

ENGINEERING INVENTIONS.

Mr. William J. Orr, of Rock Hill, S. C., has patented an improved car coupling, the principal feature of which is a bumper having a recess in its upper side to receive a link of approximately rectangular form, and hold it for engagement with another bumper of similar form.

An improvement in hydraulic engines has been patented by Mr. James Talley, Jr., of Kansas City, Mo. The novelty of this invention lies in an arrangement of parts for regulating the volume and force of the water allowed to act on the wheel or rotary piston.

A simple and effective car brake, that will apply as well to wheels when running on curves as when they are running on a straight line, has been patented by Mr. John Meissner, of New York City. It is stated that the efficiency of the brake increases with the increasing weight of the car and its load.

Mr. T. S. La France, of Elmira, N. Y., has devised an improved steam boiler, which consists in an arrangement of a cluster of flues in the fire chamber, joined at their upper ends to a single pipe passed through the crown sheet. It is stated that a great extent of water surface may be exposed to the heat without taking up too much of the crown sheet and limiting the space for smoke flues.

An improved safety regulator for pumps and water pipes has been patented by Mr. T. J. Smith, of New York City. The object of the invention is to avoid the necessity of a separate line of pipe from the water level to a pump on each floor, and to automatically cut off the communication with the street main when the water pressure exceeds the usual point, while admitting of the use of pumps during the period of increased pressure.

The Prospects of Cotton.

Mr. Edward Atkinson, one of the shrewdest business men of New England, has lately made a trip through the cotton States to investigate the prospects of cotton culture in the South. The results of his investigation have been given in the *Herald*. Touching the main point of his inquiry, he says:

"I consider an ample supply of cotton as sure or even more sure than that of any other crop. So long as the cotton States can buy from the West corn and bacon at such prices that forty cents will pay for all that an adult laborer can eat in a week—about three and a half to four pounds of bacon and a peck of meal—the South will raise cotton. It is their money crop. It is now the product of the farm and not of the plantation. The farmers of northern Georgia make a hundred bales of cotton where they made ten a few years since, and the increase of cotton by white labor in Georgia, North Carolina, and Texas will offset any possible decrease in Louisiana and Mississippi, even if the exodus amounts to a severe drain on labor. Moreover, the value of the seed of cotton has hardly begun to be known. Within ten years the seed will be worth half as much as the bale, if not fully as much. The lint left on the hull by the gin is useful for batting; the hull for tanning or for the extraction of dyestuffs; the spent hull for paper stock, for which it is admirable; the kernel first for oil and the residue for feed. There are new methods lately disclosed for extracting every particle of oil, which leaves the residuum sweet, dry, and extremely nutritious for food for sheep or cattle—more nutritious than beans; and if the residue be fed to sheep on the cotton field the crop of cotton will be doubled and the clip of wool added thereto."

A Suggestive Device.

Mr. George Wall, of the Peradeniya Botanic Gardens, Ceylon, has devised an ingenious method of fumigating coffee trees for the cure of the leaf disease. A paper umbrella, with a curtain hanging from it, is dropped over the tree, and fastened by the handle; a lighted sulphur fuse is then placed underneath, and it is said that the fumes are retained long enough to attack the spores of the fungus.

Possibly the plan might be found useful for destroying, by fumigation the parasites of other plants.

IMPROVED MICROPHONES.

A new and improved form of microphone has lately been devised by Mr. Frank Dowling. The improvements, says the *Electrician*, consist mainly in the use of a thin diaphragm to take up the sound waves, and a magnetic adjustment with which the pressure of the carbons may be varied. The diaphragm may be of animal or vegetable parchment, or thin India-rubber, or it may be a thin plate of metal. The vibrating disk is two or three inches in diameter, and screwed firmly between two boards. To the center of the disk is fastened a small piece of carbon, from which a thin wire passes to one terminal screw. A rod of carbon about an inch in length, having a piece of iron or steel rod fixed in one end, is balanced on its axle, and rests lightly against the carbon block. A small bar magnet is adjustable by a brass screw either to or from the rod projecting from the balanced carbon, and thus the pressure between the carbons may be regulated.

