

weights placed upon the crane do not exceed the set limit, these blocks are not moved, but if a heavier load is added, the springs are compressed, and the brake blocks, coming in contact with the sheave, lock this latter, and prevent all motion.—*Engineering.*

Pennsylvania Railway Regulations.

A new book of orders has been recently issued, which contains some rules which are worthy of notice and imitation, and which, if enforced, will certainly add much to the comfort of passengers. Among them are the following:

"Brakemen must announce the name of each station, and the length of stop when it exceeds two minutes. Baggage masters are prohibited from receiving perquisites for the care of articles. The order will go into operation as soon as possible.

"Newsboys on trains will not be permitted to individually importune or annoy passengers, but may announce in a low voice, or at intervals not exceeding four times in each car, the articles offered for sale. Nor will they be permitted to deposit their papers, books, etc., on the seats of the cars or in the laps of the passengers.

"Depot masters and assistants, passenger conductors, and brakemen and baggage masters must wear suitable badges.

"Passenger conductors must seat passengers and see to their comfort and enjoyment as much as possible, see that none stand on the platforms, or ride on baggage, mail, or express cars; put off passengers refusing to pay at the next station; not permit drunken and disorderly persons on trains, nor allow profanity.

"Baggage agents and masters must handle baggage carefully; the former to charge for extra weight invariably; the latter to carry only such packages, bundles, money, etc., as the Division Superintendent authorizes.

"No tickets must be sold to persons so intoxicated as to be incapable of taking care of themselves, or who, by reason of such condition, might risk their lives by traveling, nor to any one incapable of self care.

"Loungers are not permitted in telegraph offices.

"United States mail agents, express managers, sleeping car conductors, porters, news agents, and individuals running private cars are to be regarded and to consider themselves as employees, and to conform to these rules and regulations."

Some important changes have been made in the code of signals used. They are now as follows.

"Red signifies danger, and says stop.

"Green signifies caution, and says go slowly.

"White says go on, all right.

"Green and white is a signal to stop at flag stations.

"Blue is a signal used by car inspectors.

"One short blast of the whistle signifies apply the brakes.

"Two long blasts, release the brakes.

"Two short blasts, when running, are an answer to signal of conductor to stop at next station.

"Three short blasts when standing mean the train or engine will back.

"Four long blasts call in the flagman; four short blasts call for signals.

"Two long followed by two short blasts, when running, are a signal on approaching a road crossing at grade.

"A succession of short blasts is a cattle alarm. A blast of five seconds duration is a signal for approaching stations.

"A lamp swung across the track means stop; raised and lowered vertically, go ahead; swung in a circle, come back.

"The engine bell is always rung before starting a train, when passing or meeting trains, through tunnels or through streets; also, until each road crossing is passed."

An Eighty Tun Gun.

The London *Standard* says: "It may not be generally known that the principle upon which all our guns are now made is that discovered by Colonel Fraser. Briefly, it consists of a series of coils, welded together in such a way that the grain of the iron is best opposed to the explosive force of the powder, and encircling a steel tube, the interior of which is rifled. A long bar of iron—say of eight inches square—previously prepared is slowly drawn from a furnace, to a length of about 300 feet, and wound in a double coil in the form of a cylinder. This is again heated and placed beneath a steam hammer, where it is welded together by tremendous blows, which so effectually do their work that a cylinder capable of bearing the greatest possible strain is formed at a comparatively trifling expense. Several of these coils being made, they are placed in order upon a long steel tube which has been made in Sheffield, and the weapon is finally turned out at an average cost of about \$300 a tun, as against nearly \$750 at Krupp's factory in Essen. Upon this principle, then, it was resolved to construct an eighty tun gun, which should be able to pierce twenty inches of iron at a distance of a thousand yards, with a shot 1,600 pounds in weight, and by the aid of 300 pounds of powder. The length of this magnificent piece of artillery was fixed at twenty-seven feet, its diameter at the trunnion six feet, and at the muzzle sixteen inches, inside measurement. It was calculated that such a gun would be able to deliver its mischief-working missile at a distance of nearly ten miles, and that it would, at the same time, be easily placed in the turret of a war ship or the embrasure of a battery, and worked quickly and without difficulty. Of course there were many difficulties in the way of the construction of such a weapon. No steam hammer such as that which Krupp possesses at Essen was to be found in England; no forges were built large enough for such a tremendous heat; no cranes were in position to hoist such a weight. But all these difficulties were speedily overcome by the skillful officials at Woolwich. The forges were built, a huge steam hammer of forty tuns weight, with double action arrangement and a

