Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Earth Worms---How and What they Eat.

Messrs. Editors:—I see that you have published an article about the habits of earth worms, which useful little creatures seem to be much underrated. They may eat earth, as your author asserts, but I have never seen them do it, although I have seen them eat other things with great voracity, and have also seen them reject particles of earth which adhered to their proper food, such as dead spears of grass, roots and leaves.

I have watched them feeding for hours at a time, and retain a lively recollection of several rheumatic attacks, resulting from the wetting I got while so watching them. They feed at the surface only when the withered vegetation is wet with rain or dew and is in a soft and pliable state. When their food found at the surface is dry, and too harsh for their mouths to manage, they retire to the congenial depths of the ground, delighting in heaps of "long" manure, which they reduce to a homogeneous mass of compost with great rapidity by consuming the vegetable and undigested parts thereof, thus transforming the matter from a vegetable to an animal character, leaving the mass at its lowest chemical status and so fit for the food of plants. Indeed I doubt if any atoms of vegetation can decay and be again fit food for other vegetable organisms without an intervening decomposition in animal digestive apparatus. At all events, it is easy to prove that earth worms are the compost makers, and if we do not give them time to properly manufacture their "product" while the manure is in the compost heap, they will appear in the fields and then complete the job, and further, their work in fields yields another benefit by their boring and opening of the soil.

Their manner of eating is worth noticing. If you seat yourself upon a grass plat or beside the strawberry bed, during a light rain in warm weather, and have the patience to sit perfectly still for ten or fifteen minutes, you will see innumerable worm heads protruding cautiously from the ground, and feeling around until a spear of soft and recently killed grass is found. The worm touches it first with the extreme point of the head, and then the point retracts inward, much like the toe of a stocking when you touch it with your finger to commence turning it: then the worm shortens its length, the other end being fast anchored in the hole: this action makes a bight in the spear of grass, and then the worm crawls along the outside of his supper until the parts diverge too much, when he takes another pull, and so on until the grass is loosened from its own roots and safely swallowed. I have observed that if a particle of earth adhere to the food it is shoved along as the swallowing progresses, and not allowed to enter the mouth. The final act of swallowing the end, and biting off the lump of root which is sometimes attached, I have never seen, as that is performed within the hole: but I have frequently seen the worm re-appear with a pellet of earth balanced upon his head, or it may be only the piece of root if his supper was clean, which he deposits at the surface beside his hole, when he prowls around for more food while it is good.

When two worms seize opposite ends of the same spear, the pulling and hauling is most comical, reminding one strongly of his early days when he strung grains of corn upon opposite ends of a string and fed two rival gobblers. The worm fight generally ends by the breakage of the grass, but if too strong for their strength they both swallow until their heads touch each other, when they both "get," leaving the morsel, which they will not touch again. I have often seen these worms breaking off the dead parts of strawberry leaves, rejecting the living parts, and have also seen them apparently sucking the pollen from strawberry flowers. In the fall large tufts of dead leaves may be seen drawn partially within the worm holes, possibly by way of stoppers to keep out the cold. * * *

Science Familiarly Illustrated.

Why Water Presses Sideways and Upward.

"Truth is stranger than fiction." The young philosopher is surrounded with mysteries and is called upon to accept as fact what seems to him incredible. Many of the fundamental truths of natural science are apparently inconsistent with his everyday experience and observation. It certainly is not all stupidity which makes the boy slow to learn that the earth is round, that the sun is bigger than the earth, and that the air has a weight which squeezes up his body with a force of five or six tuns. It is probably the case that the children who do learn these things, are helped on more by their natural credulity than by conviction of the judgement. And there are many grown up people who remember only the outline of facts taught them in childhood, and have never troubled themselves for reasons about them. How many skillful mechanics can give good orthodox scientific reasons for the fact that water presses sideways and upward as well as downward?

Bodies which make a pressure in consequence of their weight generally press downward only, and this pressure is exactly proportioned to the weight. In fact the pressure and weight in our common experience are the same thing, and upon this conception of the case our balances and other weighing machines are constructed. The weight is due to the force of gravity which pulls in no other direction than downwards, or towards the center of the earth. Then why can there be any movement sideways or upwards?

If a lot of bricks be piled on top of each other the pressure will be only downward, and there is no tendency in any other direction. But if we try to pile up sand in the form of a column we know it spreads out at the bottom, and thus in this case there is a tendency or pressure sideways. The reason of this can be made very clear by observing what takes place when a few grains only of sand are experimented with. Sand, however, is composed of little rounded pebbles, and it is better for the experiment to take large pebbles or bullets, as they can be better seen. Place two pebbles side by side, and then a third over and between them. The result is that the two are spread apart and the third falls between them; the third pebble has acted like a wedge to divide and push them laterally. Now what takes place in our experiment may by careful observation be observed in heaping a large body of sand.

