There were no water gages in the boiler next to the chimney; the breeching that conveyed the smoke from the flues to the stack, running into the chimney not very high above the boilers. If the breeching was not very large, would not the boiler nearest the chimney have the strongest draft through its flues, consequently make steam the fastest, while the engine, through a small pipe, was drawing off steam as fast from the boiler nearest to it as from the other? Would not the boiler with the best draft make most steam and push the the water down through the large water pipes up into the the other boiler faster than a small steam pipe connection could equalize the pressure, at a time when the engine was drawing its steam through this pipe, thereby causing the boiler nearest the engine to show water at its gages, while but little water remained in the boiler nearest the chimney? If this is so, would not large steam connections (steam drum for instance), remedy it? Or running the breeching perpendicular for a distance before turning into the chimney so as to equalize the draft, be a remedy? C. G.

Beardstown, Ill.

[This may be a series of "mysterious" explosions, but we are inclined to think otherwise. The only mystery is that the explosions did not follow one another more rapidly. It seems strange that any competent engineer should arrange boilers in the way described. If we had full data, such as the size of the boilers, amount of grate surface, area of breeching, and area and hight of chimney, size and length of steam pipe, size and speed of piston, we think we could show conclusively the cause to have been the water leaving one boiler for the other; at least such is our present opinion. An expert examining the exploded boilers could have determined, probably whether there had been a lack of water or not.

The boiler next the engine would naturally have the greatest draft of steam from it, especially if the common pipe was small. The boiler next the chimney would have the best draft unless the breeching was large; hence, a greater pressure upon it. It would require but half a pound difference in pressure to change the level of the water nearly one foot, which would leave the flues bare.

Water connections should always be arranged with checks, so that the water could enter but not leave the boiler; this is a cardinal point. No boiler should be without gage cocks, glass gages, and low water indicator and reporter. Had there been a good low water reporter attached to these boilers these accidents would not, in all probability, have occurred. The mud receptacles should have been independent, having each no connection with the neighboring boiler. It would be well to run partitions in the breech or conveyer to the chimney from one boiler to another to equalize the force of the draft. —Eds.]

A Question.

Messrs. Editors:—Suppose a chain composed of three links, the whole outside-to-outside measure of which is twenty inches, the links being made of 1¼-inch-diameter round iron, and a single link made of the same size iron and having the same length as the chain made of three links. Would the single link be as strong to resist the strain of a train of cars stretching up as the three links? If not, why?

If there is any difference in favor of the three links then I think it would have to be the result of the six ends each springing a little or being more elastic than the two ends of the single link. But again, unless very carefully made, there are more chances of tearing or breaking one in three welds than a single weld. If the single link is not as strong, made of the same iron, how much heavier ought it to be made to be as strong? Wm. Weiles.

New York City.

An Invention Wanted.

Messrs. Editors:—One article which is of more importance to the laboring people of the United States than any other, would be a neat wooden shoe with a flexible sole. It ought, it can be invented. It now costs from ten to twelve dollars per year for each laborer's shoes; two pairs of wooden shoes, or $2½ per year ought to shoe our laborers. H. E. L.

New Jersey.

VALUE OF ADVERTISING---ITS IMPORTANCE, AND HOW TO DO IT.

In establishing a new business, advertising is indispensable to success. To increase or keep up an already established business, money cannot be so well expended as in judicious advertising. It is important to select mediums for advertising where the circulation is to be among the class of readers most likely to patronize the article offered for sale, and it is cheapest to advertise in papers of the largest circulation.

The Scientific American has a weekly circulation of over 32,000, which is probably more than ten times greater than that of any other publication of its kind in this country, and four times greater than the aggregate number of all similar publications, both weekly and monthly, issued on this continent.

As an advertising medium for the sale or purchase of machinery, patents, water powers, proposals for construction of bridges, situations for engineers, draftsmen, etc., we believe that the Scientific American is unequaled, and that the advertiser will derive a larger profit for the amount disbursed, by making his wants known through the advertising pages of this paper, than in any other way.

Messrs. Witherby, Rugg & Richardson, manufacturers of wood-working machinery, whose advertisement may always be found in our columns, add the following postscript to their last letter to this office:

"We consider your valuable paper worth to us more than all other sources of advertising."

This is a specimen of the expressions of appreciation we are receiving daily from all parts of the country.

Editorial Summary.

