we have no recollection—we presume it was simply an attempt to introduce air in the water of a boiler, to which much importance has been attached in this country by some. We do not share in the belief of its necessity, but, if required, there are but few feed pumps which do not occasionally force air, without water, into the boiler; and all water forced in ordinarily contains more or less air.

Steam, as defined by Webster, is the "vapor of water; or the elastic aëriform fluid generated by heating water to the boiling point." Thus, steam is not "water expanded by heat," and that is why the whole body of water does not "expand and fill the boiler." It is not the water that expands but the elastic fluid known as steam, two of the qualities of which are dryness and invisibility. It does increase the "pressure of steam to superheat it." Regnault says that steam, at 100 lbs. pressure, which may be considered "dry steam," as usually understood, has a temperature of 338°, but at 230 lbs. pressure it's temperature is 398°+. For further particulars regarding steam we refer you to any of the text books.

Making steam, or rather generating steam from water, is a purely mechanical process. The evaporation of water by the sun's rays or any other cause is making steam as much as is the application of heat to water in a boiler under pressure. In the one case its elasticity or pressure is no greater than that of the atmosphere, while in the other case, by confinement, it may be many times more.—Eds.

"Greasy Mechanics."

Messrs. Editors:—Your article headed as above will meet the approbation and awaken the sympathy of the class whose claims it advocates. There may be many persons who believe that the profession of the mechanic and his labors are inferior in value to those of others in different departments of human labor; but does it occur to these that without the aid of the mechanic, as such, the world would now be at least three hundred years behind in civilization?

Where would have been the steam engine without a Watt? Where would have been spinning machinery without an Arkwright? Where would be the transportation on our rivers, lakes, and oceans without a Fulton? Where the vast agricultural interest in the production of cotton without a Whitney? How should we cross a continent in six or seven days without a Stephenson? How should we converse with our friends across the Atlantic without a Morse? Yet these men were all mechanics!

Who will deny the blessing within the reach of every family introduced by Elias Howe? We know that he was a mechanic working for nine dollars a week during the day time and toiling nights in his attic to bring out the conception of his brain, the sewing machine, which to-day blesses the whole civilized world.

And allow me here to say, that of all the almost infinite variety of these, not one successful one that does not combine his ideas, thereby paying tribute to his genius.

The works of our mechanics, the services they have rendered to civilization, to Christianity, to liberty, to the amelioration of the condition of mankind, are their monument—their eulogy. Mechanical Engineer.

New York city.

Something About Hemp.

The comparative value of different sorts of hemp, as it regards durability, is easily and speedily tested by any one, since nearly all kinds are very short-lived when exposed to causes favorable to decay. The Manilla will last some four or five months, as used in the summer season upon our steamboats. The Sisal, which is often sold under the name of the former, will not last more than half as long. The Russian hemp, when kept moist and warm, will lose its strength in about three weeks; the American water-rotted in two weeks, and the dew rotted in from five to ten days. Different experiments, however, exhibit different results in respect to the durability and strength of the various kinds of hemp.

In Russia, hemp is assorted, according to its quality, into clean hemp or firsts, out-shot hemp or seconds, half-clean hemp or thirds, and hemp codilla. Of the first three sorts an immense amount is annually brought from the interior beyond Moscow, its quality very much depending on the region in which it is produced. That brought from Karatshev is the best; next to this, that produced in Beteo; hemp from Yshatsk is considered inferior to the latter. As soon as the hemp is brought down in the spring, or in the course of the summer, it is selected and made up in bundles with great impartiality and exactness. A bundle of clean hemp weighs from fifty-five to sixty five poods; a bundle of the out-short, forty-eight to fifty-five; and a bundle of half clean, forty to forty-five—one pood being equivalent to thirty-six pounds. The external marks of good hemp are, its being of an equal, green color, and free from spills; but its good quality is proved by the strength of the fiber, which should be fine, thin, and long. The first sort is quite clean, and free from spills; the out-short is less so; and the half-clean contains a still greater portion of spills, and is, moreover, of mixed qualities and colors. The part separated, or picked out in cleaning hemp, is called hemp codilla, and is generally made up in quite small bundles.—*Commercial Bulletin.*

Twenty years ago, Grace Church, opposite Eleventh street was placed a short distance above the fashionable quarter of New York. Now it is so far down town and business presses upon it so closely that the society propose to sell out and remove further up town. The ground is valued at $600,000. The old New York Hospital between Duane and Worth sts, one of the ancient landmarks of the city proposes to move away from its present valuable site. We have heard the ground estimated to be worth as high as four million dollars.

