

represented at G G, these latter being put in communication with the twelve electro-magnets by means of the flexible cable of multiple conductors that we have already spoken of. In the interior, at H, may be seen an escapement wheel, which is controlled by the armature, I, which is attracted every time a current is sent by the transmitter into the bobbin, J. At every attraction, the brush advances by a twelfth of the circumference, and sends the current arriving through the terminal, G', into the corresponding shutter. On taking care, before any operation, to place the brush in the position that corresponds to zero, one will consequently free all the shutters in the order that has been fixed in advance. Such order will depend solely upon the arrangement of the wires of the various electro-magnets in such or such a terminal.

One can thus easily change the order of succession of the photographs according to the direction of the motion, and this is very advantageous for the reading of the results.

The apparatus employs the current of a battery of six bichromate piles, two to actuate the distributor, and four for freeing the shutters.

**Operation of the Apparatus.**—The focusing having been effected, the shutters are set and their velocity is regulated by means of the lower handle, which moves in five notches corresponding to five different velocities. The Trouve transmitter is so regulated as to have desired number of contacts for the reproduction of the motion that it is desired to photograph. The cylinder is then set in motion, and, after it has been ascertained whether the brush is really in its starting position, the piles are lowered. The operator then holds in his hand an electric bulb, and, when the moment has arrived for operating, he has only to press the latter and maintain a contact during the time of the experiment. The brush of the distributor frees the shutters one after the other, and the photochronographic series is obtained at the intervals that have been fixed in advance. In case it was desired to obtain a discontinuous series, that is to say, the twelve photographs at any intervals whatever, it would suffice to suppress the transmitter. Upon sending the current directly into the distributor, a photograph will be obtained every time the electric bulb is compressed.

In studies concerning locomotion, either in man or animals, a very simple arrangement will permit of making the apparatus operate automatically when the subject arrives in the field of the objectives. Across the path that the subject is to follow is placed a weak thread that keeps separated from each other two metallic plates at which end the conductors that previously led the current into the electric bulb. The current will not be able to pass until, the thread being broken by the passage of the subject, the plates have come close together. The apparatus will operate then at the velocity that has been fixed in advance by the operator, and in this way will be avoided many failures, and will be suppressed the lost time that is inevitable between the moment at which the subject is seen to arrive in the field of the apparatus and that in which the apparatus is set free.

Fig. 4 shows perfectly the arrangement as a whole at the moment at which the operator is about to catch the motion of a subject who is forging a piece of metal. This figure, moreover, represents the new open air laboratory that has just been installed at the Salpetriere, thanks to a subsidy generously granted by the Municipal Council of Paris. A large screen, 20 feet in length by 10 in width, permits the subject to stand out in relief from a plain background. Parallel with the latter there is a horizontal track for the study of motions seen from the side. A second track at right angles with the other permits of catching face or back motions. In the prolongation of this latter track are placed rails that carry the car upon which the apparatus is mounted. In this way, the latter can be displaced with great facility.

The piles, transmitter, and distributor are placed upon a table. The box containing the transmitter is represented open in order to allow the latter to be seen. There is also shown the flexible cable that connects the distributor with the photographic apparatus and

the conductor terminating in an electric bulb that the operator holds in his hand. A finder situated above the camera permits of following the subject and of photographing him at the most favorable moment.

This installation will permit us to enter upon studies that it was impossible to pursue with the usual material and in a laboratory with a glass roof. On another hand, the apparatus is transportable, and this permits us to obtain a certain number of series, either in the country or at the seaside. On the present occasion, just as an example, we give in Fig. 1 a facsimile of one of our negatives representing an equilibrist upon a wire. Mlle. Barenco, of the New Circus, who was kind enough to come and pose for the special

