Z. and, in the best arranged apparatus, is made to revolve in such manner that consecutive strokes do not fall in the same place.—*Mining Journal.*

The Largest Engine in the World.

W. L. C. states that, some time since, the New York *Times* mentioned the pumping engine of the Lehigh zinc mines, at Friedensville, as "the largest stationary engine in the world." A writer in a Pittsburgh paper assails the above statement, and endeavors to show that the engine above mentioned has not even an approximate claim to that distinction, and he states that the great Haarlem engine has a 12 feet cylinder with a 10 feet stroke, and he makes its capacity to be 10,000,000,000 gallons raised 1 foot high in 24 hours. "Now, 10,000,000,000 gallons is 83,388,000,000 foot pounds per day, or 57,908,333 foot pounds per minute, equivalent to 1,755 horse power. But the designers themselves only claim 500 horse power for their engine, and must feel flattered by the Pittsburgh estimate. The Lehigh engine was originally designed and rated at 3,000 horse power, and, if called upon, could increase even that figure. Where, then, is the comparison?

The famous engine of Haarlem is nothing but a familiar single acting Cornish engine, having an 84 inch cylinder, with the attachment of Simms' combined cylinder, which is also single acting. Its normal speed is 6 strokes per minute, and who can make more than 500 horse power out of that at any reasonable pressure? But the Lehigh engine is a beam engine with a plain cylinder 110 inches in diameter, 10 feet stroke and double acting. It is now working at 11 strokes per minute, or a piston speed of 220 feet. What is there, then, in the Haarlem engine to entitle it to rank above the engine at the Friedensville mines?

I suspect, however, that my Pittsburgh friend would care little for the reputation of the Haarlem engine, if his own could be shown to be the veritable leviathan. But he describes his engines as having two 64 inch cylinders of 14 feet stroke geared to one shaft and fly wheel, each actuating two pumps, and each capable of working independently. Two 64 inch cylinders give an aggregate piston area of 6,434 square inches, while the piston area of the Lehigh engine is 9,504 square inches, or nearly one half greater. In fact, we have half a dozen blowing engines in the Lehigh valley which show a greater volume of cylinder than that at Pittsburgh. The Lehigh engine was designed by Mr. John West, the company's engineer, to bear a pressure of 60 lbs. with a factor of safety of 8, or a pressure of 80 lbs. with a factor of 6.

Finally, the justice of comparing, at all, the work of the Pittsburgh engines, which are practically two distinct engines, with the single engine of the Lehigh zinc mine is not to me apparent."

Cumberland Gap Cave.

H. B. N., a member of the 42d regiment O. V. I., writes as follows:

In the summer of 1862, while the Federal forces were occupying the Gap, a cave was discovered by our men, while felling timber on the south side of the mountain. Start from the point where all the roads converge to pass the Gap, and follow the Virginia road along the side of the mountain in an easterly direction, until you pass the spring or rather creek which gushes out of the mountain; leave the road at the curve just beyond this spring, and take a diagonal course up the mountain until you reach an altitude of about two hundred feet above, and five hundred feet east of, the spring, and you will find the place.

We were encamped at the foot of the mountain; and although we were not generally much given to ecstacies over holes in the ground, the discovery had sufficient force to rouse a few of us, who soon came to a small depression in the mountain side, as if a large tree had been uprooted, leaving a hollow some six or eight feet in depth. At the bottom of this pit was a small rectangular opening in the rocks, leading in a horizontal direction, and just large enough to admit one person at a time, on all fours. This did not quite meet our expectations, as we thought it not much of "an opening for young men." Lighting my candle, I made a venture, and found, after creeping a few feet, that the passage suddenly widened in all directions. Rising to my feet, and taking a few steps forward, I held the light above my head; but nought could be seen. Beyond the few feet of rocky floor I stood upon, all was impenetrable darkness and profound silence. From the upper ceiling or outer wall not a ray of light returned. A shout brought back a long succession of echoes, and died away in a murmur, bringing evidence that we stood in the entrance of a large cavern with irregular walls. Getting our party together, we followed along one side of the cavern until we came to a kind of rostrum, rising abruptly from the floor to the hight of eight or ten feet. At the front edge, and near one corner, stood an irregular column of alabaster, by which means we were enabled to mount the dais, which proved to be a horizontal platform extending backward at a slight inclination, and joining the ceiling at a sharp angle some distance back. This grotto was filled with stalactites of dazzling whiteness, so thickly set as to bar our entrance. Instead of the counter parts, the stalagmites, growing up like cypress trees from the ground beneath as usual, the material had been evenly distributed by the inclination of the rock, thus making a floor of glittering crystal, and fringing the front of the rostrum with a pendant veil of silver whiteness and dazzling brilliancy.