Manufacturing, Mining, and Railroad Items.

Carbonate of lead has been discovered in St. Francois county, Mo.

The new cotton mill at Suncook, N. H., will be, it is said, the largest building in the State.

A lumber mill at Portsmouth, Mich., recently cut 130,352 feet of lumber in ten hours and forty minutes.

A mill for manufacturing wrapping paper, and eventually print stock, will soon be erected in Nebraska city.

A bismuth mine has been opened in Wayne county, Mo., that aside from its value in bismuth is rich in silver.

The Shawmut Oil Company, at East Boston, runs fifteen stills, having an aggregate capacity of five hundred barrels of oil per week.

A company has been formed in London for the manufacture of beet root sugar on a large scale. This business is growing rapidly.

The Iron Mountain, in Dent county, Mo., is to be examined by Pennsylvania iron men with a view to making pig iron.

The largest vinegar manufactory in the country is said to be at Detroit, Mich. Its capacity is five hundred barrels per week.

An English company have after overcoming almost insurmountable difficulties established extensive iron works at Zimapan, in Mexico.

The Rhode Island Locomotive Works are turning out locomotives at the rate of five per month. The capacity of these works is soon to be doubled.

The Trenton Iron Works at Trenton, N. J., have been purchased by the Erie Railroad Company and are to be removed to some place on the line of the road.

A copper kettle of 1,540 gallons capacity, has just been put into a brewery at Zanesville, Ohio. The bottom of the kettle is a solid piece of copper weighing 875 pounds.

The locomotive business seems to be lively. A firm in Boston has just been obliged to decline an order for $200,000 worth.

A new artillery locomotive has been invented, armed with two pieces of artillery, and intended to perform scouting duty on the banks of the Rhine.

The Emperor of China has opened the port Chifau, on the Gulf of Pechele to foreign trade.

A new deep sea submarine telegraph direct from Malta to Alexandria Egypt, was successfully completed on the 2d inst.

The Pennsylvania Central Railroad has reduced its freight charges to all points in the West, to correspond with those of the New York roads.

Considerable excitement prevails at Laramie over new gold discoveries forty miles west of that place, said to be richer than any that have been made in that section.

Chemical manufacturing, though quite in its infancy on the Pacific coast, is already entered upon by competing firms which display considerable energy within the limited field opened to them by the demands of the market.

Some of the copper ores from the Planet mine in Arizona embracing carbonates, sulphates, silicates, the red oxide, and native copper, are said to assay from 50 to 60 per cent of copper.

There are thirty-two manufacturing establishments in North and South Adams, Mass., having an aggregate capital of ten millions of dollars, and employing from 3,000 to 4,000 hands.

Great excitement is reported in the western portion of Idaho concerning the discovery of gold in the Cœur d'Alene Mountains. The road is crowded with miners from Beartown to the new diggings. The precise location of the mines has not been announced.

The Winnemucca *Argent* says: "At no time in the history of Humboldt mining has there been more well-directed labor put upon mines, and in no instance that we know of is it being done for other than purposes of permanent development."

Hartford will soon vote on subscribing $500,000 for each of the two railroad enterprises now being agitated—the Valley Railroad and the Connecticut Western. It is thought by its leading men that the vote will pass in favor of the roads.

One of the great railway companies of England is about to defend itself against several suits for damages, for having set fire to the crops along its route by sparks from locomotives. It disputes its liability in such cases. Other lines which have suits pending are awaiting the result with great interest.

The principal seat of the saddle tree manufacture in this country is St. Louis. There are ten firms engaged in the business in that city. Hackberry and sycamore are the principal woods used, and the aggregate value of the product foots up from $200,000 to $300,000 annually.

The *Industrial American* says that buckwheat has been made use of in dyeing wool. An infusion made from the succulent stems and blossoms, with the addition of a preparation of bismuth or tin, produces a beautiful brown color. From the dried flowers are obtained different shades of green. The Siberian buckwheat yields a fine yellow which, when the wool is still further boiled in the dye, changes into a golden tint and at length becomes a beautiful yellow.

