ELECTRIC SCIENCE UP TO DATE

Remarkable Displays at the Coming National Exhibition.

WORKING MODELS OF INVENTIVE SKILL

Edison's Perfected Fluoroscope, Niagara Falls Power—Lighting by Etheric Tubes Without Filaments, and the Literature of the Sciences.

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The National Electric exposition, which opens in New York City on May 4, will be the first of its kind since the very successful electrical exhibition of 1884, held in Philadelphia by the Franklin institute. The purpose of this exhibition of 1896 is to set forth the development that has been made in electrical applications during the last twelve years, and the National Electric Light association, under whose auspices the exhibition has been organized, announces that there will be gathered together in the Industrial building on Lexington avenue and presented there throughout the month of May some most interesting and important evidences of the progress made in this branch of science.

EDISON'S FLUOROSCOPE.

One of the most attractive features of the exposition will be an exhibit of Mr. Edison's fluoroscope, which has been made a practical instrument by the American inventor, although the first experiments with it were conducted by Salvioli. In its ordinary form the fluoroscope is a flaring box about eight inches long and tapering from a size of about seven inches square at one end to two inches by four at the other. Inside and out it is covered with black cloth and has a handle on one side for the convenience of the experimenter. At the small end through which the observer looks are curved pieces of black felt that fit closely about the forehead and eyes, so as to exclude every ray of light.

The large end of the box is closed by a strip of collodion, the inner surface of which is coated with crystals of tungstate of calcium. The object to be viewed is placed between this end of the fluoroscope and a wooden box containing some form of vacuum tube, usually the Crookes variety. The Roentgen rays emitted from this tube pass through the object into the crystals of tungstate of calcium and cause it to fluoresce, so that the observer can see plainly the shadow of his hand, for example, the bones being quite distinct and the movements of the fingers easily discerned. This shadow picture of the hand does not form instantaneously, but is seen after some seconds, and persists for an equal time after the object has been removed. In Mr. Edison's exhibit the Crookes tube employed will be connected with a mercurial pump in order to maintain the highest possible vacuum, a very important point in generating a strong stream of the Roentgen rays.

It will be shown that the fluoroscope offers immense possibilities to the ordinary physician, for it can be built of almost any size and none of the materials are expensive. Tungstate of calcium (formed by the fusion of tungsten and calcium) has been known for some time, but its fluorescent qualities were only recently discovered. It fluoresces only in the crystalline form, the powder being quite opaque. Next to it in efficiency comes tungstate of strontium, and ordinary rock crystals are also highly fluorescent, so that not even the poorest practitioner need be at a loss to have his fluoroscope, and if need be to construct one himself.

Mr. Joseph Wetzler of the Electrical Engineer, and a member of one of the committees of the exhibition, is of the opinion that, with the aid of perfected fluoroscopes, which will soon be introduced, physicians will be able to examine fractures in the human body by actually seeing them, and to locate with great precision embedded shot or other foreign bodies. They will also be able to examine or discover cancers, tumors, ulcers, and other malign growths that might otherwise have existed unsuspected, and by treating these at an early stage in their development avert serious or foatal results.

The fluoroscope will also be of great service in construction work, both of buildings and machinery, since its heightened powers of vision will enable experts to locate fractures, flaws in castings, defects in welding, brazing, etc. Indeed, it has been suggested that, thanks to the fluoroscope, steamship companies may soon be able to send out their vessels with absolute confidence based on the guarantee of an examiner with the fluoroscope that their great steel screws are absolutely free from weak spots, caused by a concealed air bubble or some inequality in the annealing.

Mr. Edison will also present the perfected phonograph upon which he has been working since he bought back the rights in his own invention from the New Jersey receiver of the American Phonograph company. The great difficulty with the old phonograph was the scratching and rattling that accompanied the production of high notes, whether of voice or of instruments. In the new phonograph this trouble has been entirely done away with and even a shrill piccolo is reproduced with smoothness and brilliancy.

NIAGARA'S POWER PLANT.

In the center of the main floor will be a striking exhibit showing in miniature all the machinery of the Niagara Falls power plant. This remarkable model is composed of wood, glass and pasteboard and is about fourteen feet square. It was built at a cost of $2,500 by Mr. Allen of Philadelphia, under the direction of Dr. Coleman Sellers. The model shows the falls with real water running over them, the in-take canal, the power house on its bank, which will be lighted at night by tiny incandescent lamps, and the wheel pit down which the water falls, turning a turbine at the bottom, and then discharging through a long tunnel into the river under Suspension bridge.