striking power of nearly 1,000 tuns, was made, and very soon all was in readiness to begin the construction of the great gun. Curiously enough, His Majesty the Emperor of Russia was the first to see one of its coils welded, and since that time the work has been gradually going on, till now the steel tube, the breech piece, one coil, and the trunnion are finished; so that it is certain that by June next the gun will be ready for trial. It will then consist of the following parts: A tough steel tube inside, weighing nearly sixteen tuns and measuring about twenty-four feet in length, a breech piece coil twelve feet in length, one central coil, another coil nearer to the muzzle, and the trunnion coil. The cascabel through which the fire from the friction tube is communicated to the cartridge inside the gun is of steel, and immensely strong. Such is the weapon upon which hopes of a victory over twenty-inch armor plates are built. If it should succeed, three more will be made immediately, and the four pieces placed on board the *Inflexible*, which will then be the most powerfully armed vessel in the world. Possibly, at the same time, some addition may be made to her armor, so that she may be as invulnerable as she is terrible."

The Sandy Hook Ordnance Experiments.

The tests of the smooth bore guns which have been converted into rifles, by the insertion of a grooved wrought iron or steel tube, are making favorable progress at Sandy Hook. The artillery and ordnance officers conducting the trials appear to be quite confident of the success of the plan, and assert that it will result in trebling the efficiency of the 2,000 smooth bore guns now in Government possession. The cost of conversion, per gun, is about \$500; and if for this moderate sum a weapon can be produced equal in power to the built-up rifles of England and Prussia (which in the former country cost \$5,000, and in the latter from \$8,000 to \$10,000) the advantages on the score of economy alone will be very considerable.

The eight inch rifle now being tested is being fired with charges of 35 lbs. of mammoth powder and 175 lbs. projectiles. The one hundredth round gives a pressure of gas in the bore of 35,000 lbs. per square inch, and an initial velocity of 1,420 feet. This gun was converted from a ten inch smooth bore. Further trials are to be made with the same weapon altered to a nine inch rifle, and fired with 40 and 50 lbs. of powder and a 225 or 250 lbs. projectile.

THE telegraph cable between Europe and Brazil was finally completed and opened on the 23d of June, 1874, and is working well. The line cables are 3,213 miles in length, and extend from Lisbon, Portugal, to St. Vincent, in the Madeira Islands, 1,260 miles, thence to Pernambuco, Brazil, 1,953 miles.

At a gold mine about a mile and a half east of Mount Monadnock, N. H., several assays of ore have been made. The quartz is said to vary from \$5 to \$840 per tun, or on an average not less than \$100 per tun. The ledge in which the gold is found covers thirty-two acres.

Recent American and Foreign Patents.

Improved Filter.

Richard L. Gentry, Richmond, Ky.—This is a filtering apparatus through which rain or other water is passed before being collected in the cistern or otherwise applied for use. It consists of an outer and inner chamber filled with filtering material, to which the water is admitted by a supply pipe passing through a perforated bottom of the outer chamber and side apertures of the inner chamber into the latter, rising therein until reaching the bight of the central discharge pipe, from which it is carried to the cistern or other place. A perforated outlet hole of the discharge pipe, near the bottom of the inner chamber, drains the filtering material from the remaining water, while a screw spout of the outer chamber allows the cleansing of the filter from impurities.

Improved Mainspring.

James C. Edwards, Binghamton, N. Y.—This invention consists of the mainspring of a watch, clock, or other spring power, having the hole which receives the stud pin in the face of the barrel, arbor, or hub, for attaching it thereto, placed the distance of one circumference of the barrel or arbor from the end, and tapered from the hole to the end. The object is to graduate the rise of the next coil of the spring from the face of the barrel or hub on to the spring, so as to avoid the abrupt projection which the end of the spring forms when left the full thickness, and which produces an extra strain and bend at that point.

