IMPROVED WATER MOTOR.

Another contribution to the various devices, which have lately appeared for supplying a cheap and readily available power for general usage, will be found in the novel water motor represented in the annexed illustration. Its object is to drive organ bellows, coffee mills, and sewing machines, and to perform a variety of light work ordinarily done by hand. In brief, its special adaptation is to operations requiring less than a single horse power, although the apparatus may be built to perform much heavier work.

This device consists of a light but firmly constructed iron wheel, provided on its outer rim with buckets, and the whole enclosed in a watertight iron casing. Through the casing an ordinary water pipe is so inserted that a stream of water from the pipe, flowing downward, strikes the buckets at a right angle with the radius of the wheel. The aperture at the end of the pipe is comparatively small, and on this account the water is forced through and against the buckets with a percussion-like effect, thus imparting a rapid and steady motion to the wheel.

In the illustration, the motor is shown attached to an organ bellows, the belt running from a small pulley on the motor to a large wheel on a crank shaft, to which the pitman from each feeder is attached. These feeders are shown at various stages, working alternately. In the supply pipe are two valves, one under the control of the organist, to admit or shut off the water, while the other is a regulator and works automatically. To start the motor, the performer has only to pull up the lever which opens the throttle valve. When the main bellows are full, the upper side, in rising, strikes a lever which is connected with the regulating valve by wire cords and bell cranks as shown, closing said valve and shutting off the water.

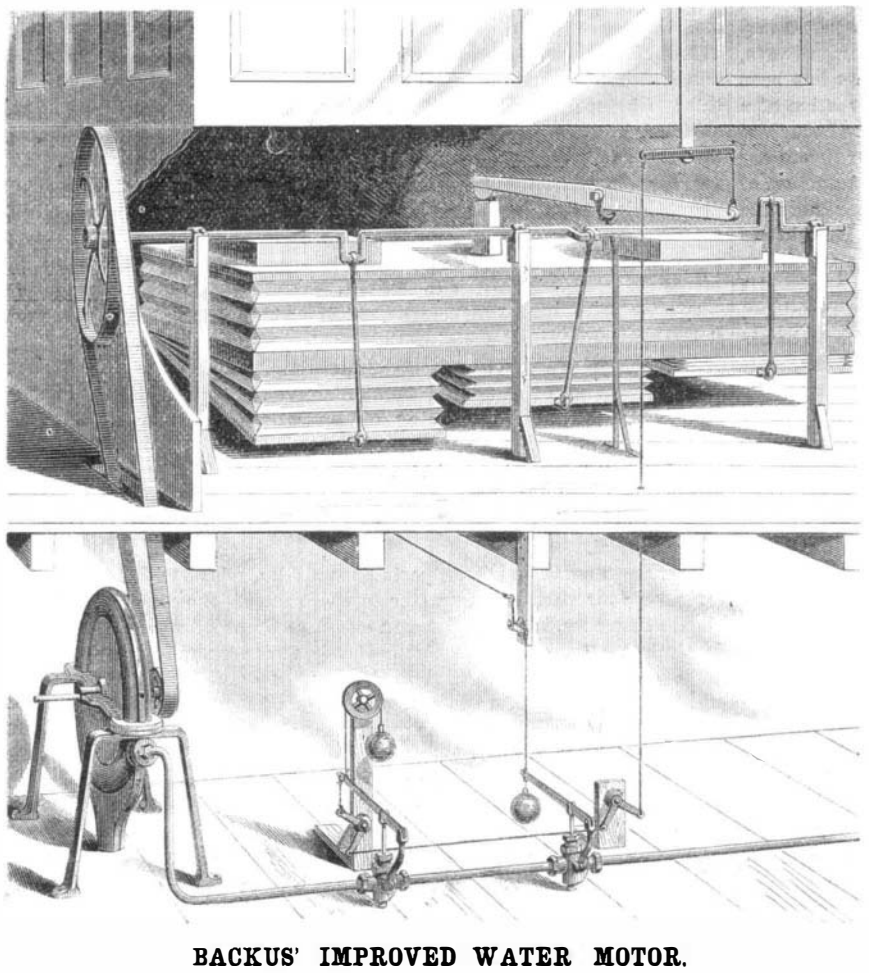
The inventor informs us that this arrangement is extremely sensitive, a mere touch on the keys of the instrument being followed instantly by a few revolutions of the motor, for a period just sufficient to replace the air expended. From testimonials submitted to us, it appears that the employment of the invention upon organs has been successful, and that the amount of water used has been about one third the quantity necessitated by other devices. It is stated that there is no jerking or thumping, but an even, smooth, noiseless, steady motion; while the apparatus is, besides, claimed to be simple, durable, and cheap, and to run for years without repairs. It is now in use on several organs of forty stops, doing the work with a pressure of water of twenty pounds per square inch, costing per annum, as we understand the inventor to assert, from $12 to $15.

