6.—What is the cause of some dead wood burning into cinders, and is it a common occurrence? It has a close resemblance to that which we see at a blacksmith's furnace where common bituminous coal is burnt.—J. N. S.

7.—I have heard that a large manufacturer of builders' hardware finishes with a brown "dip" that does not require baking. It is kept a secret. Can any reader give me a clue to the ingredients of that dip?—R. S. B.

8.—Could not a house be built much cheaper in the form of a square or oblong, than by following the plan given in your paper for November 9? And, if the roof was nearly flat, would not the chambers be cooler in the summer and warmer in the winter?—E. E. S.

9.—I hear many complaints of Wishataw oil stones being too hard. Will not some one inform me of the best method of improving the grit or softening such stones?—J. H. Z.

12.—Owing to the frost getting into the iron of my engine I found it quite rusty. I have removed the rust, but cannot remove the stains. Will some one tell me how I can do it?—P. P.

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 $1·50 a line, under the head of "Business and Personal."

ALL references to back numbers must be by volume and page.

J. J. F., of Texas, says: Enclosed please find a small piece of ore. What it is we are unable to tell. Answer: It is pyrites or bisulphuret of iron, not available as an ore.

W. S. N. asks: What is the process of giving to small wires the same point that is put on hair pins? Answer: They are generally pointed by grinding by contact with revolving grinding or milling wheels.

M. asks: Can iron be incorporated with a hair dressing? Is it harmless? Also, will sulphur prevent hair from turning gray? Answer: Preparations of iron and sulphur are used in hair dressings to blacken the hair. These substances probably injure the hair, but are not poisonous like the lead preparations so commonly used in hair dyes The use of sulphur does not prevent gray hair, but helps to disguise the gray.

P. B. W., of N. J., says: Enclosed is a mineral which I think is umber I send it to you for inspection. Is it of any value? The vein is all just like the piece that I send you; at first it was about six inches thick, and after digging three feet it was eighteen inches. The vein lays between slate rock. Answer: The specimen is an ochery oxide of iron or "umber" so called, and doubtless would make a useful pigment.

C. B., of Mich., says: I send you herewith three mineral specimens from Kansas. No. 1. is the magnesian limestone, and I am requested to inquire in regard to its suitability for building a dam. Will it stand the action of the water? No. 2. What is it, what kind of rock and what is it good for? As to No. 3, the questions are, what is it, what is it good for, and is it valuable? If so, what is its value? Answer: (1.) In our opinion is too soft for the purpose stated, and would not endure the wear of the water like the more compact limestones and tough quartz rocks. (2.) Is calcareous marl, the "chalk of America. (3.) Is ferruginous clay, of the same value as any other clay.

J. E. E. says: The enclosed mineral sample was sent to me some time ago from Arizona, and was described as a specimen of white topaz. I am of opinion that it is nothing more than quartz crystal in a molten state. It cuts glass very readily, as you will perceive. Answer: The mineral is chalcedony, a variety of quartz. Topaz is a third heavier, and is harder.

H. B. H. says: Will you please inform me of the compositions and materials used in filling in between the outside and inside lining of safes? Also state the per cent of water contained in each ingredient that the above composition is made of. Answer: Different safe makers use different filling materials. Ordinary hydraulic cement is a very common filling. Plaster of Paris is another. Plaster and alum another. The amount of water in the filling varies from 20 to 30 per cent of the space occupied by the filling.

J. M. S. says: If the levers of a horse power are lengthened so that the ends, instead of being fastened in the center of drive or bull wheel, pass on and are fastened on edge of said wheel, will there be power gained or not? My friend (who, by the way, is a subscriber to your paper) maintains that the power applied to the side of the wheel nearest the horses is the same in either case, and therefore, the lever being fastened on the opposite side of wheel, all the power there applied is gained. I, on the contrary, maintain that there is no power gained whatever, as the increased distance between the fulcrum and—weight. I suppose you might say, will exactly counterbalance the amount of power applied to the side of wheel opposite to that on which the horses are hitched. Answer: The use of levers does not in any case increase the amount of power applied. Levers are simply tools by means of which the power is employed, directed, or expended. In the case of a common lever horse power machine, the longer the levers are, or, in other words, the further their outer extremities extend beyond the center of the wheel, the more easily but more slowly the wheel will be turned.

