

THE LOWELL WATER WHEEL TESTS.

Some of the water wheel manufacturers, whose wheels have been tested at Lowell, have expressed dissatisfaction at the table of results, furnished by Mr. Risdon, published in our issue of February 24. In the hope of satisfying all parties we append herewith a tabulated statement, furnished by Mr. Emerson, which he asserts to be correct. In the report from which this table is taken, the writer states that the Risdon wheel was bound slightly in the upper bearing, at Lowell, causing a loss of perhaps one per cent, while it ran perfectly free at Mount Holly, where it gave 84.60 as the highest result. It will be seen, by referring to the table previously published, that the latter was included under the Lowell tests; but it seems the result was obtained at another time and in another place.

Table with columns: NAME, Size, REMARKS, Ft. Head, PERCENTAGE OF PART GATE (1/4, 1/2, 3/4, 4/5), WHOLE GATE (H. Power, Percent). Rows include Swain, Leffel, Common finish, Bodine Jonyal, Bryson turret, Tice, Houston, Second, Third, Trullinger, Second, Kandleberger, Stetson, Second, Same, Another, Same, Upham, Second, Third, Fourth, Fifth, Sixth, Seventh, Luther, Wheeler, Second, Third, Whitney, Second, Third, Wynkoop, Davis, Second, Third, Tyler, Second, Third, Burnham, Buzby, Cook, Second, Bastion, Second, Third, Risdon, Eclipse, Barber, Teller, Libby, Second, Third, Gardiner Cox, Thompson.

he added, holding out his sabre toward the reptile. Quickly the snake raised his chest and sprang his full length, falling within two feet of the legs of old Straddle's horse. "Look out there, or he'll bite you," cried General Bradley. "Not a bit of it," replied Straddle. "The fact is, General, I have been studying this specimen of the natural productions of this country for more than an hour; and I have found out, first, that he will not bite unless coiled; second, that he can only jump the length of himself when coiled." He then made the snake coil up again and strike two or three times. "He ain't much of a traveller, either," said old Straddle, whipping the reptile when stretched out and making it run as fast as it could. "He coils tail first," continued the experimenter, making him coil, "and like an honest fellow, gives fair warning before he strikes, which is more than some of our own kind do, General; besides, I don't believe he'd strike

Velocity of Meteoric Stones.

In Professor Nordenskjöld's account of the aerolitic shower which took place near Hesse, in Sweden, on the 1st of January, 1869, he mentions as a remarkable fact that stones weighing two pounds, which struck the ice of the Larstäviken, failed to penetrate, making holes only three or four inches deep in the ice and rebounding.

The small velocity retained by these stones, at the time of striking the earth is, doubtless, owing to the resistance of the air, and, consequently, is not an indication of the velocity which they had, upon entering the atmosphere.—Nature.

The interest of the above, says the American Gas Light Journal, lies in the fact that many meteorites have been proved to pass into the atmosphere with a swiftness more than ten thousand times greater than that of the swiftest cannon ball. The flame that attends their passage is believed to be due to heat produced by their compression of the air in front, as in the "fire syringe." The writer has before suggested that, if a cannon ball could be projected with this velocity, it would burn up instantly as a streak of intensely brilliant flame. The probability is that the impulse necessary, to impart such a velocity to a cannon ball would grind it to powder in overcoming its inertia. We have also before thrown out the idea that aerolites which reach the earth are such as have had their velocity so reduced by friction that they become cooled below the vaporizing point before reaching the earth. The comparatively low velocities above recorded are thus easily understood. Much must depend on the angle at which they first strike the atmosphere. Some think that, in meteoric showers, they merely flame through the outer edge of the atmosphere, and shoot on in their appointed paths, like messengers from the outer universe who merely call to take a look at the earth in passing; but it may be, on the other hand, that these "falling stars" are altogether consumed or dissipated, reaching us only as impalpable dust.

Copper Gas Pipes.