Effect of Lightning on Wires.—When the electric fluid is passed through a wire, undulations of the latter are produced, and the wire is momentarily shortened. This shortening was first observed by Nairne, but no satisfactory explanation of the phenomenon has ever been given. In a paper addressed to the Academy of Sciences by M. F. P. Leroux the subject is examined anew. Operating on wires left entirely free at their nether extremities, the undulations were quite apparent, but their order was so irregular, and they assumed such a variety of shapes that no rule could be laid down regarding them, but M. Leroux observed that the temperature caused by successive electrical discharges was not without influence upon them, and he concluded that the phenomenon alluded to involves in its explanation no new principle, and is simply a question of temperature. As the heat engendered by the discharges increases, the wire tends to expand in length by dilation, but simultaneously and from the same cause there is a tendency to increase in diameter, and it is to this double molecular action the undulations must be ascribed.

Encouraging, Very.—J. R. Glover writes to the New York Farmer's Club, that he has been so engaged in his experiments in hatching eggs artificially that he has not had his clothes off more than two and a half hours in any of the twenty-four for the last three months. The results of his persevering labors he sums up as follows: "I have used about 1,600 eggs, and I have now on hand, in good condition, sixteen chickens—just one chicken to one hundred eggs." Still he believes the thing can be done, if we only knew how.

The female skull, according to Weckler, is smaller than that of man, both as regards horizontal circumference and internal capacity, and the weight of the brain is correspondingly less. It may be said that the type of the female skull approaches in many respects that of the infant, and in a still greater degree that of the lower races. With this is connected the remarkable fact that the difference between the sexes, as regards the cavity of the skull, increases with the development of the race, so that the male European excels the female much more than the negro does the negress.

Miners' Lamps.—Notwithstanding that every English miner who is detected in unlocking his safety lamp is liable by law to three months imprisonment, the offence is committed with impunity by means of false keys. A simple plan has been invented by a manufacturer of these lamps for sealing them without using any lock. When the staple has been put down over the eye a small leaden pin is inserted in the latter, then being placed under a horizontal press fitted with two dies, the shank of the plug is formed into a head and both heads are impressed by the dies with any lettering or device.

Life and Death.—It has been estimated that the number of deaths per year throughout the world is about thirty-two millions. Assuming this to be correct, the deaths each day would be about 88,000; 3,600 per hour, 60 per minute, and thus every second carries one human being into eternity. A calculation of the annual births on the globe shows that whereas 60 persons die per minute, 70 children are born, and thus the increase of the population is kept up.

A Huge Laundry is established in the suburbs of Paris at which is washed the soiled clothing of the guests of the principal hotels, at the rate of 40,000 pieces a day. The clothing is boiled with soap and soda, and then washed in hollow wheels, rinsed, partially dried by centrifugal machines, and for the rest in hot-air ovens, which carry off nearly three pounds of moisture per pound of coal burned, and is finally ironed between polished rollers, and then packed ready for return to Paris.

A Mammoth Cave in southern Illinois is reported to rival the famous Kentucky cave and to exceed in length any others yet discovered. It has been partially explored a distance of three miles, but a thorough search through it has never been instituted. Some years since two men got lost in its passages, and after three days of unceasing travel emerged into the open air thirteen miles distant from the place where they entered.

The American Poultry Association recently organized in this city is instituted to encourage the raising of poultry on a larger scale than has heretofore been attempted in the United States. They propose by statistics and by the practice of individual members, to show that poultry is a source of wealth, and that the raising of poultry may be combined with many other branches of farming industry. This will encourage at some future time the formation of large poultry establishments, such as have been erected at Bromley (Kent, England), and in the environs of Paris.

New Zealand Flax.—Interesting samples of paper made from this fiber have been forwarded to England. While rather highly colored, the flax paper has a singularity of texture and a strength which suggests an excellent paper for bank notes. The coloring matter has been removed by chemical means, leaving the pulp as white as that of ordinary cotton rags.

Walrussian Wealth.—Reports of gold deposits in our new Russian Possessions are still coming in. The latest is contained in a letter to Secretary Seward from Mr. Berry, of Oregon, who relates that a party of prospectors found in the Stickteen River, three hundred miles from its month, gold and silver deposits of great wealth, also rubies and agates, and on Bristol River, copper and coal indications.

Novel Method of Manufacturing Gas.—According to a Swiss journal a means has been discovered of utilizing cockchafers, or, as they are more commonly called, "June bugs." The *Estafette* of Lausanne states that between four and five millions of these insects were recently sent to Friburg for the manufacture of gas, and the residue forms an excellent carriage grease.

A Novel Speculation of the Accidental Insurance character has been started in Buenos Ayres. A joint-stock hospital has been opened to which subscribers who pay $1 20 in silver monthly are to be admitted free, and attended with the best medical skill, in case of sickness or accident.

