

pain was the operation. This suggests the idea of employing an instrument of this kind for similar purposes in surgery. A very light and portable instrument could easily be made to receive its rapid circular movement by hand; and the freedom from pain ought to commend it to speedy use. It would have the further advantage of making the section with greater precision than can be attained with the ordinary surgical knife and hand-saw; and it would not require the same firmness of nerve either in the patient or the operator.

**THE WATER HAMMER.**—Our unscientific readers may be interested in an explanation of the water hammer. By opening a stop-cock or fountain in a tube, as that of one of the great mains of the Long Pond water, a current is established through the tube, the velocity of which is to that of the jet at the orifice inversely as the square of the diameter of the pipe to the square of the diameter of the orifice.

Thus, if the orifice at the fountain be three inches and the main thirty inches in diameter, and the velocity of the jet be seventy-five feet per second, a current of nine inches per second will be established in the main. If the jet be six inches in diameter, the current in the main will be thirty-six inches, or three feet, per second. Now, the amount of velocity multiplied into the weight of the water in motion. The water in four miles and a half of thirty inch pipe, would be something over four thousand tons, if our ciphering is correct. The motion or blow which an instantaneous stopping of a three inch fountain destroys, is that of a hammer of four thousand tons moving at the rate of nine inches a second, or half a mile in an hour, which is just the same blow as that of a hammer of forty tons, moving with the velocity of the jet, or seventy-five feet per second. And in a water pipe this blow takes effect in all directions, the weakest point, if any thing, yielding. When we consider the force of a hammer weighing forty tons, —eight hundred thousand pounds—swung with the lightning velocity of 75 feet per second, we shall see that the strength either of the gate boxes or the pipes is nothing to it, and their only safety lies in the impossibility of shutting a stop-cock instantaneously. As time is employed in destroying the motion, the force of the blow is divided.—[Farmer and Mechanic.

**NEW PRINCIPLE IN THE SAW MILL.**—Horace Hecock, writing to the Jeffersonian, says he has invented a method of sawing, "calculated, as a general thing, to save the time and trouble of gigging back the carriage, as the saw, after cutting through, is instantly reversed, together with the feeding apparatus, setting the board at the same time to the required thickness, and returns cutting through the log each way alternately, without stopping, until the log is finished." The mill, however, is built with apparatus for gigging back the carriage, for convenience in cutting through the first time, for scantling, &c.—[N. Y. Farmer.

**IMPROVED SHOE-PEGGING MACHINE.**—This is an invention described in the American Cabinet, the merits of which consist in holding the shoe on rocking, turning, or moving stocks, in the proper position to be pegged together with the simultaneous intermittent movement of the carriage and stock, by means of a cogged and grooved guide pattern, and

traversing guide shaft and pinion, for the purpose of arranging the pegs at uniform distances apart, in lines round the sole of the shoe, and parallel to its edges.

Also, the employment of the turning tube, for the purpose of receiving the charger, and then placing them over the hole punctured in the sole of the shoe by the awl, in the proper position to be driven therein, combines the manner of supplying the turning tube with pegs from the charger at suitable intervals, by means of a vibrating driver.

And lastly, the employment of a spiral chamber or groove to contain the pegs and supply them to the charger, one at a time, by the simultaneous intermittent action of the traversing pusher, and ratchet wheel, or otherwise in combination with the charger driver, turning tube, awl, and punch, arranged and operated in the manner and for the purpose described.—[Farmer and Mechanic.

**CHEAP LIGHTNING RODS.**—No. 1 wire is said to be an ample protection against lightning, put up as the large rods are. War ships use the wire with complete success.

**PATENT SAFETY BRIDLE.**—Mr. H. Seitz, of Marietta, Lancaster county, Pa., is the inventor of a recently granted, whereby it is impossible for the most spirited horse to kick or run away, and perfectly safe for a lady to drive or ride.—The principle on which it is constructed is to hold the horse by the application of a pulley around which the reins are made to pass at the side of the horse's mouth, which enables the rider to exert a great deal of lever power to control the mouth of the animal, and to check him at any moment.

**KEEPING WORTHLESS DOGS.**—It is universally admitted, that what would keep a dog would keep a pig. It need not be said then, which would be found the most profitable to a poor man's family, at Christmas, a dog for his children to play with, or ham and good bacon to fill their stomachs.

## THE ATMOSPHERE.

The positive amount of carbon present on the atmosphere is a question of much interest to the theory of vegetation, and other phenomena of the earth's surface. This question is solved, first, by estimating (which can be done exactly) the total weight of the atmosphere round the globe; next, by taking the fractional proportion which carbonic acid forms of this amount; and, finally, by deducting the further proportion of 27 per cent., which oxygen bears in the composition of carbonic acid, leaving, as a gross result, 3,085 billions of pounds of the element of carbon existing under this condition;—a quantity which, Liebig states, but on less assured grounds, to exceed the weight of all the plants and strata of coal existing on the earth.

The same method has been largely and curiously applied to the ingredients of animal and vegetable bodies, and to the parts of inorganic nature on which they respectively depend; and the results have proved singularly interesting in the natural relations thus disclosed; and of great practical utility in agriculture, and other arts of life.—[Quarterly Review.