IMPROVED WATER WHEEL.

The novel features in the improved water wheel illustrated herewith is found in the buckets, which are provided with inner arms to strike studs as soon as the buckets enter the chutes. One bucket is thus opened to the full striking force of the water just as the preceding one enters the exhaust, so that the dead pressure of the water becomes, it is claimed, entirely utilized.

Fig. 1 is a side elevation, and Fig. 2 a plan view. At A are the buckets pivoted to the wheel, as shown, so as to swing out and meet the pressure of water passing through the channels, B, to the exhausts, C, and so as to close in for passing the cut-off partitions, D. Said partitions prevent back action of the water. At E is shown one of the studs, so located that the bucket arms come in contact with it, and the buckets are thus opened. The closing of the buckets is effected by the curved part of partitions, D.

The water enters on the sides of the casing through the gates, of which there may be three or more, and is so conducted that it strikes the wheel in a tangential direction. At the same time the current opens one of the buckets, which then shuts up the whole opening to the exhaust, so that the full force of the water is spent on the bucket.

While the apparatus is in operation, four buckets are employed to each gate. The first bucket is opened to receive the water; the second bucket carries the water to the opening in the lower part of the casing, where it is gradually discharged as the bucket moves on, thereby avoiding the jerk on the wheel which might otherwise occur. The third bucket moves right over the opening in the lower part of the casing, allowing the full discharge of the water; and the fourth bucket strikes the partition which extends on one side of each gate toward and close to the wheel, and becomes closely shut.

The advantages claimed are that the apparatus works with any head of water, also under back water. It can be adjusted to any required power by the partial or entire opening of the gate. It employs the whole periphery of the wheel for the utilization of the power; and it gives the advantage of the full pressure of the solid column of water without the necessity of accelerated motion and consequent augmented use of water.

Patented through the Scientific American Patent Agency, March 14, 1876. For further information address the inventor, Mr. Henry Waltner, Hamilton, Ohio.

Fig 1

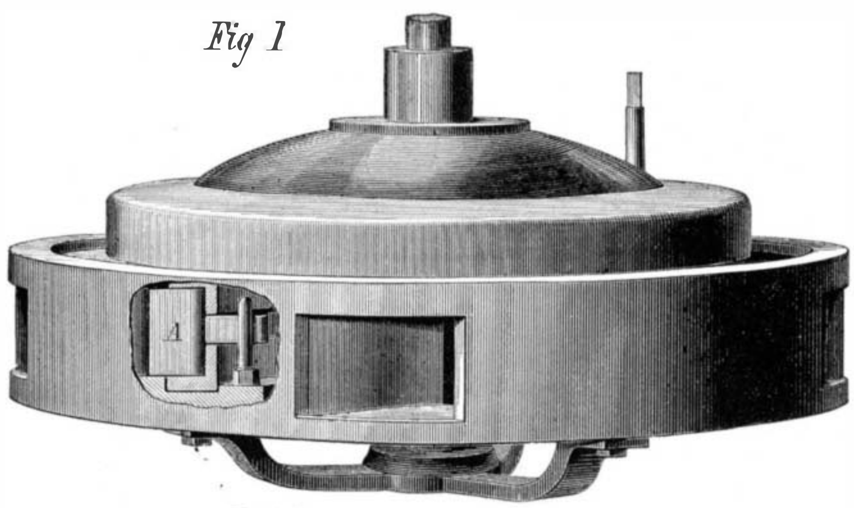
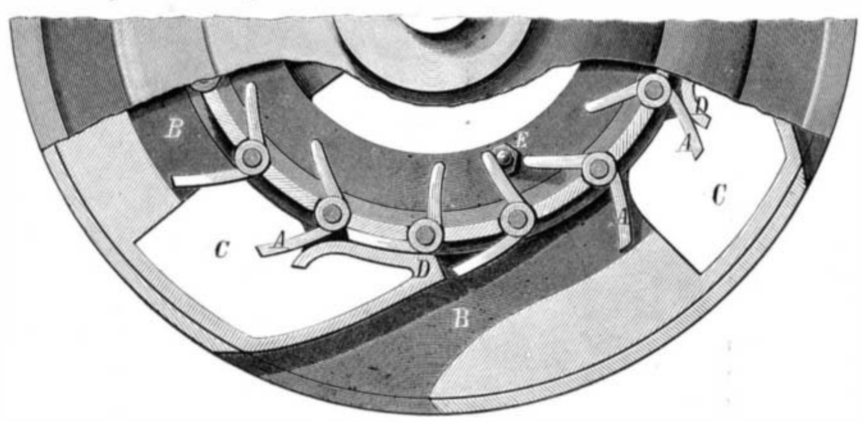