E. S. C. asks: What per centage of water is returned to the boiler by a condensing apparatus, and how many gallons of water would suffice a 40 horse power boiler, for 12 hours, with a condensing attachment? Answer: The condensing engine requires from 15 to 35 times as great a quantity of condensing water as of feed for the boilers. Each pound of steam condensed yields to the condensing water something over 1,000 units of heat. Each pound of condensing water carries away from 39 to 70 thermal units, this quantity varying with the temperature of the injection water and the condition and management of the condenser. Probably four per cent of the condensing water, as an average, goes back to the boiler as feed with the ordinary condenser. A fair 40 horse power boiler should evaporate 15,000 pounds of water in twelve hours, and would require its engine to be supplied, probably with at least 4,000 gallons of condensing water per hour in summer, and 2,500 in winter.

P. M. says: How can I ascertain the loss by radiation from an exposed boiler front, with steam at 70 lbs. by the gage? If possible let me know before the middle of January, as it will do no good after that date; a case at law is involved. Answer: To determine approximately the loss by radiation from a metallic surface heated and exposed to the air, the temperature of the air and of the metal remaining constant: 1st. The loss or gain of heat, of a body so exposed, is proportional to the difference between its temperature and that of the surrounding atmosphere up to a limit which is, by some authorities, assumed at a difference of 50 or 60 degrees Fah. Where the difference is greater, a correction is required for accurate work. 2d. Multiply this difference in temperature, in the case observed, by the area in square feet and by 0·3. The product will be the number of units of heat lost. Consult Peclet's "*Traite de la Chaleur*," p. 373, *Paris*, 1859, *et seq.*, for further information, and call in an expert of known intelligence and integrity if anything further is needed.

J. E. W. says: A dispute has arisen between us in regard to the speed of steam boats, which we respectfully refer to you for a decision. The question is, simply: At what rate of speed per hour can still water be displaced? And is there not a limit beyond which water cannot be displaced, notwithstanding the force that may be used; that is, can a steamboat be driven through still water at a rate exceeding 19 miles per hour? Another question is: Can a tapering log 40 feet long (2 inches diameter at one end, and 40 inches at the other), be towed through the water faster with the sharp end, than with the blunt end, foremost? The reason assigned in favor of the blunt end is that it encounters resistance only at one place as it enters the water, and nowhere else; whereas the sharp end encounters resistance at the point all along the log and then drags dead water after it. Answer: There is no known limit to the displacement of water by the suitable application of power. Some of our North river steamboats have made from 22 to 25 miles an hour in still water. Such a log as you describe will tow easier sharp end foremost. It takes but little power to displace water. To push it sidewise is like moving a pendulum, and requires little more power than does a pendulum. The principal resistance encountered by well formed vessels in moving through the water is due to the friction of the water on the surfaces of the vessels. Blunt vessels lift more water up in front, and are therefore harder to move than sharp vessels, at same speed.

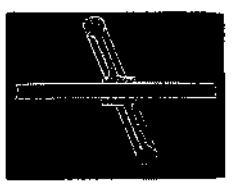
A constant reader asks:—Will a one inch perpendicular pipe filled with water and inserted in a barrel filled with water, the pipe being twenty-five feet high, have the same pressure as a two inch pipe of the same length; and if not, what would be the difference in pressure? Answer: The pressure will be the same in both cases.

