that exerted by a column of blood seven and one half feet high. The pressure per square inch was estimated by Poiseuille as four pounds three ounces. Others have estimated the pressure as that of a column of water six feet in hight. The results vary in different experiments, but they are sufficiently accurate to give us an average that we may rely upon as within bounds. They are also something more than mere estimates, as this pressure has been measured by pressure gages inserted into the blood vessels.

We shall consider the pressure as that of a water column six feet in hight, the weight of which would be nearly forty-two ounces, which, for simplicity, we will consider forty-two ounces, or two pounds ten ounces avoirdupois.

The average discharge of the heart at each pulsation may be estimated at one and one half ounces, and its number of beats at seventy-five per minute; making an aggregate of 112 ounces, or seven pounds discharged per minute.

The average internal diameter of the aorta, or the first great artery through which the blood passes from the heart into the general circulation, may be taken as being in adults three quarters of an inch.

Seven pounds of blood per minute is therefore forced through this artery against a pressure of forty-two ounces, equivalent to raising seven pounds six feet each minute, equal to raising forty-two pounds one foot, or forty-two foot-pounds.

From the diameter of the aorta and the amount of blood forced through it we might compute the velocity of flow, but that is not essential to our purpose. All consideration of friction in the performance of this work is also omitted, so that the estimate of forty-two foot-pounds per minute must be considered as considerably less than the actual work performed, this result corresponding to what is called *useful work* in the performance of machines.

Forty years of this work would be equal to the work of twenty-six thousand seven hundred and fifty-seven horses for one minute of time, or the work of one horse for forty-four and one half days of ten hours.

The work of seven hundred and eighty-six adult hearts is equal to one-horse power; therefore seven hundred and eighty-six thousand hearts would perform the work of one thousand horses. The aggregate population of New York, Brooklyn, and Jersey City, was, according to the census of 1860, one million one hundred and twenty-two thousand, and it may be safely estimated now at one and one half millions. Considering this as equal to an adult population of twelve hundred thousand, their united heart-beats exert a power equal to that of one thousand five hundred and twenty-seven horses. Averaging the power of the united pulsations of adults and children as equal to that of four fifths the entire population, and taking the census of 1860 as a basis for calculation, the work done by all the human hearts in the United States nearly equals that of thirty-two thousand horses. The work done by the beating of all the human hearts on the globe is equivalent to the power of one million forty-six thousand and fifteen horses. The nominal horse power of the engines in the *Great Eastern* is four thousand; considering the actual horse power to be ten thousand, the power exerted by the united human heart-beat of the world is sufficient to propel a fleet of one hundred and four *Great Eastern's* at full speed continually. This power could only be generated in average steam engineering practice by the combustion of four thousand six hundred and eighty tuns of coal per hour.

When we reflect that the human family is small in comparison even with the great class of mammalia, of which it forms a part, and that many of the same class, as the whale, the elephant, the rhinoceros, hippopotamus, giraffe, etc., have hearts of very much greater size and power than the human heart; and when we conceive of the enormous additional work performed by the hearts of reptiles, birds, fishes, mollusks, and insects, and to this work add in imagination the power expended in the movement of the respiratory apparatus of animals, and voluntary muscular movement, necessary to obtain sustenance for these animals, we may gain some feeble conception of the enormous expenditure of mechanical power required to sustain animated existence on the earth.

## PROGRESS OF INVENTION IN THE SOUTHERN STATES.

One of the most noteworthy features of the revival of industry in the Southern States, is the apparent disposition on the part of the people in that section to render themselves as far as possible independent of other sections for their supply of utensils, machines, and other essentials to the conduct of their agricultural and manufacturing pursuits.

One of the most striking evidences of this fact is found in the increased numbers of original devices calculated to advance the progress of the various branches of industry peculiar to that large, fertile, and, soon to be, most flourishing region. And not only are the Southern inventions which come under our notice in the course of our business applicable to the wants of the South, but many of them will find a widely extended application throughout all sections of the country.

This is a most encouraging sign of future prosperity, and one which all lovers of our common country must rejoice to see.