Fig. 2



WALTNER'S WATER WHEEL.

IMPROVED COTTON STALK PULLER.

We illustrate herewith a new and simple invention for pulling cotton stalks in preparing the land for a new crop. The construction is such as to afford a powerful leverage upon jaws which tightly grasp the stalks, so that the work is accomplished almost as fast as the operator can wheel the implement from plant to plant.

The machine consists of a wooden frame made in parallelogram shape and mounted on wheels, the axle being located near one end. It is supported and strengthened by suitable braces, and the rear crossbar serves as a handle. Two jaws, the ends of which project in front of the forward crossbar, are pivoted to each other and to the axle. The shank of one jaw is bent at right angles and secured to one of the side bars. To the other shank is pivoted a rod which passes through a slot in the side bar and connects with a hand lever, as shown. This lever is moved by the operator to open the jaws so as to cause them to grasp the stalk; then, by bearing down on the rear end of the frame, the plant is pulled from the ground, the axle serving as a fulcrum for the leverage. The device is labor-saving, and to the planter will doubtless prove an efficient and useful implement.

Patent now pending through the Scientific American Patent Agency. For further information address the inventor, Mr. Robert D. Brown, Austin, Texas.

BROWN'S COTTON STALK PULLER.

Flower Pots.

We learn from the *Hamburger Gartenzeitung* that the fabrication of flower pots from a mixture of cowdung and earth is is now extensively practised in Germany, 16,000 being used last year in one establishment. For forcing they are highly recommended, though they will not bear plunging in a hot bed; and they are admirably adapted for nursery work, for plants raised in pots and afterwards turned out, in this case pot and all. Even standing dry, the roots of plants will penetrate the sides of the pot, and extract some nourishment from them. They are made by machinery, and one man can make from 700 to 900, or even 1,000, in ten working hours. There are machines for two sizes, 2 inches by 2 (price $2), and 2¾ inches broad by 2¼ high (price $2.50.)

The Blue Color of the Sky and Sea.

The blue color of the sky and of the sea is satisfactorily proven to be due to the presence of exceedingly small particles of matter, that float in the air or water.

A beautiful illustration of the multitude and minuteness is given by Rev. Wm. H. Dallinger, as follows:

"Let clean gum mastic be dissolved in alcohol, and drop it into water; the mastic is precipitated, and milkiness is produced. Gradually dilute the alcoholic solution, and a point is reached where the milkiness disappears, and by reflected light the liquid is of a bright cerulean hue. 'It is in point of fact the color of the sky, and is due to a similar cause—namely, the scattering of light by particles small in comparison to the size of the waves of light.'

"Examine this liquid with the highest microscopical power, and it appears as optically clear as distilled water. The mastic particles are almost infinite in number, and must crowd the entire field of the microscope; but they are as absolutely ultra-microscopic as though they had no existence. I have tested this with an exquisite $\frac{1}{50}$ of Powell and Lealand's, employed with a new and delicate mode of illumination for high powers, and worked up to 15,000 diameters; but not the ghostliest semblance of such particles was seen. But at right angles to the luminous beam passing among these particles in the fluid, 'they discharge perfectly polarized light.' 'The optical deportment of the floating matter of the air proves it to be composed, in part, of particles of this excessively minute character,' and among the finest of these particles Professor Tyndall finds the source of bacterial life."

