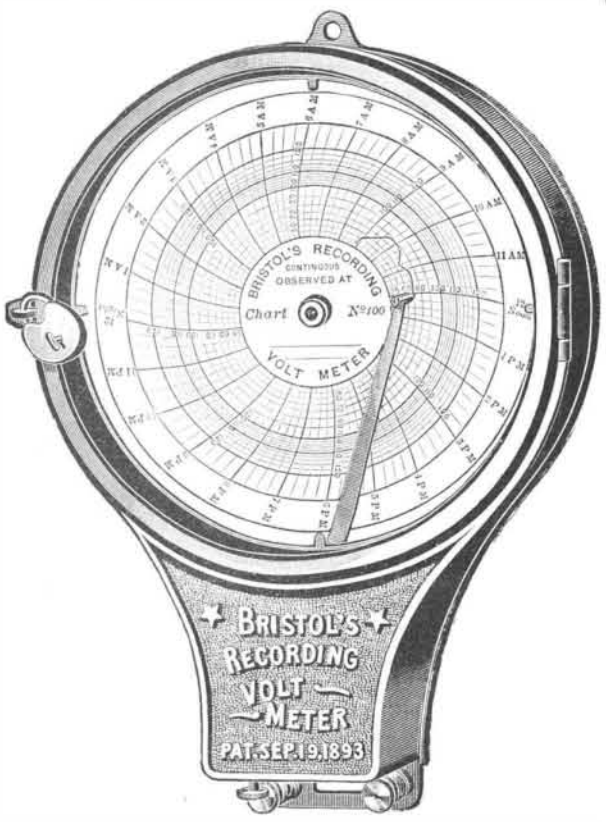
RECORDING INSTRUMENTS AT THE WORLD'S FAIR.

One of the attractive exhibits in Machinery Hall, section 25, is that made by the Bristols' Mfg. Co., of Waterbury, Conn., as shown in our illustration. Since its establishment in 1889, this company has developed an extensive business with Bristol's recording pressure gauges and steel belt lacing. Their line of gauges is now one of the most complete ever produced, comprising a list of over twenty different ranges, from vacuum to fifteen hundred pounds per



RECORDING VOLTMETER.—Fig. 1.

square inch, and adapted to record continuously, day and night, pressures of air, gas, steam, water and liquids.

The corner space occupied by the exhibit is diagonally spanned by an excellent imitation of a stone arch, the facing of fine leather, and the stones fastened together with the company's patent steel belt lacing. To each of the stones is attached one of their gold-plated recording gauges, every alternate instrument being provided with an electric light. On one pillar supporting the arch is a gauge in operation recording the pressure of steam used in the building. On the other pillar of the arch is one of their new recording voltmeters in operation recording continuously the voltage of the alternating current which supplies the lights. An artistic and ornamental feature is the semicircular grille of wrought iron, which fills in the arch and bears the name of the company and their specialties. Models of the different recording instruments are arranged on tables, so that visitors may examine the construction. For the high pressures a hand screw pump is provided, but for low pressures a gauge is fitted with a mouth piece, and each visitor can operate the model by blowing. A new recording thermometer is also shown in operation, but it will not be placed upon the market until their recording pyrometer is ready. A complete line of their patent steel belt lacing for all kinds of belting is also attractively displayed. Outside of their exhibit, there are eight of Bristol's recording gauges in operation at different points within the Fair grounds.

As the new recording voltmeter for alternating or direct currents has not been previously described, we illustrate the instrument, Fig. 1 showing it complete ready for connection, and Fig. 2 with front case removed, from which the extremely simple construction and manner of operation will be readily understood. The coil, A, is mounted on the spring knife edge supports, D and E, and free to move toward the parallel and stationary coil, B, when they are mutually attracted to each other by a current passing in series. The current is conducted to the movable coil, A, through the supporting springs, D and E, and this, together with the special feature of the moving coil being mounted on frictionless spring knife edges, renders the instrument extremely sensitive to the smallest changes of voltage. The marking arm, F, is attached directly to the spring, E, and partakes of its motion, recording the changes of voltage on a uniformly revolving chart. It will be observed that the instrument is constructed on the electric balance principle without permanent magnets. The divisions on the chart are on an increased scale in the vicinity of the voltage to be maintained, thereby making it possible to note the variation of one volt. The chart shown, Fig. 1, is intended for a one hundred and ten volt circuit. The coil, C, is an auxiliary resistance. With the alternating current voltmeter the auxiliary resistance is furnished in a separate rheostat which may be adjusted to suit the rate of alternations of the current to be measured. Several of the instruments have been in use in large electric light stations for the past three months, and are giving the highest satisfaction. One of the voltmeters is on exhibition in Electricity building. Two of them, one alternator and one direct current, are being used by the Committee on Awards in connection with the life tests of incandescent lamps.