Take a tube shaped like the letter L and pour in sand at the top and soon it runs out at the side and with a good deal of force. If the tube be shaped like the letter U, and the sand be poured in at one end it will rise up in the other. In these simple experiments we have plain illustrations of lateral and upward pressure. But it will be observed that the sand loses force in moving and that it will not go very far in the horizontal part of the L tube nor rise very high in the U tube. The reason is simply that the particles of sand are rough and the friction stops the motion; our sand needs to have a lubricator. The particles of water seem to be very smooth and slippery, so that none of the lateral and upward pressure is lost by friction, and the sideways and upward pressure at any given point are equal to the downward.

Machines Mediums and not Reservoirs of Power.

One notable fault with most young mechanics is the belief that machinery is a source of power—that mechanical appliances not merely transmit the force first exerted, but increase its power. In fact, this belief is shared sometimes by those of experience enough to know better, and is the source of the enormous waste of ingenuity and mechanical ability shown in the attempts at mechanical impossibilities and especially in the never-ending experiments for the discovery of a perpetual motion.

Mechanical appliances increase our ability to move objects, but so far as they do this they compel a loss in velocity. For instance: By the use of a lever a man may lift a rock which unaided by this simple means he would be unable to move, but if he could lift it without this aid he could move it much more rapidly. The lever is one of the most powerful of the simple mechanical powers. Archimides was not a senseless boaster when he said: "Give me a fulcrum for my lever and I will move the world." Its value may be seen in the common steelyard where a poise of one pound on the extremity of the bar will counterbalance one of a hundred at the end of the shorter arm. The safety valve lever is an example being what is called a lever of the second class, the weight being between the fulcrum and the power. In this device a weight of a few pounds or a spiral spring counterbalances the pressure or weight of hundreds of tuns.

The pulley and the gear, although not often classed as related to the lever, may be considered as modifications of the same mechanical power. The pulley may be called a double lever, having a common fulcrum in the shaft. So the gear acting by its cogs or teeth on another gear may be considered a lever. None of these are motors or originators of power but only conveniences for its transmission. Indeed they do not transmit all the power which they receive, as friction of the parts absorb or divert a certain percentage of it.

The inclined plane is commonly classed among the rudimentary mechanical powers, but this is hardly correct unless we make a double incline, as the wedge, or a spiral incline, as the screw. In fact the lever is at the root of all mechanical powers, and all others partake, more or less of its nature.

STEEL-HEADED RAILS.

We published in No. 4, present volume, diagrams of a new steel-headed rail for roads and of the pile from which it was forged. Rails with steel faces have been used, the steel being simply a plate welded on the top of the iron. They did not prove very successful from the difficulty of making a perfect union of the two metals, and from the fact that the inside lip of the wheel abraded the iron, contributing to a more rapid deterioration. Since publishing the description of the improved steel-headed rail we have seen cross sections of them which show a perfect weld between the iron and steel, which we are informed by Mr. S. L. Potter, the Superintendent of the Wyandotte Mills, at Wyandotte, Mich., is obtained without the use of a flux and the result is secured by the pecular method of making the pile for heating. These rails are steel, not on the upper face alone, but on the sides sufficiently to take the wear of the wheel lips. They are used on several of the western railroads and give perfect satisfactfon. As they cost at the present price of steel only about forty per cent more than iron rails and much less than rails made wholly of Bessemer steel, they seem well adapted to supersede the ordinary rails whenever they are removed. Railroad men who are interested in the subject of steel rails would do well to correspond with Mr. Potter, at the Wyandotte Mills, as above, where the rails are at present manufactured.

The proportion of ammonia contained in rain water is liable to considerable variation. In one million parts of rain water collected in Paris during the last five months of 1851, Barral found 3·49 parts; Boussingault, at Liebfraunberg, in 1852, found only 0·744 parts; Lawes and Gilbert, at Rothamstead, in 1853 and 1854, found the average amount from March to August to be 1·42; from September to February 0·927 parts, or about one grain of ammonia in fourteen gallons of water.

Recent American and Foreign Patents.

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

Explosive Compound.—H. A. Bleckmann, London.—Dated May 10, 1866.—This improved composition is composed of the following ingredients: Sawdust or other particles of wood, or other cellulose substance in a finely reduced or comminuted condition; saltpeter, or nitrate of potassa, and charcoal or carbon, and sometimes ferro-cyanate of potassium. These materials, that is to say, the sawdust or other cellulose substance, the saltpeter or nitrate of potassa and charcoal, with or without the ferro-cyanate of potassium, form or constitute, when mixed together, a compound or agent which will not explode by impact, ramming, or friction, but only by ignition or the application of fire, or very strong heat.