Holding our lights above our heads and looking towards the interior of the cavern, we discovered the ceiling, as far as our lights could reach, to be much more brilliant in scenic effect than anything we had yet seen. It seemed as if we were looking up into an immense dome hung with tapestry. So perfect was the imitation of heavy folds of drapery that no repetition of the view could dispel the illusion. The column that had helped us to our position was now seen to be an irregular cluster, some six feet in diameter and extending from the floor to the ceiling.

Among other features of interest was a small stalactite in the form of a quarter circle, with its base attached to the under side of a horizontal rock; it turned on a radius of about five inches, and terminated in a sharp point at right angles to the base line. The drops of water forming this had evidently followed the line of some insect's web.

When we left the chamber, everything was intact, not a stalactite broken or a crystal displaced, save a few specimens we brought away. But when I saw it the next time, "the hand of the spoiler had been there." During the "unpleasantness," I was the witness of much vandalism, but nothing ever seemed less excusable, or furnished a stronger proof of the irredeemable destructiveness of some natures, than the wanton spoliation of these beautiful specimens of the Creator's handiwork. I visited the cave several times before we broke camp, each time finding new chambers; and I left it with a feeling that I had only walked along a corridor, and had not entered the palace proper. If the cave has not been entered since then, these eleven years will afford some evidence as to how fast Nature repairs her desecrated shrines. I write this in the hope that some one may have made or will make further exploration, and report the same."

The Enormous Waste of Fuel in Stoves.

The scientist tells us that fully fifty per cent of our fuel is wasted; that is to say that, as each kind of fuel will, by proper combustion, evolve a given amount of heat to each one pound of such fuel, and as our machines for the conversion of fuel into heat, as now constructed, do not operate without a loss of one half of the heat evolved, the waste is as above stated. Our country has a population of about 50,000,000. It can be put down as a low estimate for each individual, a consumption of fuel, either wood or mineral, equal to at least one tun of coal, with a value of $6 per tun, equaling in the aggregate $300,000,000, one half of which ($150,000,000) is lost. If this be true, this enormous waste should be seriously considered by the inventor, improver, and manufacturer of the stove, in view of its improvement, and a saving of at least a portion of this enormous waste, which, if reduced to twenty or even five per cent, would be of great value to our country.

Science has already done her part of the work, and it remains for the inventor and improver of stoves to do his part. Science tells us the amount of heat each pound of fuel will produce; the conditions required for perfect combustion; the laws governing the operations of heat; the nature of the materials used, and surfaces favorable for operating with heat. Science will go no farther. The practical man must take up the facts science has given, and work on her suggestions to embody, in operating devices, those principles of construction and operation which will result in the effects desired to be secured and attainable.

The usual custom, demanded by the construction of the stove, of adapting its use for service, either for warming in all weathers or in all kinds of cooking, is by the regulation of the draft dampers, by which the combustion of the fuel is increased or diminished; or in other words, the same amount of fuel is used, in the fuel chamber, in a January thaw, or the early spring months when but little heat is required as when the outside temperature is below zero; or when a pan of biscuit or a custard is to be baked, as when a loaf of bread or a custard pie; and to diminish the amount of heat for our use. we check the supply of air to support combustion, and thus prevent perfect combustion, and evolve carbonic oxide, which, by reason of a sluggish current, is more liable to escape into the room to impair the health of our families; while on the other hand we are permitting a good portion of our fuel to escape unconsumed.

What is desired on the part of the people, and is required to effect a saving of fuel, is a stove, for both warming and cooking purposes, which will be capable of dispersing a larger portion of the heat evolved from the fuel in combustion, by all the ways in which heat is made to effect the warming or heating of bodies or substances, which should be made to embrace not only heating by radiation and convection, but also heating by transmission and reflection; and the control of the degree of heat should be obtained by the quantity of fuel in perfect combustion, used or necessary to give the amount of heat required, which quantity of fuel should be so regulated as to adapt its mass to the operations to be performed.