Recent American and Foreign Patents.

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

Rail Joint or Coupling.—E. G. Patterson, Pithole City, Pa.—This invention has for its object to furnish an improved coupling or joint for the rails of railroad tracks, which shall be so constructed as to securely connect the ends of the rails to each other without weakening the said rails by the formation of bolt holes, and in such a manner that the said ends may receive a steady straining support.

Governor for Water Wheels.—James P. Sibley and Arthur Walsh, Bennington, Vt.—This invention relates to a new and useful improvement in governors designed more especially to be applied to water wheels.

Brake for Sewing Machines.—James S. Fowler, Racine, Wis.—This invention has for its object to furnish an improved brake, designed especially for attachment to the Wheeler & Wilson sewing machines, but equally applicable to other machines, which shall be so constructed and arranged as to prevent the machine, when being started, from running backward and thus breaking the thread, and which shall at the same time be simple in construction, effective in operation, and easily applied to any machine.

Car Coupling.—H. C. Glasgow, Cleveland, Ohio.—This invention relates to a new car coupling which is so arranged that it can be easily and cheaply made and kept in order, and also to a new manner of constructing and arranging the flooring of the car between which the coupling devices are held.

Machine for Scouring and Cleaning Sheet Metal.—Horace B. Wooster, Waterbury, Conn.—The object of this invention is to clean or scour sheet brass and other similar metal after annealing, either before or after it is finished, without the use of sand or other similar material, and it consists in a novel arrangement and combination of circular wire brushes, movable riders, and a rotating winding-up cylinder.

Children's Carriage.—Francis Boylston, New York city.—This invention relates to a new manner of hanging the front axles of that class of children's carriages which are known under the denomination of "perambulators," and consists in fastening the front ends of the sills to nuts that are screwed to the ends of the axle, said nuts also forming flanges to keep the hubs of the wheels on the axle. By detaching the nuts from the sills, they are free to turn, and can then be taken off the axle, to allow the removal of the wheels. In this manner a very simple and efficient device is provided for retaining the wheels on the axle and for holding the axle on the frame of the carriage.

Apparatus for Lifting and Transporting Sugar Pans.—Andrew J. Weed, Hardwick, Vt.—This invention has for its object to furnish a simple and convenient apparatus for raising and removing the pans from the furnace in sugar houses, which shall be so constructed and arranged that the pans may be removed from the furnace easily and promptly when required, and which shall at the same time be wholly out of the way when not in use.

Cultivator.—D. S. Early, Hummelstown, Pa.—The object of this invention is to improve the cultivator by making it neater and simpler in construction than adjustable cultivators have been made heretofore, and by providing it with novel devices for adjusting the plows, and controlling the depth to which they will run in the ground.

Grain Drill.—M. F. Lowth and T. J. Howe, Owatonna, Minn.—This invention has for its object to provide a simple, cheap, and durable apparatus for regulating the feed of grain drills, so that they can be adjusted to feed one, two, three, four, etc., bushels to the acre, and so constructed and operating that the device can be perfectly regulated, and when necessary its parts can be taken apart and put together again without difficulty, in the field or elsewhere.

Apparatus for Treating Milk.—Joel A. Otis and Thomas Barber, Watertown, N. Y.—This invention is a simple and cheap device for warming milk in the process of manufacturing cheese, and consists in a furnace, boiler, and milk tank, so constructed, arranged, and operating that the heat is applied uniformly at all parts of the tank where it is required, and in such a manner as to utilize all the heat and warm the milk rapidly without scorching or injuring it in any degree.

Steam Generator.—C. F. Trill, Baltimore, Md.—This invention has for its object the construction of a strong and durable steam generator, to be heated by petroleum or other liquid or gaseous fuel.

Horse Hay Rake.—G. M. L. McMillen, Dayton, Ohio.—The object of this invention is to improve the manner of fastening the wire teeth of horse hay rakes to the axle, and of arranging the spring bar and the springs and guides that operate in connection with the rake teeth.

Tea Tray.—S. N. Trump, Baltimore, Md.—This invention consists in making the body of the tray of wood, either in a single piece or in panels, and in extending a metallic rail nearly around its upper edge, the same being supported by short posts or standards, and the whole resting on suitable legs.