The Journal de l'Eclairage notices an accident which once more proves the danger of using copper gas pipes. On the 21st of April last, a workman having, with a triangular file, cut almost through half the diameter of a gas pipe of red copper of 3/4 in. interior diameter, which supplied the Liège station, was removing the tool when an explosion similar to the report of a rifle ensued, and the workman was much burnt.

A similar incident happened the other day, with less intensity, however; and the workman, who was not injured, did not report the circumstance. Some gas pipes having been taken down, they were found covered with a blackish coating, and they showed evident signs of corrosion from ammoniacal condensation.

The black matter was analyzed, and was found to consist of an acetate of copper, which exploded between 203 and 248 degrees, producing water, copper, carbon, carbonic acid, and traces of carbonic oxide.

Coating Cast Iron with other Metals.

We are constantly receiving queries requesting information in regard to tinning, zincing, and coppering small iron articles. While we have often answered these by details of processes that we have found to answer, and which our readers have contributed to our column of answers, it is evident that there are various practical difficulties which arise to defeat success in many cases. If our correspondents who have had the requisite experience can give directions how to escape these stumbling blocks, the information will be gladly received by many readers.

SWEETENED FUEL.—During a recent passage of the steamer Morro Castle from the West Indies to New York, a fearful storm was encountered, which lasted four days. The coal fuel became short and, it appearing evident to Captain Curtis that if the engine stopped the vessel would be lost, he ordered the firemen to make use of sugar in the fires. Chairs and other furniture were also broken up and burned. Mixed with coal and wood, the sugar proved to be a good heating material, and by its use the ship was saved. Ten thousand dollars worth of crude sugar was consumed.

AN American engineer, now engaged in the construction of the Arequipa and Puno railway in Peru, a railway which twists about among the Andes, gives the following items: This road is to be 220 miles long, its highest grade line will be 14,600 above the sea; its terminus at Puno is on the shore of Lake Titica. The gage is 4 feet 8 1/2 inches. The steepest grades are 211 feet to the mile, curves 16 degrees. From Arequipa to the Pacific coast, 100 miles, a railway is now in operation.

MR. G. D. HAMILL writes to say that, in our article on Japanese native steel on page 136, current volume, speaking of him as having the position of superintendent of the Imperial arsenal at Tientsin, we were in error. Mr. Hamill is the foreman of the machine shop department of the arsenal.

THE iron plates intended to protect the turrets of the great war ship Devastation, which is being built at Portsmouth, Eng., each weigh twenty-four tons and measure twenty feet in length, nine feet in breadth, and eight inches in thickness.

A DOUBLE line of telegraph is at present being constructed across the Andes. Thirty miles of this line, which will pass over the snow covered cordilleras, will be constructed of two copper sheathed cables. It is expected that the line will be completed early this spring.

City Disinfection.

The excreta of man and animals contain all the mineral matters formerly contained in their food. It is, therefore, obvious and most natural, yet more, an absolute necessity, to return these excreta to the soil. Fresh feces contain an average of twenty-five per cent of solid matter and seventy-five per cent of water. The mineral matters consist of one third of phosphoric acid. Dried feces are, of course, much richer on account of having lost the water. A city of one hundred thousand inhabitants would yield per year 1,300 tons dried feces, containing 112,000 lbs. of phosphoric acid.

Professor Liebig says: "The coming generation will consider those men as the greatest benefactors of mankind who devote all their efforts to utilize and save the night soil of the cities." Poudrette works have been established in the United States, Germany, France, and England, but none have ever yet united the sanitary with the agricultural interests. Some trials have been made to employ iron salts for disinfecting the night soil, but such a poudrette is almost valueless. Other trials were made with lime, which only caused the loss of the ammonia, and had no disinfecting value whatever. Dr. Julius E. Dotch, of Washington, D. C., has patented a method for such disinfection, which appears to be of value. It consists in the application of a prepared earth, containing clay, sulphuric acid, and nitric acid, which is spread in thin layers over the fresh feces.

By this means, not only is the formation of fungoid growth effectually prevented, but also all the ammonia is taken up on account of the sulphuric acid; and the sulphuretted hydrogen developed from the feces will be entirely destroyed by the nitric acid present in the patent earth.

