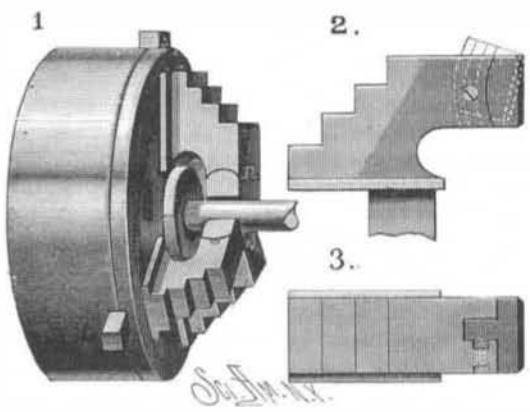
NEW LATHE CHUCK.

Those who have been annoyed by the difficulty of firmly holding tapered or headed work in the ordinary chuck will be interested in an invention recently patented by Mr. James S. Gilmore, of 4,727 Penn Street, Philadelphia, Pa. A self-adjusting jaw face, shown in side elevation in Fig. 2 and front elevation in Fig. 3, is fitted in each jaw by making the jaw proper concave on its face in the direction of the axis of the chuck, and grooving it in the same direction; the jaw face is provided with a corresponding convex back and tongue. This jaw is secured by a stud pin screwing through one side of the jaw to a notch between two short side ribs on the tongue. The jaw faces, being free to move along their seats within the limits of the ribs, will come self-actingly to a bearing on a tapered object when screwed up



GILMORE'S NEW LATHE CHUCK.

to grip them, whether by a universal adjusting device or an independently acting one.

The jaws are also constructed with undercut notches (Figs. 1 and 2) to make a clear space behind the gripping faces to enable them to grasp the shank of a bolt over the head.

IMPROVED TORPEDO BOAT.

We give an illustration of a new torpedo boat constructed for the English navy by Yarrow & Co. *Engineering*, from which our cut is taken, says: These boats form part of the equipment of the large war vessels in the navy, and consequently both the dimensions and weight are very limited. The system formerly adopted for discharging the torpedo from this class of boat may be briefly described as follows: On each side of the boat there was a skeleton steel cradle or frame provided with suitable guides into which the torpedoes were placed. These cradles were slung in davits and arranged so that they could be easily lowered below the surface of the water. When the torpedo was completely immersed, it was allowed to pass out of the cradle by its own mechanism, taking a direction parallel to the boat itself, and very excellent practice has been made with this plan; but as a considerable loss of time must clearly ensue in the lowering and starting, and as it was found difficult to aim when the boat was traveling at anything but a very slow speed, the arrangement was not satisfactory. Messrs. Yarrow & Co. have since then adopted a system of steam impulse; it consists in building into the forward part of the hull—as will be seen from the illustration—two troughs or half tubes, parallel to each other, in which the two torpedoes comprising the armament of the craft lie ready for use. Immediately behind, and under a steel covering, are a couple of impulse tubes, consisting simply of two long thin steel cylinders, provided with pistons and piston rods, the forward end of which press against the extreme after end of the torpedo. There are hinged covers which are lowered when the torpedo is in its place; this steam impulse gear is so arranged that at the will of the officer in charge, either one or both torpedoes can be instantaneously ejected by steam from the main boiler without causing any loss of speed to the boat or necessitating the presence of any of the crew on deck. The speed trial of one of these second class torpedo boats, loaded, built for the Admiralty, took place on the Thames last year, when 17·27 knots were obtained. After the speed trials were terminated, the steam impulse gear was tested at Portsmouth, and was found to be highly satisfactory, being, without doubt, far better than the side cradle system previously in use.

IMPROVED TORPEDO BOAT WITH IMPULSE GEAR.

A Bill to Assist Inventors in Making Drawings.

The following neat little bill has been introduced in the House of Representatives by the Hon. Mr. Vance, of North Carolina:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That drawings intended to explain any device or anything whatever that is patentable shall be made at the cost of the Government, under the direction of the proper authorities in the Department of the Patent Office, and without cost in any case to the inventor.

If all members of Congress were as willing to encourage inventors as the Hon. Mr. Vance, the probability is that many thousands more of new inventions and new industries would be annually brought to light. This bill is very good as far as it goes, but does it go far enough? Is it just the thing to allow the inventor to go hungry or thirsty while he is waiting at the Patent Office to give explanations about his drawings? Ought not Mr. Vance to add another section to the bill, covering refreshments, together with lodgings and transportation.

