's mammoth establishment, are the great iron and steel works of Hoerde, employing 4,500 people. Here the iron is produced from the ore, and converted into castings of various kinds, into iron and steel rails, and into puddled coils, suited for a variety of purposes, ship-building among others. Most of the vessels built by one of the largest firms in Liverpool are constructed entirely from steel plates made at Hoerde.

The Memphis Bulletin says that the gold discoveries in the counties of Polk and Sevier, Arkansas, are still proceeding, while the indications have proved so encouraging, and so exciting has been the degree of success already achieved, that the winter's snow and cold has not been able to suspend operations now in progress.

There are now about 12,000 miles of railway open to travel in France. Every line is remunerative, some paying original stockholders from 20 to 25 per cent, and it is claimed that passengers are conveyed by them with more regularity, safety, and comfort than elsewhere in Europe. Within eighty years, at the farthest, all these lines will have reverted to the Government and become practically public property.

M. Goulin, some years ago, made exceedingly hard iron by combining it with a small quantity of boron. It is now said that he has produced an equally hard material by combining fused cast iron with phosphate of iron and peroxide of manganese. The mixture cannot be forged, but is easily cast.

The Boston and Providence railroad are constructing a bridge from India Point, over the Seekonk river, on a plan which embraces some new features. The whole length of the bridge is 876 feet, and the supports in the river are iron cylinders filled with wooden piles and concrete. Six of these cylinders are six feet in diameter, and contain twelve piles, which were driven into the mud forty feet, the cylinders being sunk ten feet. Iron cylinders filled with concrete have been used before, but driving piles within them, and the combining of wood and concrete is a new experiment.

Recent American and Foreign Patents.

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

COTTON AND HAY PRESS.—William Russell, Atlanta, Ga.—This invention relates to that class of presses in which the power is applied to the follow block by revolving the press box. The improvement consists in working the follow block upon two screw rolls, in a device for causing the follow block to adjust itself, and in a device which enables the apparatus to be used as a stationary or portable press, and to be worked either by rotating the press box, upon a fixed wheel, or rotating the wheel while the box is stationary.

EXTENSION COAL SHUTE.—Jacob Heatherington, Bellaire, Ohio.—This invention relates to coal shutes which are used on the banks of rivers and at wharves, for discharging coal from cars into steamboats and other vessels, and consists in making them extensible in order that they may be adjusted to vessels in different positions, and at different distances from the shore.

COMBINED STEAM ENGINE AND CANE MILL.—John Moore, Madison, Ind.—This invention relates to a cane mill, the frame of which is so constructed as to be susceptible of receiving such parts of a steam engine, as would be necessary to drive the rollers of the mill; and also in so constructing the said frame that the rollers of the mill can be readily removed therefrom, and placed therein, to enable the steam engine, which is arranged in connection with such cane mill, to be used for threshing wheat, driving a circular or a drag saw, a shingle or a lath machine, a straw or hay cutter, a grinding-mill for corn, and for many other purposes.

COMBINED SCREW WRENCH AND CLAW HAMMER.—Ellis R. Meeker, Elizabeth, N. J.—This invention consists in combining a screw wrench with a claw hammer in such a manner that the device may be used either in the capacity of a claw hammer or a wrench with as great facility as if it were made for either purpose alone.

BEEHIVE.—W. X. Singleton, Springfield, Ill.—This invention relates to an improvement in the construction of beehives, and has for its object the wintering of the bees in a perfect manner, keeping them warm and dry, to which end a thorough ventilation of the hive is obtained, and due provision made for the absorption of all moisture.

PUMP.—Jas. Vaughn, and John Magee, Galena, Ill.—This invention consists in a novel construction and arrangement of the various parts composing the pump, whereby great effectiveness and many advantages are secured.

ATTACHING HUBS TO AXLES.—Levi Adams, Amherst, Mass.—This invention relates to the manner of attaching hubs to axles. The object of this invention is to obtain a good bearing for the hub on the axle, effectually prevent the escape of lubricating material from the axle, prevent the advent of dust between the box and axle, and admit of the wheel being readily attached to and detached from its axle.