A Lecture on Rattlesnakes.

Two miles out on our road back, we found Straddlebug sitting like a statue, gazing at something in the road just ahead of him. "Come here, General Bradley," he called, "I want to introduce you to one of the inhabitants of this delightful country," at the same time pointing to a monster rattlesnake coiled in the trail. "I have been plaguing him," continued old Straddle, "and he is in a game fellow. See,"

in the dark at all. You will readily observe," continued old Straddle, growing facetious, "the difference between the nature of the snake and the dog; a dog shakes his tail to show you he is pleased; the snake shakes his tail to show you he is mad. Look at that eye, sir; I have looked a mutineer in the eye and disarmed him; but I would not like to look at that fellow steadily in the face for the space of five seconds." The snake was coiled, his body resting on his tail, and his head raised to the height of a foot, and his neck proudly curved. His eyes shone like two little diamonds, and his yellow skin glistened in the sun. The spots on his back seemed ever changing from dark brown to a bright red copper color. "Come," said old Straddle, "I'll bet there's not a man in the crowd can shoot him in the head." (It is said to be almost impossible to shoot the head off a rattlesnake. The hunters declare that their sensitiveness is so great that they can feel the wind of a coming bullet, and dodge it. Be this as it may, I have seen men who could hit a bull's eye or drive a nail at one hundred yards that could not shoot a snake in the head.) Several revolvers were levelled and discharged at him, but the snake remained unharmed. A soldier then dismounted, and taking a carbine, at the fourth shot nearly severed the body of the reptile. "Foul!" cried out Straddle; "you hit him in the body; but take off the rattles, the game is yours." The man did as he was bid, and there were eleven rattles and a button.—Letter from the Plains to the Philadelphia Press.

MANUFACTURE OF THE SULPHATES OF SODA AND POTASH, AND CHLORINE.—Henry Deacon, of Warrington, Eng., has recently patented in this country a process of manufacturing sulphate of soda and sulphate of potash and chlorine, by causing heated sulphurous or sulphuric acids, mixed with air or oxygen and with or without vapor of water, to pass in succeeding alternations over, through, or in contact with certain chemical substances called catalytic, and over, through or in contact with the alkaline chlorides, common salt, or chloride of potassium, which alkaline chlorides are kept separate from the said catalytic substances or may be easily separated therefrom by mechanical means.

Combined Scissors, Button Hole Cutter, and Tracer.

Our engraving illustrates a very simple, and, we think, useful combination of tools to form a single implement, which adds much to the convenience of the ordinary scissors, while it but very slightly increases their cost.

It is, as our heading implies, a combined scissors, button hole cutter, and tracer for patterns, the operation of which will be readily understood, from the engraving, by our lady readers.

The tracer, A, is a toothed marking wheel pivoted to the thumb piece of the scissors. The button hole cutter is a pointed blade, B, which is fastened to the upper branch of the scissors, and which plays through a slot in the lower branch, at C, and passes into a slot in a metallic sheath, D. The edge, of the cloth in which it is desired to cut the button holes, is supported by this sheath, and the size of the holes is regulated by the thumb nut, E, which, turning in a slot in the upper branch and working on a thread cut upon the shank of the buttonhole cutter, raises it or lowers it, so that it passes more or less into the sheath as the branches of the scissors are brought together.

The button holes are thus cut with great facility and accuracy.

Patented by E. A. Franklin, through the Scientific American Patent Agency, February 27, 1872. Address the patentee, as above, or B. R. Franklin (till the 15th of March), at the Merchants' Hotel, Courtlandt street, New York. The latter wishes to negotiate with manufacturers for making the article, or will dispose of rights.

Model Railway Foundry.