In this connection it will be interesting to notice some of the more recent and prominent Southern inventions.

A Memphis paper states that George W. Grader, a citizen of that city, has taken the bull by the horns and invented a machine for ginning cotton and relinting cotton seed and cotton motes, which promises to revolutionize the whole system of cotton ginning in the country.

Taking cotton from the boll, Mr. Grader's machine leaves no motes, the falls comprising nothing but the dirt. It cleans the seed, making them more valuable for manufacturing purposes, and saves the planter a large per centage on his crop.

The Memphis paper pronounces this invention of Mr. Grader one of the most extraordinary of the present time.

Mr. Henry Thompson of Mobile, has invented, and obtained a patent on, a submarine telescopic lantern, an ingenious design admirably adapted to the purpose of examining objects at any depth under the surface of the water, as the bottoms of vessels, foundations of piers, giving light under the water, and taking photographs of any objects, even at the bottom of the sea. At the same time it is an invaluable aid in enabling submarine divers to see how to work in laying pier or other submarine foundations, wrecking vessels, and recovering the bodies of persons drowned or valuable articles hidden under the sea.

This instrument is of simple construction, similar to a pilot's sounding pole, sectional tubes joined together with reflectors, mirror, and light at one end, so artistically arranged as to reflect objects under the water to the eye of the observer above.

The same versatile inventor has taken out patents on a life, surf, business, and pleasure boat, and, according to the Mobile *Daily Tribune*, has invented one of the most graceful, rapid and safe three-wheeled velocipedes ever devised.

The Boden safety valve is another Southern invention. According to the Louisville *Courier Journal*, it has been submitted to the most satisfactory tests, and has come out triumphant. It consists of two valves, one of which opens on the inside of the boiler and the other on the outside. Thus it will be seen by any one at all acquainted with the workings of a steam boiler, that an over-pressure of steam will open the outside valve, and a suction or vacuum will open the inside one.

We are in receipt of numerous letters from Southern men, making inquiries in regard to projected improvements, which indicate that an active spirit of invention pervades the Southern mind.

Gen. G. T. Beauregard, of New Orleans, recently obtained letters patent through the Scientific American Patent Agency, for improvements in apparatus for propelling cars and other vehicles on land, and boats on canals or rivers, by means of overhead wire rope, operated by stationary engines or other power placed at intervals along the route.

His invention comprises novel and ingenious clamping devices and spring attachment for the same, attached to the car, for engaging and disengaging the propelling rope, in a manner to avoid shocks and jars to the cars or boats.

In a recent letter to us on the subject, he says: "Thanking you for your prompt attention in obtaining my patent, I would state that this improvement of mine is destined, I believe, to create a rapid increase in the number of street railways in and about cities, and of canals in the country, by materially diminishing their current or running expenses. Moreover, in northern latitudes, where, owing to the ice, canals remain idle part of the winter, they will be used in connection with the stationary engines and endless wire ropes of my system, as so many railways for properly constructed cars and boats. When these arrive at any locks they will be easily transferred from one level to the other by a lifting platform."

We are happy to chronicle these signs of growing prosperity among the Southern people.

## HOW SHOE-PEGS ARE MADE.

Shoe-pegs were invented in 1818, by Joseph Walker, of Hopkinton, Massachusetts. At least the invention is attributed to him, though the evidence upon which this opinion is based is not altogether satisfactory. A shoe-peg is a little affair, but its invention was by no means an unimportant event. It worked perhaps as great a revolution in a most important branch of industry as was ever effected by a single device. Before its introduction the soles of all boots and shoes were attached to the uppers by sewing; now, nearly ninety per cent of all the boots and shoes manufactured are pegged.

It has given birth also to numerous other important inventions; pegging awls of improved form, rasps for cutting off the parts of the pegs inside the boot, pegging machines, which will peg on a sole almost before one can think about it, machines for cutting, polishing, and bleaching pegs, etc., etc.