The machinery by which the power is conducted from the wheel back from to the surface and thence distributed is also shown. The shaft and tunnel are made of glass so that the operation can be clearly seen, and only distilled water can be used, as ordinary water would clog the delicate turbine model. There will also be near this exhibit a model, sixteen feet wide, of the Erie canal, with canal boats and a power house on the banks. This will show exactly how the energy generated at the Falls is applied by means of trolleys to the "electric mule" which pulls the boats.

The above described model is exhibited by the Historical and Loan Exhibit committee, and to Mr. T. C. Martin, chairman of that committee, belongs the credit of originating the exhibit. Mr. Martin is most anxious that the model be run with motive power generated at the Falls. The Western Union people have offered him the use of two of their wires for the purpose of transmission, providing the amount of electricity to be sent be not so great as to endanger the instruments and buildings through which the wires pass. It would be conveyed by an iron wire to Buffalo, a distance of twenty miles, and the rest of the way over the usual copper wire.

Mr. Martin also proposes to have the electricity brought from Niagara transferred to the submarine cables so that communication with London may be maintained by means of power generated at Niagara Falls. The success of the scheme depends upon the amount of power needed to run the model, which should not exceed one-quarter horse power. Mr. Nicola Tesla pronounces the scheme perfectly feasible, and says that starting with one horse power at the falls end, they would certainly have power enough to do all they would wish. The Long Distance Telephone company has arranged to have instruments in the immediate vicinity of this exhibit which will produce the voice of the great waters, so that at the same time one can see and hear Niagara Falls 500 miles away.

To the great disappointment of electricians as well as the world in general, Mr. Tesla has announced that he will make no exhibition of his work. The most valuable of his instruments and models were destroyed by a fire a year ago, and Mr. Tesla has nothing on hand that would adequately represent him.

NEW SYSTEM OF LIGHTING.

One of the most important exhibits will be that of a new and valuable discovery known as the Moore "Etheric" Lighting tubes. This is the result of the labors of Mr. D. McFarlan Moore of Newark. In the apparatus, which is very simple, an electric current passes through a vibrator contained in a small glass tube, exhausted to the highest possible degree. The atmospheric resistance being removed, the vibrator is enabled to attain a rate of 100 vibrations a second. From this vibrator the current, pulsating at the same rate, passes through the lighting tubes, which may be of any size or shape and in which only a low vacuum is necessary. These lighting tubes contain no filaments, their ends being simply coated with metallic paint with which the wires are connected.

The rarefied air in the tubes being excited by the pulsations of the current coming from the vibrator becomes luminous and shines with a phosphorescent glow. The light is very pleasant to the eye, and is so evenly diffused that it will offer great advantages for ordinary lighting purposes, as well as for such special uses as photography, illuminated signs, etc. One great point of superiority of Mr. Moore's system lies in the cheapness of its manufacture, the cost of production and maintenance being lessened by the absence of filaments. Mr. Moore will show these new lamps in a dark room about ten feet square.

ELECTRICITY IN THE HOUSEHOLD.

The possibilities of electricity in the household will be displayed in another section in the shape of electric stoves in practical operation, which will bake biscuits in three minutes; bread in ten; chafing dishes heated by electricity; a small laundry in which both washing and ironing will be performed by that agent; heating and lighting apparatus, mechanical devices for lightening labor and manifold applications of this force will be displayed. A novel idea is the electrotherm; this is an asbestos blanket, ornamental in appearance and of any size desired, which is interwoven with German silver wires which act as a high resistance coil and give out heat. A switch regulates the degree of warmth required. The electrotherm is designed to take the place of the hot water bottle, to serve as a foot warmer or as covering of any kind where warmth and lightness are desired.

AN AUTOMATIC ELEVATOR.

The Edison company will also show an elevator automatically operated by electricity. The person desiring to ascend, enters the car, closes the door and presses the button marked Up; another button stops it, and still another sends it down. Safety is ensured, as the circuit is not complete unless all the doors opening on the shaft are closed, nor will any door open unless the car be exactly opposite it.

This company will also show an improved stop-cylinder printing press, in which the motor is connected directly to the shaft. This is a simple illustration of what is now being very generally done in the way of dividing electric power by applying directly to every machine a motor of sufficient size to drive it, which can be put out of use when the machine is not in operation.

The General Electric company will combine with the Edison company in a very complete exhibit of the evolution of the incandescent lamp.

AN ELECTRIC BUOY.

Models of the Gedney channel buoys will make a very interesting exhibit, as they mark an era in harbor lighting. There are ten or twelve of these buoys on each side of the Gedney channel at the entrance to the New York harbor. They are like gigantic wooden lamp-posts, seventy feet long, anchored by heavy "muchroom" weights, the top of the spars projecting about five feet out of water at high tide. The lamp is made of very heavy bell glass and is five inches in diameter. It gives a light of 100-candle power, and the filament is spiral. From the dynamo station on Sandy Hook beach run two carefully insulated, submarine cables lying along the ocean bed. Offshoots from these cables supply each lamp. The entire length of cable used, including offshoots, is a little over six miles.