Some may say this is impracticable, and that these operations cannot be secured in stoves. In this we differ; and further, we believe that these operations will eventually be secured in modes both simple and practical. Science has given to us facts and figures, and the inventor and improver of stoves must use these, and adopt the proper means to accomplish the ends desired to be secured; and he who succeeds will do a greater work for the people than has been done by any one man for many years, and will rank with Watt, Fulton, Henry, Morse, as benefactors of our race.—*Stove Trade Gazette.*

A. M. E. states that he once saw, in Boston, the lever of a safety valve fastened down by a ¾ inch iron, driven into a brick wall so that it was impossible to raise it with any amount of steam; and this was directly under a room where some twenty-five men were at work. And still people wonder why some boilers explode!

A GRAND MEDAL FOR CLEVELAND.

THE WILSON SEWING MACHINE TAKES THE GRAND PRIZE AT VIENNA.

THREE separate dispatches from Vienna combine to dispel all doubt as to what sewing machine has won the first honors of the Great Exposition. The first was a special to the New York press on Monday, and was as follows:

VIENNA, August 15, 1873.

The Wilson shuttle sewing machine was awarded the grand prize at the Vienna Exposition for being the best sewing machine.

The second was the regular Asssociated Press report, compiled from a long special to the New York *Herald*, in which the "Wilson Sewing Machine of Cleveland, Ohio," was named as among the exhibitors which received "medals for merit," the highest class of premiums awarded at the Exposition. *All other sewing machines will receive simply an award for progress.*

The third was a private cable telegram received yesterday from Vienna by Mr. Wilson himself, which was as follows:

VIENNA, August 19.

You have received five medals—two for merit and three co-operative.

The meaning of this is that the Wilson machine has received the grand medal *as the best sewing machine*, and a second medal as the machine best manufactured—that is, embodying the best mechanical workmanship. Besides these, Mr. George W. Baker, Assistant Superintendent of the Wilson Sewing Machine Company, receives a special medal for excellence of workmanship on the machine; Mr. Williams of this city receives a medal for best sewing on leather, done by the Wilson; and Miss Brock and Miss De Lussey receive still another medal for best samples of family sewing and embroidery, done on the Wilson machine. This sweeps the entire board. Not only has the Wilson sewing machine been pronounced the most capable and efficient sewing machine in the world, but its work, on both dry goods and leather, is pronounced superior to that of all other machines. This verdict at a World's Fair, where all the leading sewing machines of both continents have competed, before a thoroughly competent committee for more than three months, is the most complete triumph ever won by a sewing machine. We congratulate Mr. Wilson, we congratulate Cleveland on this admirable result. The people of the United States can henceforth be assured that in buying the Wilson machine for $20 less than any other first class sewing machine is offered, they are purchasing the best sewing machine ever offered to the public. It is the people's own machine, made to do the people's work, and offered at a price which every one can afford to pay. It is the people's machine which has won this triumph; the judgment of the Vienna Committee only confirms the verdict that the masses had long ago reached by actual experience.—*Cleveland Daily Leader, August* 20.

The National Lifeboat Service.

Although, in the perfection of its lighthouse system, our country is unsurpassed, there are many improvements in progress in the lifeboat service. The beacon serves to warn vessels from dangerous points, but, as in the case of the ill fated Atlantic, its warning does not always serve to avert the calamity it is designed to prevent. Hence a system of coast guards, comprising staunch lifeboats and thoroughly drilled men, ready to put off to a stranded ship at an instant's warning, has been, for a long time past in England and more lately in the United States, recognized as a necessity. In 1848, an appropriation was made by Congress for the establishment of life-saving stations on the volunteer principle, but experience proved that concerted action and full efficiency were only to be attained by proper training, and therefore the service has been placed under regular naval supervision. Lifeboats have been placed along various points on the Atlantic coast; and we learn from *Inter-Ocean* that two stations are now being established at Evanston and Calumet, on the lakes. The report of the operation of the system during the season of 1871-72 shows that the number of wrecks on our eastern coast was 22. The value of the vessels lost was $227,300, and of their cargoes, $281,800. The amount of property saved aggregated $299,756, and lost, $208,344, 206 persons being also rescued.

The Highest Land East of the Mississippi River.