It is within the memory of the writer that shoe-pegs were made by hand. The timber from which they were made was sawed into blocks across the grain, of such a thickness as would, when the block was split into pegs, make them of the right length. Slabs, or bolts, thin as the body of the pegs wanted, were then split off by the use of a long thin knife and a hammer; the knife being used like the instrument called a "*frow*" by coopers and shingle makers. The bolt or slab was next beveled on both sides of one edge. The slab thus prepared was next split into pegs one by one.

Of course such a rude method as this was destined to be supplanted by a far more rapid and perfect one, and there is probably no article so well made and finished that is sold cheaper than the modern shoe-peg.

It is worthy of remark that the same principles are applied to their manufacture by the best modern machinery, as were adopted in the hand method.

The wood must be of some hard, close-grained variety, which splits easily. Hard maple and birch are the favorite woods for this purpose; birch, however, is, we believe, the shoe-peg timber *par excellence*.

The wood is cut into lengths of about eight feet, and is sold by the cord, at three or four times the price of the same kinds of timber cut into fire-wood. The logs are received at the factory in the green state, and are worked up as wanted.

The first operation is peeling off the bark, an adze being employed for this purpose. The logs are next sawed into blocks across the grain, a little thicker than the length of a peg. These blocks are placed on a planing machine and the side which is intended for the heads of the pegs is planed smooth.

The blocks are now ready to be grooved. This is done very rapidly by a machine in which a cutting tool reciprocates rapidly across the face of the block, the block being at proper intervals of time carried along by feed rollers. After the blocks have been grooved one way, they are again grooved at right angles to the first grooves, and both sets of grooves being V-shaped, the surfaces of the blocks on one side, now present a regular succession of quadrangular pyramids, which are the points of the yet embryo pegs.

The next operation is splitting, which is done on machines operating very rapidly and with great precision. The splitting knives on these machines are pivoted at one end, and the other end is made to play rapidly up and down, the motion being similar to that of a shears-blade for trimming sheet iron. The pivoted end may be raised or lowered so that the knife may only enter the wood as far as required, the object being to not split the pegs entirely apart, but to have them hang together at the heads. The blocks are fed to the splitting knives by fluted rollers, the flutes of which fit the grooves in the blocks made by the grooving machines. The blocks are fed in with the planed side downward, and the splitting knife at each stroke enters the wood at the bottom of the V-shaped grooves with great accuracy. Thus the splitting is done from the points towards the heads of the pegs. When the block has passed through the splitting machine once, it is turned and fed through again at right angles to the direction in which it was first fed through, and after this operation the pegs are very nearly split apart, but they still hang together somewhat like a bunch of split lucifer matches. The object of keeping them thus together is to enable them to be fed to the machines in a mass. After the second feeding the block is forcibly thrown off the table of the splitting machine on to the floor, and the pegs fall asunder. The pegs at this stage are of different colors, somewhat rough on their sides, unseasoned and dusty. They are therefore dried in a tumbler heated by steam pipes, bleached with sulphur fumes till they assume a uniform white color, run through a fanning mill to free them from dust, and finally packed for market.

The extent of this manufacture is much greater than would seem possible to most people. It would seem at first, that if all the people in the world were shoemakers, they must be overstocked with pegs. There are numerous factories in the Eastern States turning out from fifty to one hundred bushels and upward of shoe-pegs per day, and still the demand keeps up. Anything in universal demand even if individually the demand is small, must foot up large in the aggregate for the civilized world. The New England States manufacture the greater part of all the shoe-pegs used, Germany, we are informed, being one of the best customers.

### The Russian Exposition.

We notice that a resolution was unanimously adopted by the Louisville Convention requesting Ex-President Fillmore to appoint a delegation of six persons to attend the Russian Exposition in 1870, these Commissioners to take charge of all specimens that exhibitors in the United States may desire to send, and they are specially instructed to procure thousands of samples of cotton from various States.

The papers containing the report of this proceeding add that the suggestion came from Europe, and that a hundred thousand American specimens are asked for, to show the importance and the diversity of production in our country.

A letter from Baron Osten Sacken, Consulate General of Russia to the United States, published in another column, states that the Exposition is intended only for the display of Russian products. We invite attention to this letter. Before the Commissioners are appointed by the venerable Ex-President, it might be well to first find out if they are wanted.