Philadelphia Schools.—Of the total number of 142,517 children between the ages of six and eighteen within the city limits, 53·5 per cent are in her public schools; 17·4 per cent in private and parochial schools; 14·6 per cent at work, and 14·5 per cent in [illegible]. The children between six and eighteen are usually estimated at 18 per cent of the whole, which would give for Philadelphia a total population of 734,000.

For testing the different lubricating properties of oils and other lubricants an English inventor has contrived an apparatus whose principle depends on the amount of frictional motion necessary to produce a given temperature.

Flexible Glue.—A German chemist has discovered that if glue or gelatine be mixed with about one-quarter its weight of glycerin, it loses its brittleness and becomes useful for many purposes for which it is otherwise unfit, such as dressing leather, giving elasticity to porcelain, parchment or enamelled paper, and for book binding.

A Heavy Blast.—Two tuns of gunpowder was fired in a mine of the Salt Lime Works Company, Clitheroe, England, and the explosion which followed the lighting of the train resulted in the displacement of about 20,000 tuns of stone.

Power of the Human Voice.—It is stated that the human voice, when speaking with clear articulation and supplied from good lungs will fill 400,000 cubic feet of air. The same voice singing, under like circumstances, can fill with equal facility 600,000 cubic feet.

The Imperial Commissioners of the Exposition are proposing to give a grand entertainment to the members of the juries, the great prize holders, and other notables, while the exhibitors are about preparing a banquet for the Emperor himself, who, it is said, has given a conditional acceptance.

Remarkably Accurate.—A full examination of the United States Treasury Department shows that since 1861 $14,500,000,000 have passed through the hands of the Treasurer, in many thousand receipts and payments, but such has been the accuracy with which all these monetary affairs have been transacted, that the vaults contained the requisite cash indicated by the books, to the fraction of a dollar.

A New Alloy consisting of 65 parts tin, 8 parts copper, 10 parts lead, and 17 parts antimony, has been patented in England. The composition is particularly designed by the inventor for facing or forming calico-printing rollers. In this country these rollers have been always made of composition brass or bronze, or preferably of copper, cast, drawn and rolled directly from the ingot.

Explosion of a Letter.—While one of the employés of the New York Post Office was stamping a letter a few days since, he was much perturbed by a mysterious explosion that blew part of the letter away, and scorched his hands and face. The letter contained percussion caps upon which the stamp unfortunately descended.

A French Chemist says that thirty pounds of flesh, thirty-two pounds of blood, and sixty-two pounds of bone, contain as much nitrogen as one thousand pounds of farm manure; and hence that the carcass of a dead horse is worth more than a tun of the best farm-yard manure for the purpose of vegetation.

Graphite.—A gas pipe in the lower part of this city that had lain undisturbed for several years, was recently taken up and found to be so completely coated with graphite that pieces were sawed off in convenient size and served admirably as lead pencils.

Consumption of Paper.—England uses about 220 million pounds of paper annually, France yearly consumes 195 millions, while the United States demands more paper than both these countries combined—440 million pounds.

There are 862 journals of various kinds now published in Paris, against 416 only in 1854. The Exhibition has been the cause of eleven publications being added to the usual list.

Diet Eaters.—An analysis of the earth eaten by the natives of the Island of Borneo shows that in 100 parts there was 15·4 of pit-coal, resin (organic matter volatile at red heat), of pure carbon, 14·9, of silica, 38·3, of alumina 27·7, and of iron pyrites, 3·7 parts.

Prolific.—In San Bernardino county, California, the farmers raise three crops a year off the same field: first oats or barley, next Indian corn, and last, turnips, beets or grass.

Bismarck was a healthy man till he achieved greatness, and now he has all the diseases which foreign correspondents attached last summer to Napoleon.

The great tabernacle of the Saints at Salt Lake City is now finished. It is 250 feet wide, and furnishes comfortable sitting room for 10,000 people.

Two century plants are now in full bloom in New Orleans, and, say the papers of that city, attract great attention.

Gold, in paying quantities, is found near Bellville, Richmond county Ohio.

The American Watch Company now finish a watch every two and a half minutes during the working hours of the day.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The plans for the new bridge across the Mississippi river at St. Louis have been accepted, and it is to be commenced without delay. The new bridge will be an immense structure, accommodating two double tracks of rails for street cars, beside sidewalks for foot passengers, and will consist of three arches, the central arch having a span of 515 feet, and the two side arches 497 feet. The central piers will be nearly 200 feet in hight from the bed of the river. The estimated cost of this great bridge is $5,000,000.

The Dismal Swamp canal, now in a very dilapidated condition, is to be repaired by a company composed chiefly of North Carolina speculators. It is estimated that more than a half million dollars will be needed to restore the canal to a working condition.