Professor T. Sterry Hunt, in a paper on the mountains of North Carolina and Virginia, recently communicated to the *Tribune*, says that the region bounded between the Blue Ridge and the branch known as Iron Mountain, Smoky Mountain and the Unaka range, is the most elevated range east of the Mississippi. The summits of the Blue Ridge in North Carolina rise to nearly 6,000 feet above the sea, while the highest points of the Unaka range, in the same State, reach about 6,700, or more than 400 feet higher than Mount Washington, the culminating point of the White Hills of New Hampshire. This region, though abundantly wooded, watered and arable, besides possessing a delightful climate, is in the condition of primeval forest, from the fact that it is cut off, by its position, from the markets, and hence offers little advantage in remuneration of labor to the agriculturist.

The August Meteors.

G. C. T. says: "On the night of August 10, one hour before the moon arose, I kept my eye in the direction of *Perseus*, whence emanated eight meteors, two of which were of unusual brilliancy. The first traveled eastward, parallel with the horizon for 90°, with a uniform trail of 20°. The other ascended to the zenith; it also had a trail of 20°, with brilliant lateral scintillations, increasing in width."

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]
From August 2, to August 14, 1873, inclusive.

ANCHOR.—C. A. Chamberlin, Pittsburgh, Pa.
ARTICLE OF DRESS.—E. La P. Daniels (of New York city), London, Eng.
BALE TIE.—E. P. Jones (of Shell Mound, Miss.), London, England.
BOOT STRETCHER.—D. Harris, St. Louis, Mo.
CAR PLATFORM.—E. Miller, New York city.
DOVETAIL JOINT.—T. Hall, Northampton, Mass.
ELECTROMAGNETIC ENGINE.—C. Gaume, New York city.
FURNITURE CASTER.—J. B. Sargent, New Haven, Conn.
JOURNAL BEARING.—J. Eccles, Philadelphia, Pa., *et al.*
MATTRESS AND LIFE PRESERVER.—J. F. Peck, Springfield, Mass.
PILE DRIVER.—P. S. Justice, Philadelphia, Pa.
PROPELLER.—N. A. Patterson, Cleveland, Tenn.
RAILROAD RAIL.—J. B. Johnston, New York city
RAILWAY SIGNAL.—F. L. Pope, Elizabeth, N. J.
SEWING MACHINE.—D. Shedd, New York city.
STEAM PUMP.—D. Douds *et al.*, New Castle, Pa.
THEATER SEAT.—P. W. Nolan, New York city.
TOY.—A. H. Cramp, New York city.
WOOD PAVEMENT.—B. B. Hotchkiss, New York city.

Recent American and Foreign Patents.

Improved Pen Holder.

John S. Orndorff, Virginia City, Nev.—The object of this invention is to furnish an improved pen holder, which softens the scratches and jars of steel pens, producing an easy hold without cramping or tiring the fingers. The invention consists in attaching a hollow elastic sleeve to the stem of a pen holder, so as to confine a quantity of air and form a cushion.

Improved Farm Fence.

Winfield S. McKenzie, Rockwall, Texas.—This invention consists in the posts and pivoted or tilting bars for supporting a fence formed of wires or other material; in the combination of the loops and bars with the bars or posts that support the fence; and in the portable brace for strengthening an inclined fence against pressure. By this construction the weight of the panels forces the bars downward upon the loops, clasping the panels firmly between the bars with a greater or less force, according to the weight of said panels. The bars and loops may be used for connecting the panels to vertical posts, if desired.

Improved Rotary Engine.

George W. Cummings, Conneaut, O., assignor of one half his right to Daniel W. Hazeltine, of same place.—The object of this invention is improvement in the class of rotary engines and pumps having a piston box placed eccentrically within the steam cylinder and controlling the piston arms. The piston arms are arranged concentrically with the steam cylinder and tightly fitted to it by means of springs and packing.

Improved Signs.

William B. Lambert, Geneseo, Ill.—This invention consists in applying, to the backs of detachable letters, pivoted spring jaws or arms, which are adapted to be sprung under or into notches in a rod supporting the letters, said springs serving, in connection with hooked plates or clips attached to the letters and fitted on the rod, as a medium for firmly retaining the letters in position while not preventing their easy removal when desired.

Improvement in the Manufacture of Beer and Yeast.