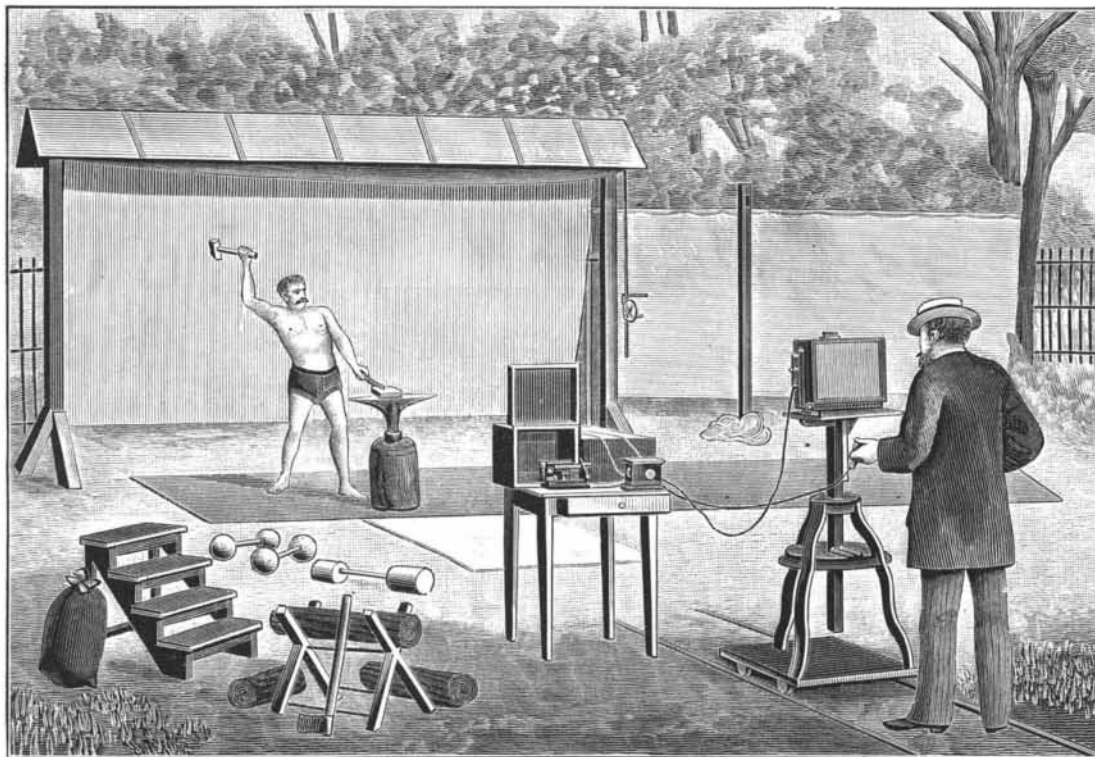
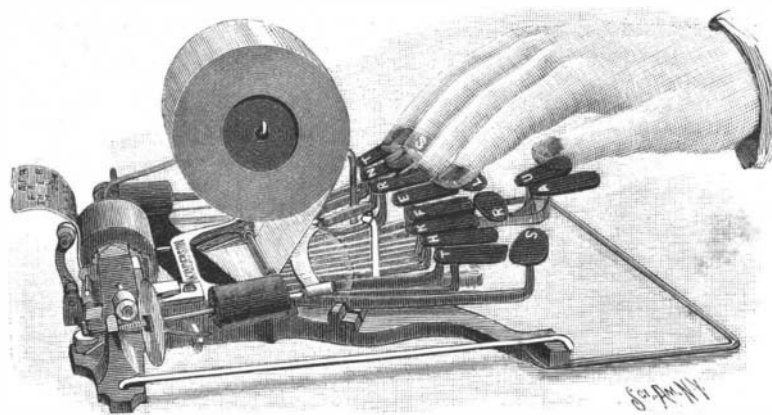


Fig. 4.—NEW OPEN AIR PHOTOCRONOGRAPHIC LABORATORY.

benefit of our readers, is, in these photographs, executing a volt from right to left—a motion that she repeats several times in succession, her limbs remaining extended. The series is complete in ten photographs, the eleventh and twelfth representing the beginning of the same motion, but in an opposite direction. The twelve photographs were taken in  $1\frac{1}{2}$  second. Each of them measures  $2\frac{3}{4}$  by  $2\frac{3}{4}$  inches.

