Water and Wind.

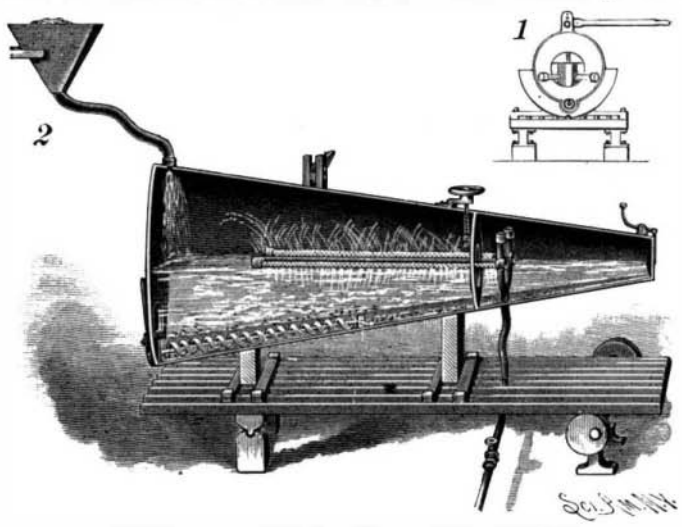
The latest news from Germany shows that a definite contract has been made for transmitting power electrically from the falls of the Lauffen to Frankfort-on-the-Main, a distance of 112 miles, for service at the electrical exhibition which is to be opened at that place on June 15. At Hartford, Conn., a similar transmission of power is successfully made for a distance of 22 miles for lighting purposes. In several places in both Europe and America, electric power is transmitted distances of five to ten miles.

At Coronada Beach, Cal., a company has invented and successfully applied an apparatus to a section of the surface of the sea, by which its ceaseless motion is converted into electric energy; and this is transmitted through a cable to the point where it is needed for the usual service of an electric current.

Thus, not only is the application of electricity rendering available a multitude of water falls in stream and tide which have hitherto been useless for mechanical purposes, but wind power on every hill top can be gathered in by the blades of the windmill, and thence conveyed to the more accessible plain. It will not be long ere fuel of all kinds may be to a large extent superseded in dwellings, and its uses performed in a better manner by the new household servant—electricity. Thus, possibly, we may be saved from the tyranny of the coal mine and the wood pile, and from their final exhaustion, by the utilization of an exhaustless power which everywhere pervades the universe.—*Practical Electricity.*

AN IMPROVED ORE CONCENTRATOR.

The illustration represents a concentrator recently patented by Messrs. Fred Manuel and Kenneth M. Reeves, of Helena, Mont., which is designed to be very effective in operation and readily separate the concentrates from the tailings. It consists of a conical cylinder mounted to rock on a series of longitudinal strips on the top of a table, which can be raised and lowered at the small end of the cylinder, where the tailings and water are discharged, the pulp being introduced through a flexible tube from a hopper near the larger end of the cylinder, as shown in Fig. 2. The two rockers, of which one is shown in transverse section in Fig. 2, have each, in the middle of their under side, a V-shaped notch engaging one of the longitudinal strips of the table, whereby the cylinder is returned to the proper place as it is rocked to the right and left, there being also transverse guide strips on the table on each side of each rocker. The table, under the small end of the cylinder, is raised or lowered by eccentrics on a transverse shaft, having on one end a belt wheel or other means of turning the shaft, or jack screws may be employed instead of the eccentrics, the table at its other end being fulcrumed on recessed supports. At one place on the top of the cylinder are brackets, as shown in Fig. 1, pivotally connected with a pitman, through which, by means of suitable machinery, the cylinder is rocked on the strips, giving a continued series of jarring motions designed to effectively agitate the pulp. The small end of the cylinder is opened by a gate hung on a lever under the control of the operator, and in the cylinder, near this end, is arranged a water feed pipe, connected by a flexible tube with a suitable source of supply. Segmental and

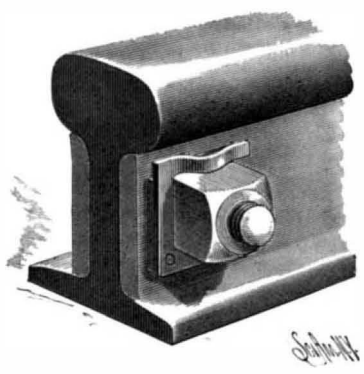


MANUEL & REEVES' ORE CONCENTRATOR.

longitudinal perforated pipes, with nozzles, extend from this water feed pipe on the inside of the cylinder, whereby the discharge of water in jets is designed to aid in the agitation of the pulp. Near the feed water pipe is a gate, adapted to be raised or lowered by a screw rod extending through the top of the cylinder, this gate being designed to retain finely pulverized ore floating on the top of the water, the lower edge of the gate being kept below the surface of the water in the cylinder. In a pocket in the bottom of the cylinder is a conveyer screw, the shaft of which has at its outer end a ratchet wheel engaged by a spring-pressed pawl fulcrumed on a lever, connected by a rod with suitable machinery for rotating the screw at intervals. The concentrates settling in the bottom are thus fed toward the large end of the cylinder, where they are discharged through a suitable opening provided therefor, the tailings and water flowing out through the gate at the small end of the cylinder.

A SIMPLE AND EFFECTIVE NUT LOCK.