The invention is also adapted for driving sewing machines, and, we are informed, can be applied to a single machine for domestic use so as to run at a cost of from $2.50 to $3 per annum. By regulating the water supply through a foot treadle, any speed may be attained from one stitch per second to 1,000 per minute, as desired. The apparatus can be attached to the ordinary water pipes, and it is claimed that a stream no larger than the head of a pin is sufficient to drive a sewing machine. Generally, the device can be used where the pressure is from twelve pounds upwards.

Among other practical applications of the motor may be mentioned its use for printing presses, turning lathes, jewelers' lathes, opticians' and lapidaries' wheels, grinding coffee and spices, cutting sausage, hoisting for stores and private residences, and, in fact, all light machinery requiring one horse power or less.

We understand that this motor is being used in Brooklyn and vicinity with much success, and at very cheap cost. Water sufficient for the purposes of a large organ can ordinarily be obtained for from $12 to $15 per year, or for a sewing machine for about $3.50 for the same period.

The invention was by Mr. Oscar J. Backus, of Oakland, Cal. For further particulars address the manufacturers, Backus Bros., & Co., Wright street and Avenue A, Newark, N. J.



BACKUS' IMPROVED WATER MOTOR.

Progress in Spain.

A very practical sign of real progress and improvement in Spain is seen in the increased demand which is springing up there for scientific information. *La Gaceta Industrial* of Madrid, formerly an insignificant publication, now comes to us enlarged to sixteen quarto pages, and is published twice a month, illustrated with engravings. It has reached its eleventh year. It is a handsome periodical and is ably edited. In the number before us the editor, Mr. Alcover, has a very excellent article upon the Centennial Exposition to be held next year at Philadelphia. He urges the authorities to provide liberally for a Spanish representation on that occasion, which, he says, is to commemorate the glorious anniversary of American liberty. It is to be a demonstration, he thinks, of the achievements of true liberty and independence, that can only be realized by labor, which is the secret of the prosperity of nations, and which has given to the North Americans such an astonishing preponderance.

Fourteen Thousand Miles of Ice.

The Hudson river ice crop for 1875 has now been harvested, and is one of the largest and finest ever gathered. The blocks average 14 inches in thickness, and the total quantity secured is about 2,000,000 of tuns, or seventy millions of cubic feet. If this mass of ice were arranged in a single line or beam, 12 inches square, it would have a total length of about fourteen thousand miles, and would reach more than half way around the world. To transport the entire quantity above named simultaneously, in ice carts, each carrying two tuns, drawn by two horses, driven by one man, would require an army of a million men, two millions of horses, and a million vehicles.

This enormous supply of ice will be chiefly consumed in the city of New York. It is brought down the Hudson river from the great ice houses, which are located at the water's edge, in large barges, towed by steam. It is delivered directly from the barges into the ice carts, and in them conveyed to the doors of private dwellings. For a quarter to half a tun a month is a common supply for a small family. The price charged is from $15 to $30 a tun for families, according to the scarcity or abundance of the supply. Large consumers, such as market men and hotel and restauraunt keepers, get the article at a much less price.

MEASURING MOUNTAINS.