Treating and Applying a Certain Vegetable Plant for the Purposes of the Tobacco Plant.—F. C. Buisson, Natiat, France.—Dated April 21, 1866.—This invention consists in treating the leaves of the tuberous sunflower or Jerusalem artichoke (*helianthus tuberosus*), and applying them to the purposes for which the leaves of the tobacco plant have been employed. The patentee collects the leaves of the tuberous sunflower, dries them, and submits them to the operations to which the leaves of the tobacco plant are ordinarily submitted in order to manafacture therefrom a tobacco for smoking—cigars, rolls, cakes, snuff, or other usual forms. The smoke arising from the tuberous sunflower leaves, when thus heated, is odorous, sweet, and slightly acidulous; it is not acrid, and has no poisonous effect.

Director.—W. G. Grant, Wakeman, Ohio.—This invention relates to a director for inserting a sponge or other similar or suitable pessary into the vagina, to act as a support to the mouth and neck of the uterus, in cases of female weakness.

Chemical Process.—René Cupper, New York City.—This invention relates to a process for the extraction of iodine from sea water, which is accomplished by precipitation.

Chimney Top or Cap.—W. F. G. Beeuwkes, Holland, Mich.—This invention relates to a top or cap for chimneys. The principal object of this invention is to prevent the roof of the building through which the chimney extends, from becoming heated by the action of the heated currents of air and products of combustion passing through the chimney.

Copy Holder.—Charles B. Moseley, and Lucius L. Woolley, Medford, Mass.—This copy-holder is specially intended for the use of compositors, although it can be readily and easily adapted for use by various persons such as copyists of legal and other papers, proof-readers, etc.

Saw Set.—W. A. Alexander, Mobile, Ala.—This invention relates to an improved device for setting saw teeth, and consists of a clamp formed in two parts, one of which parts contains a recess for receiving the saw tooth when it is bent as desired, by means of a lever in the other part, the extent of the deflection of the tooth being regulated by a set screw in the recess, which limits it as desired.

Vise.—James S. Ralston, Indiana, Pa.—This invention relates to an improved plan of construction of a vise for blacksmiths, carpenters, or other mechanics, and consists in an arrangement for opening and closing the jaws of the vise by means of two eccentrics or cam disks placed outside of the jaws on a connecting and operating rod.

Tool for Cutting Boiler Tubes.—Richard H. Burke, New York City.—This invention relates to a tool which is intended to cut off boiler tubes inside the tube sheet, but which may also be used for cutting off the ends of such tubes. It consists of a pipe which contains a conical head provided with slots to retain the cutters, and with a feed screw in such a manner that by the action of the feed screw and conical head the cutter can be gradually fed out as the operation of cutting progresses, and boiler tubes of any desired thickness can be cut with the greatest ease and facility. The pipe, which contains the conical head and the cutters, is provided with a series of sleeves in such a manner that said pipe can be adapted to boiler tubes of different diameters.

Cooler for Coffee and Other Articles.—Jabez Burns, New York City.—This invention consists in an apparatus for cooling coffee as the same is discharged from the roaster, or other articles of a similar nature, by a downward draft produced by a suction blower or other suitable apparatus in such a manner that the smoke and dust which generally rise from the coffee or other article to be cooled, are prevented from filling the room, and all inconvenience and danger of fire arising from that source are avoided.

Roof for Railroad Cars.—John Stephenson, New York City.—This invention relates to the construction of the roofs of horse or street cars, and has for its object durability, a greater convenience than hitherto in shipping cars of this class, and a greater facility and economy in repairing the roof.

Peat Car.—Thomas J. Wells, St. Anthony, Minn.—This invention relates to a new car for transporting peat blocks or bricks from the machine or place where they are prepared to the drying house, where they remain until they become sufficiently dry for fuel. Also, in a novel construction of the car, whereby one person is enabled to load and unload the car, with the greatest facility.

Composition for Coating or Covering Ships' Bottoms.—R. Hamilton St. Helen's Place, London.—Dated April 19, 1866.—This composition is composed of fifty pounds of tallow, thirty pounds of white arsenic, and ten pounds of mercurial ointment.

Treating India Rubber—S. Bourne, Harrow, Eng.—Dated May 3, 1866.—This invention consists in heating india-rubber and india-rubber compounds in the presence of charcoal, by preference animal charcoal, whereby all unpleasant odor is removed from the india-rubber.