It is expected that the horticultural department of Cornell university will make an exhibit of the application of electricity to growing plants. They have lately been making some successful experiments by radiation from arc and incandescent lights directly upon the plants, and forced Easter lilies two weeks ahead of time. In Russia two years ago very satisfactory results were attained by passing an electric current through the ground in which the seeds had been planted.

COMPLETE ELECTRICAL LABORATORY.

A complete electrical laboratory, fitted up with the finest and most complete instruments and apparatus, will be in charge of Mr. Max Osterberg of Columbia college, who will each day conduct a number of interesting experiments. This laboratory is designed to show the actual methods of studying the electrical science, and the processes gone through to obtain well known results. For instance, on a large screen will be thrown the magnified reflection of an arc light in which the carbon points can be seen to diminish as the light burns. There will also be standard instruments which will show the method of measuring the electrical units of pressure, quantity and resistance, i. e., the volt, the ampere and the ohm.

The United States patent office will have a large exhibit of electrical models in charge of an expert.

There will be an extremely fine collection of cathodographs, taken by the Roentgen rays, which will be mounted as transparencies, such as a man's hand with seventy-two shot in it, Sandow's foot filled with splinters of glass, Jack McAuliffe's famous left arm and shoulder. Mr. Tesla has promised some very fine specimens.

Mr. E. Lynde Morse, son of Prof. S. F. B. Morse, will allow to be exhibited for the first time all the apparatus his father left, and models will be made that the great inventor designed or mutilated, so that his work will be completely illustrated. The medals bestowed upon Prof. Morse will also be shown.

ELECTRICITY FOR RAILROADS.

Electricity as applied to railroad service will be illustrated from the beginning, the earliest model of electrical locomotive having been built by Thomas Davenport in 1838. Another model was built by Dr. G. Q. Colton in 1848-49, in which the track was used as a part of the circuit, as in the modern trolley system. In 1852 Charles Grafton Page built a working model of a locomotive which he exhibited to a committee of congress to convince them that electric force could be applied to railroad service. He made a trial trip from Baltimore to Bladensberg, a distance of fifteen miles, when one of the parts became heated, cracking one of the jars and causing the liquid to leak away. This model will be exhibited.

RARE BOOKS ON ELECTRICITY.

A remarkable and novel exhibit will be of books and publications having to do with electrical discoveries from the earliest times, and all form the library of Dr. Park Benjamin, who has the most remarkable collection of rare electrical books to be found anywhere.

Beginning with mediaeval books on magnetism, the collection brings one gradually to the treatises of Galileo, the original editions of Descartes, and the famous book of Otto von Guericke, which describes the first of all electrical machines.

Then comes the first book on electricity in English, written by Robert Boyle, and the treatise of Hauksbe on light and electricity, wherein is described for the first time the glow produced in vacuum tubes. There are also the treatises of Dr. Watson, telling of attempts to send electricity over long wires and under the Thames. Then follow all the original publications of Benjamin Franklin, recounting his famous experiments.

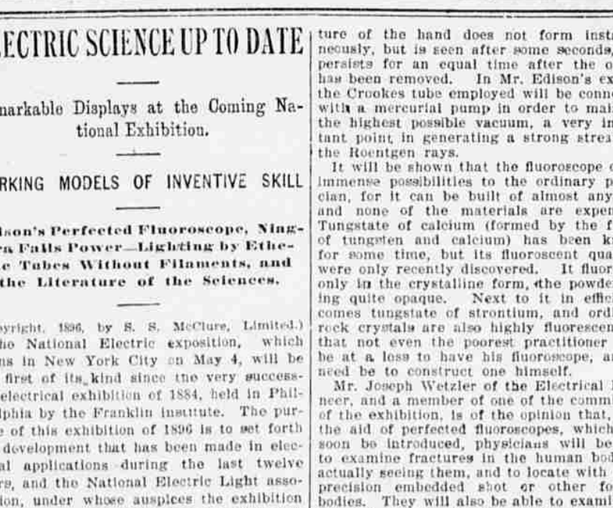
Then comes the epoch of Galvani, his own treatise, with annotations by himself, telling of his experiment with the frog's leg. Then come the original publications of Volta, and the lectures of Humphrey Davies, explaining the discovery of the arc light, as we now know it.

