An Instrument for Measuring Hearing Capacity.

At the *conversazione* held by the Cambridge Medical Graduates' Club, at the Marlborough Rooms, London, Feb. 29, Mr. Dalby lent for exhibition an instrument, the accuracy of which many of those present had the opportunity of testing. We subjoin the description:

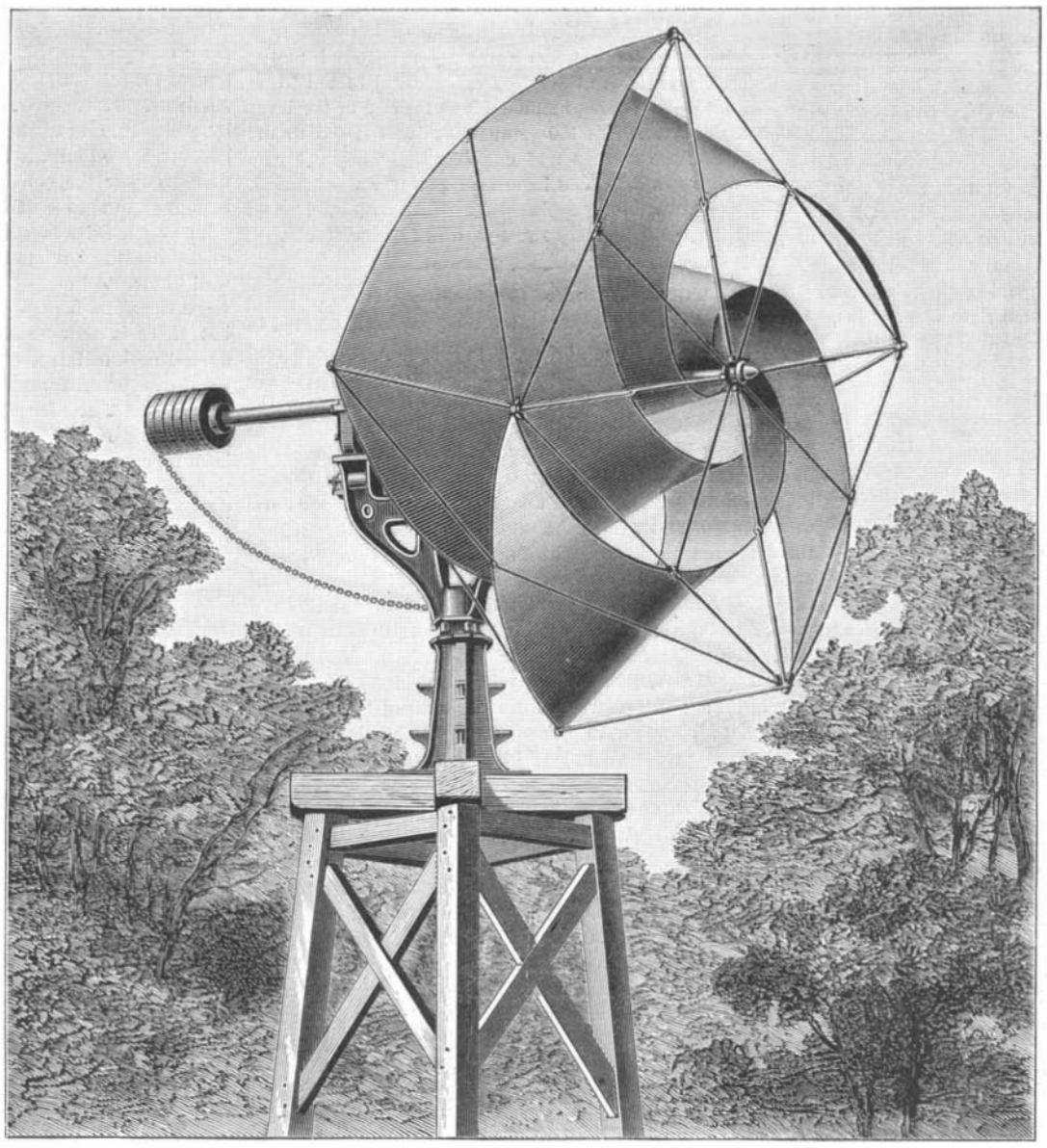
"Professor Hughes invented this instrument to be used with the induction balance as a scale of sound for comparison with it. During the past twelve months I have made use of it for the purpose of measuring variations in hearing power, and registering such variations with absolute accuracy. The registration can be made with perfect facility by the patients themselves. The telephone being applied to the ear, the patient can move the sliding coil from left to right until the clock movement can be heard. The point can then be registered in millimeters, which are 200 in all. It is an electrical instrument, and is used in connection with the telephone. The nature of its construction is as follows:

"At each end of a wooden bar divided into millimeters a flat wire coil is fixed, and a similar coil is mounted on the bar, capable of being slid from one coil to the other. One of the end coils is much smaller than the other two, in order to shorten the scale. To the middle coil the telephone is attached; the battery (in the circuit of which is a microphone) and clockwork for making and breaking the circuit are in connection with the two end coils. The wire on the said coils is wound in the reverse direction, so as to produce a neutral point between the coils. The middle coil being slid upon the bar, currents are induced in it relative to its position between the coils, its maximum point being next to the large coil, and its silent position near the small coil. The position of the coil is read off by figures on the scale. The electric currents are of short duration, being produced at the moment of making and breaking the circuit by the clockwork. One cell is sufficient to work the apparatus. It is advisable to put the clockwork at some distance from the sonometer, that the noise from the wheels running may not interfere with the sounds in the telephone."

THE ATMOSPHERIC TURBINE.

The accompanying engraving (from *La Nature*) represents a new form of wind motor called by its inventor, Mr. A. Dumont, an atmospheric turbine. The principal value of this apparatus lies in the form of the sheet iron sweeps that store up the power of the wind, these possessing the remarkable property of revolving more rapidly under the action of a slight breeze than under that of a strong wind. For example, when one of these motors, free from all constraint, is actuated by a breeze of two meters per second, its driving wheel runs at the circumference at the rate of four meters per second, a velocity double that of the wind. When actuated by a wind of ten meters per second, the same wheel acquires a velocity of eleven meters only, or one about equal to that of the wind. In this, the apparatus forms an exception to the general rule, which is that all known windmills revolve with a velocity proportional to and thrice that of the wind, that is to say, with so great velocity that during gales they must be stopped in order to prevent them from breaking.

The turbine under consideration owes to such a property the sensitiveness of its wide spread of sail to the least breeze; and to it, likewise, it owes its excellent performance during those strong winds that alone possess true power, while all other wind motors have to be stopped in order to prevent them from being destroyed. According to data furnished by the inventor, it appears that this turbine possesses a mean motive power triple that furnished by any similar motors that have hitherto been employed.



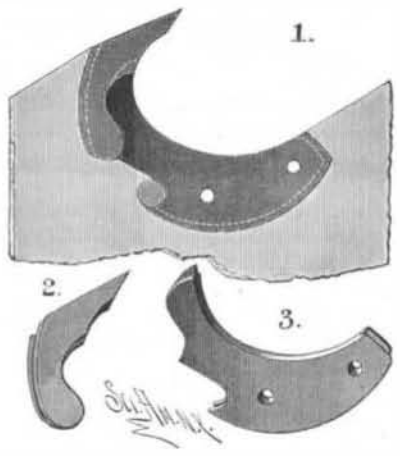
THE ATMOSPHERIC TURBINE.

Resemblance of Boron Compounds to those of Acetic Acid.

Prokofjew presented a paper to the Russian Chemical Society in November last, in which he pointed out certain curious analogies between the acetic acid residue (C_2H_3) and boron. Beginning with anhydrous boracic acid (B_2O_3) and acetic acid ($(C_2H_3)_2O_3$), he showed that each was really a sesquioxide; that borax ($Na_2B_4O_7$) corresponds to a compound obtained by combining acetic anhydride with potassium acetate, ($K_2C_2H_3)_4O_7$); while the boride of nitrogen (BN) represents acetonitrile (C_2H_3N).

SAW TOOTH.

The accompanying engraving represents an invention recently patented by Mr. R. W. Kellen, of Albion, Cal. Fig. 1 is a side view showing the tooth and shank in place; Fig. 2 is a perspective view of the tooth, and Fig. 3 shows the shank. The back of the tooth is curved and grooved, as usual, but the front is made in the ogee form, the shank being made to correspond; and as the inner end is wider than the central portion, the possibility of its flying out is prevented so long as the shank remains in place. A long and strong nib on the shank enters a groove in the tooth and holds it securely against being pressed out laterally by the file. A



KELLEN'S SAW TOOTH.

groove extending along the back and end of the shank fits on a rib in the saw plate.