The Union Pacific Railroad will locate its locomotive, machine and car shops at Cheyenne, a new city just laid out at the foot of the Black Hills. Coal, iron, minerals and water power are found in proximity. At present it is a bare prairie, but within four months it will be the terminus of the railroad.

Ohio has just now two mining excitements; one is a gold mine discovered in Richland county, the other a silver discovery in Washington county. The former locality has been visited by a Cincinnatti scientist who reports extensive deposits of gold ore, the best specimens being found near Bellville on the borders of West Virginia.

In the United States there are 81 square miles of territory to each mile of railroad, and one mile of road to each one thousand of population. In Great Britain the proportion is nine miles area to one of railroad, and one mile of road to each 2,819 of population; in France the ratio is twenty-four miles to one of railroad, and one mile of road to 4,172 inhabitants. Belgium with one mile of railroad to every seven miles of territory, has a more thorough network of railroads than any other country, while Russia, with a territory twelve times the extent of the British Isles, has only one fifth the length of road.

In San Francisco, the North Pacific Fur company, capital $1,000,000, has been formed for trading in our new northern possession. The trade of this latter country in skins and furs, last year amounted to $1,500,000. These furs consisted of sea-otter, seals, blue and white foxes, mink, muskrat, beaver and bears.

The citizens of Schuylkill county, Pa., have under consideration the erection of Bessemer steel works in that county. At a meeting in furtherance of the project held in Schuylkill Haven, it was stated that $160,000 had already been subscribed. There are now only two Bessemer steel works in the country.

The directors of the New York Central Railroad Company, at their late session resolved to issue stock of the company to the holders of the stock of the Athens and Schenectady line, so as to absorb that line in the Central. This will add two millions to the capital stock of the Central Company.

The largest blast furnace in the world is at the Norton iron works, Cleveland district, England. Its capacity is 2,600 cubic feet. Although its productive powers have not yet been tested, it has already made 434 tuns of pig iron in one week.

The total consumption of roofing slates in the United States was, in 1866, 250,000 squares,—a square being ten square feet. Beside this the trade in finer slate qualities used for mantle-pieces table and billiard plates, is annually increasing in importance. There are twelve slate quarries in Pennsylvania whose combined productions in 1865 was 60,000 squares, in 1866, 90,000 squares, and this year it will reach a much higher figure, while the demand exceeds five times the present power of supply.

The Pacific Asphaltum company have an apparently inexhaustable mine of this substance convenient to San Francisco. The Asphaltum, which has the solidity of coal—powder being used to blast it—and differing entirely from that heretofore used, is found at a depth of six to ten feet from the surface, continuing in solid masses about 15 feet deep when soft and liquid matter is met with, which the company do not yet know how to employ, or dispose of.

The originator of a railroad route from Cordalia to Salta, S. A., a distance of seven hundred miles, is William Wheelwright, a native of Newburyport, Mass. The road is being built by an English company, and 130 miles of it are already completed.

EXTENSION NOTICES.

Norman Millington, of Shaftsbury, Vt., for himself and S. M. George, executrix with Abraham B. Gardner and Leland J. Mattison, executors of the estate of Davies J. George, deceased, having petitioned for the extension of a patent granted to the said Millington and George the 18th day of October, 1853, for an improvement in machines for figuring carpenters' squares, for seven years from the expiration of said patent, which takes place on the 18th day of October, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 30th day of September next.

Harry Whittaker, of Buffalo, N. Y., having petitioned for the extension of

patent granted to him the 18th day of October, 1853, for an improvement in the application of high-pressure engines to screw propellers, for seven years from the expiration of said patent, which takes place on the 18th day of October, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 30th day of September next.

Samuel Pratt, of Hammonton, N. J., having petitioned for the extension of a patent granted to him the 25th day of October, 1853, for an improvement in screw nails, for seven years from the expiration of said patent, which takes place on the 25th day of October, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 7th day of October next.

David M. Smith, of Springfield, Vt., having petitioned for the extension of a patent granted to him the 25th day of October, 1853, for an improvement in spring clamp for clothes lines, for seven years from the expiration of said patent, which takes place on the 25th day of October, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 7th day of October next.

Recent American and Foreign Patents.

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

RAILROAD SPIKE.—Lewis Postawka, Boston, Mass.—This invention consists in constructing a spike, designed more especially for securing rails and their chains to the ties or sleepers, with a longitudinal slit extending from its point upward a certain distance, and having the ends of the slit or slitted portion beveled at their inner sides, so that, when the spike is driven into the tie or sleeper, the resistance which the latter offers to the penetration of the former, will cause the two parts of the spike, formed by the slit, to spread out or diverge, so as to effectually clinch the spike.