COMBINED STAMP AND CANCELING DEVICE.—Joseph H. Berret, New York City.—This invention relates to a device by which revenue stamps may be marked or printed, and canceled, at the same time. The invention consists in applying a cutting device to the ordinary hand stamp, in such a manner that, when the face of the stamp is forced down upon the revenue stamp, and the latter printed with the name of the party or firm canceling the stamp, the cutters applied to the hand stamp will perforate the revenue stamp, and effectually cancel the same.

LATHE REST.—H. K. Smith, Norwich, Conn.—This invention consists in so constructing the rest (through which the screw shaft works), for carrying the frame on which the block holding the lathe cutting is arranged, as to move the tool toward or away from the article on which it is to act, and that such nut, should the screw work loose, or play from side to side, can be tightened up therein. Also, in so hanging the block, holding the cutting or lathe tool, to a frame—arranged to be moved forward to or backward from the work on which the tool is to operate—that such block can be inclined either more or less in a direction toward the work, as may be desired.

LOADING FIRE-ARMS, AND CARTRIDGES FOR THE SAME.—S. S. Rembert, Memphis, Tenn.—This invention relates to double-barrelled breech-loading fire-arms, more particularly, and to cartridges for the same. It consists in a projection at the breech end of the barrels, between the two, of such a shape in combination with a correspondingly shaped recess or notch in the upper portion of the stock or butt, that when such projection fits in the said recess, the barrels will be held securely in position while being discharged. Also, in a novel connection between the trigger and guard, and the barrels, in combination with hinging the barrels to the butt or frame, whereby, by properly swinging such trigger guard, the barrels can be thrown up and out of place for removing or inserting a cartridge, and brought back into position, as may be desired. Also, in a cartridge case, provided with a nipple in a novel and peculiar manner, and a novel constructed nipple for the cartridge case. Also, in a simple attachment to the gun barrels for extracting the cartridge cases therefrom.

ANIMAL TETHER.—Martin Leonard and Stephen C. Leonard, Oberlin, Ohio.—This invention relates to a method of constructing tethers, whereby the same are rendered more durable and horses more effectually prevented from jumping or breaking down fences.

INNER SOLE.—R. A. Webster, Sandusky, Mass.—This invention relates to a method of constructing inner soles for boots or shoes, whereby the same are more cheaply made and more durable, and are rendered impervious to water. It consists of one or more pieces of wood or veneers, a thin piece of wood, and a piece of felt or cloth, between which is a thin layer of gutta percha or rubber, by the warming of which all the several layers are firmly cemented together.

STEAM GENERATOR.—W. H. Thomas, Sacramento, Cal.—This invention relates to an apparatus for heating water and generating steam for various purposes.

APPARATUS FOR WORKING WINDLASSES.—Porter Everts, Madison, Conn.—This invention has for its object to so improve the construction of the apparatus for working a ship's or other windlass, that the operator can instantaneously adjust it to obtain increased power or increased speed, as he may desire.

BURIAL CASE.—J. R. Hatbaway, Westfield, N. Y.—This invention consists in forming the burial case of cast-iron plates, which are dovetailed and grooved together, the joints of which are secured and rendered air and water tight by incited lead or other equivalent metal.

FANNING MILL.—Stewart McWilliam, Fletcher, Ohio.—This invention relates to an improvement in the construction and arrangement of fanning mills for cleaning small grain and seeds, and consists in building the main side frame of cross bars, making it very cheap, light, and strong, and in combining the rotary fan and the sieves in such a manner that they work with great facility by means of a crank movement connection.

PORTABLE CHAMBER CLOSET.—Wm. J. Lyman, East Hampton, Mass.—This invention relates to a new arrangement whereby most of the advantages of the real water closet are obtained, in the sick chamber as well as in chambers and dwellings generally.

CHURN.—Daniel H. Carpenter, Hector, N. Y., and Hiram L. Slaght, Lodi, N. Y.—This invention relates to the method of constructing and operating churns for dairy purposes, whereby the ordinary single or double dasher barrel churn is operated with much less labor or exertion of strength than in the ordinary manner.

FAN VENTILATOR.—H. B. Worth, Chicago, Ill.—This invention has for its object to improve the construction of the ventilator known as Griffith's patent ventilator, so as to make it more effective and satisfactory in operation.