W. McD., of Ohio, says:—The proprietors of the planing mill in which I work thought they could heat the carpenter shop from the exhaust steam from the engine. The size of the boiler is 20 feet long, 40 inches diameter, with two return flues. They had a galvanized iron pipe put in, 6 inches in diameter, the iron being about one sixteenth of an inch thick, leading from the engine through the room (about 20 feet), then into a drum at the top. The drum is 20 inches in diameter and 4 feet long. A 4 inch pipe leads from the bottom of the drum to the outside. The heat it gives off is just perceptible when we hold our hands or faces very close to the pipes or drum. Why does it not afford more heat, and what would be the best remedy? Answer: The temperature of your exhaust steam is probably but little above 212° Fah., and the exposed surface of the pipe is of too limited area to heat what we presume to be a room difficult to warm where the source of heat has so low a temperature. Put a lightly loaded valve on the discharging end of the heating pipe, or else draw steam direct from the boiler. Probably the latter method would be best.

J. G. Says:—I am building a large ice house, 100 feet square, over lager beer cellars; the joists used across the walls are oak, 6 X 12 inches, 20 feet in length, 20 inches apart; a 2 inch strip is nailed on the lower edge of each joist to support a 10 inch pine board between. I now propose to tar those joists all over, together with the board, with hot tar. I then want to fill between the joists, level with the top of each, with something that will not injure or rot the wood. I can get coal ashes from the salt works that are impregnated more or less with salt; or I can get saw dust or tan bark. The object in filling between joists is to protect the ice from exposure below. A floor is then laid over the whole, this is felted and tarred, and made water tight, similar to a roof; a rack is then placed on this floor to receive the ice, which will be from 12 to 15 feet thick. Owing to the immense weights those joists have to carry, it becomes necessary that the filling should be something that will not rot the timber very soon. Now which of the three, ashes, saw dust, or tan bark, would you advise? Answer: Your ashes, containing salt, will be certain to absorb moisture rapidly, and the weight and increased conductivity of heat consequent will be seriously objectionable. The sawdust, if perfectly dry at first, and if it can be kept dry, would be probably best as it is light, an excellent non-conductor, easily handled, and cheap. If, and we presume it will be the case, there is a probability that the filling around your ice house is likely to get moistened from exterior or interior, or both, we should advise tan bark. It is a good non-conductor, not liable to heat in consequence of dampness where the ice is removed, and the tannin remaining in the bark will be a good preservative of the woodwork in contact with it.

Seneca says:—I have had a dispute with a learned friend, and he will be ruled by your decision. He has a windmill on his farm, and uses the power to pump; I remarked that the rod, working perpendicularly, stopped at every revolution of the wheel; he says that as the rod takes its movement from a circular motion (the wind wheel), there can be no stoppage at all as long as the wheel turns. Please state how the matter stands. Answer: There is a cessation of motion at either end of the throw of the crank, but it is of indefinitely short duration. The period of rest is inappreciable and immeasurable by finite power. Seneca and his friend are approaching too closely the mistyregions of metaphysics.

An old subscriber writes us to state the names of some cheap liquids, *not* of an oily character, which are not frozen by our coldest winters, and also please state if there is any chemical which will unite with water and form a compound not easily frozen. Answer: Pure alcohol, ether, bisulphide of carbon, and glycerin do not freeze at any temperature to which they have ever yet been subjected. Ammonia freezes at about 45° below Fahr. zero, and pure nitric acid at about the same point. Mercury freezes at —39° Fahr., sulphuric acid and some other substances require also a temperature far below the zero of Fahrenheit scale to produce solidification. The union of any liquid, which itself remains fluid at a very low temperature, with water will raise its freezing point. Experiment will best determine what liquids and what proportions will answer the purpose.