RUDDER.—Thomas W. Murray, New York City.—This invention consists in constructing the rudder with a cast-iron post, and securing the blade of the rudder, which is of wood, to the post in a novel way, and also in a novel way of securing the rudder post to the stem post of the vessel. The object of the invention is two-fold; to wit: to prevent the unshipping of the rudder, and to obviate the contingency of the bending and twisting-off of the rudder post.

CLEANING HARNESS AND OTHER LEATHER.—George H. McCleary, Hollidaysburg, Pa.—This invention has for its object to furnish an improved process by the use of which old harness and other dry and hard leather may be renovated, or made soft, pliable and tough.

RAILROAD CAR WHEEL.—David Forrest, Eastport, Me.—This invention has for its object to furnish an improved car wheel, so constructed that the parts most subject to wear or liable to be broken may be replaced when worn or broken, and which shall be very compact.

CHURN.—Wm. Weddington, Winterset, Iowa.—This invention has for its object to furnish an improved churn, so constructed and arranged that the churning may be done by air introduced into the churn.

GATE.—E R. Wolfe, Plymouth, Pa.—This invention has for its object to furnish an improved attachment for closing gates, which shall be simple, cheap, efficient, easily constructed, symmetrical in appearance, and which shall have no projecting parts to catch upon passing objects.

MACHINE FOR WASHING AND DRYING DISHES.—A. W. Ward, Fishkill, N. Y.—This invention has for its object to furnish an improved machine by means of which dishes may be washed and dried quickly, thoroughly, and conveniently.

POTATO DIGGER.—Henry P. Smith, Denton, Mich.—This invention has for its object to furnish an improved machine by means of which the potatoes may be easily and rapidly dug and separated from the dirt that may adhere to them.

WASHING MACHINE.—Butler R. Platt and Joseph A. Gray, Holland, Mich.—This invention has for its object to furnish an improved machine by means of which the clothes may be washed quickly and thoroughly, and which may be easily adjusted to wash coarse or fine clothes.

HORSE RAKE.—John B. Hoag, Oxford, Ill.—This invention relates to a new and useful device for holding a horse rake when working and releasing it when loaded, to enable it to revolve and dump the hay.

COMBINED WRITING DESK AND TABLE.—Albert A. McMore, Brooklyn, N. Y.—This invention relates to a new and improved arrangement whereby two indispensable pieces of furniture are combined in one, and the invention consists in attaching the top of a table to the frame in such a manner that the table is transformed into a writing desk in one second of time, and altered to a table with equal facility.

OFFICE CHAIR.—Robert Fitts, Fitchburg, Mass.—This invention relates to improvements in the construction of arm chairs designed for use in offices and for other purposes.

EXTENSION BEDSTEAD.—Jacob Holzmann, New York City.—This invention relates to a new bedstead which can be extended in length and width, so that it can be used for children or as a double bedstead for adults, as may be desired. The invention consists in making each of the side bars as well as the end bars or heads of two pieces, so that the ends as well as the sides can be made longer or shorter at will.

CARTRIDGE BOX.—William H. Morris. Cold Spring, N. Y.—This invention consists in constructing a cartridge box with a series of blocks or cartridge receivers constructed and arranged in such a manner that a greater number of cartridges than usual may be contained in a case of a given size, and the cartridges extracted from the blocks or receivers with the greatest facility.

CULTIVATOR.—William E. Smith, Oquawka, Ill.—This invention relates to a new and improved cultivator of that class which have their plows or shares attached or arranged in such a manner as to be capable of being moved or adjusted both vertically and latterally by a person walking at the rear of the machine.

TETHERING ANIMALS.—Warren Johnson, Fisherville, N. H.—This invention relates to a new and improved device for tethering animals and is an improvement on that class of tethers which are composed of a weighted pole connected by a swivel to an upright or stake. The invention consists in an improved swivel by which the pole is connected to the upright or stake.

WASHING MACHINE.—W. W. Adams, West Derby, Vt.—This invention has for its object to furnish an improved washing machine so constructed and arranged that the washing may be done quickly and easily, which will not tear the clothes, and with which the labor of handling the clothes shall be greatly diminished.

MAKING BUNGS, PLUGS, TAPS, ETC.—Wm, L. Standish, Pittsburg, Pa.—This invention consists in constructing and combining mechanical devices for making bungs, plugs, taps, etc., for barrels and other purposes.

SASH FASTENER.—George King, John Gomber and Lindhurst Shope, Frederick, Md.—This invention relates to a new and improved device for fastening window sashes.

