

D'Arsonval's Chronometer with Magnetic Escapement.

The following translation of M. D'Arsonval's memoir, recently presented to the Paris Academy of Sciences, is given by the *Electrical Review*: The apparatus which I have the honor of laying before the Academy has been designed at the instigation of my master, Professor Brown-Sequard, who wished, with my assistance, to resume his former experiments on the rate of the transmission of sensitive impressions through the spinal marrow in a normal or in a pathological condition. My distinguished master was, in fact, the first to show, in 1859, that a sensitive impression undergoes a considerable retardation in its passage through the spinal marrow. Subsequently a great number of physiologists (Helmholtz, Bast, Chauveau, Marey, Hermann, etc.) have measured with great precision the absolute speed of the nervous agent in the nerves.

The procedure generally employed by physiologists, especially since the researches of Marey, is application of the graphic method, which owes so much to this author. A smoked cylinder, moved by a Foucault regulator, receives two parallel traces; the one, which gives the time in hundredths or thousandths of a second, is a sinusoid traced by the vibrations of a diapason. The second trace, which marks the beginning and the end of the phenomenon, is given by a Marcel Deprez electro-magnetic signal or by the pen of Marey's lever drum. This method is faultless as regards precision, but it requires a previous training and a series of operations which cannot be expected from a hospital surgeon, and still less from a medical man in his private practice.

The apparatus which I am about to describe gives the time in tenths of a second like an ordinary chronometer, by the simple displacement of a needle on a scale without employing the graphic method. It is essentially composed of a piece of clockwork provided with a Foucault regulator, which causes an axle, ending in a small circular plate of 12 millimeters in diameter, and covered with a thin sheet of caoutchouc, to make exactly two revolutions per minute. Opposite this plate, and at the distance of one millimeter, there is a second plate of tinned iron, of the same dimensions and parallel to the former. This second plate terminates a small, very short axle, carrying at its other end a thin aluminum wire at right angles to itself. This aluminum wire serves as a finger, and moves on a scale divided into 50°. An antagonistic spring constantly pushes the tin plate against the plate of the movable axle; under this pressure the two axles form one, and the aluminum needle turns round the scale with the speed of two revolutions per second. A small electro magnet is behind the tin plate, which serves it as a keeper.

If a current is directed into the electro magnet, the disk of tin is attracted, it becomes separated from the revolving plate, and the aluminum finger is rendered motionless on the scale as long as the current passes. At the moment of the rupture of the circuit, the antagonistic spring produces the escapement, and the finger sets off instantly at the speed of two revolutions per second. The extreme lightness of the pieces and the nature of the electro-magnet render the time lost similar to that in the electro-magnetic signal of M. Marcel Deprez. The displacement of the finger on the scale measures the time during which the electric current is interrupted, in hundredths of a second. Hence to measure the speed of an impression the arrangement required is most simple.

The experimentalist touches the subject with a small manipulator consisting of a spring bearing upon a point. At the moment when contact with the skin takes place, the spring abandons the point, the current is broken, and the finger sets off from zero at the speed of two revolutions per second. The subject holds in his hand an electric stop, upon which he presses as soon as he feels the impression. This pressure reopens the current, and consequently stops the finger by actuating the electro-magnet. The time which has elapsed between the moment of excitation and that of perception is thus found given in hundredths of a second by the movement of the finger on the divided scale. This little apparatus, very ingeniously constructed according to my indications by M. Ch. Verdin, is of minute dimensions; it is contained in a circular box of 20 cm. in diameter by 6 in thickness. Its small bulk and the ease of its use render it an essentially clinical apparatus, calculated in many cases to throw a light upon nervous pathology.

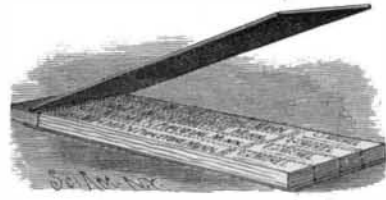
This, however, is not the limit of its utility. It is

equally calculated to be of service in measuring phenomena of short duration, measurements which we are reluctant to undertake by the graphic method. M. Brown-Sequard will shortly lay before the Academy very interesting and novel results already obtained.

ADHESIVE ADDRESS TAG FOR TRAVELERS.

The accompanying illustration shows the idea of a recently copyrighted book of addresses, intended for the use of travelers. Instead of writing the name in a hotel register, one simply tears out a slip and pastes it in place. This method also serves, where desired, to afford the means of making a conspicuous advertisement, such as a traveling salesman might like to employ on behalf of the house he represented.

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EHMAN'S TRAVELER'S REGISTER SLIP BOOK.

THE STAR PORTABLE FORGES.