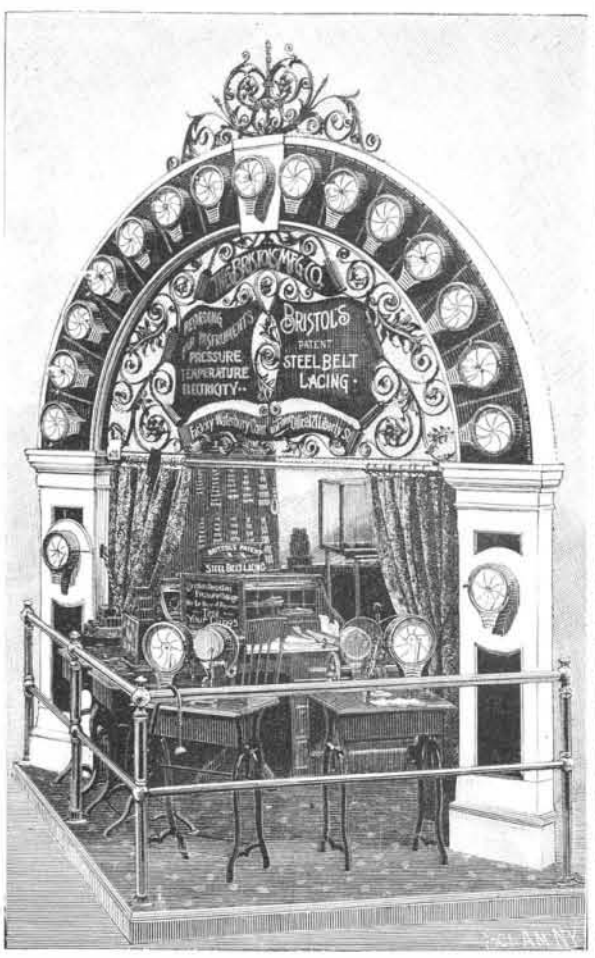
The Action of the Eye.*

NIKOLA TESLA.

It can be taken as a fact, which the theory of the action of the eye implies, that for each external impression, that is, for each image produced on the retina, the ends of the visual nerves concerned in the conveyance of the impression to the mind must be under a peculiar stress or in a vibratory state. It now does not seem improbable that, when by the power of thought an image is evoked, a distant reflex action, no matter how weak, is exerted upon certain ends of the visual nerves, and, therefore, upon the retina. Will it ever be within human power to analyze the condition of the retina when disturbed by thought or reflex action, by the help of some optical or other means of such sensitiveness that a clear idea of its state might be gained at any time? If this were possible, then the problem of reading one's thoughts with precision, like the characters of an open book, might be much easier to solve than many problems belonging to the domain of positive physical science, in the solution of which many if not the majority of scientific men implicitly believe. Helmholtz has shown that the fundi of the eyes are themselves luminous, and he was able to *see*, in total darkness, the movement of his arm by the light of his own eyes. This is one of the most remarkable experiments recorded in the history of science, and probably only a few men could satisfactorily repeat it, for it is very likely that the luminosity of the eyes is associated with uncommon activity of the brain and great imaginative power. It is fluorescence of brain action, as it were.

Another fact having a bearing on this subject which has probably been noted by many, since it is stated in popular expressions, but which I cannot recollect to have found chronicled as a positive result of observation, is that at times, when a sudden idea or image presents itself to the intellect, there is a distinct and sometimes painful sensation of luminosity produced in the eye, observable even in broad daylight.