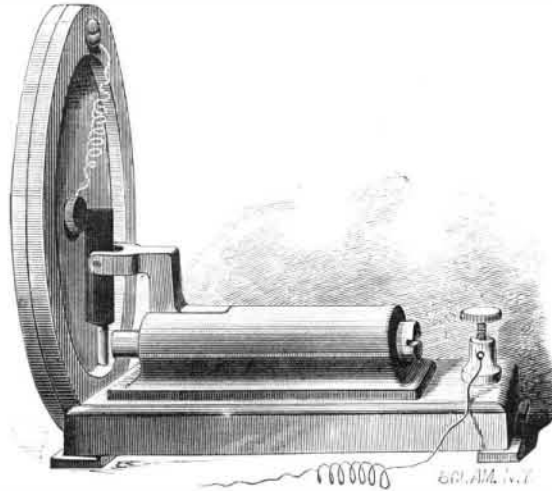
For transmitting speech it is preferable to have the diaphragm in a vertical position, but for experiments it is horizontal.

This microphone is much more sensitive and of less resistance than others, and transmits speech perfectly and distinctly. Speaking at a distance of about 200 feet from the transmitter can be heard, and some sounds about a mile distant. With a battery of two cells it will act as a receiver

having a similar transmitter. This microphone will receive speech and other sounds. Mr. Dowling considers that this is due to vibrations imparted to the carbon and diaphragm by the current itself, the current and vibrations being varied by the transmitter. He is of opinion that this is also the cause of the "singing noises" observed sometimes.

In another speaking transmitter the diaphragm causes a small carbon ball to vibrate in a carbon tube or case. This requires no adjustment, and may be used in any position.

The magnetic adjustment may be applied to ordinary lever microphones, and Mr. Dowling finds it preferable to



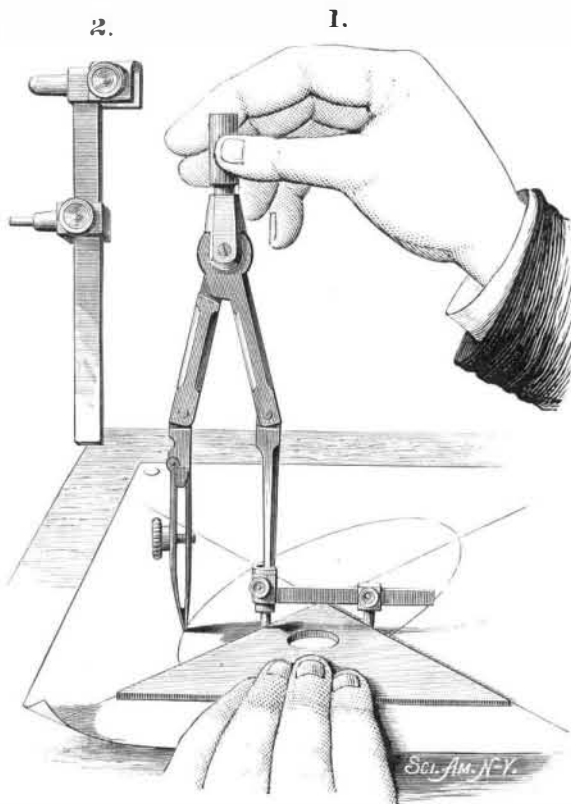
DOWLING'S IMPROVED MICROPHONE.

balance the carbon lever on a vertical axle, the lower axis being pointed and working on a plate. The magnet tends to draw this against a carbon block.

Mr. Dowling has also devised a remarkably small microphone. It consists of two small blocks of carbon, having a cup shaped hole in each, and a small carbon ball placed inside. The blocks are insulated by parchment or some other non-conductor placed between them. One of these in a case, having a binding screw at each end, forms a very portable microphone. The ball is, in this case, the vibrator, making contact between the carbon blocks. A microphone has been made in this way only $\frac{1}{8}$ inch (cube) in size, being covered with paper, wires being placed against opposite sides. The usual size is $\frac{1}{4}$ inch (cube), either with or without a casing of wood. The speaking microphones mentioned above come nearer to perfection as transmitters than any others, and, unlike others, do not get out of order.

A SIMPLE ELLIPSOGRAPH.
BY S. W. BALCH.

The accompanying illustrations represent a simple attachment for compasses for drawing ellipses. It consists in



adding an extra point to the compass and then employing it in a manner similar to the way the trammel is used for the same purpose. From the consideration that the draughtsman does not have many ellipses to draw, the cross bars have been dispensed with for the sake of simplicity and the triangle made to take their place. It will be observed that the point inserted in the compass leg, and also the one on the sliding piece, are blunt at the end, so as not to catch on the paper in sliding along the edge of the triangle.