### A Letter from Dr. Livingstone.

There can no longer be any reasonable doubt of the safety of Dr. Livingstone, and there can be no doubt either, that if his life is spared to narrate the incidents of his last great tour in Africa, it will prove a most remarkable narration. The extracts from a letter of Dr. Livingstone, sent by Dr. Kirk from Zanzibar to Sir Roderick Murchison, contain the following information:

"Dr. Livingstone had traced a chain of lakes, connected by rivers, from the tracts south of the Lake Tanganyika to south latitude 10 degrees to 12 degrees, and he conjectures that these numerous connected lakes and rivers are the ultimate southern sources of the Nile. When he wrote he was about to travel northwards to Ujiji, on the eastern shore of Lake Tanganyika, where he expected to find some information from home, of which he had been entirely deprived for two years, as well as to receive provisions and assistance."

OUR predictions in regard to the effect of high-heeled shoes upon female health have been verified. A French physician states that this fashion "has produced distinct diseases not only of the distorted foot, but of the body. As the frame is thrown permanently into an unnatural position, it affects the spine, and as it is a question of balancing, nervous irritation sometimes occurs. You see by the expression of the face how much a woman suffers who has walked about or even stood in high-heeled boots. Besides, we have accidents from falls very frequently."

### Tartaric and Citric Acids.

Tartaric acid, when pure, is in colorless, inodorous, very sour crystals. It is soluble in two parts of water, and also in alcohol. The watery solution has no smell, is perfectly limpid, and is very acid. The specific gravity is 1·59 and 1·75. Heated on a piece of metal over the flame of a lamp, it swells up, emits a very peculiar smell, and leaves a porous coal. The solution exposed to the air very soon mildews on the surface and turns to vinegar.

The composition of pure anhydrous tartaric acid is: Carbon, 36·49; hydrogen, 3·02; oxygen, 60·58 parts in one hundred, but the crystals always contain 11·84 per cent of water.

Tartaric acid is manufactured from cream of tartar (bitartrate of potassa), which latter, as we have stated in a previous article, contains 70·18 per cent of this acid. The mode of its preparation is fully described in all recent works on chemistry applied to the arts and manufactures.

It is frequently adulterated by admixtures of cream of tartar, bisulphate of potassa or lime. These are readily detected as follows;

1. The acid, if pure, dissolves without leaving the slightest sediment.

2. Alcohol must dissolve the whole of the crystals, leaving no undissolved portion.

3. After calcination, lime can be detected in the ash by its effervescing if a drop of any strong acid be allowed to fall on it.

4. Sulphureted hydrogen, sulphate of lime solution, or chloride of barium introduced into a solution of pure tartaric acid, will cause neither cloudiness, change of color, nor deposit.

The uses of tartaric acid are many, large quantities being annually consumed in the manufacture of lemonades, soda waters, and other sparkling drinks, where it replaces advantageously the more expensive "citric" acid. It is also much employed by calico dyers as a special mordant.

In conclusion we will only mention that tartaric acid combines with some other substances, forming what are called "tartrates" and "bi-tartrates," many of which are valuable in the arts or in the practice of medicine.

Tartaric acid itself, finds a place in the phamacopœia.

Citric acid is found in the juices of many plants, but in none is it more plentiful than in the fruit of the lemon and its allies.

In a pure state it forms transparent, scentless, rhombic crystals, which do not alter by exposure, and have a very acid flavor. The specific gravity is 1·617. It is soluble both in water and alcohol. Dry heat soon destroys it.

Citric acid is largely used in bleaching establishments and laundries for removing rust and ink stains, and by the dyer for intensifying many red colors. The best class of artificial lemonades and sparkling acidulated drinks and powders are made from it.

Accidental impurities are, sulphuric acid and salts of lead; they are not, however, of frequent occurrence.

The "trade" adulterations are with oxalic acid, tartaric acid, and occasionally sulphate of lime.

