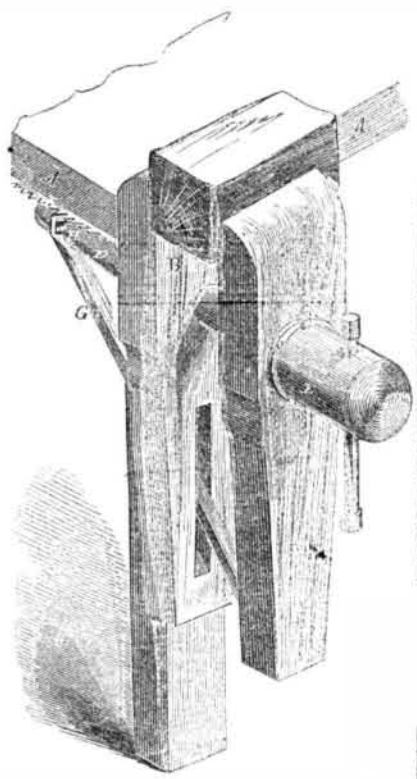
D, and brace G. The upper end of brace G is sharpened so as to mesh into the notches of rack I, which is secured to the under side of the bench. The brace, which thus becomes a pawl to the rack, should have sufficient vertical play to enable it to enter and be disengaged from the rack, but no more. A notch and pin, H, may limit this motion. A few coils of screw thread are cut on the outer projecting end of rod D. on which a nut, E, fits; this is provided with the ordinary winch or handle used for turning the screw of a common vise, and with a flange, *b*, around the edges of which, hooks, *c c*, pass, to keep the nut in contact with the jaws.



When the jaws are free, the weight of the brace, G, keeps it disengaged from the rack I, and consequently the movable jaw may be pashed in or drawn out by simply sliding it along. But when any article is placed between the jaws, and the movable jaw is pressed against it, the lower end of said jaw is thereby pushed inwanrd toward the movable jaw till the ratchet brace enters one of the notches of the rack, I. A turn of the nut, E, then tightens the jaws upon the article, the stronger the pressure against it, producing a corresponding increase of pressure of the brace, G, into the notches of the rack, so that the article is again set free; by turning back the nut, E, the ratchet brace falls from the rack, and the vise is free to be opened or shut by simply sliding the rod, D, and movable jaw, C.

This vise accomplishes two objects most desired, viz., to open and shut the jaws by an instantaneous movement, requiring only a turn or two of the winch simply for tightening, and to keep the jaws parallel. It not only effects the latter purpose, but permits the movable jaw to be adjusted to an exact parallelism with the other jaw, or to vary but slightly therefrom. And withal, its simplicity is such that the cost of the manufacture is less than that of the ordinary screw vise. It is equally suitable as an iron and wooden vise for the smith or the carpenter. More information may be obtained by addressing Messrs. Florey & Davis, Yellow Springs, O.

Improvement in Gas Retorts.—By John G. Hock, of Newark, N. J.—The object this invention is to enable the heads of the retorts to be more handily and quickly attached and detached than the mode of fastening them, at present in general use admits. Another object is, to enable the fastening to be readily detached from a worn out retort and applied to a new one. The neck of the retort is cast with a strong lug on each side, close to the mouth, said lug having a square hole through them to receive the square shanks of two hook headed bolts, which, with a bail and an inclined projecting rib, on the outside of the retort, constitute the fastening.

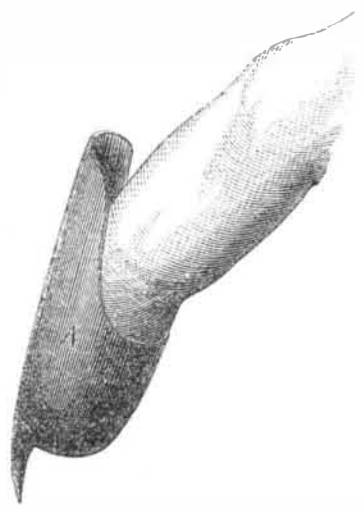
Improved Head Block for Saw Mills.—By Bela Gardiner, of Florence, Mass.—The ordinary head blocks of saw mills must be moved by hand after each board is cut. This improvement consists in rendering the head blocks self-moving so that the labor of an attendant for that purpose is not needed. It is done by means of an endless chain and pinion screw connected to the driving machinery. The log, after being properly placed upon the carriage, will be all sawed up into boards without stopping the saw.