The *Aurora Beacon* says that the new foundry of the Chicago, Burlington & Quincy Railway Company, in Aurora, Ill., is 180 by 190 feet. One wing is reserved exclusively for casting car wheels. The cupola which supplies the molten iron for this purpose is of the capacity of seventeen tons, and the full force is enabled to turn out sixty car wheels per day. This floor is supplied with four monster cranes, which pick up the wheels from the flasks while still at a red heat, and, passing them along from one to the other, convey them to the annealing room. Here are twelve immense pits, of great depth and walled with brick, into which the wheels are lowered one by one to undergo the annealing process. Nearly the entire eastern floor is appropriated to general casting purposes, supplied with another cupola, of the same dimensions and mammoth cranes for handling the ponderous castings produced. Another wing contains the carpenter shop for the repair of patterns, flasks, etc., and the cleaning room, which is furnished with two immense "tumblers" to facilitate that operation. The engine room, in charge of Mr. Keyes, is a model of order and neatness. The machinery of this room was put up under the direct supervision of C. F. Jauriet, Esq., Superintendent of Machinery of the road, and Mr. Prindle, Master Mechanic, a sufficient guarantee that the nearest possible approach to perfection has been attained. All the iron and coal is elevated to the furnaces by steam, instead of the old system of tramways; and one of the celebrated Root blowers furnishes the blast for the cupolas. So perfect is the working of every portion of the machinery that with the eyes averted one will fail to detect the slightest noise, or to dream that a powerful engine, massive wheels, and numerous pulleys are in full operation within a few feet of him.

Improved Clothes Rack.

The clothes rack shown in the accompanying engraving is a very neat and handy device, cheap, and easily applied to use. It occupies no floor space, and when not in use can be arranged to occupy but very little space on the wall to which it is attached.

A wall piece is constructed of a back rail, A, and a front one, B. The back rail, A, has a projecting flange, under which the rear ends of the clothes bars, C, bear while they rest in notches cut in the front rail, as shown. The clothes bars have each a short dowel pin extending upward from the rear end, which engages with a hole bored partly through the projecting flange of the rail, A. This prevents their swinging laterally. At the front end of each clothes bar there are two pins placed at a suitable distance from each other, on opposite sides of the bar. The bars, when not in use, may be taken out and, by the two pins described, may be suspended vertically from the wall piece.

The rack, as a whole, may be suspended in any suitable manner from the wall.

Patented, December 19, 1871, by J. & D. Miller, of Marietta, Ohio. For further particulars, address them as above.

Expert Testimony.

There was a fresh example of the worthlessness of expert testimony during a recent trial for forgery at Taunton. A couple of experts disposed of the prisoner at the bar very

summarily. When Mr. Henry D. Hyde, of Boston, his counsel, handed the smartest expert four old envelopes and asked him if he could tell whose handwriting was on them, the witness, after taking time to examine them, said that "the superscriptions on the envelopes were all in the same handwriting, and all written by the man who forged the check." Mr. Hyde at once took the stand, and taking the envelopes, said, "This one was written by the clerk of the Boston Water Power Company, this one by a friend of mine in

gearing is protected by a shield, so that neither the cloth nor the dress of the operator can get caught in it. A spring is used merely to balance the weight of the bar and render the power necessary to be applied to the winch more uniform. The speed of the needle is by this means more than doubled, with an expenditure of less labor than before, the exertion required to move the fore arm in the former machine being the principal source of the expenditure of power. A much slower motion of the wrist—while the fore arm is comparatively motionless—now produces more than double the useful effect, and greatly increases the utility of the machine.

No change has been made in the feed, or in the stitch (loop stitch) and the cost of the machine is not increased by the improvement. We have never seen a sewing machine that will work with so little expenditure of power as this. It is self feeding, the stitch may be made long or short, it will hem and tuck, and it sews with facility through a number of thicknesses of muslin.

For further particulars, address W. S. Barlow, President Beckwith Sewing Machine Co., 26 West Broadway, New York.

Power of the Waves.