Mr. C. Hammelmann, the patentee of all forges made in Buffalo, N. Y., so far as we know of, has, after long study and having noted the vulnerable points and defects in his early inventions, produced a portable forge which, in its mechanical arrangements, is very much superior to any former ones. On this page we give cuts of this forge and blower, known as the "Star Portable Forge" and blacksmith's hand blower. Many admirable features are introduced, which increase in every way the general efficiency of the device. The number of working parts has been so reduced that the construction is extremely simple, thereby lessening the friction to be overcome in a corresponding degree. There is only one large wheel, over which passes the belt driving the blower. The method of operating the hand wheel is simple and ingenious, and there is no liability of getting out of order. This wheel is driven by a rack, which has an up and down motion in guides attached to the legs of the machine, and which engages with a pinion on a clutch mounted on the main or driving shaft. This shaft is so arranged that any wear of the pinion and rack can be taken up by means of set screws. The rack is operated by a lever hung on a swivel, so that the worker is permitted to move about on a considerable radius. It is evident



Fig. 1.—THE STAR PORTABLE FORGE.



Fig. 2.—THE STAR BLACKSMITH'S FORGE.

that, owing to the direct method of applying the power, and the minimum amount of friction, almost all of the force applied to the lever is transmitted to the blower. The clutch has very few pieces, and is so designed that there is practically no wear. Another advantage is obtained by the employment of steel shafting and by babbitting the journals.

The forge shown in Fig. 1 is adapted to the use of machinists, plumbers, gas fitters, and manufacturers in general. In this size, which will produce a welding heat on 2½ inch round iron in six minutes, the fan is 8 inches in diameter, the hearth 21 inches in diameter, the height of fireplace 34 inches, and the weight 110 pounds.

The forge shown in Fig. 2 is especially adapted for heavy blacksmith work, having a large fireplace, with sufficient blast, to do the heaviest kind of work. It will heat 4 inch round iron in ten minutes. The fan is 14 inches, the hearth 30 by 40 inches, the height 30 inches, and the weight 265 pounds. This forge has been used by carriage and wagon blacksmiths, and has given great satisfaction. It saves time, occupies but a small space, and is more convenient and effective than brick forges and bellows.

The manufacturers of these forges, the Star Machine Company, of 198 and 200 Terrace, Buffalo, N. Y., also make all the usual styles and shapes of forges and blowers, and in each one the same essential principles are embodied. It will be seen that this company, owing to the reduced number of parts and labor necessary to make them, can place a first-class machine upon the market at a reduced cost.

Balloon Voyage from France to England.

M. M. L'Hoste and Joseph Mangot, the latter a famous French astronomer, and the former being secretary of L'Academie d'Aerostation Meteorologique de France, have lately made a balloon voyage from Cherbourg, in France, to Tottenham, a suburb of northern London, near Alexandra Palace, a feat that would be deemed impossible were it not for the actual proof. M. L'Hoste, who is quite an enthusiastic aeronaut, has long conceived the feasibility of directing a balloon to the point intended for arrival or utilizing it for dropping torpedoes. It was their intention to alight in Finsbury Square, five miles from the place where they did stop; the steering apparatus worked all right, however, and the balloon kept in a uniform northeasterly direction.

The main object was not so much an experiment, to prove the power and accuracy of steering, as to ascertain the possibility of maintaining an equable altitude above the waves in crossing the water. This was done by means of a pipe extending into the waves, and by means of which water could be drawn up to be used as ballast in counteracting the condensation by rarefaction of the gas which causes balloons to shoot upward. It worked quite well, keeping the balloon about 150 feet above the surface until the Isle of Wight was reached, when it shot up, but the water ballast is always under control, an advantage unobtainable with bags of sand.

The trip occupied twelve hours, and was successful in every particular, the French newspapers attaching much importance to the feat, on account of military and scientific benefits.

Yellow Azo Dyes for Cotton.

The *Allgemeine Zeitschrift für Textil-Industrie* describes a range of azo dyes invented by the St. Denis Manufacturing Company, which impart a fast yellow color to vegetable fibers. By the action of metadiazobenzol acid upon diphenylamine or monobenzylaniline, there is produced a pure yellow dye; an orange-yellow being obtained by the use of paradiazobenzol acid. In order to use these two acid dyes in cotton printing, they are first brought into their respective salts by

soda, potash, or ammonia, and are then thickened in the usual way with starch and tragacanth. After boiling and cooling, an excess of acetic acid is added to the printing color, by means of which the dye (finely divided in the thickening) is again expelled in its original form. Finally, a certain quantity of acetate of chrome is stirred in, and the color thus composed is printed upon cotton, steamed, washed, and soaped at 144½° F. By replacing acetate of chrome with an alumina mordant, greater brilliancy is obtained, but less solidity. The color with chrome mordant can also be used and printed with artificial alizarine.

Cincinnati Industrial Exposition.

The Exhibition of Industry and Art to be held this year at Cincinnati, from September 1 to October 9, will be the thirteenth of a very highly successful series of expositions inaugurated in that city in 1870. The last exposition attracted exhibitors from twenty-nine States and four Territories, as well as from numerous foreign countries, and was attended by nearly a third of a million visitors. It is expected that the present occasion will be even more popular, and every provision has been made for its success. The accommodations of the city are ample, and will be furnished at ordinary rates. A very commendable feature of the Cincinnati expositions is the absence of any private interests. They are managed entirely in behalf of the citizens, and are under the control of the Board of Trade, Chamber of Commerce, and Ohio Mechanics' Institute. Mr. Edwin Stevens is the president of the Board of Commissioners for the present year.