Compcsition for Removing and Preventing Incrustation In Steam Boilers.—G. Feasey, Camberwell, Eng.—Dated May 2, 1866.—This improved preparation or composition for removing and preventing incrustation steam boilers is composed, mainly, of carbonate of soda and co on salt, with a small quantity of borax, and sometimes sal ammoniac or hydrochlorite of ammonia mixed with soap, a small quantity being added from time time, to the water in the boiler.

Combined Corset and Skirt Supporter.—Wm. Bacheller, Boston, Mass.—This invention relates to a skirt supporter and corset combined, the said supporter being made of sheet metal or other suitable material molded to fit the form of the person wearing it, and so secured to the corset as to form a part of the same and to be susceptible of being attached and detached at pleasure when the corset is to be washed or cleansed.

Globe Valve.—C. L. Frink, Rockville, Conn.—This invention consists in forming a peculiar-shaped disk by which a person is enabled to hold the elastic packing in globe or other valves in place.

Cultivator.—C. P. Norton, Roseville, Ill.—This invention relates to the construction and arrangement of the several parts of a corn cultivator whereby an efficient and very simple machine is produced.

Life-boat.—William Henry Wylly, Savannah, Ga.—The object of this invention is to provide a life-boat which shall not only combine lightness, strength and durability with safety, but be so constructed that it can be easily transported from place to place overland or on shipboard.

Pump.—J. G. Weisinger, Danville, Ky.—This invention consists in so constructing and arranging the various parts composing the pump as to secure contiuuous suction and thus discharge therefrom in a continuous stream.

Fan Blower.—George W. Bright, Philadelphia, Pa.—The object of this invention is to obtain a blast by the reaction of steam or other elastic substance discharged from the wings of the blower thereby causing them to revolve with great rapidity.

Plant Tray.—Dr. William W. Smith, Montrose, Pa.—This invention consists in forming a box or tray for the propagation or growth and cultivation of plants and flowers either for outdoor or indoor use.

Gold Condenser.—William G. Redman, Louisville, Ky.—This invention consists in constructing an instrument for condensing gold in the process of filling teeth, and for preparing the cavity for filling, whereby the operation is much more perfectly performed than by the old method.

DEVICE FOR NDING RAILROAD CAR WHEELS ON OR OFF THE TRACK.—George T. Lape and Jephthah Leathe, New York City.—This invention relates to a device to be used for guiding railroad cars on or off the track, the form being modified to adapt it to the rail either of a street horse-car railroad, or of a railroad for steam cars.

WASHING MACHINE.—Charles Daniel, Lamonte, Mo.—This invention consists principally in a slotted cylinder, adjustably pivoted to the sides of the tub or box, in combination with a slotted adjustable concave frame, pivoted to the sides of the box or tub, by means of which the clothes are held forward to be washed by the revolution of said cylinder.

FILTERING TUBULAR WELLS.—Charles C. Cole, Northfield, Vt.—This invention relates to the construction of lower sections of tubing, to be used for obtaining water cheaply and readily in clay or sandy regions without the expense and trouble of digging wells.

TETHER.—Daniel Kidder, Franklin, N. H.—The object sought to be attained by this invention is to provide a tether by the use of which it will be impossible for the rope or chain employed, and by which the animal is harnessed or connected with the tether, to become entangled with or about the limbs of such animal.

CANE STRIPPER.—Amos Bean, Canaanville, Ohio.—This invention has for its object to furnish an improved instrument by means of which cane may be stripped quickly and cleanly.

STEAMBOAT SIGNAL BELL.—Patrick Kenny, New York City.—This invention has for its object to furnish an improved apparatus, by means of which the pilot from the pilot house may readily and unmistakably communicate his directions to the engineer.

WINDOW BLIND FASTENER.—L. C. Wing, Concord, Mass., and A. R. Bradeen, Waterborough, Me.—This invention has for its object to furnish an improved means by which window blinds may be held and locked both when closed and when opened to any desired angle.

SCAFFOLD.—L. B. Carpenter, Milwaukee, Wis.—This invention has for its object to furnish an improved scaffold for masons' and bricklayers' use, by means of which they can raise themselves as their work advances to any desired height, without its being necessary for them to unload the scaffold and build it higher.

PUMP.—John Ross, Greenville, Mich.—This invention has for its object to furnish an improved pump, by means of which water can be raised from deep wells quicker and easier than with the pumps now in use.

OPENING AND CLEANING COTTON, ETC.—Samuel Fay, Lowell, Mass.—This invention is designed to furnish an improved machine for opening and cleaning cotton and other fibrous substances in a thorough manner, without injuring the fiber or rolling or curling it, as is the case when opened by ordinary means.

COTTON CHOPPER AND THINNER.—David P. Lewis, Huntsville, Ala.—This invention relates more particularly to the cultivation of cotton, but is adapted to other crops, and it consists in operating a double-bladed hoe by machinery.