New Method of Hanging Saws.—By John Robingson. New Brighton, Pa.—Consists in hanging the saw frame between the ends of vertically vibrating arms, so that the saw, in its descent, will be thrown forward against the stuff, but in its ascent will be drawn back, away from the wood. This improvement is said to render the saw more effective in cutting, to consume less power in rising, afford better opportunity for the dust to be cleared from the cut, &c.

Weighing Apparatus for Carts.—By James W. Martin, Burlington, N. J.—Consists in the attachment of a weighing apparatus to common carts, so arranged that by pressing a lever the cart body and its contents become separated from the wheels and swings on a scale beam, by which it may be accurately weighed. No change in the form of the cart is made. The common use of such vehicles would put an end to cheating in the weight of coal and other articles, for the consumer could himself weigh them, before his own door.

Music Rack.—By Thomas Ward, Birmingham, Pa.—This is a frame for holding up music books, and is intended to be placed upon pianos, organs, and other instruments. One feature of novelty consists in the facility with which it slides from side to side, so as to accommodate the position of the performer.—Another feature is an action which turns the leaves of the music. This is done by a spring and wires. By touching a pin, and the leaf instantly turns. The invention contains other interesting features. We have an engraving in preparation, which will shortly be published.

Husking Thimble.—By J. H. Gould, of Deerfield, Ohio.—In the operation of husking corn it is common to take the ear in one hand, and with a finger nail of the other, to slit the husk lengthwise, so that it may be more easily torn off. This method wears away the nail and excoriates the end of the finger, rendering it so painful that the operator is obliged ere long to quit work.



The present improvement consists of a thimble, A, the bottom part of which is furnished with a small cutter, B. The thimble is worn upon the finger and used in place of the nail. It is an effectual remedy for the evil above mentioned.

Recent Foreign Inventions.

Air Springs.—A patent has been received by T. Macintosh, of London, for rendering membraneous tissues, such as bladders and skins, air tight, whereby they may be formed into bags, and made into air springs like india rubber. Skins or bladder tissue are steeped or some hours in solution of glycerine and glue, and then taken out and dried. After this, such tissue can be formed into a bag, filled with air and placed in a cylinder in which a piston is inserted for the purpose of forming an elastic air spring. The object of the invention is to use such springs for railroad cars, &c. Air springs of the same nature, but formed with india rubber air bags are old and have been illustrated in a back volume of the Scientific American, and are of American origin, but the preparing of skins and membraneous tissues, as described, to render them as air-tight as india rubber, is a new process, and if it accomplishes the object specified, it is a useful discovery.

Steel Pens.—Mr. Macintosh has also taken out a patent for making steel pens with two nibs—one at each end of the pen—so as to have two pens on one piece of steel. The penholders are made to receive the nib end of such pens, and not injure them, and when one nib is worn out, it is turned round, as it were, and the other used. This invention possesses the merit of saving steel pen material.

Air Gas.—A. Longbottom, of London—formerly a resident of New York—has obtained a patent for constructing retorts for making gas from oil, with an interior cone in each, and convex on the outside. to contain the fire. Each retort has also a false perforated bottom, under which is placed a mixture of charcoal and lime. The oil is permitted to enter the retort and drop on the red hot apex of the cone, when it is converted into gas. The gas cannot get out without passing through the perforated bottom and amongst the heated mixture of charcoal and lime, which tend to purify it. From the retort it passes to the cooler, where it is washed with water, and from thence into a receptacle for use. The inventor was engaged in this city some five years ago, in endeavors to improve portable oil gas apparatus and introduce them into use. Cotton and other factories are now illuminated with oil gas made from crude resin oil, which can be obtained very cheap.

New Tooth Powder.—J. P. Garbai, of Paris, has obtained a patent for a new tooth powder said to possess wonderful virtues over all others heretofore used. It consists of salt mixed with iron in solution, coffee, chicory, sugar, rice flour, saffron, rhubarb, cream of tartar, and powdered ivory. About two grains of the sphate of iron is mixed with an ounce of common salt in solution; the water is evaporated by heat, and the residue is mixed with the other substances named—about one-fourth of each according to the quantity of salt being used. This may be a good tooth-powder, but it is certainly a complicated one, and no better, we think, than are made of common salt, sugar, and whitening, in about the proportions of one-fourth of the sugar and whitening, by weight, to that of the salt. These ingredients should be ground all together to a fine powder in a mortar. Charcoal may be substituted for the sugar.