Mr. Verplanck Colvin, in his report on the topographical survey of the Adirondack wilderness, elucidates some new theories on the subject of mountain measurement, and describes one method as follows:

"For short distances, I carefully measure on the mountain side a base line with steel tape, and from its extremities take the angular position of the object, afterward computing the distance. For very distant mountains, an adaptation of tri-linear surveying has been employed. From the station of the barometer, the angles between any three of the surrounding peaks, whose positions I have before found trigonometrically, are measured, and afterward, by three point problem (usually graphically upon the survey map) the distance is obtained and the proper allowance made for curvature and refraction. Now that we have so many trigonometrically determined points throughout the region, the tri-linear me-method is found not only the easiest, but the most accurate.

The practical application of this method to the work of the survey is well shown by the illustration, which represents a survey party engaged in leveling observations with mountain barometers, at the levels of the different peaks seen in the distance. At A is seen the transit, by which the horizontal angular distances between three of the distant peaks are measured in order to obtain the data for correction for curvature and refraction. Below, on the same same mountain side, at e, e, and e, are stations of barometers at the apparent levels of the peaks by the lines of sight level.

At the foot of the mountain is the bark camp, and the assistant observing on barometer at lower station; a guide near by is cutting night wood for camp.

The sight lines, or lines of apparent level (e —— to —— e), are taken from points on the mountain side, which are really lower than the distant peaks; for, following to the left the curve of the earth from the barometer station (h .... to .... h), it will be seen to descend below the level of the peaks in proportion to their distance—the true level of the distant peaks being the curved dotted line of equal hight—above sea level, evidently considerably higher than the stations of their apparent level. The effect of refraction is not shown in the illustration. In practice, the observer on barometer at the lower station takes observations upon his instrument and the attached and detached thermometers every five minutes; and (whenever possible) similar observations are taken on the summit of the peak above the intermediate leveling stations, affording both a lower and an upper station when well determined. The observations, therefore, taken at any five minutes, will be synchronous with those taken on the mountain sides, at leveling stations, or on the peak above; they can then be computed as usual, by the upper or lower station records, and, by the tri-linear measurements, the proper corrections for curvature, etc., made, and the true hight of the distant peak is found."

SCIENTIFIC AND PRACTICAL INFORMATION.

NOT A "NEW JERUSALEM."

It may perhaps be unnecessary to assure our devouter readers that Virginia City, Nev., is not the much longed for "New Jerusalem, the city of the Saints," notwithstanding its streets are paved with precious metals. It is true, nevertheless, that the denizens of that unsaintly city boast that the very mud of their streets is rich in silver and gold. It happens that the principal streets of the city were macadamized with refuse ore taken from the mines in early days; and since then, they have been steadily dusted with rich ore sifted down upon them from passing ore wagons, making a surface so precious that an ounce or two of mud (taken from the wheel of a wagon to decide a wager) proved on assay to contain, to the tun, silver, $7.54; gold, $2.32; total $9.86. "After this," exults the *Enterprise* of that richly paved city, "we may put on airs, even though our streets are villanously muddy occasionally, for the very mud on our boots contains both silver and gold."

A NEW USE FOR MINERAL OILS.

In a late number of the *Australian Medical Journal*, Dr. John Day maintains that certain of the mineral oils, gasoline especially, are of great use as disinfectants, their value depending, he believes, on the fact that they are rich in peroxide of hydrogen. He employs the gasoline in various ways as a disinfectant, applying it to walls, to articles of furniture, and to clothing; also as a wash for the hands after treating infectious diseases, allowing the moistened hands to dry in the open air. A peculiar and valuable property of these oils as disinfectants is their continuous action, while they improve and gather force by exposure to the air.

THE MARTIAL SEAS.

M. Meunier has recently advanced the theory that the planet Mars is much older than the earth, because of the rarification of its atmosphere and the small extent of its seas. The form of the latter, he says, is exactly that which the terrestrial oceans would assume after partial absorption by the earth's crust. If, for example, the Atlantic were absorbed so that only that portion included in the contour made by the uniform depth of 12,000 feet were left, the shape would be exactly similar to that of some of the seas recognized in Mars.

LEMON JUICE IN DIPHTHERIA.

Dr. Revillout states that lemon juice, used as a gargle, is an efficacious specific against diphtheria and similar throat troubles. He has successfully thus employed it for over eighteen years.