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.

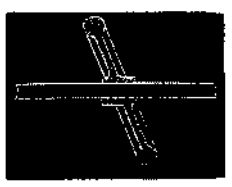
A constant reader asks:—Will a one inch perpendicular pipe filled with water and inserted in a barrel filled with water, the pipe being twenty-five feet high, have the same pressure as a two inch pipe of the same length; and if not, what would be the difference in pressure? Answer: The pressure will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

EARTH CLOSET.—Henry Clark, Baltimore, Md.—The invention consists first, in providing the vibratory shaft of an earth closet hopper valve with a spring-retracted horizontal rod. It consists, secondly, in the peculiar construction and arrangement of a lock bar and catch in connection with the hopper. The case of the earth closet is made in the form of a washstand or oureau. The lower part of the front of the case is made in one piece, is hinged at its lower edge to the forward edge of the bottom of said case, and has cleats attached to its inner side to serve as ways or guides to the receiver when being drawn out and pushed in. The lower or small hopper is supported from the case in such a position that its bottom may be just above the receiver when said receiver is pushed in, and the discharge-opening of the said hopper directly above the opening in the top of said receiver, so that the earth from the said hopper may pass directly into the said receiver. The discharge opening of the hopper is closed by the door or valve, which may be closed and opened by turning a shaft. This shaft is connected with a rod which projects at the forward side of the case in such a position that the door, when closed, will strike against it and force it back, opening the valve and allowing the earth in the hopper to fall into the receiver. The discharge-opening in the bottom of the upper hopper is closed by a door or plate, so that when the said hopper is fully pushed back the said discharge opening will be closed, and when the hopper is drawn forward a little way the discharge-opening will be opened sufficiently to allow a small quantity of earth to pass down into the small hopper. The hopper has a bar so arranged as to draw it forward to supply the small hopper with earth by opening the door.

EYE GLASS.—Lucius B. Winslow, of New York city.—This invention consists in so forming the joints of the glass bows and arranging the connecting spring therewith that the screw for fastening the ends of the bow and securing the glass also fastens the spring to the bow, and holds it so that it can be adjusted to lengthen or shorten it and thereby vary its tension.

CAR COUPLING.—Robert Neisch and Charles G. Hirner, of Allentown, Pa.—This invention has for its object to furnish an improved car coupling so constructed as to couple automatically as the cars are run together, even though the cars to be coupled should differ in height, and which may readily be so adjusted that the cars will uncouple as they are drawn apart. A block or heavy plate is inserted in a seat in the frame work of the car, to which it is secured by bolts which pass through slots. Rubber springs, inserted between the inner edge of the block and the edge or shoulder of the frame work, are designed to diminish the shock when the cars are run together. As the cars are run together, the end of the coupling link enters one or other of the spaces between the plates, according to the hight of the adjacent car, and pushes back a lever, which allows the coupling pin to drop into place. By pressing down one end of a lever the movable parts of the coupling may be raised into place, and by pressing upon the other end the said parts may be lowered, releasing the lower end of the coupling pin so that the coupling link may be drawn from said pin as the cars are drawn apart, the hole in the block through which the pin passes being elongated into a slot to allow the lower end of the said coupling pin to be drawn outward. The pin is held in place in the forward end of said slot by a spring, placed in its inner end, and which is so formed as to be compressed and allow the pin to take an inclined position when its lower end is released and drawn outward. The lever may be placed beneath the frame if desired, in which case it should have rods pivoted to its ends and passing up through the said frame, so that the lever may be conveniently operated by the brakeman with his foot.