Spike.—R. K. Walton, Clarington, Ohio.—The object of this invention is so to construct a spike, for railroad purposes or for common use in spiking planks to timbers, or in spiking timbers together, for ship building or other purposes, that the spike can be firmly imbedded in the wood, so that it cannot be withdrawn or even moved or started in its bed, by any vibration of the wood or of the spike, or by any extracting instrument which will not tear away or remove the wood itself.

Sash Fastening.—William Brown, Duncannon, Pa.—In this invention a single fastening is employed to lock both sashes in any required position. The device is simple, cheap, easily operated, and not liable to get out of order.

Car Coupling.—A. J. Elder, Kansas City, Mo.—This invention has for its object, in addition to the connecting of cars, their uncoupling in a certain and efficient manner, in case one or more of the carriages of a train be thrown from the track, in order that the displaced car may not drag the others after it.

Plow.—S. T. Denise, Redbank, N. Y.—This invention is an improvement in the construction of the coulters, standards, and braces of a plow, whereby the instrument can be made more simple, strong, and durable, and at less expense than heretofore. The plow is, at the same time, so formed that it will not clog, but will clear itself.

Ice Preserver.—Julia W. D. Patten, New York city.—The object of this invention is to provide a neat and cheap receptacle, which will protect ice, food, medicines, etc., from the action of the air, and having its walls made of a substance, herein described, which is a remarkable non-conductor of heat will maintain around the inclosed contents of the receptacle a uniform temperature thereby preventing the melting of the ice and the decomposition of the food, medicines, chemicals, or other article to be preserved.

Butt Hinge.—H. Hockemeyer, Toledo, Ohio.—This invention relates to an improvement in the construction of hinges or butts for hanging doors, and for other purpose.

Drawing and Writing Slate.—F. Melville, New York city.—This invention relates to a new and improved mode of applying a writing or drawing copy to a slate.

Rotary Engine.—Elim Osborn, Economy, Ind.—This invention relates to an improved method of applying steam to a rotating wheel for driving machinery, and for all other purposes for which steam engines are used.

Stave Machine.—James Holmes, Belfast, Maine.—This invention relates to a new and improved machine for sawing staves; and it consists in a novel means employed for operating the bolt carriage, whereby the bolt is automatically fed to the saw, and rigged back from the same, and the bolt also set to the saw, at the termination of the rigging back movement.

Adjustable Ventilating Apparatus.—Jethro Peckham, and John Peckham, Middletown, R. I.—This invention consists in supporting the wedge cover upon vertically adjustable supports, and combining therewith a wind lass for raising or lowering it to open or close the ventilating passage through the wedge.

Reversible Barber's Chair.—Albert Gerdes, and Julius Reiche, New York city.—The present invention relates to a new and useful improvement in barbers' chairs which are so constructed that, by a single movement, the seat, back, and head rest, may be removed, simultaneously. The object in reversing the seat, back, and head rest, is for the purpose of giving each new comer a cool seat, and by thus reversing the parts it will prevent dust and dirt from collecting around the edges, as well as airing the parts at the same time.

Pattern Chart for Cutting Shirts.—James H. Myers, New York city.—The object of this invention is to produce a set of diagrams for men's shirts, which one set will be sufficient for cutting shirts of all sizes for persons of various forms. The invention consists in so forming the diagrams for the various parts of the shirt that those edges which will be changed for persons of different size, will be graduated and numbered, so that when the requisite measurement is known, the necessary line can at once be pointed out.

Folding Chair.—Chas. C. Schmitt, and Rudolph Wodrich, N. Y. city.—The object of this invention is to construct a chair of ordinary or suitable form, in such manner that it can be readily folded together to occupy but little room. This is important, not only for transporting chairs, but also for crowded rooms in which chairs when used can be easily folded into a small compass. The invention consists in pivoting the legs of the chair to the seat of the same, and in connecting their respective braces in such manner that the desired result is obtained, and that the chair, when in use, is entirely firm and reliable.

Slat Matting.—William Barton, Troy, N. Y.—This invention consists in such an arrangement of the cords or strings, by which the various slats are connected into an elastic matting that by winding the string around itself or by tying knots unto the same, the buttons or washers for holding the slats the requisite distances apart, may be dispensed with, the said knobs or windings being the substitutes for the said buttons or washers.