COVERING COT OR ROLLS.—Edward Livingston Perry, New York City.—This invention consists in forming a cot or covering for the rolls of spinning and other machines, of three or more separate layers or thicknesses of material, secured or united together, by means of cement, glue, or other suitable adhesive material, or in any other proper manner, either independent of the roll on which the cot is to be used, or directly upon the same.

CUTTING FILES.—Charles Vogel, New York City.—This invention consists in an improved arrangement of mechanism for feeding the file bloks to the cutter, whereby the speed of the file may be varied according to the size of tooth required. Also, in an inproved file-bed, so constructed that files of varying sizes can be secured to it; and also, in a novel manner of hanging the cutting-tool, whereby it can be adjusted to suit the desired direction or angle of inclination of tooth with reference to the length of the file block.

BROOM.—Hy. E. Newton, Manchester, N. H.—This invention consists in attaching one or more springs to the broom head, and securing their upper ends to the handle, in such a manner that they form the connection between the handle and the broom head.

PLOW.—Israel Long, Terre Haute, Ind.—In this implement, which is a wheel or sulky plowing machine, a plow is attached to either end of the axle outside of the wheels by means of adjustable arms or beams, one plow being raised out of contact with the ground while the other is in operation. The working plow stands in close proximity to the wheel on that side of the machine, and prevents clogging by uprooting and deflecting the weeds, stones, etc.

MILL GOVERNOR.—William Bahme, New Media, Pa.—This device is intended to close the water gate and stop the water wheel when a certain speed is attained. When the grain ceases to feed between the mill stones the rapid revolution of the runner frequently fires the woodwork. To avoid this a revolving governor ball is pivoted by an arm to the mill shaft, so as by the rise due to a high rate of speed to strike a plate and release the water gate which controls the admission of water to the wheel.

GANG PLOW.—J. H. Doutbit, Albany, Oregon.—This invention relates to a gang plow, and consists in a novel construction and arrangement of parts, whereby the operator has full or perfect control over the plows.

CAMP COFFEE POT AND BOILER.—Luke Plumb, Biddeford, Maine.—This invention relates to the combination of a camp tea or coffee pot and boiler, or pitcher, whereby an ordinary coal-oil lamp may be rendered serviceable as a heater for cooking in a small way; such, for instance, as the making of coffee and tea, warming water, and keeping a meal warm during the delay or temporary absence of a person from the table.

SEED PLANTING MACHINE.—D. S. Holman, Conneautville, Pa.—This invention relates to a machine for planting seed, and it consists in a novel seed dropping device, with means for regulating the discharge of the seed, and also in an improved means for opening the furrows and covering the seed after being dropped therein.

HOOP-SKIRT HOLDER.—Emile Loiseau, New York City.—This invention consists in arranging a device whereby the lower or any one hoop of the skirt is secured to the petticoat, thereby making actually one garment out of the two.

COMBUSTIBLE AND INEXTINGUISHABLE COMPOUND.—J. Sharp and R. Smith, Blackford, Perthshire.—This invention relates to the combination or mixture of certain materials for the production of a combustible compound which, when once ignited, becomes inextinguishable by any agent at present known, as it burns without atmospheric air, and will burn in water, m carbonic acid gas, nitrogen, and all other gases which do not support combustion. Under one modification the compound may be formed by mixing nitre, charcoal, and sulphur, all in a powdered state, and then adding and thoroughly commingling therewith a quantity of unground or unpowdered gunpowder. The proportions are four parts nitre, two parts charcoal, and one part sulphur, with the addition of two parts gunpowder.

PULLING FLAX.—John Harrington, Minomonie, Wis.—This invention relates to a machine for pulling standing flax for the purpose of harvesting the same, and it consists in the employment or use of a reel provided with clamps and arranged in such a manner that it will rotate as the machine is drawn along and grasp the flax, draw it out of the earth and deposit it upon the platform.

CAR TRUCK.—J. W. Reynolds, Hyde Park, Pa.—This invention relates to a mode of attaching or applying the pivot or king-bolt to the truck, whereby said bolt may be readily applied to and detached from the truck and a new one applied at any time, when necessary, with the greatest facility. This invention also relates to a novel manner of applying the springs to the truck, and in an improved arrangement of the boxes.

APPARATUS FOR HEATING HOUSES AND APARTMENTS.—G. Davies, London.—The object of this invention is to utilize all the heat eliminated from the flame of gas, or that of any of the oils or fluids possessing illuminating properties, by causing such flame to pass over or come in contact with a system of heat-radiating materials, so arranged as to absorb, conduct, and radiate the heat imparted to the said radiating material from the burning gases or fluids. The smoke or vitiated air from the burning gases or fluids are conducted off in a separate pipe to the chimney or other place of exit, and pure heated air is conducted into the apartment when a heating apparatus is used, or radiated within the various compartments of a cooking stove or range when the latter used.