Tartaric acid and oxalic acid, from their low prices and somewhat similar aspect and flavor, are generally found mixed in proportions varying from 30 to 80 per cent with the commercial citric acid. For the detection of this adulteration, dissolve your sample in water and add gradually, stirring all the while, a solution of sulphate or carbonate of potash. If the citric acid be pure, no deposit whatever will show itself, but if it contain either tartaric or oxalic acids, a white crystalline precipitate of tartrate or oxalate of potash will fall to the bottom and tell the tale at once.

Citric acid is manufactured from the juice of lemons, limes, citrons, and other similar fruits. Lemon juice is frequently brought to market in barrels or in bottles from the warm countries where the tree prospers. It is used in its natural state for many domestic purposes, and also by the dyer in his profession.

Lemon juice must be carefully clarified, as by neglect of this operation it will be sure to undergo fermentation and to acquire a very unpleasant odor and disagreeable taste. It is often largely adulterated by the addition of water, besides which, vinegar, sour grape juice, citric acid, muriatic acid or tartaric acid, and sometimes several of these combined, are not unfrequently added to it.

The detection of these admixtures needs the practical science of the analytical chemist.—*New York Mercantile Journal.*

### Hyacinth Culture.

Many of our readers just now will be thinking of growing that beautiful winter flower, the hyacinth. A few hints given by a correspondent of the *Journal of Horticulture* may prevent failure, and consequent disappointment, in not a few cases. He says:

"I annually grow about eighteen hyacinths in glasses, and invariably place them all in water at the same time. I have tried different times in the hope of insuring a succession of bloom, but it has happened that those placed latest in the glass were among the first to bloom. I have also ceased to put the bulbs in the water so early as I used, and now do not think of putting them in till the middle or end of October. Fresh rain water is to be preferred, and the glass should be so filled that the water only just touches the base of the bulb. Rain water should not be employed unless it is quite fresh, or otherwise it soon becomes putrid, and causes the roots of the bulbs to decay. If there is no alternative but to employ hard water, if it can be exposed to the action of the sun or external air for a time, so much the better.

"My experience has taught me that hard water used directly after it is taken from the well is apt to cause the roots to become a mass of pulp, highly offensive, and fatal in its effects. Two or three lumps of charcoal placed in the glasses about two or three days before they are occupied by the bulbs, in order to allow of the charcoal becoming saturated and sinking to the bottom, will keep the water from turning rank, and prevent the necessity for its being often changed. Some of my best flowers have been in glasses, the water of which was not once changed. Place the glasses in a dark and rather cool situation until the roots have nearly reached the bottoms of the glasses, when they can be brought to the light.

"A month or six weeks' imprisonment will bring the roots to this stage of development. The most airy and lightest part of a sitting room, but as far from the fire as possible, is the best position for them. When the bulbs have been in the water about a week or ten days, the base of each should be examined, and any decaying or slimy substance removed. As the shoot of growth increases in size, evaporation will take place, therefore the water should be replenished at intervals, care being taken that what is supplied is not lower in temperature than that in the glass. The foliage of the plants should be kept scrupulously free from any dust or dirt; a small piece of sponge will remove this with but very slight trouble. When the flower spikes begin to show themselves the glasses should be kept filled to the rim with water, as at the point of flowering the bulbs absorb a great quantity of moisture."

### Monckhoven's New Artificial Light.

Dr. Desire van Monckhoven recently demonstrated satisfactorily its importance before a meeting of the Vienna Photographic Society, and delivered a lecture upon its mode of application.

One of the most intense lights to be obtained by oxidizing metals or metallic compounds at a high temperature, is that derived from chloride of titanium, or chloro-chromic acid, when exposed to the action of an oxy-hydrogen flame; the light thus produced is of high actinic power, and capable of blackening chloride of silver paper to an appreciable degree in thirty seconds, the formation of titanic acid or chromic acid being brought about at a very high temperature. It is this description of light that has been chosen by Dr. M.