R. and W. say:—R affirms that a balance or fly wheel if in standing balance or. each side of equal weight need *not* be at right angles to the shaft, to run fast without affecting the *steadiness of the shaft*. Also that it may be keyed on at even 45° to the shaft without affecting it, except so far as the air may do so, as shown in the engraving; W. asserting the contrary. The one mistaken is to pay five years subscription to your paper for the benefit of him whose premises prove correct. Answer: If a balance wheel is accurately balanced and is perfectly symmetrical in form, and if it is keyed firmly on its shaft in any position except with its plane at rightangles to the line of the shaft, it will always tend to turn itself until its axis shall coincide with the center line of the shaft This effort will be a constant one, tending to bend the shaft but does not necessarily produce unsteadiness in the shaft, as will be readily seen if the experiment be tried. R. is right. We shall be happy to settle many controversies like the above, on the same conditions. The loser certainly does the handsome thing in supplying the SCIENTIFIC AMERICAN for five years to his friend.

I was troubled with angle worms in my well, as "E. L." was with his, until I had a wood house built over it.—S. B., of Conn.

Keep the fur or woolen articles in paper boxes; paste a strip of paper joining the box and cover tightly. It is not possible for the moths' eggs to be laid through paper.—R. S. B., of Conn.

J. W. C., query 4, page 345, can silver brass by dissolving one ounce nitrate of silver, and two ounces cyanuret of potassa, in twenty ounces distilled water; let it stand until clear, then pour it in half ounce phials, each being two thirds full of Paris white: apply with a brush, and polish with a soft cloth.—F. S. B., of Me.

To T. J. S., query 26, page 314.—You may bleach broom corn in a solution of sulphurous acid gas (produced by burning roll sulphur) in water at a temperature of from 70° to 80° Fah.—A. O.

A. G., Jr., query 7, page 345, should learn the art of lithography, as, without a knowledge of it, all experiments in photozincography or photolithography must fail. Lithographic printing ink is used.—W. N., of N. Y.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges with much pleasure, the receipt of original papers and contributions upon the following subjects:

On Cheap Microscopes. By T. B.

On the Transmission of Motion. By L. S.

On a Method of Conveying Water to the Roofs of Buildings in Case of Fire. By W. C.

On Queer Freaks of a Leyden Jar. By N. E. F.

On a Premium Acre of Corn. By W. R. S.

On a Method of Constructing Cheap Fireproof Safes. By B.

On the Prevention of Fires. By W. C. D.

On Ball Lightning. By H. B. S.

On Marine Life Saving Inventions. By J. A. A.

On the Origin of Storms. By J. H.

On the Modern Atomic Theory. By R. D. W.

On the Formation of an Association to Assist and Encourage Inventors. By R. H. T.

On the Effect of Lightning upon Trees. By J. C. S.

On What Constitutes Credible Testimony in Regard to Scientific Questions. By J. H. P.

On Religion and Sciences. By J. F.

On Milk Sickness. By O. S. M.

On the Manufacture of Cotton Goods at the South. By E. J. C. W.

Recent American and Foreign Patents.

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

MEDICATED CONFECTION.—Nicholas Saltabassi, New York city.—This invention relates to a new and useful improvement in the line of confections, medicated in such a manner as to make it not only pleasant to the taste, but valuable as a promoter of digestion and a strengthener of weak digestive organs. It consists of equal quantities of grapes and Zante currants reduced to a pulp by heating, pressing, or macerating, or in any manner to form a homogeneous mass. The seeds and skins are then separated therefrom by straining or filtering, and the pulp reduced to a semi-liquid state. Equal quantities by weight of Mocha aloes and camomile flowers in the proportion of about one ounce of the extract to one pound of the above described pulp or sirup are then added. Before cooling, the composition may be run into "drops," and before or after cooling it may be divided into pieces of any form convenient for use, after which it is put up into boxes or packages for sale. Other ingredients, in addition to those named, may be added to give the confection any desired flavor.

STEREOSCOPE.—Antonio Quirolo, New York city.—This invention relates to stereoscopes, and consists in a jointed handle permanently attached to the instrument and made attachable to a fixed standard, whereby the instrument is thus supported in the desired manner without requiring the handle to be detached.