Folding Easy Chair.—Charles C. Schmitt and Rudolph Wodrich, New York city.—The object of this invention is to produce an easy chair, which is so arranged that its seat can be adjusted higher or lower, and locked in any desired position, and that its back can be set, more or less inclined, and taken at any desired angle of inclination.

Feeder and Cooler.—John Nairn, Milton, Ind.—This invention consists of a vessel which is secured to the top of the ball of a running stone, and provided with two tubes extending downward near to the bed stone, with which the article to be ground is fed by a tube fixed to the mouth of the hopper, and extending near to the bottom of the said vessel when it is provided with arms which act as scrapers when the said vessel rotates by the action of the stone, to force the materials into the said tubes. The vessel is also provided with hollow curved arms for gathering and forcing air down through the feeder to facilitate the feeding, and to cool the stones.

Saw Set.—L. T. Smart, Ossipee, N. H.—This invention consists of a circular bed die fitted into a suitable die holder, so as to turn them on a ver-

tical axis, which is provided with a square socket in its central axis, and with four or any other suitable number of inclined facets on its upper end, varying in degree of angularity which serve as the bed on which the teeth are to be hammered to produce the required set, and a movable die provided with a central shank, which fits in the recess of the bed die, arranged in combination therewith, having a corresponding number of facets of various degress of angularity corresponding with those of the bed die, supported in a vertical position therein, and the facets maintained a short distance above those of the bed die by a suitable spring. The bed is provided with gages, whereby the saw may be presented so that the teeth may be suitably acted upon by the said dies when a blow is given to the head of the movable die.

IMPROVEMENT IN SPRING SEATS.—Charles B. Smith, Springfield, Ill.—This invention consists in forming the main portion of the bottom of the seat of thin strips of metal laid longitudinally and transversely, and riveted at the intersecting points, the end of which strips are provided with hooks, which hook into and are supported by loops projecting from double coiled springs secured to rods or bars connected to the base or frame of the seat.

IMPROVED CARRIAGE WHEEL.—John G. Buzzell, Lynn, Mass.—This invention relates to that class of wagon wheels, in which tight metallic spokes are used, and consists, first, in fastening the out ends of the spokes to springs inserted in the felly; second, in forming annular chambers around the hub for the reception of the inner ends of the spokes, and of the nuts, by which such inner ends are fastened; the chambers allowing the nuts and inner ends to play if the rim of the wheel should be somewhat contracted.

IMPROVED FILTERING AND VINEGAR APPARATUS.—Theodore Grundmann, Cleveland, Ohio.—This invention relates to a new apparatus for making vinegar from suitable fermented liquids, and consists, first, in substituting for the shavings generally employed braided straw, cotton, or hemp, strings, which are held suspended, and along which the liquid has to flow down in small streams.

IMPROVED TRUSS.—John Burnham, Batavia, Ill.—This invention relates to a new and useful improvement in trusses, and it consists in attaching the head lever to the band by means of a ball and socket joint.

IMPROVEMENTS IN NAIL MACHINES.—W. H. Battelle, Youngstown, Ohio.—The object of this invention is to provide an improved nail cutting machine, the improvements being in the arrangement of the nipper, and the means of actuating the method of securing the heading dies, and the arrangement of the feeling apparatus of a machine arranged to form a head alternately on each side.

SOLVENT AND DETERGENT PROCESS.—James G. Marshall, Leeds, Eng.—This invention relates to a new mode of combining the influences of high temperature and great pressure in solvent or resinous matters adhering to the fibres of various fibre yielding plants, or for cleaning fibrous material of animal origin, such as wool or silk, from some of the extraneous matters that may be adherent thereto. I effect these objects by enclosing the material fibres or fabric to be operated upon in a closed vessel or chamber of a shape and strength suited to resist the amount of internal pressure that is intended to be employed to force the solvent or divergent liquids through the fibres when the goods to be operated upon are arranged in the vessel.

LANTERN—G. W. Putnam, Boston, Mass.—This invention relates to a new and useful improvement in that class of lanterns which are designed to be more portable that the ordinary or original kind, and which are adjustable so as to be capable, when not in use, of being or arranged so that one part may be fitted within the other.