SMUT MACHINE.—George W. Grant, Middleport, Ohio.—This invention consists of certain novel combinations and arrangements of screening, separating, scouring, and fan-blowing apparatus. The hopper has a bottom composed of wires extending from the rear to the front, and diverging so that the spaces increase in width toward the front. Said spaces at the rear are too close together to let the grain fall, for allowing the sand and other small matters to escape to the spout below and be discharged through it, the coarse matters passing off at the front escape through a spout. The rear end of the hopper is arranged in the concave form shown, for breaking the force of the grain discharged against it, and a short distance in front of this back is a valve, which is swung up by the flowing grain in passing along the wires. This valve has longitudinal grooves in the side against which the grain comes, which grooves are designed to so act on the straws, sticks, and other matters having considerable length, as to turn them at right angles to the wires before letting them pass, to prevent them from falling through the wires. Along the middle portion of the bottom the grain falls through, between adjustable gates, into the hopper below, At the lower end of the bottom of this hopper is a gate which checks the descent of the grain and causes it to fall in a thin even stream through the space of the upper portion of the separator to the space below, to be exposed in such fall to a blast of air by a fan, to deflect the lighter grains and other matters inward to be separated into two grades by gates, which may be shifted to vary or regulate the separation. The first grade, consisting of the heavy grain, falls on the deflector, and is thereby chuted into the sides and bottom of the hopper, from which it is conducted to the scouring frame. The second grade falling between the gates passes into the oats and cockle separator, consisting of the concave metal plate and the wire brush or cushion wheel. The brush will have a slow rotary motion. From between the scouring devices the grain passes out into the case, between the blades, to the scouring action of which it is subjected for a considerable time, and is then forced up by them to the deflectors, where it is again subjected to a blast to have the scoured off light matters blown away; thence it passes out through the spout.

ENGRAVING AND CARVING MACHINE.—Thomas W. Minter, New York city.—This invention relates to a new machine for engraving and carving, die sinking, cameo and intaglio cutting, and similar fine and delicate work, in stone, steel, or other material, with the object of enabling the exact and artistic imitation of suitable designs. It consists, first, in fastening the engraving or carving tool in a spindle which hangs on a vibrating beam, said beam being also provided with the feeling or pattern pin. The chief novelty in this feature is in fastening the tool in a spindle which hangs horizontally on the beam, and in revolving said spindle by belt connection the same as a lathe spindle, so that the tool can be used to the very same advantage as that to which it is at present used on the lathe only. The next feature of novelty consists in fastening the pattern and the article to be cut upon platforms which can be tilted into a suitable inclined position. The tool can thereby be made to work at any suitable angle on the material to be cut, and consequently to incisions of all kinds, not only straight up and down, as in the present engraving machines, but also inclined, rounded, etc., as may be necessary for the making of reliefs for cameos or depressions for intaglios. The mechanism for thus inclining the pattern and the work is so united that both will be moved in exactly the same degree and offer the same angle of surface to the feeling pin and cutter respectively. This tilting motion is effected by worm wheel segments applied to the supporting platforms of the pattern and work, and matching both into the thread of a screw, which, when turned, inclines them. Furthermore, the invention consists in making and applying disks to the aforementioned platform which are jointly rotating and longitudinally adjustable in equal degree, and in providing the nuts that embrace the longitudinally adjusting screw, jointed to permit their being placed at suitable distances apart. Finally, the invention consists in hanging the screw which causes the joint rotation of the platforms in vertically sliding boxes, so that it will accommodate itself automatically to the greater or less hight of the platforms during their tilting motions.

PAPER CUTTING MACHINE.—Edwin R. Sheridan and Theodore W. Sheridan, New York city.—This invention has for its object to improve the construction of paper cutting machines. The knife bar and knife are moved up and down by the movements of the lever, which is connected with said knife bar by an adjustable connecting rod. The lever is pivoted and works in a guide slot in the lower part of the frame. To the end of the lever is attached the lower end of a chain, the upper end of which is attached to the shaft or to a drum placed upon and secured to said shaft. In the shaft or drum is formed a spiral groove into which the chain is wound as the shaft or drum is revolved in one direction, so as to raise the lever and draw the knife bar and knife down upon the paper to make a cut. The spiral groove in the shaft or drum keeps the coils of the chain parallel with each other, and thus prevents the coils overlapping and the chain from kinking while being wound and unwound, so that the movement of the knife may be steady and uniform. A block moves up and down loosely in grooves or ways in the frame and guide block, and is so formed that as the lever approaches the up per limit of its stroke it may strike against and raise the said block. The upper end of the block is inclined so that, as it is raised by the lever, it may move the free end of the lever outward, and thus allow the lever to descend by its own weight, raising the knife bar and knife to make another cut. The lever should have an adjustable weight attached to it, to enable its rapidity of descent to be regulated as desired. As the lever approaches the limit of its downward movement it strikes a spring attached to the lower part of the lever, which checks it, prevents rebound, and at the same time moves a second lever which is pivoted to the frame, and its upper end is connected with one end of the brake band or strap, which passes over the hub of the gear wheel, or a brake wheel attached to said gear wheel, so that the first lever as it reaches the lowest point of its descent, may apply the brake, and stop the movement of the gear wheels, until motion is again given by throwing a clutch into gear.