ANIMAL TRAP.—George Barr, Clatskanie, Oregon.—This invention has for its object to furnish an improved trap for catching and destroying mice, rats, squirrels, gophers, minks, etc., and it consists in a combination of springs, levers, and wheels whereby, on touching the bait, the animal is killed, and the trap automatically resets itself.

CEMENT.—William McKay, Ottawa, Canada.—To produce a hard, durable, and quickly setting cement the inventor makes a compound of marl or oyster shells, clay, road dust, wood or coal ashes (or equivalent alkalies), sand, soluble or other glass, or any one or more of the silicious ingredients, any one or more of the metallic oxides, carbonate of magnesia, or calcined magnesian rock. All the above mentioned ingredients, with the exception of soluble glass and ashes or alkalies, are mixed together with water and ground to a powder in a mortar mill or by any convenient process, after which the whole is brought to a liquid state by the addition of water. The compound is then run into tanks and left to precipitate. When the precipitation has taken place, the excess of water is withdrawn, and the ashes or alkalies are added and thoroughly mixed and incorporated with the compound. The whole is then dried either by artificial heat or in the open air, after which it is thoroughly calcined and ground to an impalpable powder in a flour mill or by any other process. The soluble glass, previously powdered, is then added and incorporated with the compound, which is ready for use in the same manner as other hydraulic or plastic cements.

OIL CAKE TRIMMER.—Washington Hawes, Port Richmond, N. Y.—This invention consists of an endless cutter and a press clamp with a table for holding the oil cake and suitable apparatus for working the cutter and clamp, arranged in such manner that one or more cakes placed on the table under the clamp may be trimmed completely all around the edges at one operation of the cutter. This invention also consists of a receiver for the trimmings and breaking apparatus combined with the trimmer, and adapted to break and pulverize them for being worked over again.

MACHINE FOR MAKING BUNGS.—Charles Abel, Morrisania, N. Y.—This invention relates to a machine for manufacturing bungs for barrels and kegs and for similar purposes, and consists in a revolving tube, through which the timber is automatically fed in a movable tapering cutter head and spindle. When the bung has been turned and tapered a saw is brought down by a lever and the bung is cut off, and at the same time a burr bevels the corner of its large end. The operations of sawing off and beveling the corner are simultaneously performed.

HAY LOADER.—Anthony Garver, Lime Spring Station, Iowa.—This invention has for its object to furnish an improved device for loading loose grain, hay, etc., upon a wagon rack which shall be so constructed as to enable the loading to be done easily and rapidly, thus avoiding the necessity of binding the grain, and thereby greatly diminishing the labor and expense of harvesting. As the wagon is drawn forward, the loose grain or hay is gathered by the fingers or teeth, up which and up the platform it is assisted by the raker with his rake. As the grain or hay passes upon the rack, it is received and arranged by the loader. A lever extends up in such a position that it may be conveniently reached by the operator to raise the fingers from the ground in passing obstructions, etc. When the load has been completed the device is detached and left in the field, or attached to a second wagon while the first is being unloaded.

FLOUR BOLT.—John W. Johnson, Evansport, Ohio.—This invention consists of a reel with spiral ribs inside of the ordinary longitudinal ribs, the former arranged as wide apart as the width of a strip of bolting cloth, and the cloth arranged spirally on said ribs and nailed upon the inside.

CARTRIDGE BOX.—Polydore S. Thomson and Frank M. Thomson, of Hudson city, N. J.—The object of this invention is to make cheaper boxes and provide a better and more convenient arrangement of the cartridges; also to increase the capacity of the box. It is a cartridge box consisting of a wooden block having holes of the same length as the cartridges to be inserted, and any elastic perforated sheet, both covered completely by the leather body and all arranged compactly together.

FURROW STAFF.—George H. Comer, of Indiana, Canada.—The object of this invention is to provide a simple and practical instrument for determining the depth of furrows in millstones, so as to insure their equal depth throughout. The invention consists in the arrangement of a sort of sled, carrying a vertically adjustable furrow staff, which, in use, is painted to show the more elevated portions of the furrow by leaving paint thereo