ANIMAL TRAP.—James A. Sinclair, Woodsfield, Ohio.—The object of this invention is to furnish an improved trap, so constructed and arranged that the rat, in seeking to reach the bait, shall cage himself, and in seeking to escape, will operate mechanism by the action of which he will be killed and thrown from the trap, leaving it set for the next rat.

MACHINE FOR MAKING PEARL BARLEY, ETC.—W. Rickard, Chicago, Ill.—This invention has for its object to furnish an improved machine for making pearl barley, pearl wheat, splitting peas, removing a part of the bran from wheat before making it into flour or farina, and other similar purposes, which will do its work quickly and well, and which will not be liable to get out of order.

SEPARATOR SIEVE.—Joseph Barker, Amboy, Ill.—This invention relates to a method of constructing the sieves of fanning mills, whereby one kind of seeds is more perfectly separated from another, and more easily freed themselves from chaff and refuse. It consists of a frame covered with wire gauze on both sides, a portion of the wire gauze on one end of the frame being coarser; also, in the frame being inclined at the back end of the same, whereby the same cleans itself from chaff or refuse.

COTTON CULTIVATOR AND CHOPPER.—Zina Doolittle and A. M. Crowder, Houston Factory, Ga.—This invention relates to a device for cultivating cotton, scratching the earth from the hills of the plants, removing weeds, etc., thinning out the plants and throwing fresh earth up to the same, all being done simultaneously, or at one operation.

HARNESS.—John J. Smokey, Natchez, Miss.—This invention relates to the driving-reins of harnesses, and consists in so arranging the driving-rein as to give great leverage to the driver over the animal, and thus enable him to easily control it, without irritation, but leaving it free to use its utmost speed, and in fact to encourage it to do so, while at the same time the animal can be readily checked by the driver.

BEEHIVE.—Daniel S. Bear, Toledo, Iowa.—In this invention a beehive is constructed in two parts, and so that they may be readily separated whenever required, and the filled half of an occupied hive united to the empty half of an unoccupied hive, and colonies of bees multiplied without the natural process of swarming, and therefore without the trouble, risk, and annoyance of living.

GRAIN THRESHER.—A. S. Whittemore, Willimantic, Conn.—This invention relates to a method of constructing machines for the threshing of grain by hand or power, whereby the same is more effectually done without unbinding the bundles, and the straw left in better condition. It consists of a box frame through which are longitudinal parallel wires, on which the grain is placed to be threshed, and also of arms attached to an axle rotating in suitable bearings on said frame, between each pair of which are pivoted any convenient number of flails.

SILK CLEANER.—W. G. Watson, Paterson, N. J.—This invention relates to a device for cleaning silk while the same is being wound on bobbins, and consists in the use of horizontal instead of vertical guides, whereby the lateral motion of the thread as it is being wound spirally around the bobbin is accommodated.

SCROLL SAW.—B. J. Camp, Marion, Ohio.—This invention relates to a new manner of fastening, straining, and guiding reciprocating scroll saws, so that the same will work with great ease, and can be operated with the greatest speed without jarring or getting out of order.

STEAM VALVE.—Wm. Ord, Brooklyn, Ohio.—This invention relates to a method of constructing steam engine valves, whereby they operate without sticking from the unequal expansion of the parts, and are more easily adjusted, and the wear from friction more economically provided against. It consists of the combination of a valve stem with cylindrical segments, or valves, and two wedges with an intermediate key, so arranged in connection with a set screw that by forcing the key between the wedges, the segments or valves are drawn together, and the pressure against the valve casing relieved.

SHACKLE FOR THE PLATFORM SPRINGS OF WAGONS.—John Price, New York City.—This invention relates to a shackle or joint by which the ends of the several parts comprising what are generally termed platform springs are connected together. The parts of these springs are at present connected by shackles or joints which do not admit of any horizontal play of the latter and the springs are consequently subjected to considerable strain and injury, the leaves of each part being frequently disengaged from the ribs which keep them in place. This invention is designed to obviate this difficulty by constructing a more flexible joint than hitherto used.

DEVICE FOR CHANGING FEED.—R. L. Nelson, Mexico, N. Y.—This invention relates to a device for changing the feed of saw mills or other suitable machines and consists in the general combination of the devices by which the desired result is obtained, also in a new manner of arranging the gear wheels and in a new method of moving the shifting gear and of throwing in gear with the driving and driven gears.