GANG PLOW.—Joseph Lane, Eugene, Ind.—This invention consists in certain improvements in gang plows in which the plows are adjustably pivoted to the supporting frame, and connecting rods are used for connecting the plow beams with the evener, so that the draft on the evener forces the points in the ground and keeps them in; and one or more of the plows may be kept out of work while the others are at work, or some may be worked deeper than others, and all may be adjusted higher or lower; and in which rolling colters for cutting the sod, and a gage wheel for regulating the depth of cut and for supporting the weight at the front of the axle so as to take it off the horses, is used.

POTATO DIGGER.—Robert G. Dayton, North Granville, N. Y.—By suitable mechanism a shaft is actuated by the wheels, which revolve upon the journals of the axle. To the shaft are attached spur or chain wheels, around which passes the endless carrier, which also passes around spur or chain wheels attached to another shaft, that revolves in bearings in the lower forward part of the scoop flanges a little below and in the rear of the rear edge of the scoop. The carrier is formed of slats hinged to each other at their edges, and having flanges formed upon their lower edges to carry up the soil and potatoes more surely. From the carrier the potatoes and soil fall upon the shaker, through which the soil passes, and from the rear end of which the potatoes fall to the ground. By suitable construction the shaker is moved both laterally and longitudinally as the machine is drawn forward. A plate or apron is placed upon the forward part of the shaker in such a position as to receive the soil and potatoes from the carrier. The apron is held in position by rods, the lower ends of which are attached to the ends of the said apron, and the upper ends of which are connected with the carrier shaft, so as to keep the said apron always in the same position with respect to the rear end of the carrier.

EARTH AUGER.—Thomas C. Harris, Dresden Deep River, Iowa, assignor to himself and Amos Taylor, of same place.—This invention comprises certain improvements in the construction of the augers of well boring apparatus. The inventor proposes to make a large portion of the disk in front of each lip of thin spring steel plate, and attach said parts to the thicker parts rigidly, by riveting them or otherwise, by which a much more efficient and durable, as well as cheaper, arrangement is obtained than that in which the corresponding parts of thick and strong metal are hinged to the parts. In this case the spring plates yield sufficiently to allow the large stones to pass up with the earth raised by the bits, and they return to and retain their position for holding the earth when the auger is lifted out of the well much better than the hinged parts. These plates are curved inward and attached to the inner sides of the braces, so that the earth forced back on the auger will pass and not obstruct the turning of the auger, as it would if allowed to come against the front of said braces. These braces are made of gas tube or other like tubing, and the disk has holes where they are attached, so that air can flow down under the auger to prevent the forming of a vacuum below when the auger is raised; and below these holes the bow shaped spring cap plates are placed, so that they can slide back and forth as said caps spring up to the disk, when the auger is boring, to close the holes and protect them from clogging, and spring away again to open the holes and admit the air as soon as the auger is slightly lifted.

BRIDGE.—Hamlin G. Russell, of Lincoln, Ill.—The invention consists in arranging the bridge floor so as to leave a space between it and the lower chords, and so as to be below, or in the same horizontal plane with, the under side of said chords. It also consists in the arrangement of vertical tie bolts or rods, with the braces, cross beams, and chords, whereby a strong and durable yet comparatively light and inexpensive bridge skeleton is formed.

LATHE DOG.—Lorenzo P. Whiting, of Poughkeepsie, N. Y.—The object of this invention is to provide convenient means for holding bolts which it is necessary to turn, as in steam engine work, locomotives, and other nice pieces of machinery; and it consists in an adjustable dog in which each jaw is acted upon by a separate rib or scroll, and the ribs are placed at an angle which moves the jaws very quickly and saves time. The scroll plate is held to its place by the center plate, which is fastened to a stationary plate. The scroll plate is rabbeted for the center plate. By means of screws the dog is attached to the face-plate of the lathe, and by suitable means it may be adjusted to any distance from the face or side of the face plate, according to the length of the center in the lathe spindle. An orifice is provided through the plate, through which the center passes, and is allowed to come in contact with the bolt head with the point or center of the lathe.

[OFFICIAL.]

Index of Inventions

For which Letters Patent of the United States were granted.