This instrument has the disadvantage of only drawing a quarter of the ellipse at a time, and of requiring a little practice in its manipulation on the part of the draughtsman.

On the other hand, it possesses the advantages over the trammel of a greater range of work, of not requiring an additional pen and pencil to keep in order, of compactness, of simplicity, and cheapness.

Professor Morton on the Gary Motor.

The following note from Professor Morton was lately read at a meeting of the Franklin Institute, Philadelphia:

Dr. Isaac Norris, Secretary of the Franklin Institute:

In reply to your favor of the 10th, asking for a note on the "Gary motor," to be read at the next meeting of the Institute, I would say, that though I have not time at present to go into any lengthened discussion, and indeed do not think that such a subject merits so much attention, I will with pleasure contribute the following remarks to the proceedings of next Wednesday.

This so-called "Gary" motor comes before the public in a double character. First as a perpetual motion machine, which is to do work without transformation of energy. In this light I think we may at once dismiss it as a fraud or blunder, to take its place with materialization of spirits, and other matters which are not subjects for the investigation of scientific students, but rather in the line of the police detective.

Secondly, however, Mr. Gary appears as the supposed discoverer of some new facts in reference to the action of magnets, which, though they certainly can no more enable us to create energy than to create matter, may add to our means of utilizing natural forces and existing sources of energy. In this view his claim of discovering what he calls a neutral line round magnets is worth investigation.

On looking into this matter, however, I find that he has only reobserved a set of phenomena, which are so old as to have been described in the *Principia* of Sir Isaac Newton, book ii., prop. xxiii., scholium to theorem xviii, where I find as follows:

"The virtue of the magnet is contracted by the intervention of an iron plate, and is almost terminated at it; for bodies further off are not attracted by the magnet so much as by the iron plate."

All Mr. Gary's experiments which will work are readily explained by the well known principles of magnetic induction, by reason of which a piece of soft iron near a magnet is inductively magnetized by the same, and rests upon it, and thus "contracts the virtue of the magnet" and neutralizes its action on exterior bodies.

There is no evidence whatever of the existence of any neutral line about a magnet, but the very experiments cited by Mr. Gary as proving it simply demonstrate that in certain relative positions the opposing actions of a permanent magnet and a piece of soft iron magnetized by induction from it, neutralize each other's effects upon a third magnetic body, such as a piece of iron or a compass needle.

Fully to work out all the relations between the mutual actions of three such bodies in any case is of course a problem of considerable complexity, but by no means a new one, and among many others a very able discussion will be found in the "Philosophical Transactions" for 1831, page 501 *et seq.*, by Sir Wm. S. Harris, under the title "On the Power of Masses of Iron to Control the Attractive Force of a Magnet." Also an earlier memoir by the same author in the *Edinburgh Philosophical Transactions*, 1829. This subject is also fully treated in Harris' "Rudimentary Magnetism," published by John Weale, London, 1850. Very truly yours,

HENRY MORTON.

Stevens Institute of Technology, Hoboken, N. J.,
April 12, 1879.

A Plan to Flood the California Desert.

Within a recent period, geologically speaking, a large portion of Arizona and the Colorado plateau has been converted into a desert by the drying up of an arm of the Gulf of California, cut off from the sea by silt brought down by the Colorado river. Some years ago it was proposed to refill the old sea bed, now known as the Valley of Death, by turning into it the water of the Colorado. General Fremont has been urging another plan. He says that a canal ten miles long would lead the waters of the Gulf of California to the bed of a lake, and another cut-off, fifteen miles from the upper end of the lake, would admit the waters to the great basin, parts of which are 350 feet below the sea level. Six months are estimated as the time required for the work, and the cost one million dollars. General Fremont, as the Governor of Arizona, lays great stress upon the value of this engineering work in reclaiming desert land in that Territory, in which purpose the United States is not strongly interested at this time. But the new inland sea might prove serviceable in opening up a water route through Southern California of value to commerce, and in this respect of some national importance.

THE Russian Imperial arsenal at Petrozavodsk has just completed its 40,000th cannon. The works, which are situated on the shores of Lake Onega, in the Olonetz government, were founded in 1774, since when it has been the custom to brand each cannon cast with a consecutive number. Most of the field artillery of native manufacture employed by the Russian army is cast at Petrozavodsk, the heavier ordnance being manufactured at Perm or St. Petersburg. The budget of the foundry mostly amounts to a million rubles a year. The iron used at the works is brought from the half a dozen mining establishments that exist in the province of Olonetz.