The tremendous force of the sea was exemplified on a recent passage of the steamship *Helvetia*, from London to New York. At midnight a mountainous wave struck the ship from the starboard side. The captain at the time was standing on the bridge giving orders. The wave caught him with full force, and would have washed him into the sea had he not grasped a funnel stay. After

the wave had passed, the captain found himself dangling in mid air, twenty feet from the deck. He held on until rescued. The storm continued with relentless fury for six days, when another monstrous wave was shipped. It carried away two life boats, made a complete wreck of the larboard side of the bridge, destroyed all the ventilators on deck, and tore a hole eight feet in length by two feet in breadth in the smoke stack. Through the aperture thus made, an avalanche of water was precipitated into the engine room. The fires were all extinguished, and for two hours the vessel lay helplessly battling with the waves. After almost superhuman efforts, the rent in the funnel was patched up, the fires were again kindled, and the engines resumed operations.

Durable Sensitive Paper in Photography.

Sensitized albumen paper may be preserved good and white for many days, if placed between heavy paper—that used for copperplate printing—provided the paper is first saturated with a solution (1 to 5) of carbonate of soda, and dried.

Another method, highly spoken of and long practiced by Dr. Vogel, is to wash the paper after sensitizing. This paper requires ammonia fuming when used.

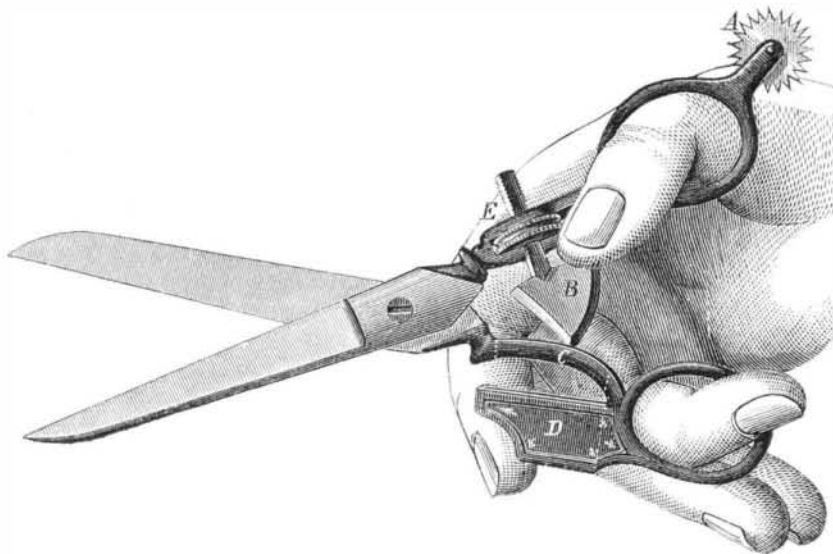
The same author states that paper sensitized in a bath composed of 12 parts of water, 1 part of nitrate of silver, and 1 part of citric acid, keeps perfectly white for six weeks, will print as rapidly as ordinary silvered paper, and requires no fuming.

In the last volume of the *SCIENTIFIC AMERICAN*, we published a formula for citric acid paper, as presented to the Berlin Photographic Society, consisting of 6 ounces of water and 1 ounce each of nitrate of silver and citric acid. One of our correspondents who tried the formula, stated that it gave him red pictures, and that discouraged him from its further use.

Traveling Stones.

Many of our readers have doubtless heard of the famous traveling stone of Australia. Similar curiosities have recently been found in Nevada, which are described as almost perfectly round, the majority of them as large as a walnut, and of an irony nature. When distributed about upon the floor, table, or other level surface, within two or three feet of each other, they immediately began traveling toward a common center, and there huddled up in a bunch like a lot of eggs in a nest. A single stone, removed to the distance of three and a half feet, upon being released, at once started off, with wonderful and somewhat comical celerity, to join its fellows; taken away four or five feet, it remained motionless. They are found in a region that is comparatively level, and is nothing but bare rock. Scattered over this barren region are little basins, from a foot to a rod in diameter, and it is in the bottom of these that the rolling stones are found. They are from the size of a pea to five or six inches in diameter. The cause of these stones rolling together is doubtless to be found in the material of which they are composed, which appears to be loadstone or magnetic iron ore. "Rolling stones gather no moss."