FOR THE WEEK ENDING NOVEMBER 19, 1872, AND EACH BEARING THAT DATE.

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On an application for Design (seven years)	$15
On an application for Design (fourteen years)	$30

Alloy for hardening iron, Macker and Marston	133,237
Amalgamation, preparing ores for, A. B. Paul	133,172
Animal matter, treating, Sillar and Rawson	133,125
Augers, finishing the lips and points of, W. P. Maxson	133,238
Barrels, forcing beer from, J. Devlin	133,084
Basket handle, metallic, O. A. North	133,168
Bath tub, portable, G. Wheeler	133,276
Bed bottom, W. Graham	133,093
Bed bottom, Frankfoder and McGeorge	133,090
Bed, folding box, A. G. Bayles	133,137
Bee hive, J. G. Staunton	133,128
Bell, door, A. L. Swan	133,259
Bessemer plant, A. L. Rothman	133,258
Boiler, agricultural, Haviland, Cronk and Antisdel	133,097
Boiler and furnace, steam, G. W. Lascell	133,161
Boiler feed regulator, steam, R. Berryman	133,189
Bolt machine, A. A. Wilder	133,135
Boot, gaiter, C. Hersome	133,245
Boot and gaiter fronts, machine for fitting, T. Lincoln	133,106
Boot and shoe soles, wire for riveting, H. H. Bigelow	133,191
Boot and shoe stiffenings, machine for crimping, N. J. Simonds	133,262
Bottle lock, J. Dugan, (reissue)	5,151
Bottle packer, R. T. Penick	133,173
Bottle filling apparatus, C. A. Gregory	133,094
Bracelet, W. Edge	133,146
Brick machine, H. B. Ramsey	133,175
Brick kiln, R. A. Smith	133,127
Bridge shoe, truss, M. Lassig	133,232
Brine, apparatus for evaporating, J. McGrew	133,239
Brush, painter's striping, P. Feeck	133,088
Burial case, C. C. W. Morgan	133,166
Butter tub, H. Holt	133,236
Button, S. B. Lane	133,160
Button, lacing, D. Heaton	133,223
Buttons, etc., to fabrics, attaching, H. B. Walbridge	133,273
Calculating machine, E. D. Barbour	133,188
Car coupling, M. Disney	133,085
Car coupling, D. Walter	133,181
Car coupling, J, W. Radebaugh	133,252
Car coupling, D. Sutherland	133,238
Car seat, J. F. D. Hollings	133,102
Car roof, J. Garry, (reissue)	5,147
Car spring, railway, T. F. Allyn	133,074
Car starter, S. H. Kenney	133,157
Car starter, D. W. Garst	133,213
Car starter, W. E. Snediker	133,265
Carriage, child's, F. H. Way	133,139
Chair, J. Lewis	133,233
Cider mill, H. L. Whitman	133,133
Cock, H. S. Ross	133,120
Cock, self acting basin, S. C. Wentworth	133,131
Column, wrought iron, C. S. Smith	133,263
Connecting rod, S. N. Wate, Jr	133,182
Cooking apparatus, portable, D. F. Jauss	133,155
Corn sheller, J. Hutchison	133,228
Corn stalks, cutting and pulverizing, W. M. Taylor	133,270
Corset, S. A. Dake	133,209
Cotton gin, R. McKenna, (reissue)	5,148
Cotton gin, J. M. Clough	133,080
Cradle, crib, and standing stool combined, C. E. Nurse	133,169
Desk, adjustable, E. Dummer	133,087
Doors and gates, device for closing, Griffin and Harrod	133,221
Dovetailing machine, J Dill	133,145
Drawers, J. Bellamy	133,138
Drawing knife, J. C. Smead	133,126
Eave trough, J. R. Baker	133,186
Eggs, pan for poaching, M. M. Crutchfield	133,205
Engine, reciprocating, J. Scott	133,260
Engine, rotary, T. S. La France	133,159
Envelopes, machine for feeding, E. Allen	133,184
Fan, rocking chair, O. Matzke	133,164
Fence, H. McMullin	133,165
Fence, portable, D. K. Peterson	133,116
Fire plug and lamp post, combined, D. Z. and J. H. Johns	133,230
Floor cloth from straw board, manufacture of, F. N. Davis	133,210
Fluting iron, S. D. Hubbard	133,104