Several kinds of oxy-hydrogen lights have been devised from time to time; the Drummond light, in which the flame acts against a cylinder of unslaked lime, but which requires the constant presence of carbonate of lime, and the surface of the cylinder to be continually changing; the Tessie du Motay light, in which the lime cylinder is replaced by means of a compressed magnesia or zirconia cylinder; and the Carlovaris light, consisting of small parallel pipes of hard charcoal moistened with chloride of magnesium. Of all these lights that of Drummond is the best, and by substituting for the lime cylinder another composed of titanic acid, magnesia, and carbonate of magnesia, a suitable illuminating power is obtained. A cylinder of this description, measuring three centimeters (1 inch) broad and nine long (3 inches) lasts for three hours, and may be produced for the sum of threepence. Instead of hydrogen, ordinary coal gas is employed; and for the supply of oxygen, M. Deville's method of obtaining it by heating a mixture of calcined peroxide of manganese and chlorate of potash is employed.

### Hoosac Tunnel.

The new railroad bridge across the Deerfield river, at the east end of the Hoosac Tunnel, has been completed, and the rock from the tunnel is now deposited on the other side of the river. The work at the west end of the tunnel progresses rapidly. Last week forty-three feet were completed, being twenty feet more than during any week under the State management. Messrs. Shanly & Co., are the contractors. The Burleigh drills are used exclusively at this tunnel, but with compressed air as the motor. The air is condensed three atmospheres, by means of Burleigh's air compressors, operated by steam power, and the condensed air is carried nearly two miles in an iron pipe before it operates upon the drills. The air which exhausts from the drills gives perfect ventilation within the tunnel.

The progress made at the Hoosac Tunnel is nearly one third greater than at Mont Cenis, notwithstanding the supposed superior and the costly nature of the French machinery

THE FIRST MAN WHO HAD CHARGE OF A LOCOMOTIVE IN THE UNITED STATES, turns out to be, not Nicholas Darrell, as stated on page 326, current volume, in an article copied from the *Rural Carolinian*, but John Degnon, 48 First street, New York. We had the pleasure of a call from Mr. Degnon a few days since, and he explained to us that he was the man who took charge of the *Best Friend* on its way to Charleston, and that he ran this locomotive three months or thereabouts, meanwhile giving Mr. Darrell the necessary instructions to qualify him for the post. The following year he executed a similar commission with a second locomotive. In proof of his statement, Mr. Degnon referred us to Horatio Allen, and other prominent engineers and manufacturers of this city. "Honor to whom honor is due."

GERMAN TINDER.—Amadou, punk, or German tinder, is made from a kind of fungus or mushroom, that grows on the trunks of old oaks, ashes, beeches, etc. It should be gathered in August, or September, and is prepared by removing the outer bark with a knife, and separating carefully the spongy, yellowish mass that lies within it. This is cut into slices, and beaten with a mallet to soften it, till it can easily be pulled asunder between the fingers. It is then boiled in a strong solution of saltpeter.

## 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 correspondents by mail.*

*SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal."*

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

E. N. B., of Ottawa, Ca.—No method of trisecting an angle based upon principles of plane geometry has ever been discovered, though many attempts have been made. Believing the problem impossible, the prizes offered at one time by several learned societies for its solution have all been officially withdrawn, notwithstanding ambitious geometers are still busying themselves with the problem. An attempt at its solution, recently made by Patricio M. Del. Rio, ex-professor in the Peruvian Naval Academy, has been recently published, but it has since proved to be erroneous. You will find immortal fame sooner in other pursuits than in muddling your brains with this question.

J. M., of S. C.—No simple rule has ever been found for determining the size of a second pulley, only the distance between centers, length of belt, and diameter of first pulley being given. A solution has, however, been sought by eminent mathematicians. The problem is extremely difficult, and involves the higher mathematics for even an approximate solution. The practical and proper way to work is to fix the size of both pulleys and determine the length of belt accordingly; and actual measurement is the readiest way to determine the length of a belt when the diameter of the pulleys in which it is to run are given.

J. W. M., of Ind.—The best varnish we know for the preservation of a portable boiler liable to rust through exposure to out-door influences is asphaltum. This substance readily dissolves in turpentine, which forms a good vehicle for its application. We presume you can obtain it ready mixed.