CAR VENTILATOR.—M. F. Hitchcock, Springfield, Mass.—This invention relates to a car ventilator in which a sliding valve is employed which is moved by the wind to the rear end of its case or shell in whatever direction the car may advance.

HEAT DEFLECTOR.—Lewis Dowe and Aruna C. Colton, Sycamore, Ill.—This invention consists in arranging a series of adjustable slats within the drum or tube by which the current of heated air and gases from the fire or air chamber may be deflected and retarded in their course, and thereby compelled to part with their contained caloric.

PROTECTING HEELS OF BOOTS AND SHOES.—John Fearn, Tompkinsville, N. Y.—This invention relates to an improved mode of applying a screw to the heels of boots and shoes for the purpose of preventing them from wearing away unevenly, or more on one side than the other, and also to prevent slipping on ice where liable.

PUMP.—Taylor Chamberlin and T. Ellwood Garrett, Philadelphia, Pa.—This invention relates to a method of constructing pumps whereby they are greatly simplified in their parts and rendered more durable than those of ordinary construction, and the invention consists in a hollow shaft and piston, and in the manner in which the cylinder is constructed and the water discharged therefrom.

WELL-TUBING APPARATUS.—N. C. Clark, Low Moor, Iowa.—This invention has for its object to improve the construction of well tubing, and the manner in which it is inserted in the ground so as to make it more reliable and convenient in use.

CARRIAGE JACK.—Adam Myers, Van Wert, Ohio.—This invention has for its object to improve the construction of carriage jacks so as to make them more convenient and effective in operation.

CAR COUPLING.—John C. Heaton, Fitchburgh, Mich.—This invention has for its object to furnish a simple, strong, and reliable car coupling which shall be self-coupling, and shall have no springs to get out of order.

CORN PLANTER, SOWER, REVOLVING HARROW, AND CULTIVATOR.—W. P. Byler, Leavenworth, Kansas.—This invention has for its object to furnish an improved machine for planting and cultivating corn, harrowing ground, and sowing and putting in grain, which shall be simple in construction, effective in operation, and easily and quickly adjusted for one or the other of said uses.

SULKY PLOW.—Elias Levee.—This invention has for its object to furnish an improved sully plow, so constructed and arranged that it may be easily raised from and lowered into the ground, which will not be raised out of the ground by the wheels passing over obstructions or rough places, and which shall be simple in construction and easily adjusted to run at any required depth.

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 in formation from us; besides, as so 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. W. Y., of N. Y.—See reply to "G. W. E.," in No. 8, current volume, SCIENTIFIC AMERICAN, as to the estimating of horse-power of engines.

J. W. B., of N. Y.—"What are the lightest liquids known and the process of manufacture? Can water be made lighter by chemical means, and if so by what process?" The light products of petroleum are the lightest liquids known. They are separated from the heavier portions by distillation. Water can be made lighter in the same way—that is by boiling. It then becomes steam which is the vapor of water, commonly called, but not properly, water. The addition of any chemicals could only increase its weight.

J. B. R., of N. Y.—"Will you, or some of your readers inform me the method of clearing cinder from the fire brick of a hard coal stove? How can I loosen the tops of lamps fastened with plaster of Paris?" Oyster shells burned in the stove fire, or chalk, or limestone will assist in detaching clinker. We know of no solvent for dried plaster of Paris. Kerosene or benzene will sometimes soften it sufficiently to facilitate its removal.

W. J. H., of Mo.—"If the air be extracted from a case or box and an inclined plane four feet in length, having a grade of one inch to the foot, be constructed within the box, will a ball run down the incline with greater velocity than if the box contained air?" A ball will roll or fall faster in a vacuum, as air offers a resistance.

E. K. P., of N. Y.—"Is there any form of glass prism that will decompose a ray of light into a perfect circle or rainbow of the seven colors instead of the ordinary oblong spectrum?" Yes, let the prism be bent or curved. For a perfect circle use convex lenses.