PADLOCK.—G. W. Dana, Racine, Wis.—This invention relates to a new and improved padlock and it consists in a peculiar construction of the same, whereby a very simple, economical, and secure lock of the class specified is obtained.

CAR COUPLING.—H. C. Glasgow, Cleveland, Ohio.—This invention relates to a new car coupling of that class in which the coupling box is made backward and forward movable; and its object is to so arrange the coupling box, its connections with the car body and the coupling pin, that the coupling link can be inserted from above or below, even if the cars to be joined should close together; to prevent the bending or breaking of the coupling pin, by the insertions into the box of a link on the opposite car; and to insure safety and convenience, by the construction of the devices which connect the coupling box with the car body.

MILK VAT.—John A. Edwards, Waterford, Pa.—This invention consists of a vat, whereon the milk is to be set, and in which water is used for governing the temperature of the water, and an agitator whereby the water is caused to circulate freely under the milk cans which are suspended in suitable numbers above the water of the vat or so that they come into contact with the water. The vat is provided with a gate to separate the part of the vat to which the heater is connected from the part which the water communicates with the pans when desired.

SKIRT SUPPORTER.—N. A. Vurgason, Brooklyn, N. Y.—The nature of this invention relates to the supporting of ladies' skirts whereby the weight of the latter is not required to be sustained by tieing the same tightly around the waist with strings or similar fastenings.

HORSE HAY RAKE.—Peter Prescott, Boonville, N. Y.—The object of this invention is to provide a horse hay rake which is conveniently operated, and which is almost if not entirely free from the objectionable downward pressure of the shafts upon the horse drawing the same. Other devices perfecting the whole render the rake of light draft and effective in operation.

HORSE POWER MACHINE.—B. H. Wilcox, Petroleum Center, Pa.—The object of this invention is to provide a simple and portable horse-power machine for the purpose of sawing logs on the spot where the tree is felled, and for other purposes where a simple and cheap machine is required for the transmission of horse-power. It consists in general terms of a cam table turned by a sweep; the cams of the table vibrating a roller lever as the table revolves. The lever is connected with the same or other mechanism by a rod.

CLAMP FOR CROSSED RODS OR TUBES.—James M. Moorehead, Brooklyn, N. Y.—The object of this invention is to provide a firm and easily adjusted clamp for the purpose of clamping the vertical and horizontal rods of engineering or other structures when each crosses each other at right angles and are sufficiently approximated at the line of their line of crossing to admit of being held in the same clamp. It is probably used more in the construction of iron railway cars where two vertical rods and a horizontal rod are clamped together at different points on the top and bottom of the car.

DOUGH MIXING MACHINE.—François Grenier, Beroserac, France.—The object of this invention is to construct a machine for mixing dough, in which the motions of the arms during manual operation are as nearly as possible imitated. The invention consists in arranging within an annular wooden vessel to which rotating motion is imparted, two sets of rapidly revolving stirrers or manipulators, of which one set constitutes the beaters, for agitating the dough, while the other is a set of spiral blades, which move the dough vertically, as is also done by hand during manual operation.

LINIMENT FOR RHEUMATISM.—A. M. Dennen, Folsom City, Cal.—The object of this inuention is to provide a medical compound which is an effective remedy in treating rheumatism by topical application.

WATER GAGE.—H. P. Stafford and H. H. Stafford, Decatur, Ill.—The object of this improvement in water gages is to indicate the hight of water in a steam boiler, so that the attendant can see by the position of a pointer on a graduated limb or index just where the solid water stands, though the water may be foaming to such an extent that this important knowledge cannot be arrived at by means of the ordinary gage cocks, or any other ordinary device heretofore used.

WASHING MACHINE.—John Stafford Kelly, New York city.—The object of this invention is to provide a simple and effective wasning machine. It consists of an oscillating drum or barrel provided with a lever handle or other convenient means of actuating it, and also a number of floating rubbers composed of a canvas sleeve containing a number of wooden balls arranged in a row, together with other devices contributing to the practical operation of the machine.

COMPOUND DOUBLETREE.—John Wykoff, Grant City, Mo.—The object of his invention is to obtain a more equable draft for the three animals and to operate advantageously in other respects. It consists of a double tongue or shafts within which the middle horse works, he being hitched to a single-tree, which is attached by a pair of chains, or the equivalent thereof, to the inner ends of double trees which overlap each other, and are provided at their outer ends with single trees for the outside horses. The double trees are pivoted to the tongues or shafts' or to a splinter bar affixed across the tongues or shafts.