Improved Machine for Shaping Chair Bottoms.

Jacob Shuh, Berlin, Canada, assignor to himself and John Shuh, same place.—This machine is designed for hollowing and shaping the upper side of wooden chair bottoms. It comprises mechanism for holding the plank, of which the bottom is to be made, upside down over a rotary cutter, and guiding it to the cutter so as to cut to the required depth and shape, both on the bottom and the back, and at the same time feed it forward and backward laterally, and also from front to rear, so that one tool will perform all the work. The holding contrivances are adjusted for seats of different sizes, as well as for varying the depth and form of the hollow.

Improved Combined Step Ladder and Wash Bench.

Frederick S. Bidwell, Thompsonville, Conn.—The object of this invention is to improve the combined step ladder and wash bench patented February 3, 1874. This invention consists in the introduction of a supplementary brace frame pivoted to the lower part of the ladder-supporting frame, so that when the ladder is used as a wash bench and the supplementary frame set into the sockets of the latter part, the supporting frame, jointly with the shelf brace, forms diagonal braces for the wash bench, and stiffens the same more fully for the heavy weight generally placed thereon.

Improved Iron Fence.

Henry D. Stimson, Covington, Pa.—This fence is formed of a series of overlapping metallic rings, attached to central connecting bars, and secured below to a base sill.

Improved Pruning Implement.

Samuel J. Vance, Palmyra, Ill.—This is a pruning knife, which cuts the limbs or twigs by lever power exerted on the cutting knife and hook by the downward pulling of the handle. To the upper end of the handle, the rear end of the cutting knife is pivoted, while the front part is pivoted sidewise to a hook, having a slide guide plate and a guide band for sliding along the handle part.

Improved Litholyte.

Henry W. Bradford, Randolph, Mass.—The inner tube of the apparatus is arranged within another tube, which forms the confining tube for holding a bag, and springs within such compress as will admit of inserting both in the bladder and withdrawing them from it. Spring jaws have the edge of the mouth of the bag fastened to them, and are pivoted together at one end, and at the other end are connected to small steel rods between the tubes. These jaws are provided with mechanism so as to grasp the stone, and a small tube of platinum is inserted after the stone has been secured in the bag, for conducting nitric acid into it for dissolving the stone, so that it will flow out through the inner tube. The invention mainly consists of ingenious mechanism for governing the jaws, etc., to understand which a drawing would be requisite.

Improved Door Check.

Conrad W. Breidenbach, Dayton, O.—This consists of a stud, provided with a cushion for the door to strike against and having beneath a spring latch, which catches under the door and holds the same.

Improved Shutter Fastening.

Josephine S. Keator, Kingston, N. Y.—This consists of an angular hook, which is held in position by the window sash, and which engages with the staple of the blind. The butt end is turned to form a right angle, and a lip projects upward from said portion and bears against the sash when an effort is made to unfasten the blind from the outside. The lower rail of the sash bears against the lip.

Improved Steam Fountain Washer.

Henry R. Robbins, Baltimore, Md.—This invention relates to means whereby the steam boilers of hotels, laundries, and other buildings may be readily utilized for washing purposes, thereby greatly economizing fuel, and lessening the cost of washing over ordinary methods of specially generating steam for each tub or vessel.

Improved Handle and Covering for Burial Cases.

William S. Wood, Newtown, N. Y.—This handle is attached to rounded or angled corners of the lid, so that there will be two handles at each end, and so that the lid can readily be lifted and adjusted by two persons. The same inventor has also patented an improved process for covering metallic burial cases. The shells and the caps of the casket are submerged in a vat of melted beeswax, and while the wax is warm the cloth or velvet is put on and rubbed or pressed to the waxed surface.

Improved Carpet Stretcher.

John Niver, Sherman, N. Y.—The invention consists of three parts, a stretching bar, having a series of hooks and a perforated flange on its under side, a standard for supporting it, and a detachable brace rod, which connects them, and is made adjustable. The construction of said parts is such that the stretching bar may be used to stretch the carpet in two opposite directions from the point where the standard is located.