Louis Pasteur, Paris, France.—The object of this invention is to eliminate and prevent the multiplication of microscopic organisms by the following means, namely: First, obtain pure yeast by separating the organic germs foreign to brewers' yeast; second, treating the wort while cooling from the time it leaves the copper, in which all the germs of disease are destroyed, until it reaches the vats, tuns, or fermenting apparatus, and even after fermentation in such manner that it shall not again receive, either by unlimited contact with the open air or with the vessels employed, any pernicious germs capable of multiplying and of subsequently changing the condition of the product; third, cooling in closed vessels in the presence of a limited supply of filtered air or carbonic acid gas.

Improved Dovetail Machine.

Alfred C. Van Alstine, New York city.—This invention consists in the improvement of tenoning and sash dovetailing machines. This machine is mainly arranged like an ordinary tenoning machine. Next to a tenoning head is a cope head; next to cope head is a dovetailer, which is set as close to cope head as it can be and run clear; it is mounted on a bar, which is pivoted to the machine in such a manner that it can be set perpendicularly, or inclined by swinging the bar on its pivot. Another dovetailer is set far enough to allow the check holder to tip over while passing between. The dovetailers are driven by belts from an upright shaft. There is also other improved mechanism of which a clear idea cannot be imparted without the aid of a drawing. To operate this machine for dovetailing sash stiles, the carriage is raised by means of inclines and screw, so that the sash stile, when laid on the carriage, will be above and clear of the head and cope; the upper head is then set so as to cut the stile to the required thickness; the dovetailer is then set so as to give the dovetail or diagonal cut, and another dovetailer is set so as to cut the last part of the dovetail mortise; then the stop is adjusted to give the depth of cut required; the stile is then put on the carriage against the gage bar, and passed through, and is finished at each end by one operation. The stiles for the bottom sash are run with the face of the stuff down, and the stiles for the upper sash are run with the face up. The inventor's address is 236 East 42d Street, and the machine may be seen in operation at 124th Street, East river, both in New York city.

Improved Ice Cream Freezer.

Antonio Lucetti, New York city.—To the tub of the freezer is connected the ice receptacle, which is made with a spout leading into the tub, through which the pieces of ice enter. The spout of the receptacle is provided with a gate to enable the outflow of ice to be regulated as required. A tube extending up allows the cold air from the ice to pass into the middle part of the receiver, so as to freeze the middle part of the cream as quickly as the outer parts. To bars crossing the open lower end of the tube and secured to the bottom of the receiver is attached a pivot, which works in a socket in the bottom of the tub. With the upper end of the tube is connected a vertical shaft which by suitable mechanism communicates with the crank for operating the machine. In using the freezer, the receiver is revolved by turning the crank with the right hand, and a spatula is controlled and guided with the left hand. The apparatus should be so arranged that the operator, while turning the crank with his right hand, can open the gate with his left hand to admit ice to the tub as required.

Improved Machine for Dressing Millstones.

Joel W. Parish, McFarland's, Va.—A small rectangular frame is arranged so that a platform, sliding forward and backward on a long frame, will carry the picks parallel with the furrows; that the shifting of the frames will adjust them from line to line for fine or coarse cracking; that by turning the pickstock the picks can be adjusted for cracking or furrowing; and that by shifting the socket piece on the pickstock the picks can be adjusted to the angle of the furrows, and by the fast and slow feeds the picks can be moved along the stone radially at the requisite speeds for the different kinds of work.

Improved Water Wheel.

Elyanus Hackett, Ulysses, Pa.—This invention relates to modes of utilizing the reactionary power of water, and consists in buckets having peculiarly shaped curves; in a novel mode of applying adjustable gates; and in combining with the ordinary wheel a subjacent second one which receives the reactionary impact of the water from the first and utilizes it in a very effective manner.

Improved Tilting Gate.

John Bartholf, Hillsborough, Wis.—This invention consists in the combination with double main posts of two folding half gates, which fold up into a vertical or inclined position, as may be required.

Improved Splice Joint for Railroad Rails.

William D. Lindsley, Wathena, Kan.—This invention consists in a fish plate having a solid flanged base that fits an excised part of the inside base flanges of rail, and rests, with an offset, upon a shoulder of the same to give strength to the rail ends and cause them to last as well as other parts of the rail, and at the same time to take the strain off the bolts.