STEAM CUT-OFF.—L. Griswold, Portland, Wis., and G. Caul, York, Wis.—This invention consists in providing a steam chest with cylinders and pistons or valves and apertures and arranging them in such a manner that the valves or pistons which admit and cut off the steam shall not be subject to undue friction in consequence of the pressure of the steam and also so that the steam is made to operate upon the main shaft when the crank is on the center.

BROAD-CAST SEEDERS.—Jacob Slauder, Osborn, Ohio.—In this invention the seed board is made reversible, so as to throw the seed in front of or behind the plows at pleasure. Secondly—the plows can be removed and drill teeth substituted, hose being attached for the purpose of conveying the seed from the seed-board to the conducting tubes. Thirdly—the seed box can readily be adjusted to sow oats as well as wheat and other grains.

DEAD BODIES.—Colin Cree St. Clair, Washington, D. C.—In this invention a liquid composition or cement is poured around the body in a suitable mold, which, drying and hardening, effectually preserves the body and at the same time serves the purpose of a coffin or sarcophagus.

CHURN.—L. M. Cook, Owatonna, Minn.—In this invention the churn is provided with two stationary and two movable dashboards.

HEDGE PRUNER.—Frederick Bender, Baltimore, Md.—In this invention the cutting blade is made with a perfectly straight edge, and when closed enters a longitudinal slot in the opposite blade, which is also straight.

CORN PLANTER AND FERTILIZER.—John B. Gemmill, Strawbridge, Pa.—The object of this invention is to combine in one machine a corn dropping mechanism and mechanism for depositing a phosphate or other fertilizing material, together with a novel and simple arrangement of devices for operating the slides which regulate the flow of the material from the hoppers.

MACHINE FOR DIGGING AND GATHERING POTATOES.—Christian G. Grabo, Detroit, Mich.—This invention has for its object to furnish an improved machine by means of which potatoes may be dug and gathered thoroughly and cleanly.

SNOW PLOW.—R. S. Harris, Dubuque, Iowa.—This invention has for its object to furnish an improved apparatus by means of which the snow may be readily removed from the track and thrown to a sufficient distance at one or both sides of said track, to be wholly out of the way.

WINDOW-BLIND FASTENER.—Jackson R. Baker, Jersey City, N. J.—This invention has for its object to furnish an improved fastening, by the use of which the blind will be held securely when open, and which can be operated to close the blind without its being necessary to reach so far out of the window as is the case when the ordinary fastening is used.

LOCK.—Robert M. Webb, New York City.—This lock is of that class of locks employed for articles having hinged or rising and falling lids, covers, or tops, such, for instance, as pianofortes, sewing-machine cases, etc.

LATH FRAME.—Albert Reed, Mankato, Minn.—This invention relates to a frame so constructed as to facilitate the nailing and securing of laths to the side of a room and at regular and equal distances apart, so as to leave spaces or openings of a uniform size or width between the several rows or series of laths.

CULTIVATOR.—Jacob Wilson, Somerford, Iowa.—This invention relates to a new and improved two-horse cultivator for cultivating those crops which are grown in hills or drills, such as corn, cotton, etc. The invention consists in a novel and improved construction of the parts, whereby the rider or operator has full control over the plows, being enabled to raise and lower and move the same laterally with the greatest facility, and the draft mechanism also improved and rendered more favorable for the horses than hitherto.

COMPOSITION PLATE FOR ARTIFICIAL TEETH.—G. F. J. Colburn, Newark, N. J.—This invention relates to a new and improved composition for the plates in which artificial teeth, or teeth and gums, are set. The object of the invention is to obtain a composition for the purpose specified, which will admit of being manufactured or molded into the desired form, and the teeth, or teeth and gums set into it with far greater facility than hitherto, and which will also possess the advantage of admitting of repairs being made (broken teeth replaced), with far less difficulty than with either the metallic (gold) plate or with the hard rubber or vulcanite plate.

BASE FOR ARTIFICIAL TEETH.—G. F. J. Colburn, Newark, N. J.—This invention consists in combining a peculiar composition with a metal plate, whereby a very superior base for artificial teeth is obtained, one which will be strong and durable, possess the advantage of being readily and economically repaired when necessary, as, for instance, the replacing of a broken tooth, and which may be worn by any person with the greatest convenience and comfort, even those to whom the hard rubber or vulcanite bases are repulsive.

SAW MILL.—Alfred Gifford and Robert L. Felts, Milroy, Ind.—This invention relates to a new and improved reciprocating saw mill, and has for its object portability, to admit of the whole machine being drawn from place to place by yokes of cattle, and also admit of being driven or run by a small engine and to operate rapidly.