Breathing through the Nose.

There are various reasons for considering the nose the natural outlet of the lungs, and hence various advantages are to be derived from breathing through the nose.

1st. If we breathe through the nose we will be enabled often to detect the presence of noxious odors in the air we breathe, and so be warned in time to prevent disease.

2d The internal nose is studded with hairs, which in some degree at least prevent the ingress of noxious matters in the air we breathe. Dust is strained out; and it is confidently asserted, by persons who have tested the matter, that miasmas are prevented from entering the blood if one breathes only through the nose. Some persons have lived in malarious districts, slept on the banks of malarious rivers, etc., for years, and yet have escaped all the forms of fever which usually followed a residence in the country, who have ascribed their exemption solety to the settled habit of breathing only through the nose.

3d. By breathing through the nose, little, if any, air passes into the lungs until it has come in contact with the membranes of the nose, which are supposed to possess some power of neutralizing malarious and contagious poisons.

4th. By drawing our breath only through the nose, the air is warmed by contact with the membranes before it reaches the lungs, and so inflammations and congestions of those organs are avoided.

Per contra, the habit, so common, of breathing through the mouth has many disadvantages. In this way a great volume of air is quickly taken in, loaded with dust, malarious or contagious impurities, etc., of which we are utterly unconscious, until the blood has been poisoned, and serious, perhaps fatal, disease has been inaugurated. The cold air, being taken in in great volume and with great rapidity, chills the lungs, whereas, if breathed through the nose, it would be warmed before reaching the lungs.

The habit of breathing through the mouth is caused largely by weakness of the respiratory muscles, and one excellent method of strengthening those muscles is to breathe through the nose. It is certainly as wise a plan as sucking air through a silver tube, so often recommended. Then breathe through the nose, as Nature indicates, if you would have good health.

Japanese Iron.

A foreign technical serial gives the following account of Japanese ironworks: The blast furnaces of Japan are small and of very simple construction, although built on the same principle as those of Europe. The walls are built of fireproof clay, mixed with a few stones. The blast furnaces are round, and have an opening at the side, closed by a band of clay; opposite are two other openings, through which comes a strong current of air, driven into the furnace by Chinese bellows worked by men. Before pouring the ore into the furnace, they mix it with coal, and subject it to a previous calcination, so as to get rid of its carbonic acid and sulphur. The Japanese do not understand puddling as practised in the West; but the principle of their procedure is exactly the same. The fused iron, mixed with a little sand and pieces of iron, is again fused with charcoal in a second furnace, where it is left to cool for several days, uutil the whole mass has the appearance of fluid. The Japanese method of making steel is quite different from that practised in Europe. They mix a certain quantity of iron in pigs and iron in bars, cover the mixture with borax, and melt the whole for a week in a small fireproof crucible. The borax serves to dissolve the impurities in the dross. When the metal is separated from the dross, which floats on the surface, and cooled, it is hammered hard, and alternately plunged into water and oil, after which it is cemented and tempered. The mode of cementing is as follows: The steel, on coming from beneath the hammer, is covered with a mixture of clay, cinders, marl, and charcoal powder. When this plaster is dry, the whole is subject to a red heat, and the steel is cooled very slowly in warm water, which is allowed to become tepid. Steel thus obtained is not very supple, but extremely hard, because it is not properly tempered or freed from its impurities. It would not do for making watch springs, but it is used by the Japanese for swords and sabers, which are tempered as many as eleven times, and knives, which are tempered four times.

To whiten lace, iron it slightly, and sew it up in a linen bag; let the bag remain for 24 hours in pure olive oil. Then boil the bag in soap and water for 15 minutes, rinse in warm water, and then dip into water containing a slight proportion of starch. Take the lace from the bag and stretch it out to dry.