Improved Pruning Knife.

Abraham C. Hulse, Palmyra, Ill.—This invention relates to pruning knives, and consists in a novel mode of combining the parts to form a pruning knife which shall be simple, effective and durable. It also consists in a peculiar mode of adjusting the relative position of the blades to take up the gradual wear upon them.

Improved Grindstone.

James F. Green and Sidney H. Green, Haverstraw, N. Y.—The object of this invention is to produce a perfectly true and central fastening for the cranks of grindstones, for the purpose of permitting their placing on and detaching at pleasure, economizing thereby in space and freight in shipping. The method provides a bushing cemented centrally to the grindstone, with a detachable crank. The different pieces may be separately packed, resulting in less damage to the goods and reduced expenses for freight.

Improved Hose Coupling.

Simon Ingersoll, Stamford, Conn.—This invention consists of a couple of short sections of metal tube, which couple together by a screw collar swiveled to one of them, and in connection therewith each section is provided with a clamp composed of two semi-circular parts connected together by flanges and bolts for clamping the hose on the metal tubes. The clamps are attached to the metal tubes by stud pins, which prevent the hose from slipping off the tubes endwise, as when clamped thereto by the ordinary two part metal clamps not connected to the tubes.

Improved Car Coupling.

Gebhard Koeb, Springfield, O., assignor to himself and Jacob B. Korn of same place.—The mouth of the bumper is made hopper-shaped, and with a horizontal opening between the inner edges of the upper and lower inclined sides of said mouth. The upper and lower inclined sides of a wedge-shaped cavity meet the upper and lower inclined sides of the mouth of the bumper head, just in front of the hole for the coupling pin, so as to form ribs, which angles serve as fulcrums to the coupling link, to allow its outer end to be raised to enter the bumper head of the adjacent car by lowering its inner end. The coupling pin passes down through a hole in the bumper, and upon its rear side is formed rack teeth connecting with a small gear wheel, attached to a rod. The rod passes through and works in holes in the flanges formed upon the upper side of the bumper, and which rise sufficiently high to protect the gear wheel. The ends of the rod extend out to the side of the car and terminate in a crank, or hand wheel. The lower end of the rack forms a shoulder, which rests upon the link, so that by turning the rod and gear wheel in the direction to force the pin downward, the inner end of the link will be lowered, raising the outer end of the said link to adjust it to enter the bumper head of the adjacent car. As the pin is raised, the outer end of the link will drop by its own weight. To the rod is attached a spring to hold the pin in any position.

Improvement in Attaching Knobs to Spindles.

Franklin M. Merriam and Joseph B. Merriam, West Meriden, Conn.—The spindle is made square, and has one, two, or more transverse notches or grooves formed upon the side of one end to receive the screw that fastens the neck of the knob. Upon the outer end of the spindle is cut a screw thread to receive the nut, the outer middle part of which is recessed to adapt it to serve as a cap to receive the neck of the other knob, which is secured to the spindle by a screw which passes in through a hole in the side of the socket nut, so as to lock the said nut as well as to secure the knob. A sleeve is slipped upon the socket nut to keep the screw from working out. The cavity of the rose is so formed as to receive within it the socket nut and sleeve, and its outer end projects inward so as to cover the ends of the said nut and sleeve, and fit upon the neck of the knob. The inner side of the plate of the rose is recessed to fit upon a washer, interposed between the said rose and the side of the door to prevent the door from being chafed by the said rose.

Improved Wrench.

Michael Bubser, Jersey City, N. J.—This invention is an improved wrench for turning the nuts of fish plate bolts, and other nuts and bolts that require great power to turn them. The base of the improved wrench is of such a length as to rest upon three ties at the same time. To the middle part is attached a wide bearing in which a shaft revolves and slides. One of the projecting ends of the shaft is enlarged, and in its outer end is formed a square hole of sufficient size to receive the nut to be operated upon. To the other projecting end of the shaft is attached a chain wheel, which is so small that its rim will not come in contact with the tie or ground. An endless chain, passes around the chain wheel and also around another chain wheel attached to a second shaft. By turning suitable screws the bearings may be raised to tighten the endless chain. Locking nuts are placed upon these screws so that the two halves of the bearings will be held close together. To the second chain wheel is attached an arm, to the outer end of which is attached a bolt, which passes through a longitudinal slot in a bar, and is provided with a hand nut. The other end of the bar passes over the projecting end of the wrench shaft, and is secured in place. Upon the end of the bar is formed a handle for operating. The arm and slotted bar thus form an extendible crank, which may be conveniently extended and contracted to give a greater or less leverage as more or less power may be required. The machine may be inclined in one or the other direction, as may be convenient in operating it. By this construction, as the machine is operated to turn the nut in one or the other direction, the movement of the nut upon its bolt will move the machine out or in.