J. B. S., of Wis., asks for the philosophy of the common observation that "it is too cold to snow." We all know that the weather moderates on the fall of snow, and that our coldest days succeed the fall. It is a natural law that bodies in passing from the liquid to the solid state always give out an amount of latent heat. Now snow is frozen vapor, and in its change in the air from the liquid to the solid form, heat is imparted to the atmosphere and its temperature is increased. Similarly, when the snow begins to melt, it draws from the air its latent heat necessary in order to turn from the solid to the liquid state.

J. A., of Me.—The origin of amber is assigned to a resin which flowed from the trunk of certain trees which flourished in the tertiary period. We would refer you to an article on amber and meerschaum published on page 161, Vol. XV.

G. J. L., of Conn.—Bituminous and anthracite coal differ in that the former contains a large amount of pitchy volatile substances which readily ignites and burn with smoke and flame. In the latter these substances by some means have been driven out, and the remainder being a purer variety of carbon burns without smoke or flame.

A. A. L., of Ind., calls attention to a prevalent notion among millers that a water wheel under the same head runs with a greater velocity in the night than in the daytime. "If any explanation is attempted by the workmen, they assert that the air becomes heavier after sunset." We have before us the observations on this very subject made by Prof. Cleveland and published in the Journal of Science. He selected one fine day in August, and at two o'clock P. M., the barometer standing at 30.19 inches, the number of revolutions of the wheel was thirty-six in a minute. At midnight the pressure of the atmosphere had increased seven-hundredths of an inch, the temperature of the water being the same, the wheel was found to revolve precisely ninety-six times in a minute, showing the same velocity as on the preceding noon. The workmen admitted the truth of the result but seemed to believe that it would have been different on a cloudy night. This matter has been fully discussed in previous volumes of this paper.

Business and Personal.

The charge for insertion under this head is one dollar a line.

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EXTENSION NOTICES.

Frederick G. Schaum, administrator of Frederick Schaum, deceased, of Baltimore, Md., having petitioned for the extension of a patent granted to him the 25th day of April, 1854, for an improvement in glass furnaces, for seven years from the expiration of said patent, which takes place on the 25th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 13th day of April next.

William Baker, of Attica, N. Y., having petitioned for the extension of a patent granted to him the 16th day of May, 1854, and reissued the 22d day of September, 1863, for an improvement in clap board joints, for seven years from the expiration of said patent, which takes place on the 16th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

Albert Fink, of Louisville, Ky., having petitioned for the extension of a patent granted to him the 9th day of May, 1854, for an improvement in bridges, for seven years from the expiration of said patent, which takes place on the 9th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

Wm. H. Mitchell, of New York city, having petitioned for the extension of a patent granted to him the 16th day of May, 1854, for an improvement in machinery for composing type, for seven years from the expiration of said patent, which takes place on the 16th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

Edward Brown, of Waterbury, Conn., having petitioned for the extension of a patent granted to him the 16th day of May, 1854, for an improvement in machines for making hinges, for seven years from the expiration of said patent, which takes place on the 16th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

Ward Eaton, of New York city, having petitioned for the extension of a patent granted to him the 16th day of May, 1854, for an improvement in machines for cutting glaziers' points, for seven years from the expiration of said patent, which takes place on the 16th day of May, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of April next.

B. J. La Mothe, of New York city, having petitioned for the extension of a patent granted to him the 4th day of April, 1854, for an improvement in railroad cars, for seven years from the expiration of said patent, which takes place on the 4th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of March next.

Benj. A. Lavender, of Halifax, N. C., and Kate Lowe, administratrix of the estate of Henry Lowe, deceased, of Baltimore, Md., having petitioned for the extension of a patent granted to the said Benj. A. Lavender and Henry Love the 4th day of April, 1854, for an improvement in treating cane fiber for paper and other purposes, for seven years from the expiration of said patent, which takes place on the 4th day of April, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of March next.

Warren Gale, of Peekskill, N. Y., having petitioned for the extension of a patent granted to him the 12th day of September, 1854, for an improvement in straw cutters, for seven years from the expiration of said patent, which takes place on the 12th day of September, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 2d day of April next.

Elia Ingraham, of Bristol, Conn., having petitioned for the extension of a patent granted to him the 3d day of December, 1861, for an improvement in design for a clock case, for seven years from the expiration of said patent which takes place 3d day of December, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 26th day of October next.

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