In conclusion, we believe it our duty to thank all those who have been our true fellow-laborers, and who have been instrumental in causing our ideas to pass from the domain of theory to that of practice: Messrs. Dessoudix and Bazin for the mechanical part, the Messrs. Mors Brothers for the electrical arrangement, and Mr. Lucien Leroy for his distributor. Nor can we forget our venerated master, Mr. Charcot, who has always encouraged our researches in the so interesting field of medical photography, and whom we saw for the last time when he did us the honor to come to witness the operation of the new laboratory installed under our direction in his service of the Salpetriere.—A. Londe, in *La Nature*.

ARTIFICIAL wood suitable for making furniture, roof covering and insulating purposes can be made



ANDERSON'S SHORTHAND TYPEWRITER.

according to a patent process by burning magnesite together with waste vegetable or animal matter, such as wood, shavings and chips, sawdust, cellulose, cotton, hair or wool. The materials are first pulped with a solution of magnesium chloride in water, or a solution obtained by saturating hydrochloric acid with magnesite, with which mineral the pulp is then mixed and moulded into any desired form. The articles are subsequently lixiviated, preferably in running water. Suitable coloring matter can be added to the materials at will.

**Transportation.**

The principal lesson suggested by the Fair, as it appears to me, is the importance of improving the means and methods of transportation between the different parts of our country, so that food products of all kinds and perishable goods and materials in general may be carried to market with the greatest possible celerity and in the best possible condition. The great mass of the American people need better food. It is an indispensable basis and condition for their attainment of permanent prosperity and of the fullest civilization of which they are capable. Most of them still think of their food without seriousness and with slight perception of its relations to the highest uses and objects of human life. Though every dish prepared by unwilling hands is poisoned, yet cooking is mostly slave's service, without honor, respect or reward. The life of American working people needs reconstruction, from its basis in the character of their food to its apex, whatever that may be, and one of the most important means for improving the food of the mass of the people is the development of the better methods for the transportation of food products between the different regions of our country. The people who work with their hands for wages, and especially those who work in shops, mills and factories, need more fruit for food, fruit in better condition and at less cost. We should, as fast as possible, reduce the time for railway transit between the great fruit gardens of our Pacific coast region and the homes of the vast populations of our northeastern States. We shall soon

have a home market for all our food products; our system of railway management should be such as to secure the best possible markets for producers and the best products for consumers at reasonable prices.—J. B. Harrison in *Chicago Tribune*.

**A SHORTHAND TYPEWRITER.**

This is a typewriter built especially for rapid work; simple enough to be very strong and small enough to be light, portable and noiseless. In fact, it is not much larger or heavier than a pair of opera glasses. Speed is gained by arranging the keys and type so that every letter on the keyboard can be printed at one time without shifting the hands, all the most frequently used letters being duplicated. Thus in writing the word "start," the "sta" would be struck with the left hand and the "rt" with the right hand simultaneously, the entire word being printed at one stroke, after which the machine automatically draws the paper forward and is ready for the next word to be printed, so that it really requires no more strokes of this kind to print a whole sentence on the Anderson Shorthand Typewriter than it would to merely strike the space key for making spaces between the same words on an ordinary typewriter. This arrangement of the keyboard restricts the number of keys and necessitates the omission of the less frequently used letters of the alphabet. These omitted letters are represented by combinations of those the machine prints, and as soon as this list or code of cipher letters is memorized, the learner has a complete alphabet at his service and can begin practicing for speed. Six weeks' practice will, it is said, give a speed of about 100 words a minute. No knowledge of stenography is required; there is nothing to learn except the list of cipher letters.

The New York office of the Anderson Shorthand Typewriter is in the World building, rooms 149-151. Among the well known firms employing its operators may be mentioned the Forbes Lithograph Manufacturing Company, of Boston, the *Journal of Commerce and Commercial Bulletin*, of New York, the Trust Company of North America, at Philadelphia, the Kellogg Newspaper Co., Memphis, Tenn., the American Public Health Association, with numerous lawyers, Congressmen and business houses.

**Crops of the United States.**

The total value of the crops of the United States during 1892 is estimated at \$3,000,000,000, of which the largest item is \$750,000,000 worth of hay. The animal products, including meats, dairy products, poultry and eggs, and wool, are placed at \$965,000,000 more.