DRAWING OR PROPELLING BOATS, BARGES, RAFTS, AND OTHER SIMILAR STRUCTURES, ON CANALS, RIVERS, ETC.—C. E. Brooman, London.—This invention consists in constructing a continuous rail or bar, or its equivalent, along the side of the canal or navigable water, which rail or bar is grasped by traction or friction wheels operated by steam or other power in the boat to be removed. It is attached by any convenient means to upright posts firmly fixed and ranging along the direction of the canal.

SAFETY RECORD PAPER.—L. M. Crane, Ballston, N. Y.—This invention relates to a safety record paper for bills, deeds, currency bonds and other instruments or documents which are liable to be forged or fraudulently altered. This invention consists in inserting in the paper pulp and incorporating with it, during the process of manufacturing the paper, one or more threads or strips of gutta percha or other material which will soften under the heat of the drying cylinders of the paper-making machine, and become inseparably united with the paper so as to be incapable of being removed or detached without destroying the latter.

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."

R. L. B., of Mass.—The alloys of magnesium reported on at the present time are all brittle, and are generally more easily oxydized than magnesium alone. But we hope you will continue your experiments, and let us hear from you when you shall have produced a useful alloy.

J. C. M. & Co., of Pa.—The oxygen of the air can readily be removed by phosphorus. But in that way you dispose of only one-fifth of the whole. There is no substance that will take up the nitrogen. We think therefore you will not be able to secure a good vacuum on the absorption plan.

H. S. C., of Pa.—The coloring matter of clay is generally iron or organic matter. On baking clay, the organic matter is burned up, and if the clay contained no iron or other metal, the ware will be white. The iron may be removed by soaking the clay in hydrochloric acid. The ordinary blue clay gets most of its color from organic matter. The red color of bricks is due to an oxide of iron.

W. E. B., of Pa.—You will find in the text books on chemistry reliable tables of the expansion of metals by heat. Of the metals you name, zinc expands the most.

J. C., of Tenn., quotes from Hooper's Medical Dictionary, article Caloric, some contradictory statements regarding the density of melted and solid iron. When the doctors seem so disinclined to agree on matters touching their own art, it is not surprising that they should be inconsistent on outside matters.

C. A. G., of N. Y.—The tarnish on silver ware is most often due to sulphur. A gentleman, who wears a silver watch finds that it is tarnished from the sulphur fumes of the rubber ring which holds together his ferry tickets. Sulphur fumes enough get into the air to account for all ordinary cases of tarnishing. The sulphide of silver is black.

G D. C., of Conn.—Wheels of lead, or rather a mixture of lead and tin, will carry flour of emery or crocus and will not deface the corners of an object and will give a perfect polish.

J H. P., of Mass.—There is necessarily nothing in the matter on postage or other Government stamps, or on envelopes, to induce sores on the lips. When they occur, as in the case of preparing replies to numerous correspondents, the soreness is to be attributed to the friction on tongue and lips which is much increased by the adhering quality of the dextrine.

T. H. K., of N. Y.—You say that attached to your water wheel is a four-feet bevel gear, driving a sixteen-inch bevel gear, on a shaft carrying a thirty-six inch driving pulley with fifteen-inch belt, and ask whether more power can be obtained by the use of larger gears. Judging from the size of the belt used to transmit your power we think your gears are full small. Really no more power is developed by large than by small gears, but as bevel gears are at best but mechanical makeshifts, absorbing power, we think the nearer the two wheels approach in size the better they work. Better use bevel gears of equal size and speed upon your pulleys. This statement is a reply to both your questions.

H. B. L., of Ind.—A boiler begins to make steam as soon as the water begins to heat, and makes steam as long as the heat is applied, under all circumstances. The steam pressure in a boiler to the square inch is as great in the water space as in the steam space with the addition of the weight of water. Water does not, in our belief, present a barrier or wall to the pressure of steam. You are mistaken in saying that steam will not go down through water. Steam exists in water, and if you will carefully study "Heat and Steam by Charles Wye Williams," H. C. Baird, Publisher, 406 Walnut street, Philadelphia, you will probably modify your present opinions.

H. N. G., of Pa.—Turning tools for iron will cut better if ground on the side of the stone running toward you Never grind a tool the temper and edge of which you wish to preserve, on a dry stone. It is a certain and effectual method of drawing the temper of hardened steel.

R. O. N., of Mich.—A large part of the saltpeter (nitrate of potash) now used is an artificial product. Gun powder makers at first had a prejudice against saltpeter made from nitrate of soda, but there is no way of distinguishing the artificial from the natural product.