An oval rivet is placed in an oval-shaped hole formed between the shoulder of the shank and the spur of the plate; a quarter turn of the rivet draws the shank firmly down to place, and tightly secures the tooth. The rivet is held in place by upsetting. By this construction the tooth is held firmly, and by making the joint between the tooth and shank a reversed curve, the centrifugal action of the tooth causes its gradually curved inner end to wedge up between the upper end of the shank and saw plate, thereby automatically tightening itself.

M. PASTEUR and his collaborators have announced to the French Academy of Sciences the fact that by inoculation they can render all dogs absolutely proof against the effects of rabies, in whatever way or quantity the virus may be administered.

An Invention that was "Not" Patented.

Sir Henry Bessemer had made several inventions before he commenced the investigations that led to the completion of the Bessemer converter. One of these inventions was the manufacture of bronze powder. This was selling in England in 1840 at about $28 per pound, while the raw material cost only 22 cents a pound. The manufactured article came from Germany, and how it was made was not known in England. Young Bessemer set to work to manufacture the powder by machinery, and, after two years' persevering effort, succeeded. In order to obtain all the advantage possible from his invention he determined to keep it secret, and therefore sent sectional drawings of the machinery needed to different engineering works, thus obtaining the parts piecemeal from different portions of England. This machinery he put together himself—a work that occupied him nine months—and then engaged confidential assistants, paying them high wages on condition that everything was to be kept strictly secret. His five machines, thus started, produced as much as sixty skillful operatives could by the old methods.

To this day the mechanical means by which this famous gold paint is produced remains a secret. The machinery is driven by a steam engine in an adjoining room, and into the room where the automatic manufactory is at work none but the inventor and his assistants have ever entered. When a sufficient quantity of work is done, a bell is rung to give notice to the engineman to stop the engine, and in this way the machinery has been in constant use for over forty years without having been either patented or pirated. Its profit was as great as its success. At first he made 1,000 per cent profit; and though there are other products that now compete with this bronze, it still yields 300 per cent profit. "All this time," says the successful inventor, thirty years afterward, "I have been afraid to improve the machinery, or to introduce other engineers into the works to improve them. Strange to say, we have thus among us a manufacture wholly unimproved for thirty years. I do not believe there is another instance of such a thing in the kingdom. I believe that if I had patented it, the fourteen years would not have run out without other people making improvements in the manufacture. Of the five machines I use, three are applicable to other processes, one to color making especially; so much so that notwithstanding the very excellent income which I derive from the manufacture, I had once nearly made up my mind to throw it open, and make it public for the purpose of using part of my invention for the manufacture of colors. Three out of my five assistants have died, and if the other two were to die and myself too, no one would know what the invention is."

Since this was said, in 1871, Sir Henry has rewarded the faithfulness of his two surviving assistants by handing over to them the business and factory.

A Model of the Eads Ship Railway.

As an aid in getting the capital to build the Tehuantepec Ship Railroad, Capt. Eads is having a working model made to illustrate in detail the devices needed for raising and lowering ships at the harbors, and distributing their weight on the wheels of the cranes on which the ship will rest during its transit across the isthmus. The *Railroad Gazette* mentions this as a convenient method of explaining contrivances to non-professional persons, but one from which the engineer can seldom gain much information as to the feasibility of the methods used when applied to a gigantic and complicated structure. The model will also show the method of side tracking the loaded cradles and the means by which the direction in which the traveling cradles is changed by turn tables instead of curves. The ship will be 7 feet long and the cradle 76 inches. The floating dock will be 90 inches long and 30 inches wide, and the basin in which it floats will hold about 500 gallons of water.

According to the latest surveys, the heaviest gradient on the Atlantic side does not exceed 42 feet per mile, while that on the Pacific is only 52 feet for about eight miles, and the remainder of the route will have no grades exceeding 26 feet per mile. It is said that no exceptionally heavy work will be encountered either in cuts or embankments, and the entire road from the Coatzacoalcos River to the Pacific harbor will be only 134 miles long.