

general, and the world of medicine in particular, is under a deep debt of gratitude to Professor Hughes for his simple and beautiful instrument, which I have christened the audimeter, or less correctly but more euphoniously, the audiometer.—*The Telegraphic Journal*.

DEPREZ'S ELECTRO-MAGNETIC ENGINE.

By the COUNT DU MONCEL.

According to Count du Moncel, writing in *La Lumière Electrique*, M. Marcel Deprez has succeeded in solving the problem of making an electro-magnetic motor capable of doing useful work in many industrial applications. We venture to doubt whether the new motor can compete with even a water-motor as regards economy, to say nothing of gas and steam engines; but, according to Du Moncel, Deprez's apparatus is barely eight inches long, by less than six inches in breadth; it weighs about $6\frac{1}{2}$ pounds and can supply a power of nearly eight foot-pounds per second with five Bunsen elements. This, says Du Moncel, is really an extraordinary result, and one which could scarcely have been anticipated a few years ago. Under these conditions sewing machines may with perfect ease be worked by electricity without any cumbrous apparatus. This ingenious system consists of a horseshoe magnet of eight plates $5\frac{1}{2}$ inches in length, between the poles of which is introduced a Siemens armature, acted upon by the magnet over a length of $2\frac{1}{2}$ inches. Up to the present time no one has ever thought of causing magnets or electro-magnets to act otherwise than by their polar extremities, and all the engines devised hitherto have been arranged on this principle; but M. Marcel Deprez, thinking that under these conditions the whole of the magnetism that can produce a magnet was not utilized, endeavored to cause the whole of the sufficiently-magnetized portions of the magnet engine to act upon the mobile system to be influenced; that is to say, in the present case, the branches of the magnet nearly up to the neutral line. The electro-magnetic armature, instead of being placed transversely to the magnet, is arranged longitudinally and parallel to it. Under these conditions the magnetic power exerted on the armature is found to be considerably augmented, as is perceptible from the difficulty experienced in producing rotation, and this increase of force may give an idea of the consid-

erable advantages presented by this system of motor, which works by the effect of successive reversals of the current. Everybody knows the Siemens armature; it is a kind of galvanometer frame, of which two sides constitute the two poles of a straight electro-magnet with a flat core, broader than it is long, upon which the wire is wound. The axis of this electro-magnet is parallel to the coils of wire in the magnetizing helix, and consequently to the arms of the magnet. At one end it carries a reversing commutator, and at the other end it is provided with a pinion which gears into a wheel of which the diameter is thirty times greater. When the apparatus is properly regulated, the armature makes ninety revolutions per second, and, consequently, the wheel which it acts upon makes three revolutions. It is upon the axis of this wheel that are fixed the pulleys transmitting the movement, and by which the engine is caused to work either a sewing machine or any other apparatus which is to be set in movement. In order to render the working of the apparatus perfectly uniform, M. Marcel Deprez has adapted to it an extremely ingenious regulator, the action of which is very efficacious. It is a sort of spring fixed by one of its extremities to one of the ends of the armature. By means of a screw, a tension suitable for any given velocity of the engine is given to the spring. The transmission of the current from the commutator to the wire of the armature is effected without difficulty by this spring, as in the case of all frictional contacts; but when the velocity is greater than that which is requisite, centrifugal force is brought into action, and the mass of the spring causes it to fly off and to break the circuit, whence results a slackening of the speed, and then the completion of the circuit, which is again broken when the velocity again becomes too great. These alternations are so rapid when the electric power is somewhat higher than is strictly necessary, that a continuous spark is seen at the commutator where the regulating spring is in contact with it. Nothing can be simpler than this little apparatus, which, as at present constructed, may be of great service. Its force may be estimated by trying to stop the pulley, the diameter of which is nearly four inches. With five Bunsen elements at work, this stoppage can be effected only with great difficulty; whereas with the ordinary electro-magnetic engines it is easy to produce a stoppage by pressing a little upon the axis of rotation. Count du Moncel does not say what is the cost of five Bunsen elements, nor where they are to be placed when employed in working a sewing machine in a lady's boudoir.—*English Mechanic.*

REVERSAL OF MOTION WITHOUT GEARS OR BELTS.

Editor Journal Franklin Institute:

DEAR SIR—I note on page 417 of your issue for June, as a translation from a French journal, a description of an alleged invention of M. Bourdon for “reversing motion without gears or belts.” Just how old the method described may be I am not aware; but the first published account of it, within my knowledge, is contained in an illustrated work published at Lyons in 1719, which purports to be a description of the models contained in the cabinet of M. Grolier de Serviere, by his grandson; this would probably place the date of the invention (if original with M. G. Serviere) somewhere about 1650. In the work named it is shown as communicating motion from a horizontal crank shaft to a crank on the axis of a submerged rotary pump. Further, the device claimed as M. Bourdon’s invention was used in the second pumping engine erected (in 1857, I think) for the supply of water to the City of Chicago. In this particular case the motion was transmitted from an *eccentric* on the main shaft to a crank on the end of a revolving shaft, on which were the cams for actuating the valves of the engine. The same arrangement was repeated, with slight modification, in a pair of pumping engines built for the same city about ten years subsequently. I think the above-named engines were constructed at the Allaire works, New York.

Verily, such claims as those of M. Bourdon recall the saying of Chaucer: “Oute of olde bookes come all this new knowledge that men lere.”

Yours truly,

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Photographic Transit Measurements.—M. Cornu has been investigating the best theoretical conditions for measuring the photographs of the transit of Venus, with especial reference to the metric determination of angular distances. From Mouchez’s photographs he deduces a value, for the sum of the radii of the sun and Venus, which differs from the value in the *Connaissance des Temps* by less than $\frac{1}{4}$ of 1 per cent. This indicates a possibility of determining the sun’s distance, by photographic observations, within $\frac{1}{16}$ of 1 per cent., or within less than 100,000 miles.—*Comptes Rendus*. C.