Improved Machine for Trimming Keys of Musical Instruments.

Milton Pratt, Deep River, Conn., assignor to himself and Pratt, Read & Co., same place.—This is a machine for trimming off the wood remaining on the keys after the pieces commonly known as "sharps" are removed. The keyboard is moved along under a cutter, and the spaces between the keys are cut on a bevel down to the ivory. The cutter is actuated by means of a treadle applied to the pitman. By means of a gagescrew, the cutter is made to stop when it cuts through the wood, so that the ivory is not injured.

Improved Coupling Rod.

John Way and Alvan S. Hoffman, Napanock, N. Y.—This consists mainly of a weight attached, by an arm, to the coupling rod, and in the mode of supporting the weight before coupling. The arm is held up by the friction produced by a spring; but when the weight is raised, and the coupling rod is set for coupling, the pressure of the spring on the arm is reduced by a catch, which holds the spring out from the hanger, so that a slight concussion releases it, and allows the weight to drop and turn the coupling rod.

Improved Lamp Stove.

John W. Schreiber, New York city.—This invention relates to the construction of lamp stoves, in which a lamp or burner, already patented by the same inventor, is employed. The bottom of the fire box is perforated, and beneath are a series of wires. Beneath the wires is an annular plate with holes, which are arranged directly below the holes in the bottom. There is a space beneath this annular plate and the bottom through which air is furnished to the burner, the bottom of which burner is perforated. The bottom of the fire box, the wires, and the annular plate are arranged in two separate parts, one part being stationary and forming the greater portion of a circle, and the other part being attached to the door. When the door is closed, the two parts form a complete circle. The annular plate has a narrow flange on its outer edge, which prevents the air from escaping outward.

Improved Cone for Smoke Stacks.

James Hughes, Scranton, Pa.—The object of this invention is to break the striking force of the products of combustion before they reach the reticulated cover of the bonnet; and it consists in placing under the cover, and directly over the top of the smoke pipe, a concave spiral plate, which will readily allow the products of combustion to pass through the center and between the convolutions, but will cause all to strike the plate at some point.

Improved Process for Restoring and Purifying Caustic Alkali.

David Hanna, Jersey City, assignor to Henry C. Ohlen, Madison, N. J.—The lye is gathered in iron tanks and agitated to throw off the gaseous residuum it retains from the oils. After filtering, it is run into evaporating pans, where it is kept boiling till reduced to 30° or 40° gravity, and is then drawn off into settling tanks, and a quantity of finely pulverized quicklime added; also a little ammonia is sprinkled over the top. After standing a few days, the alkali is drawn off and put up in packages.

Improved Sewing Machine Table.

William Whitworth, Cleveland, Ohio.—The middle piece is of soft cheap wood. The side pieces and the end piece are of walnut or other fine and expensive wood. The soft wood portion is arranged with the grain running crosswise of the table, and it will be tongued and grooved to the side and end pieces, and these pieces will be framed together at the ends in any approved way. The veneer will be glued on in the ordinary way. The table thus constructed will not shrink, nor swell, nor warp by atmospheric influences, and will have the appearance of a table of solid fine wood.

Improved Detachable Horseshoe Calk.

Bushrod O. Bradfield, Pittsburgh, Pa.—This horseshoe calk has a rear aperture and horizontal lips, the lower preferably a little longer than the upper, and somewhat thicker. These lips embrace the body. A bolt is passed diagonally from the highest point of the calk through the body and lip. The lip, being comparatively thin, will not be objectionable, while the rivet or pin is out of the way of the hoof, and is yet made to take a good hold upon the shoe.

Improved Traveling Bag Retaining Device.

David L. Holbrook, Sing Sing, N. Y.—This invention consists in an improved traveling bag fastener formed of an angle plate, provided with a bent arm with a chain and a link or ring. In using the device, the chain is passed around the arm of the car seat, or around any other object to which the bag is to be secured. The angle plate is then passed through the ring, and placed within the traveling bag. The jaws or frame of the traveling bag are then closed upon the arm and the bag locked. With this fastening, the bag cannot be removed without first unlocking it.