SCREW PLATE.—John S. Dutton, Jaffrey, N. H.—The object of this invention is to provide a convenient means for cutting any number of screws of equal size with the ordinary screw plate. This is accomplished by means of a gage collar which is movable on the screw which closes the dies, and which is further provided with a set screw to affix it at any point on the said screw, and thus limit the movement of the screw in closing the dies. Suitable marks or indices are engraved on the collar and on the proximate reduced end of the screw plate against which the collar is in contact when the closing of the dies is stopped.

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 advertisemets at $1 00 a line, under the head of "Business and Personal."

☞ *All rererence to back numbers should be by volume and page.*

G. J. W. & Co, Pa.— We know of no glue which is used for uniting pressed horn. It is generally done by heating the horn while compressed.

H. G. B., of Ohio.—The Chapman patent for india-rubber blocks, for shaft couplings has we believe expired. The effort to obtain an extension was futile.

J. J. M., of Cal.—You had better send us a sketch and description of your improvement and we will examine. When you write dont fail to give us your full address.

C. C., of Oregon—We have mailed to your address one of our pamphlets about patents.

P. C. C., of Conn.—A licensee under a patent does not enjoy the right to surrender a patent for a reissue, but he is entitled to the same right under a reissue that he had under the old patent. You have confounded a reissue with an extension of a patent, which are very different proceedings.

P. H., of N. Y.—Judge Curtis decided in 1855, that one owner in common in a patent has as good a right to use and to license others to use the thing patented as the other owner in common has. This we believe covers the point of your inquiry.

E. P., of Ill.—The Tucker bronze is not properly speaking a bronze. It is iron finished so as to resemble bronze. We do not believe it excels other bronzes. The color does not permeate the mass, it is a surface finish.

J. C. M., of Ga.—Horns are marketable, and are employed in the arts for many purposes, which we have not space to specify. A letter addressed to T. Gilbert, dealer in horn, 248 Front street, N. Y. city, will will probably secure all the information you desire.

S. and C. B., of N. Y.—Any cheap varnish that will dry hard is good to fill up the grain of open woods, so as to get a good surface for varnishing. There is a patent filling used by coachmakers which has been highly spoken of but we do not know its composition.

J. McC., of N. J.—The trouble in your case is that it is hard to melt thin sheet copper by itself without oxidizing the metal, which renders it very brittle. We advise you to condense the copper into a solid mass as nearly as may be, before you attempt to melt it. Then cover it with powdered charcoal and cover the crucible tight before applying the heat.

A. M. L., of Minn.—Everything else being equal the increasing the size of the discharge pipe of a force pump will not increase the pressure upon the valves, or increase the power necessary to drive it. Neither will it make any difference whether you discharge into the tank at the bottom or the top. The measure of the force required will be in either case the weight of the water multiplied into the hight to which it is raised.

A. M., of N. Y.—Meerschaum, is a hydrated magnesian silicate, found in serpentine veins in various parts of Europe. The pipes are made by carving, or by pulverising the substance, forming a paste of it, molding, and drying. The Turks formerly made pipes by the latter process but we think the Germans were the first to carve pipes out of the native material.

G. H. C., of Iowa.—The best cement we know of for general use is made as follows:—Isinglass, 2 drachms; soak 24 hours in 2 ounces of pure water; boil it down half, add 1 ounce of rectified spirit, and while it is hot strain through linen. Next melt one drachm of mastic and ½ drachm of gum ammoniac in 1 ounce of rectified spirit; add the latter solution to the first and mix thoroughly. This may be used for joining almost any thing that is broken, but is too expensive to be used as a substitute for glue where the latter will do as well. In cementing, warm the edges of the articles to be joined, and spread the cement over as thinly as will cover the entire surface. Most people use too much.