Treating Cotton Seed Oil to Render it Drying.

Henry Goldmann, New York city.—This invention consists of a chemical treatment of cotton seed oil, to prepare it so that it can be used in the arts as a substitute for linseed oil. The inventor dissolves bichromate of potassa in water, heats to boiling point, carries into this clear cotton seed oil, agitating and mixing strongly for two hours; after twenty-four hours the oil is drawn off into another vessel, and here is added gradually, under constant strong agitation, *aqua regia*, freshly prepared, diluted with water. After settling the oil is again drawn off into another vessel, where it is mixed with oil of vitriol, diluted with water under agitation. It is then allowed to stand till clear enough for use.

Improved Harvester Cutter.

Frederick R. Sutton and William O. Sutton, Wellington, Ill.—This invention consists of independent ledger plates for the cutters of mowers and reapers, secured to the fingers by a lip at each rear corner turned down on the edge of the finger, and a bar above extending along the whole series, and secured detachably to the front edge of the finger bar, so as to be readily taken off to remove the plates for sharpening them. At the other ends the plates are secured by a notch in the end, and a notch or slot in the finger, as in other cases

Improved Wagon Seat Fasteners.

George Ruston, Freeport, Ill.—The object of this invention is to provide a fastener or latch, which is applied to both sides of a wagon seat, to connect the same firmly to the body of the wagon, so that the displacing or detaching of the seat is prevented, and a secure seat obtained. The invention consists of a hinge fastener combined with a latch applied to the sides of a wagon seat, the hinge fastener with bent end closing over the guide strip of the wagon body in connection with a pin locking into a hole of the same.

Improved Water Regulator for Boilers.

Calvin J. Weld, Brattleborough, Vt.—This invention consists, mainly, of the employment of a small tube or cistern by the side of the principal receiving cistern or vessel, into which small cistern the water is received and flows from it into the boiler, and in which is arranged a float having such connection with the cock for shutting the water off from the boiler that, when the water rises to the required level in the boiler, it will close the passage, and open it again when the water falls.

Improved Leg for Furniture.

James C. Orr and James M. Baird, Wheeling, W. Va.—This invention consists in constructing the legs of tables, desks, chairs, etc., in two parts, made and applied separately at right or other angles to each other, at the corners, and fastened separately to the table or other article, and fastened together at the bottom by a kind of lock-joint, secured by a button at the top on the table.

Improved Disinfectant Compound.

Jonathan Hilton, New York, N. Y.—This improved deodorizing and disinfecting compound is nitric acid mixed with oil of tar. This mixture is agitated with carbonate of lime. Sulphurous acid is caused to pass through, when, after settling, the fluid is separated from the solid parts. The solids are then dried, and, when reduced to powder, are fit for use. The fluid product is also very useful for pouring into sinks and other conduits requiring disinfection.

Improved Musical Railway Signal.

Reed A. Filkins, Cheshire, assignor to himself and Augustus R. Tyrrell, Savoy, Mass.—The object of this invention is to avoid the disagreeable and monotonous whistling of locomotive engines, and substitute therefor a more satisfactory method of signaling, and at the same time to indicate different signals, by the combination of harmonious sounds, or by various successions of sounds. This object is accomplished by providing a series of whistles in connection with the steam boiler of a locomotive engine so that one or more of said whistles may be brought into action by the engineer

Improved Hoe.

James M. Baird, Wheeling, W. Va., assignor to himself and Richard Stanley, same place.—This invention consists in an acute angled socket for attaching hoe blades to handles, the part or arm of the same which is to be secured to and cover the end of the handle being of semi tubular form, and provided with an inner projection or lug, and the other part being flat, or nearly so, to adapt it to be applied to the back of the hoe blade, to which it is secured by means of rivets.