Quite a number of old books have a special interest apart from their contents. Thus there is book on electricity by John Wesley, who discusses the curative properties of the new force. There is also a little volume dated 1746, by Benedict Arnold, who sums up the electrical discoveries made up to that time. A worn French grammar is filled with schoolboy handwriting and a caricature of a school master, this being the work of James Watt in the very year when he made his great tea kettle discovery. There is also a little volume on mathematics, inscribed in the hand of Isaac Newton.

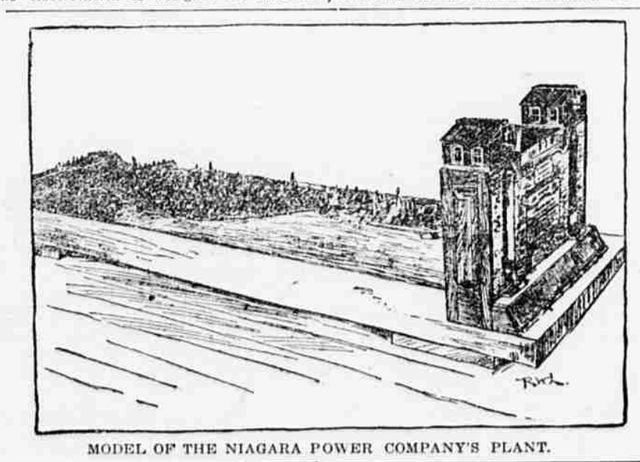
The collection is supplemented by a number of works showing the history of the steam engine, going back to the time of Hero of Alexandria. Besides these books on steam there are the first treatises on mechanical engineering wherein are shown the first uses of the crank and the paddle wheel; and also the first publications on mining and mettalurgy, these dating from the 16th century.

Floating in the air five hundred feet above the roof of the Industrial building will be anchored a large balloon, around which will run the words "National Electrical Exhibition" formed by incandescent lamps. Some very unique effects of flashing and changing colors will be produced, the lights being controlled by a switch-board in the building below. This balloon will be visible for miles in all directions.

CLEVELAND MOFFETT.

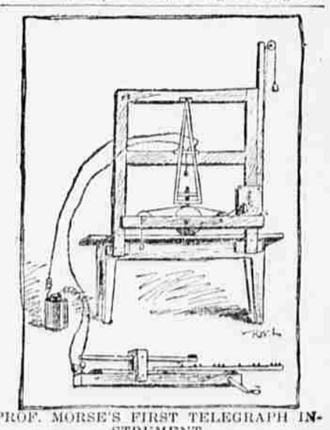


THE EDISON FLUOROSCOPE IN USE.



MODEL OF THE NIAGARA POWER COMPANY'S PLANT.

(1) Prof. Morse's diagram of the Washington & Baltimore line.
(2) Prof. Morse's sketches of the repair material, June, 1844.
(3) Prof Morse'e sketches of line repair material, June, 1844.
(From originals in possession of T. C. Martin.)



PROF. MORSE'S FIRST TELEGRAPH INSTRUMENT.

RELIGIOUS.

The parish church of Chesterfield, Eng., has a curious spire 228 feet high and six feet out of the perpendicular.

Canon Knox Little, who has been denouncing corruption in society in St. Paul's, London, has been preaching to small congregations.

Evangelist Sankey draws large, but poorly-paying crowds in Oakland, Cal. Not enough money is gathered in the collections to pay for the lights.

The friends of Rev. Dr. David Riddle Breed, pastor of the First Presbyterian church of Pittsburg, think that he may be elected moderator of the Presbyterian general assembly, which will meet next month.

The seventieth anniversary of the founding of the Congregational Home Missionary society will take place in New Haven, Conn., on June 2. At the same time and place three other societies will meet, namely: the Congregational College and Educational society, the Congregational Church Building society, and the Congregational Sunday School and Publishing society.

In a recent lecture on the historical character of the "Book of Acts," Canon Gore declared that the speech of Stephen was beyond doubt a shorthand report, and gave proofs that stenography was a widely practiced art in new testament times, and that then as well as now shorthand was a distinct profession.

Rev. Dr. Houghton of New York's famous "little church around the corner" is raising an endowment fund for his church, and has already secured $88,000. If he needed further help the actors and managers of the country would be very glad to take hold—but Dr. Houghton will not have to turn to that quarter. He has the good will of the theatrical profession in any event.

Rev. W. H. Moore, pastor of the Methodist church at Stevensville, Mich., is now a firm believer in special answers to prayers. He prayed for a new suit of clothes the other day, and on the day following received a present of a fine suit from a Dakota friend. The fact that the suit was on its way to him when he was praying for it counts for nothing with him. Something might have happened to it in transit if he hadn't prayed.