Cod Liver Oil and Chocolate.—F. H. Lebargire, of Paris, has obtained a patent for mixing cod liver oil with chocolate, and forming the compound into cakes. The oil is mixed with the chocolate in grinding the latter. This is stated to be a pleasant mode of using cod-liver oil by invalids.

Engineers, and Steam Boiler Explosions.

This subject is always coming up in some new form requiring constant watchfulness and discussion, because it is of such vast consequence to the safety and welfare of thousands of our people. The boiler to which we alluded last week, as having recently exploded at Albany, N. Y., requires to be noticed at some further length. It was a large boiler, weighing five tuns, capable of generating steam for a seventy-five horse power engine. The testimony regarding the quality of the iron, and the manner in which the boiler was constructed, is contradictory; but, on the whole, we would infer that the iron was pretty good, and the workmanship not of an inferior character. It had been managed, however, with a great disregard to safety. It was put up in February last, was never tested, and had no gauge on when it exploded. T. Merritt, the foreman of Pruyn & Lansing, at whose shop it was built, gave it as his opinion that the explosion was caused by the want of water in the boiler, and then injecting cold water into it when over-heated.

Some engineers testified that the iron of the boiler was bad, but all agreed that the water had been low in it, and the universal opinion of engineers, examined as witnesses, was "that cold water had been injected into the boiler while in a heated state, for want of water, by which certain gases were generated which caused the explosion." This is the point to which we wish to direct the attention of engineers. D. Gage, an engineer, gave his testimony to this being a cause of explosions; so did Theodore Merritt, so did Louis Provost, who also said he heard so from scientific men; and so did W. S. Low, who also added that steam alone could not have produced such an explosion.

About three tuns of the boiler, in one piece, was projected into the atmosphere like a rocket, and large pieces of other parts of it were driven nearly a mile distant; and the shock was like that of an earthquake in Albany. The explosion was of such a violent character, that no wonder the engineers who testified upon a stock of common information regarding steam, attributed it to certain gases generated in the boiler; in other words, they did not exactly know how it could have been produced by common or uncommon causes.

We are of opinion that the construction of the boiler was good, and that the explosion was caused by the sudden generation of a great steam, not gas, pressure, by injecting water into the boiler while in a highly heated state from want of water. It appears plain, from the evidence, that the water in the boiler had fallen below its proper line, and that the fire acted on the plates above the water, and had raised them to a high temperature—red hot, perhaps. The steam above the water in this case would then become super-heated, and when water was injected into it, a sudden generation of steam would take place, and at a pressure far above that at which the boiler was contracted for to withstand, viz., 125 lbs.

Experiments have proved the possibility of heating steam in contact with water, without increasing the temperature of the latter. Steam heated in a boiler by hot plates above the fixed water line, if raised to a temperatnre of 435°, and water suddenly injected into it, will raise the pressure instantly to 360 lbs. on the square inch. If steam were heated to 1000°, its pressure would only be increased three-fold, but if water were suddenly injected into it, its pressure would be increased 1700 times. What foreign gases could be generated in the boiler that exploded at Albany? What were the substances in the boiler capable of generating them? The water could not be resolved into its elementary gases by the hot boiler. Red hot iron will decompose some water by absorbing the oxygen and setting the hydrogen free, but the latter gas is not explosive. Cold water injected on a red hot boiler plate at 1100°, will generate steam slower than if injected into a boiler having its plates of no higher temperature than 450°. Water poured on highly heated plates assumes the spheroidal form, and repels the heat; therefore the injecting of cold water into the heated boiler, at Albany, could not have produced foreign gases, nor have caused the explosion in the manner assumed by the engineer and witnesses mentioned. The boiler at Albany was hurriedly put up; hurriedly put to use without being tested, and recklessly managed without a gauge. All the business connected with it appears to have been driven with furious haste, and this always involves an unwise regard of consequences. As so many engineers appear to be unacquainted with the fact that steam can be superheated in a boiler, and produce explosions in the manner stated, we hope the above will be discussed freely throughout all our engineering establishments, for the purpose of diffusing useful knowledge.

Shafts for the Adriatic.

The Philadelphia *Times* states that one of the shafts for the above noble steamship has been completed at the Reading Forge, Pa. In the rough, it weighed 40 tuns, when finished it will weigh 33 tuns. It is the heaviest shaft ever forged in our country. The crank for it will weigh 16 tuns.

A Great Philosopher Dead.

Sir William Hamilton died at Edinburgh on the 6th inst. He was generally considered the most profound philosopher in Europe. His reach of thought was vast, and his learning deep and extensive.