J. W. M., of Pa.—Nails are made of any size ordered, provided the order is large enough. We do not know whether the size you mention is kept on hand or not by any dealers, but are inclined to think it is not.

W. B. L., of Vt.—There is no cheap metal that will withstand the action of salt water. You can obtain all kinds of rubber tubing from any dealer in rubber goods.

R. A. C., of Ky.—You can render brittle sheet brass tough by annealing, that is, heating it and plunging it in cold water.

G. S. R., of Mass.—There is no gain in using high steam for heating purposes. The total amount of heat in steam at any pressure is found by adding the latent heat to the sensible heat or temperature, and this is practically a constant sum for all pressures.

## Business and Personal.

*The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.*

To ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's manufacturing news of the United States. Terms $4·00 a year.

Superheated Steam House Furnace. Pure Air. Efficient. Automatic. Safe. Controlable. Unequaled. Tested. Cheap. Circulars. H. G. Bulkley, New York.

Foot Lathes—E. P. Ryder's improved—220 Center st., N. Y.

Read the advertisement of A. Daul, International Agent.

For Sale—The Undivided half of U.S. Patent for Elastic Broom Iron, Patented July, 1869. J. M. Allison, Cranberry P.O., Venango Co., Pa.

Wanted—Tough, heavy card board, in large quantities, 12x15 inches. Address, with sample and price, W. S. & W. N. Poulson, Cadiz, O.

Tables to Compute Wages, by the day and by the hour—most perfect system published. Address, for circular, Lester Hayes, Cleveland, O.

For Sale Cheap—The entire interest of a new horse hay rake, warranted to be absolutely superior to all others. $1000 wanted to hire on it, for which 25 per cent will be given. H. N. Green, Whitney's Point, Broome county, N. Y.

Improved Hydraulic Press, with elevating shaft attached. No. 83,421. Right for sale. Address J. B. Tunstall, Boydton, Va.

Aquatic Velocipede, invented by Lewis D. Bunn. Patent for sale. See advertisement on back page.

For best quality Gray Iron Small Castings, plain and fancy Apply to the Whitneyville Foundery, near New Haven, Conn.

Keuffel & Esser, 71 Nassau st., N.Y., the best place to get 1st-class Drawing Materials, Swiss Instruments, and Rubber Triangles and Curves

Peck's patent drop press. For circulars, address the sole manufacturers, Milo Peck & Co., New Haven, Ct.

Those wanting latest improved Hub and Spoke Machinery, address Kettenring, Strong & Lauster, Defiance, Ohio.

For Aluminum Bronze and Oroide Watches, Chains, and Jewelry, send to Oroide Watch Co., Boston, U. S. Price list sent free.

For Sale—A patent for a composition for covering steam boilers, pipes, etc. E. D. & W. A. French, 3d and Vine sts., Camden, N. J.

For tinmans' tools, presses, etc., apply to Mays & Bliss, Brooklyn, N. Y.

Mill-stone dressing diamond machine, simple, effective, durable. Also, Glazier's diamonds. John Dickinson, 64 Nassau st., New York.

Send for a circular on the uses of Soluble Glass, or Silicates of Soda and Potash. Manufactured by L. & J. W. Feuchtwanger, Chemists and Drug Importers, 55 Cedar st., New York.

Glynn's Anti-Incrustator for Steam Boiler—The only reliable preventative. No foaming, and does not attack metals of boiler. Liberal terms to Agents. C. D. Fredricks, 587 Broadway, New York.

Cold Rolled—Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Machinists, boiler makers, tinners, and workers of sheet metals read advertisement of the Parker Power Presses.

Diamond carbon, formed into wedge or other shapes for pointing and edging tools or cutters for drilling and working stone, etc. Send stamp for circular. John Dickinson, 64 Nassau st., New York.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4·00 a year. Advertisements 17c. a line.

Winans' boiler powder, 11 Wall st., N. Y., removes Incrustations without injury or foaming; 12 years in use. Beware of Imitations.