Improved Hoisting and Conveying Apparatus.

Charles B. Stough, Monticello, Ill.—This invention consists of a portable apparatus, having a crank frame and roller frames, over which an endless chain is stretched, which is provided with adjustible links and hook carriages at suitable distances for hoisting and conveying the receptacles for the materials. Two of the roller frames are placed on the ground; two others are combined with the crank frame at any required hight above the lower frames and connected by guides which convey the boxes to the place of work. The chain is so constructed that it can pass over the rollers, which have separate shafts and are placed at some distance from each other, to allow the passage of the hooks between them.

Improved Combined Brake and Propelling Mechanism for Cars.

Jacob W. Hill, Jefferson, Iowa.—This invention is an improvement in the class of apparatus for propelling and braking railway trains, in which air is forced into suitable receivers when the train is checked, and its expansive power utilized into subsequently starting or propelling the train. The operation is as follows: When the train is running on a level, or when it is to be stopped or impeded by the brakes on down grades, so that all the steam is not required for driving it, the throttle valves will be closed, and air inlet valves will be allowed to act, thus converting the engines into pumps, which, being actuated by the running gear of the car, will force the air through passages into the receivers, which are connected together by a pipe, so that all may be filled to the extent of their capacity to retain it—say two hundred and fifty pounds to the inch; then valves will be fastened open to stop the pumping. At any time when more power is required than the steam is capable of exerting, the valves will be released so they can close, and the throttle valves will be opened, thus converting the apparatus into a motive power, which, being impelled by the compressed air, will largely aid the overburdened engine in its work.

Improved Churn.

Esau Archer, Davisville, W. Va.—In this invention the body of the churn is hung between standards so as to have a universal movement to adapt it to the dasher, which, worked by a crank, is provided with gearing so that it has both a rotary and an up and down motion.

Improved Smoke and Steam Burner.

John W. Kingman and Adolphus Eurgens, Laramie City, Wyoming Terr.—A box or trough, open at its top, is supported upon pivots attached to its ends, which work in bearings attached to the front and rear walls of the fire box. The coal to replenish the fire is first placed in the box, where it is exposed to the full heat of the fire. This heat expels the more volatile gases, which, with the smoke, are at once ignited and consumed. At the proper time the box is tilted, and the coke is dumped into the fire, so as to replenish without checking it. A steam pipe leads from the exhaust of the boiler, or from the boiler, and passes through the fire upon the grate. The pipe is connected, by a hollow pivot or other convenient means, with a pipe which extends along the bottom of the box, and has numerous holes formed in it. By this means the steam is superheated while passing through the pipe, and is discharged among the coal in the box, where it is decomposed, mingles with the smoke and volatile carbon from said coal, and is consumed.

Improved Shutter Worker.

Seth R. Foster, St. John, Canada.—This invention consists of an improved device for connecting all the window shutters upon each row, or upon each side of a storehouse or other building, so that they may be all closed or opened at the same time, and from any floor of the building upon which the operator may happen to be.

Improved Chair Seat.

James P. Sinclair, Elbridge, N. Y.—This invention relates to an improved mode of forming seats, backs for chairs, settees, etc. Strips of wood are placed edge to edge, and the ends enter grooves in the inner edges of the side bars of the frame. The forward edge of the forward strip and the rear edge of the rear strip enter grooves in the inner edges of the front and rear bars of the frame. The adjacent ends of the bars of the frame are framed and secured to each other in the ordinary manner. A strip of galvanized iron, flat or a wire, is passed through holes in the strips and its ends enter and are secured in holes in the front and rear bars. One or more of the metal strips may be used as may be required.

Improved Fireproof Floor and Ceiling.

William T. Butler, Chicago, Ill.—The joists are made of wood and form abutments for brick arches at the top or for the floor, and so as to support inverted arches for the ceiling or bottom. Braces of iron may be used for tying the joists together, the design being to keep the joists rigid and at a uniform distance from each other. A succession of arches forms the entire support of the floor. These arches are sprung from one joist to another, with bricks made for the purpose, supported by the beveled surfaces or abutments of the joists. The floor may be of any description. The lower part of the joist has beveled surfaces, which support the arches The bricks which form the arches come in contact with each other and form a continuous incombustible surface beneath the joists. The plaster or ceiling surface is laid directly upon the arches, thus dispensing with laths