S. N. M., of Va.—Magnesia is an essential element in hydraulic cements. Any magnesian limestone, will give on burning, hydraulic lime.

R. D., of N. H.—Coal is found in several localities in New England, and has been mined in Rhode Island. But there is not enough coal in New England to affect the fuel question.

S. N., of Wis.—Copper is smelted on a tolerably large scale in this vicinity. The largest copper smelting works however, are located in Baltimore.

P. B., of O.—The reason that pickles, apple sauce etc. made in an iron kettle look dirty and black, is that some of the iron is dissolved by the acid, and this with a little tannin contained in the fruit, produces a black substance which is the same as ordinary ink. Acid fruits should be cooked in a porcelain lined kettle.

B. B. R., of Mo.—Lithographic stone is worth about 50 cents per lb. If you send your sample to any practical lithographer he can give you a reliable opinion of its value. But be prepared to find out that you have been mistaken, and that your article is not the genuine thing.

N. S. of Cal.—The best solvent of gold is aqua regia (nitric acid 1 part, hydrochloric acid 3 parts). There are also many other solvents.

S. L., of N. Y.—The expansion by heat is generally understood by gas and steam fitters. You should observe that steam pipes for warming buildings are arranged so that no harm can come from the expansion.

M. B., of Del.—Leather is chemically a compound of gelatine and tannin. Your article, which you say contains no gelatine, is not leather, We trust, however, you have something better than leather..... You say that whenever you hear a fiddle you think of poor pussy cat. But you are misplacing your sympathy. Sheep and calves furnish us with catgut.

B. R., of Pa.—The fact that stretched rubber on contracting becomes cold is not new. You will find it mentioned in Grove's Correlation of the Physical Forces.

R. V., of Ind.—Sorgho sugar cannot be distinguished from ordinary sugar when thoroughly purified.

B. F. C., of Pa.—The question asked is this: If a cylindrical boiler of 3 feet diameter and 18 feet long has an extension attached, the inside dimensions of which are 18 inches long, 6 wide, and 1-64 high will the pressure to the square inch of surface to this contracted appendage equal that to the square inch on the boiler? We answer: The pressure will be the same, whatever the form and dimensions of the vessel, the only difficulty being to preserve the same temperature in the thin projection from the boiler as in the boiler itself. A thin film of steam at any noted pressure will exert the same force as a thicker stratum of one or more inches in depth.

G. W. J., of R. I.—There is no necessity of cutting large holes through your floors, or of cutting holes at random to lead belts from a shaft on one floor to one on another. The mechanic who resorts to such means is a bungler. The whole plan can be laid out full size on an unoccupied floor, or by a scale on a sheet of paper or a board. As an instance, if you wish to lead a belt through two floors, measure the distance of the center of the shaft carrying the driver from the first floor, taking the diameter of the pulley. Draw a line on the floor, sheet, or board representing the floor, and giving its thickness, with the diameter and position of the pulley. Then measure from the upper surface of the first floor to the ceil- of the next, making another line; then from the next floor or top of the ceiling—allowing for thickness between them—to center of driven shaft, giving the diameter of driven pulley. Draw lines from periphery of driver to driven, and where these intersect the floor lines, are the passages to be cut.

J. R. M., of Ohio.—You need have no fears on the point you suggest. We shall publish all that we think will afford interest and instruction to our readers. The society to which you referred, needed a strong hint. It will do the members no harm.

Sundry Answers:—E. K. C.—Mercury and oil are good examples.—J. B. C.—The royalty paid to the owner of a patent is always a subject of negotiation. The patentee has the right to fix the price so high that it amounts to a prohibition if he chooses. But we never heard of one who was such a fool as to do that. It is a matter of interest as well as of pride with a patentee, to have his invention used as extensively as possible. —C. H. M.—The best way is to advertise for an agent.—E. N.—In the back pages of the SCIENTIFIC AMERICAN, you will find information about dummy engines.—J. M. C.—Your perpetual motion will prove to be a perpetual stand-still.—C. A. S.—The screw jack simply enables a man to apply his strength to good advantage, but it does not increase his strength It is impossible for you to obtain any more power from your screw arrangement than you apply. Your perpetual motion is also a no-go.—R. H. S.—You would get a partial vacuum in the way you describe, but it is a roundabout way to do it. The part by which you obtain the vacuum namely, the air piston and cylinder, are shown in all natural philosophies.—C. R. S.—Cannot find the address without search.

Business and Personal.

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

J. C. Haines, whose Patent Bridle was illustrated in No. 3, present Vol., wishes parties to address him hereafter at Lancaster, Pa., instead of Lewistown.