The Silk Weavers of Lyons.

Mr. Porter in a letter to the *Tribune* states that it is impossible to compare the earnings of silk operatives in Germany and France with those in the United States, because power machinery is almost exclusively used at home, while in France and Germany 90 per cent of the work is done on the hand loom. The raw material is given out either directly to the men by the large manufacturers or by what are called patron masters, who are really a species of "fogger." These small masters make a decent living, earning from 2,400 to 2,500 francs a year, or about $500, which enables them to live comfortably. The poor weaver of black silk dress goods only makes 2 francs (40 cents) a day, and on the finer grades 3 francs (60 cents). Many of the toilers at Lyons are born, live, eat, sleep, and die in the same room. While walking through the streets the clatter of the loom is heard away up to the sixth and even seventh story.

"The loom occupies the largest part of the room. Upon a tiny stove the next meal is cooking, and while watching it the wife is arranging the shuttle. There is an air of barrenness about the room, and nothing homelike. A common print or some religious symbol is on the whitewashed wall. No carpet is on the floor. With the weaver it is work or the cafe. The weaver and his wife and children wear outer garments that are clean. They will appear better on the street than their English brethren. Their garments are principally cotton, and are washed in public. Projecting into the river may be seen hundreds of little stalls, which are rented by the day or hour for a small sum, and here the women assemble and wash the soiled rags of the town. The silk weavers are physically an inferior race, and many of the young men are exempted from military service on account of weakness." In 1883 the silk industry of Lyons gave employment to 150,000 persons.

MEMORANDUM BOOK AND PAD.

To the cover of a plain memorandum book, of a size adapted to be carried in the pocket, is attached a slip pad. The other cover of the book is provided with a carbon paper attachment, which is composed of a heavy paper flap attached to the cover by rivets. The frame holding the carbon paper folds back upon a leaf that folds in between the leaves of the book—as shown in the upper engraving—so that when the book is closed the leaf, frame, and paper serve as a bookmark; the leaf also serves to hold the carbon paper

SILBERMAN'S MEMORANDUM BOOK AND PAD.

in its proper place, so that when the book is opened for making a memorandum it is only necessary to tip the frame over upon the right-hand side of the book to bring the carbon paper into position for use. A slip is then taken from the pad, placed upon the carbon paper, and the memorandum written with a lead pencil; a facsimile will be produced upon the leaf of the book. The frame will then be raised sufficiently to permit the sheet having the memorandum written upon it to be turned, when the parts will be arranged as before, and the book placed in the pocket ready for the next entry. The book is very convenient and easily used, and, by the use of the frame, the carbon paper is always held in a flat position.

This invention has been patented by Mr. S. J. Silberman, of 79 Canal Street, New York city.

Steam Engine Practice.

As a comment on the able *resume* of "Present Steam Engine Practice" in the SCIENTIFIC AMERICAN of March 8, 1884, it is not improper to state that, from a number of personal observations and from reported results, the introduction of "high speed" engines in machine shops and iron and other metal manufacturing establishments is not satisfactory.

There are places where the rapidly running engines, with a piston speed of 600 or more feet per minute, are at home; but their proper place is not the machine shop, if reports and facts agree. One of the largest and best known manufactories of metal goods in New England ran its works satisfactorily with a slow moving engine. To accommodate additional demands, the cylinder was rebored and other changes made that added largely to the capacity of the engine. Except for this enlargement the engine required no doctoring, and before and after the change could be relied upon to do its work.

An addition to the works was made three years ago, and a little buzzing engine put in to run it. The claim was made that the little wasp had more power than the old fashioned traveler. But the result comes in frequent repairs and inconvenient stoppages; six hundred dollars having been expended in repairs on the rapid moving engine within two years—four times as much as has been expended on the old engine, that has run evenly for eighteen years.

There are slow moving engines of thirty years ago or more, in the New England States, built, some of them, by concerns now out of existence and bearing the names of men on their claim plates who have "gone over" and left only their memories as mechanics, which do their work as honestly as some of the machines that to-day assume to displace them. They were built for their work, and not to illustrate a theory. H.