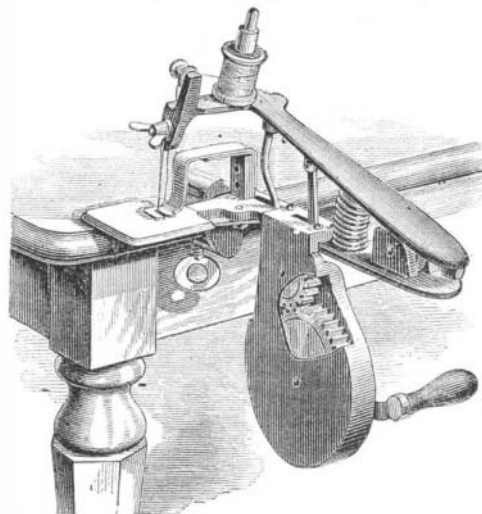
GREAT BRITAIN uses 20,000,000 tons of coal per annum for power, and thereby adds an equivalent of 133,000,000 of working men to her population without having to feed or clothe them or care for their families.

**COMBINED SCISSORS, BUTTON HOLE CUTTER, AND TRACER.**

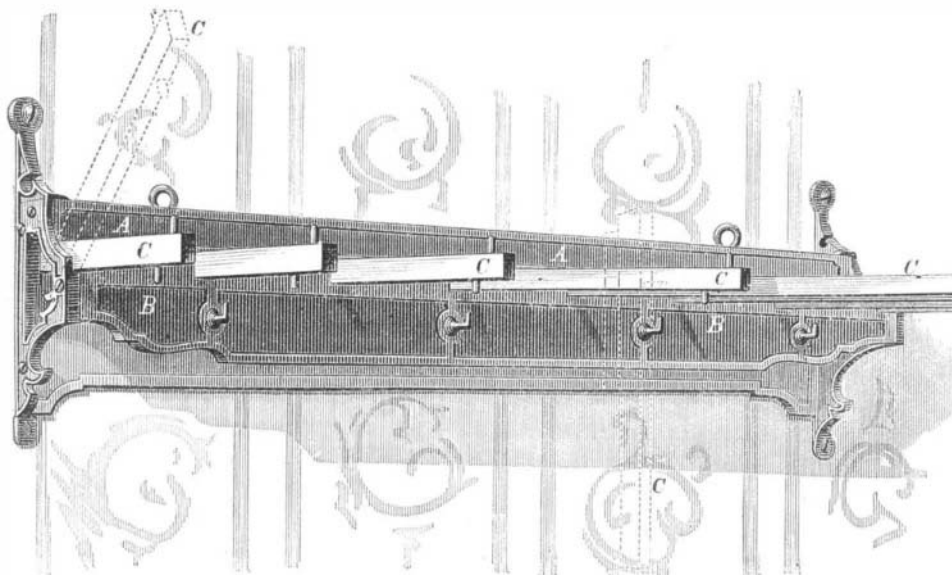
New York, the third is my own hand writing, and the fourth is the prisoner's," substantiating his statement by producing the letters received in some of the envelopes.—*Springfield Republican*.

THE BECKWITH IMPROVED SEWING MACHINE.

Our readers will remember our illustration of a ten dollar sewing machine, published on page 70, current volume. They



will also recollect that the needle, in the machine referred to, was carried by a bar, the downward motion of which was produced by the hand through the agency of a wire and thumb-ring, while the upward movement was made by a coiled spring. This arrangement, while it answered the purpose very well, had two defects; first, that it required some practice to acquire the motion of the wrist, necessary to impel the machine properly and make it do uniform work, and secondly, that the speed was limited to the speed at

**MILLER'S IMPROVED CLOTHES RACK.**

which it is possible to move the wrist with regularity and without fatigue.

Both these defects are removed by the improvement here-with illustrated, which consists in the attachment of a strong toothed wheel impelled by a winch, which wheel meshes into an equally substantial pinion, the pinion being also a crank wheel connected to the needle arm by a short pitman. This