Two facts about the eye must forcibly impress the mind of the physicist, notwithstanding he may think or say that it is an imperfect optical instrument, for-

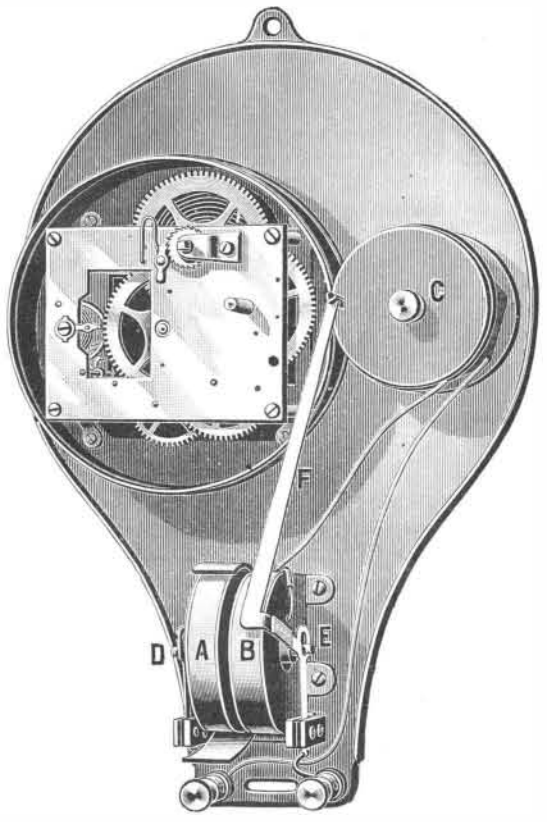


THE WORLD'S COLUMBIAN EXPOSITION—THE BRISTOLS' MANUFACTURING COMPANY'S EXHIBIT OF RECORDING INSTRUMENTS.

getting that the very conception of that which is perfect, or seems so to him, has been gained through this same instrument. First, the eye is, as far as our positive knowledge goes, the only organ which is *directly* affected by that subtile medium which, as science teaches us, must fill all space; secondly, it is the most sensitive of our organs, incomparably more sensitive to external impressions than any other.

This divine organ of sight, this indispensable instrument for thought and all intellectual enjoyment, which lays open to us the marvels of this universe, through which we have acquired what knowledge we possess, and which prompts us to and controls all our physical and mental activity—by what is it affected? By light! What is light?

It is beyond the scope of my lecture to dwell upon



RECORDING VOLTMETER.—Fig. 2.

the subject of light in general, my object being merely to bring presently to your notice a certain class of light effects and a number of phenomena observed in pursuing the study of these effects. But to be consistent in my remarks it is necessary to state that according to the idea now accepted by the majority of scientific men as a positive result of theoretical and experimental investigation, the various forms of manifestation of energy which were generally designated as "electric," or more precisely "electro-magnetic," are energy manifestations of the same nature as those of radiant heat and light. Therefore the phenomena of light and heat, and others besides these, may be called electrical phenomena. Thus electrical science has become the mother science of all, and its study has become all-important. The day when we shall know exactly what "electricity" is, will chronicle an event probably greater and more important than any other recorded in the history of the human race.

* Extract from paper on the "Action of the Eye," read before Franklin Institute.

Whitewashing by Machine.

A correspondent in York, Pa., calls our attention to a plan for whitewashing successfully followed there in imitation of a method of painting employed on the buildings of the World's Columbian Exposition, devised by Mr. F. D. Millet, director of decoration, and illustrated in the SCIENTIFIC AMERICAN of April 29, 1893. A building 50 × 150 ft., two stories high, was to be whitewashed, and the lowest estimate of cost obtainable was $85, while by the method adopted the expense was reduced to $25 or $30. The whitewash was slaked and carefully strained through a fine sieve into a barrel to which was attached the suction pipe of a small double-acting force pump. The pump and supply of whitewash were placed in a convenient location on the first floor, with a delivery pipe, to which was attached fifty feet of hose to be taken to any part of the building. A pressure of 100 pounds per square inch was pumped into the delivery pipe and the whitewash discharged through a nozzle having a hole one-sixteenth of an inch in diameter. The arrangement did the business in first class style, and made a better job than could be made with a brush. No ladders were required; the man in charge of the hose standing on the floor can cover every spot of the roof timbers, twenty-five feet above his head.

Bread Made with Soap.

From a communication read to the Association of Belgian Chemists, it seems that Continental bakers are in the habit of mixing soap with their dough to make their bread and pastry nice and light. The quantity of soap used varies greatly. In fancy articles, like waffles and fritters, it is much larger than in bread. The soap is dissolved in a little water; to this is added some oil, and the mixture, after being well whipped, is added to the flour. The crumb of the bread manufactured by this process is said to be lighter and more spongy than that made in the ordinary way.