W. W. T., of R. I—"In looking over your paper for rules for gearing up screw lathes, I find none for the old fashioned lathes with four gears. If there is such a rule perhaps some of the readers of the paper will furnish it. In our shop there is such a lathe and the only way to find the gears is to guess and then figure, and continue until we find the right number." What an "old fashioned lathe with four gears" is we do not know. Ordinary lathes with back gears, whether furnished with a screw or not, have four gears, but not for screw cutting particularly but for reducing speed. If our correspondent means that his lathe has a screw and a change of gears numbering only four, we should suppose that the highly exact method of "guessing and figuring" would not give a very great range of threads that might be cut. Three gears are usually sufficient to cut a screw; one on the live spindle, one on the leading screw, and one intermediate. The rule is so simple it would seem to be hard to go astray: Divide number of threads in proposed screw with the number in leading screw, and the quotient and 1 compared give the relation between the two gears required. Thus: leading screw, 4 threads to the inch; proposed screw to be cut, 12 threads; 12 divided by 4 equals 3. Or, assume a number for a multiplicand, using the number of threads as multiplier; thus: assume 6; then 6 multiplied by 4 equal to 24 which is one gear. 6 multiplied by 12 equals 72 which is the other. In either case the relation of the teeth of the gears is as 3 to 1. Of course the intermediate gear may be of any size so it connects the two; as the rule is "a tooth for a tooth."

J. P. W., of Mass.—Hair cloth is made in this country. The warp is either cotton or silk, and the filling hair from horses' tails. The width of the cloth is governed by the length of the hairs, they being assorted for that purpose.

H. & Co., of Pa.—We can recommend nothing as equal to the hair felting, now extensively used, as a "covering for steam pipes to prevent condensation." As a non-conductor it is as nearly perfect as any material or method with which engineers are acquainted.

P. McK., of N. J.—Your acknowledgment that the force of the blow of your favorite, the trip hammer, depends largely on a spring admits our position and confirms the statements we made on page 195 current volume.

C. W. T., of S. C., is an apprentice in the Phœnix Iron Works, Charleston, and asks what he should do to become a first class engineer (probably mechanical); and why there is no power gained by the use of the lever We are always willing to reply to requests from apprentices for information, although we must repeat our instructions not unfrequently. To become a first class *anything* requires attention to the details of the business, a practical acquaintance with it, a knowledge of its principles—the why and wherefore—and untiring perseverance. All these the apprentice can acquire and do. Get a school book on natural philosophy and it will answer your second question and aid you greatly in your business.

T. W. H., of N. Y.—"If two boilers connecting by tube and stopcock, one containing atmospheric air and the other steam and water, are heated so that each one shows a heat of 200° Celsius, the one containing the atmospheric air heated, however, with valves opened for the escape of air so that *no pressure* is generated. If then at 200° Celsius the valves are closed and the stopcock is opened what will be the temperature, density, and pressure per square inch of the mixture, and what proportion of the whole space, will be occupied by the steam and what by the air, supposing the water contained in the one boiler at the time of opening the stopcock to have occupied one tenth of the whole space? What will be the effect of opening the stopcock upon this water, no loss or gain of heat to be supposed by exterior causes?" Air can be expanded seven volumes by heat, but if the reservoir of air in this case is left open until 200° Celsius or 390° Fah. is reached, there will be very little air left in to resist the steam in the other boiler when the communication between the two is opened—the air may as well be left out of consideration. The 390° Fah. in the steam boiler will give a pressure of 210 lbs. per square inch.

J. T. G., of Mich.—"I have a tubular boiler 60 inches by 12 feet, with 90 3-inch tubes and very large steam dome. The boiler foams considerably, and I would like to know the best way to stop it. The engine is low pressure, cylinder 22 by 24 inches, 72 strokes per minute, working at 45 lbs. pressure. What sized holes shall I put in a plate to be placed in the steam dome?" If the boiler is upright, place in the dome a capped cone of sheet metal (in form like a thimble) perforated with holes of from one eighth to one quarter inch, sufficient in number to have their combined area equal one third the area of the steam pipe that supplies the cylinder. Let this capped cone, or cylinder be small enough to have its walls at least an inch from the inner walls of the dome. If the boiler is horizontal introduce a plank of wood through the manhole and hold it by wires under the dome allowing it to float on the water surface at the low water level. Either of these will prevent foaming; but we think the boiler is insufficient for the engine if its full power is developed, and this would cause the foaming, as the rapid taking off of steam would mechanically lift the water and cause foaming.

Business and Personal.

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

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