In the device shown herewith, which has been patented by Mr. Samuel M. Churchill, of Lawtey, Fla., the lock is established by means of a washer having a spring tongue transversely of its face, by which the lock is formed. The washer is of a double thickness, being formed of two metal plates riveted together on one side, or, when applied to a wood surface, secured by a screw arranged to enter the wood. The plates



CHURCHILL'S NUT LOCK.

are of spring steel, the outer plate extending beyond the inner one, and this extended portion being partly divided from the main portion by a slit. A spring tongue is thus formed, in which is produced a curved middle portion. As the nut is screwed on or off, its corners ride over the curved projection of the tongue, forcing the latter down, but when screwed to place, a flat side of the nut is made to come in line with the slit, allowing the spring tongue to rise and bring its curved portion up against the side of the nut. As the main portion of the spring tongue does not project above the washer, there is no necessity to hold it down in putting the nut on or off, the operation being simple and quick, and the locking device automatic in its action.

Facts about Lime and Limestone.

With regard to the burning of limestone or carbonate of lime, pure carbonate of lime may be subjected to the intense heat of the oxyhydrogen blowpipe without losing its power of slaking when exposed to moist air, a fact but too well known to all who use the lime light. Even natural limestones of considerable purity can be exposed to the highest available temperatures without deterioration of the resulting hydrate; and I have myself exposed Buxton limestone to the intense white heat of a steel furnace, and subsequently found it to slake as well as the same stone burnt in the ordinary way. Should any of the limestone be insufficiently burnt, *i. e.*, should it still retain its carbonic acid, it will not slake, and the lumps can easily be separated from that which has been converted into a fine powder by the slaking process. The use of wood for burning lime has the great advantage that it does not introduce the deleterious sulphur compounds present in all mineral fuels.

The interesting experiments of Wolters and other observers have clearly proved that the presence of carbonic acid is not necessary for the setting of mortars, and that mortars will set perfectly well in an atmosphere quite free from carbonic acid. No doubt the ultimate hardness of mortars is much increased by the gradual absorption of carbonic acid; but the process is extremely slow, and as it requires several generations for its completion, we must not rely on it for modern work. Dr. Ziureck found a considerable percentage of caustic lime in mortar 500 years old, and a sample of mortar from a bridge over the Great Western Railway, which was removed last April, and was about 50 years old, still contained 27 per cent of the lime in a caustic state. Air-slaked lime does not absorb carbonic acid unless free water is present; this has now been known for more than twenty years, and yet some persons specify that lime shall be newly slaked.

This is in direct contradiction, both to the practice of the ancients and modern scientific observation. There is a reason for the use of pulverized marble. Marble, even in the finest particles, is crystalline in structure; and it is a fact, well known to chemists, that a particle of a crystalline substance will often produce crystallization, when added to a mass of identical chemical composition, but amorphous in structure. It is, therefore, highly probable that the presence of these crystalline particles in mortar may cause the carbonate of lime, which is slowly formed, to assume the crystalline structure; and, as this is the final and most permanent form of all mineral substances, the result is, no doubt, favorable as regards the permanence of the mortar.

With regard to the admixture of glue with *whiting*, this could hardly be very desirable; but *caustic* lime would have a very different chemical action on the glue. I have used for many years for painting woodwork, out of doors, a mixture of blood and caustic lime, which mixture is much more desirable than a wash of lime or even Portland cement; and yet the blood alone is a very unstable substance.—*Walter F. Reid, F.I.C.*

The Next Advance in Telescope Making.

Why, asks the *Pall Mall Budget*, is it so difficult and expensive to construct an immense telescope? From the time of Galileo to that of Clark, steady work has been done, and each step has given us a larger object glass. The pupil of the eye is one-fifth of an inch in diameter, and can grasp but a limited amount of light. A 25 inch object glass will enable the eye to take in over 15,000 times more light, and with such a glass the moon can be seen as though it were only 80 miles away; but if the size of the object glass could be further increased, the moon would be brought considerably nearer. To make a large object glass is the difficulty, and it is only after years of patient work of the most skilled men on earth and after repeated attempts that one can be produced which is accurate. Slight differences of specific gravity, changes of structure due to jarring, strains resulting from unequal pressure and changes of temperature, are all capable of ruining the work. Some one who is anxious to anticipate events has asked: Why not replace the glass, which is only a medium transmitting light at a different velocity from air, by a properly constructed electric field? It is conceivable that an electric field 50 feet in diameter could be arranged. Just what the nature of this field should be, with our present knowledge, we cannot say, but some day it will be known, and then the secrets of the other planets will be ours. Ether (says a technical paper) is now paramount with experimentalists; some day it will form the basis of all electrical text books. We seem to be on the verge of discovering something really great in the world of ether. The early experiments of Faraday, the marvelous mathematical researches of Maxwell, and the crowning experiments of Hertz, all show the intimate relations which exist between electricity and light. They have so entirely changed our views of science that it has been truly said that electricity has annexed the whole domain of optics.

SIMPLE AERIAL TOP.

Zip! up, up, she goes! "There! she's out of sight!" An instant of silence. "There she comes! down, down, down, there she is across the street." In the lively scramble a lucky youngster grabs it, and hastening to the vender, says, "Here she is, mister." "All right," says the vender. "I give you a penny every time you catch the aerial top."

This is a 42d Street scene: "Here is your aerial top, a regular sky skimmer. You can see it go out of sight. Only ten cents." Meanwhile, in the intervals of the jangle, the vender with his bird warbler imitated the canary, mocking bird, various animals, and Punch and Judy. A new comer says, "I'd like to see it go up," and up she goes, down she comes, and another gamin gets his penny for securing the sky skimmer, while an occasional passer-by invests a dime in the interesting toy.

AERIAL TOP.

The object of so much interest was a simple three-armed wheel punched out of tin, with its arms widened at their outer ends and all inclined in the same direction, a little spool with prongs at one end which enter corresponding holes in the central portion of the wheel, a wire supporting the whole, and a string wound around the spool for giving the flier its impulse. The string is quickly pulled, and the rapid rotation of this aerial screw propeller causes it to leave its prime mover and fly skyward out of sight.