PAPER NECKTIE.—Hiram Whitney, Watertown, Mass.—This invention relates to the manufacture of neckties from paper, and consists, first, in providing a necktie made from paper, with an extension piece along its upper edge, and a folded piece upon its lower edge, having a buttonhole in the same, by means of which two pieces the necktie can be secured upon the front button of the shirt.

STOVE-PIPE SHELF RACK.—John Turner, Marshalltown, Iowa.—This invention relates to a new device for utilizing the strength as well as the heat of stove-pipes, and consists in arranging shoulders firmly around the stove-pipes, and placing thereon revolving shelves upon which plates and other kitchen utensils can be placed.

BUTTON.—Victor Charlet, Hoboken, N. J.—This invention relates to a revolving button fastening which is so arranged that the said fastening projects from one side of the shank of the button when being applied, and can be made to project from opposite side of the same after being applied.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

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

A. H. G., of Mo., and also J. K. of the same state ask: "Why do the notches of the quadrant on a locomotive vary in distance when the steam is admitted and cut off in a regular ratio?" The graduation of the quadrant on the locomotive is not done by an unvarying rule. It is determined by turning the engine and noting the movement of the valves. The motion of the link is compound, owing to the setting of the eccentrics, which are not set exactly opposite each other. It is also varied by the length of the eccentric ends. Scarcely any two engines have their quadrants slotted precisely the same. Without elaborate diagrams it is impossible, on account of the above facts to demonstrate the subject.

W. J. B., of Mich., wants to know what proportion of a horse power five square inches of water, operating on a wheel 6 5-9 inches diameter, under a head of four feet, provided the water transmits its whole power, will develop. The actual weight of a column of water, not in motion, of the dimensions of five square inches sectional area and four feet high, is 42.60 lbs. The velocity of the water and the description of wheel are essential data to a categorical reply.

A. H., of N. Y., asks us to publish engravings and descriptions of the condensing steam engine. It can be found in the "Guide to Inventors," published by Munn & Co. Price 25 cents.

R. S. S., of Ga., says he has three elbows in a pipe conveying wind from a fan to a cupola, and that the fan gives much less blast than when it was run with a straight pipe. The trouble is probably in the elbows. The remedy is to make the elbows larger than the straight pipe. Where elbows are used they should have four times the sectional area of the straight pipe. Usually the pipes of fan blowers are too small.

C. F. S., of Mass.—Iron and zinc castings may be bronzed by precipitating on the surface by the battery or otherwise, a coating of copper.

D. B., of N. Y.—We have had practical experience in the manufacture of grape sugar from starch, using sulphuric acid and lime, and have fermented the sirup without encountering the difficulty you allude to. We suspect that you have mismanaged the process in some way.

J. B., of N. Y., thinks that the gases from a gun which is fired, cleave the air and leave behind them a vacuum; the concussion on filling up the vacuum produces the sound. The theory is bad: the vacuum is mostly imaginary. The gases of burning gunpowder tend to expand equally in all directions, and to produce condensation rather than rarefaction. After the bullet has left the gun there is a vacuum in its path.

M. S. D., of N. Y.—Some of the most useful cements for water joints, are white lead and oil, india-rubber, rosin and lard, shellac, sealing wax and pitch. The choice among them would be determined by the materials used in the construction of the apparatus, its size, etc.

E. H. R., of Mass.—If you still find metal unsuitable for the molds in which you cast your Babbitt or other alloy we suggest that you try soapstone. Soapstone is easily brought into form and will give a good surface to the casting.

J. B., of Ill.—The utility of sand to the blacksmith in welding iron, arises from the fact that it makes a flux with the superficial oxide which protects the iron from burning and keeps its surface clean.

J. S. McC. of Ohio.—We do not think that plaster of Paris would answer for "small and delicate cores for cast iron."

A. T. S., of Conn.—The weight of the earth has been determined with great accuracy. The elements for the calculation are the mean density (5.6604 greater than water) and the cubical contents.

G. H., of N. J.—Pine wood yields less acetic acid on distillation than almost any other kind of wood, and it is doubtful if you can separate the acid with profit in the circumstances you mention. There is nothing cheaper than lime to neutralize the acid.

J. N., of O.—We are not aware that the philosophy concerned in the renovation of feathers by steam is fully understood. There can be no doubt that feathers are often injured by parasites, and that steam will destroy them as you suggest.

R. G., of Ill.—Borax is found in California and we are told in quantity sufficient to supply the whole American market.

J. E. H., of W. Va., asks what is the power of an engine 10-inch cylinder, 20-inch stroke, making 100 strokes per minute, and carrying 90 lbs. of steam? The effective power of your engine, if you *have* 90 lbs. on the piston, working full stroke, is 33.57 horse-power. You do not say whether the steam is throttled by your governor or not. If it is, the power would be less, and can only be determined by the indicator.