Fruit cans, implement for opening, A. McClanahan	133,108
Furnace, hot air, W. H. Harris	133,096
Furnace and kettle, portable, Lapaire and Jacquot	133,231
Furnace for using the waste heat under boilers, metallurgic, G. Nimmo	133,124
Gas, manufacture of, A. N. Wilkinson. (reissue)	5,149
Glass furnace, H. R. DeMonthureux	133,083
Glass, etc., cutting and polishing, J. P. and C. Colné	133,204
Governor, steam engine, H. Bilgram	133,192
Granary, C. T. Moorman	133,244
Harness traces, cock eye and button hole for, P. Philippi	133,117
Harrow, A. B. Depeny	133,212
Harvester, corn, J. Bowers	133,141
Harvester reel rake, C. Young	133,285
Hoe, weeding, J. G. Harriman	133,151
Hoisting apparatus, hydraulic, J. R. Ritter	133,256, 133,257
Hops, apparatus for curing, N. E. Hinds	133,152
Horseshoe, B. P. Hutchinson	133,105
Hose, vulcanized India rubber, D. C. Gately	133,219
Ice cream freezer, A. L. Platt	133,251
India ink slab, J. Speyer	133,178
Ink, indelible, E. W. Briggs	133,197
Inlaying metals with rubber, B. L. Rowley	133,259
Iron, steel, etc., manufacture of, A. T. Hay	133,098
Iron and steel direct from the ore, process and furnace for making gas and, T. J. Chubb	133,202
Ironing table, B. Schoonmaker	133,122
Journals, bearings, etc., graphitized material for, A. Hitchcock	133,101
Key way gage, J. Donaldson	133,086
Knitting machine, H. A. House	133,103
Lamp, W. M. Marshall	133,107
Lamp, J. S. Fish, (reissue)	5,146
Lamp, carbureting, J. W. Post	133,118
Lantern, advertising, S. Kuh	133,158
Lathe, chuck, F. Tully	133,272
Lathe for turning regular forms, J. Moessinger	133,241
Leather, pattern for channeling, S. Glocher	133,149
Logs, machine for turning, G. W. Baker	133,185
Looms for weaving irregular fabrics, take up mechanism for, H. Carstaedt (reissue)	5,150
Lubricator, W. T. Garratt	133,217
Lunch box, W. H. Van Allen	133,129
Masonic emblems, apparatus for display of, Lyon and Rand	133,236
Medical compound, A. B. Dorman	133,213
Middling separator, J. G. Birely	133,193
Mitten, J. L. Whitten	133,183
Mosquito net frame, W. M. White	133,279
Music stand clamp, I. H. K. Downes	133,214
Nail making machine, Miles and Lawrence, (reissue)	5,152, 5,153
Nozzle for hose pipes, hydrants, etc., I. O. Endicott	133,215
Nut lock, T. E. Rhine	133,253
Oil can, transportation, J. C. Moore	133,242
Oil tank, incased, Shea and Campbell	133,123
Ordnance, cartridge extractor for, N. Thompson	133,271
Ore crusher, G. Mitchell	133,111
Ores, reduction of, A. T. Hay	133,099
Organ, reed, B. E. Riggs	133,255
Oyster opener, J. H. Starin, Jr	133,267
Paddle wheel, G. W. Tinsley	133,179
Pump, J. W. Whitaker	133,278
Pyroxyline, manufacturing, I. S. and J. W. Hyatt	133,229
Pail, dinner, A. Nevin	133,113
Paint restoring compound, W. O. Bradstreet	133,195
Paint, etc., metal can for, G. H. Chinnock	133,203
Painter's striping brush, P. Feeck	133,089
Painter's striping implement, Lyndon and Halsey	133,163
Paper pulp, machine for grinding wood for, J. G. Moore	133,243
Pipe tongs, A. Gomersall	133,092
Plane, bench, J. Lehner	133,162
Planter, corn, N. Mendenhall	133,109
Planter, corn, J. Campbell	133,199
Plow, S. C. Baughn	133,187
Plow, gang, M. S. Curtiss	133,206
Plow, subsoil, Myers and Gummow	133,16
Plow, subsoil, S. E. Fletcher	133,21
Printing press, J. M. Jones	133,156
Pruning shears, P. M. Gilbert	133,220
Pulleys to shafts, securing, D. K. Overhiser	133,246
Pump, H. Spear	133,266