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:

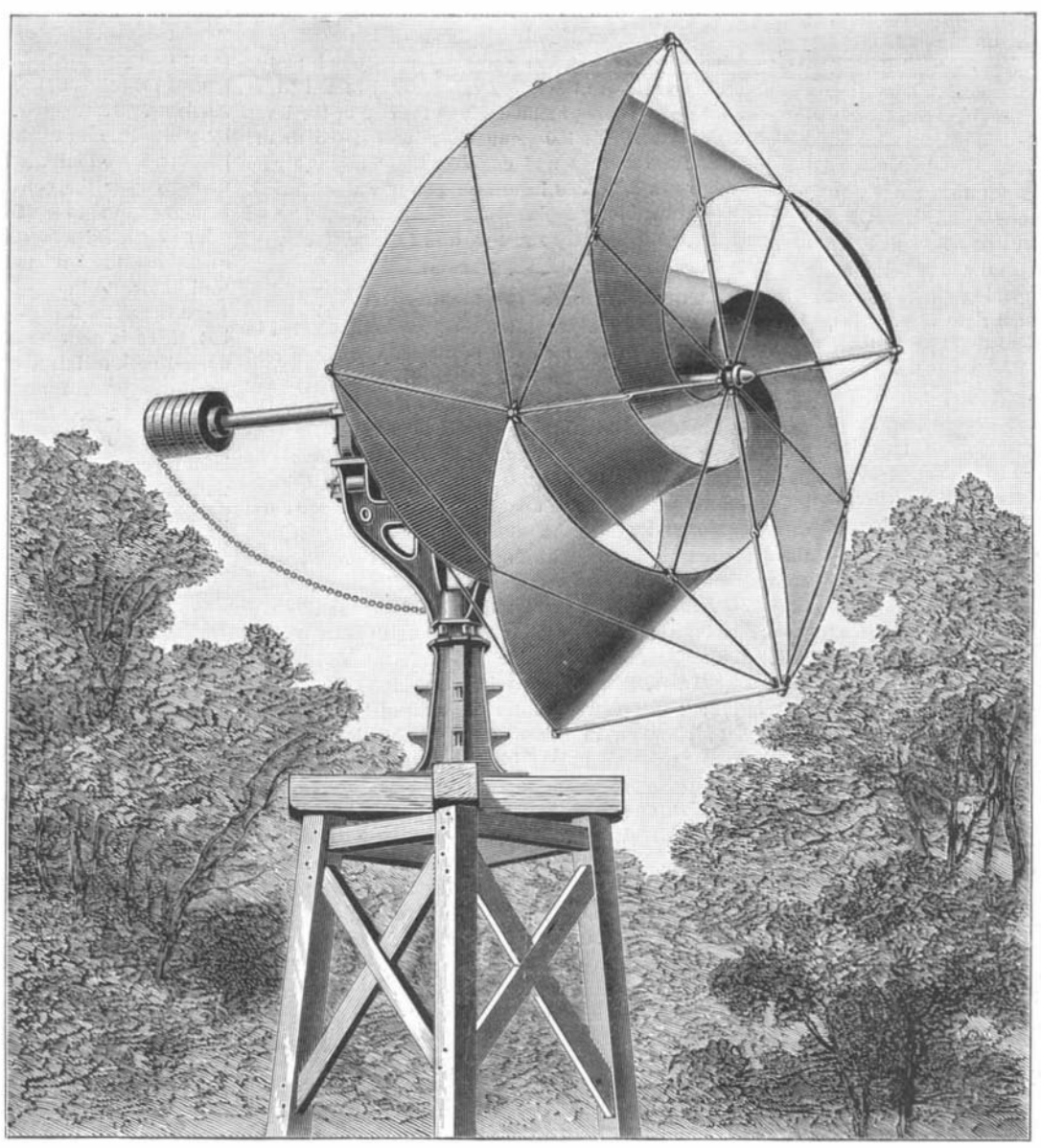
"Professor Hughes invented this instrument to be used with the induction balance as a scale of sound for comparison with it. During the past twelve months I have made use of it for the purpose of measuring variations in hearing power, and registering such variations with absolute accuracy. The registration 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.



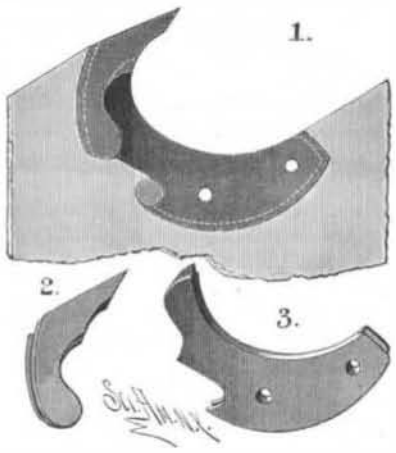
THE ATMOSPHERIC TURBINE.

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



KELLEN'S SAW TOOTH.

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.