N. D. J., of Mass.—We know of no way to harden a casting of soft iron unless by ordinary case hardening. Possibly some of our readers may know of some effectual method, beside chilling in the mold, to render your castings hard. We think such knowledge might be useful to some.

J. G., of Texas.—"A friend of mine who has raised a large family, and they have all married off except one daughter, and no one knows how soon she may have an opportunity to try matrimonial felicity, and as he does not wish to break up house keeping, and his wife's hands are so drawn up with the rheumatism that she neglects the dairy work and her servants have all left her, and in order to live on the dainties of the dairy it is necessary that the cows be milked, HENCE" (Good Heavens! What does he want? The above reminds us of the preamble to the Declaration of Independence. "J. G." is no doubt a rigid parliamentarian, perhaps a member of Congress, and—) "he wants a milking machine." Inventors of milking machines to the rescue!

H. A., of Conn.—The light emitted by a solution of phosphorus in oil or ether is very feeble, and would not be sufficient for a miner's lamp. The light resembles the phosphorescent light of decaying wood or fish.

R. S. N., of O.—Vegetable fiber from whatever source it is obtained, when purified from foreign matter is always the same substance chemically. Paper may be made from any vegetable fiber, but one plant will be preferred to another for the purity, strength, abundance of the fiber, etc. In a few years more paper will be made from wood than from rags. Even now it is almost entirely used on daily papers.

J. C. W., of Pa., says he is using in his foundery Scotch pig, Lake Superior, and scrap iron, and finds much difficulty in getting sound castings. Notwithstanding careful skimming, a large amount of "stodge" finds its way into the flasks and injures the castings. He asks for a remedy .... He asks also what is the proper place to put the gage cocks in a horizontal cylinder boiler of 32 inches diameter. Answer 1; the Lake Superior and scrap iron will turn to "stodge" much more rapidly than the Scotch pig; probably you use too large a proportion of those qualities. You can keep much of this scoriæ from your castings by making high and wide pouring gates, thus allowing these lighter particles to rise from your castings. Unless you do this you will find an open, porous, and rough upper surface on your castings. A small quantity of sawdust or fine charcoal thrown on the surface of your iron in the ladle will take up much of the floating scoriæ. .... Answer 2; place your lower gage cock 2½ inches above the line of fire surface, the next 2½ inches above that.

H. M. B., of Ill.—The aniline colors are readily soluble in spirit varnish, and you will find varnishes so colored useful in making the transparent paintings for your magic lantern.

Business and Personal.

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

NEW PUBLICATIONS.

ATLANTIC MONTHLY for August. Boston: Ticknor & Fields.

One of the best numbers of this most excellent monthly. The *Atlantic* is especially fortunate in its contributors, or rather in its managing editors; for it contrives to get the cream of current American literature. Among the other excellent articles in this number we call attention to "Hospital Memories," "Cincinnati," "Up the Edisto," and a "Lilliput Province." Indeed, every contribution and the criticisms of the Editors' department are especially superior and interesting.

SECOND ANNUAL CATALOGUE OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

It exhibits a very promising future for this new institution, and we are pleased to see that mechanical and civil engineering, practical chemistry, and mining occupy prominent positions in the course of studies. For particulars address William P. Atkinson, Secretary and Librarian, Massachusetts Institute of Technology, Boylston street, Boston, Mass.

RESULTS OF METEOROLOGICAL OBSERVATIONS made at Brunswick, Me., between 1807 and 1859, by Parker Cleaveland, LL.D., Professor in Bowdoin College.

This collection of calculations, interesting and valuable to the astronomer and the geometrician, is published by the Smithsonian Institution in a large quarto pamphlet which can be obtained by addressing B. Westermann & Co New York.

SKELETON STRUCTURES, Applied to Bridges, by Olaus Henrici, Ph.D. New York: D. Van Nostrand, 192 Broadway.

Especially valuable to the practical engineer and useful to the student in civil engineering. The plates accompanying the work will be found very useful both to the student and the working engineer. The calculations and directions are plain, and will save much time and brain labor now uselessly wasted.

ASTRONOMICAL OBSERVATIONS Made at the United States Naval Observatory during the years 1851-2. Published by authority of the Secretary of the Navy.

For astronomers, navigators, and scientific students these tables will probably be of great use in the saving of time in making calculations, and in assisting the solution of problems usually entailing a vast amount of labor They are very systematically arranged and of easy reference.