Reiner Brothers, Line Lexington, Pa., want manufacturers of cultivator hoes, also of tub and bucket machinery, to forward their address and price list

To Agricultural Implement Makers.—Send catalogues to W. A. O. D., Box 6810, Post-office, New York.

Wanted, a situation as foreman and superintendent of an Agriculture Tool and Machine Factory, by a first-class mechanic who has experience and good references. Address E. Peek, Chicago, Ill.

Watchmakers wishing cuts and circulars of Lakin's Lathe Tool will please address J. A. Lakin, Thompsonville, Conn.

C. G. Van Pappelendam, Charleston, Lee County, Iowa, wants a shop right to manufacture molasses out of corn.

NEW PUBLICATIONS.

The progress of the beautiful art of photography in this country, is indicated to some extent by the variety of books and other publications pertaining to the subject, which find a ready and extensive sale. From the publishing house of J. H. Ladd, 600 Broadway, we have lately received the following:

HUMPHREY'S JOURNAL FOR 1866. Semi-monthly, at $3 a year.

A fine volume of 400 pages, brim full of the latest and best things concerning photography that have been recorded during the past year. The journal is highly valued for the many original contributions by its experienced editor and home correspondents, and for its foreign reports.

THE SILVER SUNBEAM. 440 pages. Price $2 50.

This is a text book of photography, and has had a very extensive sale. It contains full explanations of almost every known photographic process, from the simplest to the most complicated, hot or cold, wet or dry. It has the rare merit of practical correctness in its directions, as probably all of its formulas and processes have been actually tested by the author, Professor Towler. The book presents the science of optics as applied to lenses, the history and progress of photography, complete directions as to preparation of photographic chemicals, collodions, developers, fixing agents, intensifiers, negatives, positives, ambrotypes, tintypes, silver printing, carbon printing, porcelain pictures, photographs on leather and cloth, transferring, relief printing, stereoscopes, engraving, Wothlytypes, eburneum process, how to glaze photographs, duplex pictures, irontype, etc., etc. All who desire to be fully posted in respect to photography should possess this work.

THE PHOTOGRAPHER'S GUIDE. Price $1 50. 150 pages.

This is a recent work from the pen of Prof. Towler, containing concise and brief instructions for conducting all the most approved forms of photographic operations, both in the gallery and in the field. Nothing can be more straight forward and plain than the directions here given. Solar printing, vignetting, saving of residues, opal pictures, and every branch of the photographic art, are admirably explained.

AMERICAN PHOTOGRAPHIC ALMANAC FOR 1867. Edited by Prof. Towler. 102 pages. 50 cents.

A record of the most valuable improvements, processes and formulas made during the past year. The almanacs for 1865, 1866, and 1867, are all in print.

THE MAGIC PHOTOGRAPH, 25 cents, the PORCELAIN PICTURE, with full instructions, $1 00, and DRY PLATE PHOTOGRAPHY, OR THE TANNIN PROCESS $1 00, all by Prof. Towler, are highly useful.

Inventions Patented in England by Americans.

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

PROVISIONAL PROTECTION FOR SIX MONTHS.

3,203.—PROCESS AND FURNACE OR APPARATUS FOR THE MANUFACTURE OF STEEL OR METAL HAVING SOME OF THE PROPERTIES OF STEEL.—Thomas J. Chubb, Brooklyn, N. Y. Dec. 5, 1866.

3,205.—APPARATUS FOR SEPARATING SUBSTANCES OF DIFFERENT SPECIFIC GRAVITIES.—Thomas J. Chubb, Brooklyn, N. Y. Dec. 5, 1866.

3,217.—LOOMS AND SHUTTLES FOR WEAVING.—Benjamin Oldfield and Edward Oldfield, Newark, N. J. Dec. 6, 1866.

3,246.—SEWING MACHINERY.—Frank Armstrong, Waterbury, Conn. Dec. 8, 1866.

3,253.—BREECH-LOADING FIRE-ARM AND CARTRIDGES AND BULLETS FOR THE SAME.—Hiram Berden, New York City. Dec. 10, 1866.

4,256.—RAILWAY CARRIAGE AND WAGON.—Samuel Maynard, New York City. Dec. 11, 1866.

3,282.—SCRUBBING MACHINE.—Andrew Irion, Femme Osage, Mo. Dec. 13, 1866.

3,430.—NAUTICAL LOG.—Truman Hotchkiss, Stratford, Conn. Dec. 29, 1866

3,452.—METHOD OF EFFECTING THE CUTTING-OFF IN STEAM ENGINES, ALSO THE REGULATOR FOR CONTROLLING THE SPEED OF STEAM ENGINES.—Geo. H. Babcock and Stephen Wilcox, Jr., Providence, R. I. Dec. 31, 1866.