



ELECTRIFIED BY NIAGARA.

Wonderful Effects to Be Produced at the Pan-American.

They Will Give a Realistic and Startling Portrayal of a Thunderstorm With Vivid Lightning Accompanying—The Current For This Electrical Display Will Come From Niagara and Is the Result of a Remarkable Invention.

Niagara Illuminated by Searchlights—Glorious Illuminations About the Court of Fountains of the Exposition.

BY ORRIN E. DUNLAP.

THE production of thunder and lightning by artificial means is one of the highly sensational latter day achievements of electrical science.

While the startling and awe compelling elements of the electric storm are in evidence, all danger to life and property is absent.

The apparatus with which such wonderful results are obtained is the invention of Mr. C. E. Skinner, who is the electrical expert of the Westinghouse Electric and Manufacturing company. In the apparatus he has built he has sought for and succeeded in reproducing the most wonderful effects of nature in her fiercest moods. Paul M. Lincoln, the electrical superintendent of the Niagara Falls Power company, has become associated with Mr. Skinner in perfecting the apparatus, and Mr. Lincoln has installed one of the thunder and lightning machines in the transformer station at Niagara Falls for experimental purposes.

The artificial electric storm will be one of the features of the Pan-American Exposition. It is not enough that when the hundreds of thousands of incandescent lamps are turned on in the evening, just when the summer sun is sinking in the western sky, there will come a glow of light resembling a veritable June sunrise, making the hearts of all happy, but added to the wonderful features of thrilling electrical accomplishment there is to be placed on the glorious Midway an electrical sign that will give off artificial thunder and lightning in tremendous quantities at the will of the operator.

This sign will be one of the most commanding features of the locality where it will be installed. From the time the operation of it is commenced until the last flash of lightning has fled across its surface and the last awful peal of thunder has fallen upon the ears of the assembled multitude it will demand attention. Its beauty and weird effects will hold people for hours, and they will see as they have never seen before all the grandeur and beauty of a thunder and lightning storm.

It will be grand and beautiful because it will have all the wonderful effects of a perfect storm while robbed of those fears created by a realization that the deadly bolts of lightning from the sky so frequently dart down to earth and cause death and destruction. This thunder and lightning storm of the Pan-American Exposition will be under full control. All of the death dealing qualities of a natural storm will be there, but so expert has mankind become in handling this harnessed lightning that it darts at his bidding. The deadly bolts of lightning flash out in startling rapidity. Forked bolts of flame dart here and there, and the deep, sullen roar of the approaching storm is heard in the air.

Up to this time the power transmission between Niagara Falls and Buffalo has been at a voltage of 11,000, and only recently it has been raised to 22,000 volts. This is a frightful pressure, but yet the artificial thunder and lightning machine of the Pan-American Exposition will be operated at an approximate voltage of 40,000.

The lightning display will practically be of two kinds, for the effects closely resemble the forked and sheet varieties. Forked lightning is practically lightning of the first class, while sheet lightning is known as second class and ball lightning as the third class. All who see the artificial lightning of the Pan-American will agree that it is principally of the first class variety. It is well known that forked lightning has no definite form, but seems to be a great mass of light having sharp and well defined edges. Sheet lightning has not the intensity of lightning of the first class, and at times it is tinged with red, blue or violet. These effects will be brought out by the apparatus of Messrs. Skinner and Lincoln.

So perfect is this invention that it imitates almost exactly the intermittent flashes of lightning discharges and produces the same detonating effects that we are accustomed to hear when fierce thunderstorms are in progress. The apparatus is charged with high tension alternating currents, which will produce a display or bolt about 12 inches long about the letters placed on the

applied for various purposes, while it will also serve to demonstrate very fully the extent to which electrical science has advanced in this respect during the last few years.

In the Niagara-Buffalo locality there is such a bounteous supply of electricity developed for the use of mankind that all visitors to the Exposition will look forward to being entertained by unusual displays and features. Naturally they will expect that, inasmuch as Niagara is the greatest electrical storehouse in the world, the features that will be attached to and operated by its current supply will be of unusual character, magnitude and brilliancy, and in this respect there will be no disappointment. Never yet has an event of the character of the Pan-American Exposition been so rich in its electric power advantages, and for miles and miles along the Niagara border, for miles and miles on every side of Buffalo and the Exposition grounds, for miles and miles across the country of King Edward, even to Hamilton and Toronto, there will flash through the sky wonderful beams of light projected from the lamps operated by Niagara power.

Progress is the inspiring word of the Pan-American Exposition, and its extent is well defined by the determination of the management to make the night scene of the Exposition a feature of wondrous beauty. It is but a few years ago that the opening of an exposition at night would have been an impossibility owing to the lack of light-

surface of a large sheet of glass. When the potential is low, each letter of the sign is surrounded by a violet fringe of brush discharge, and as the voltage is raised, strange and brilliant writhing streamers of lightning shoot out about the letters like a lot of roots, an effect faithfully portrayed in the illustrations. These vary in length, and the voltage is increased and form a truly dazzling imitation and effect. At this period of the operation each flame or streak of lightning is about a foot in length. It is when the full voltage is on that the display becomes exceedingly lively. Then the number of complete discharges is 250 a second, a complete discharge being portrayed in each of the darts of lightning surrounding the word "Niagara" in the illustration. Just think of 250 flashes of lightning every second! Conceive, if you can, witnessing such a display by nature and then think of what man has done to develop such a condition for the safe entertainment and enlightenment of the people!

Humanity is not given to standing out in the storm to witness a thunder and lightning display, but this Pan-American exhibition of artificial thunder and lightning will not be accompanied by a rainstorm unless, of course, nature adds to the reality of the spectacle by furnishing a downpour.

Thunder is understood to be a commotion of the air brought about by the passage of electricity. When storms are in progress, people standing at different points hear different sounds. A person close to a flash of lightning hears only one sharp report, while persons at a distance hear the same report as a prolonged peal. The prolonged rolling of the thunder and the rise and fall of the sound are hard to account for.

All of these storm effects are apparent in the device of Mr. Skinner, but never yet have human eyes looked upon such a fierce display of lightning as he has made possible of development through his wizardlike machine. Before the electric current is turned on the apparatus appears like a simple sheet of glass, peaceful and quiet. But when the current is furnished there is a wonderful transformation. The letters become surrounded with a hue resembling the effect of sheet lightning behind a cloud, and soon the writhing, snake-like bolts of lightning shoot out here and there. They dart hither and thither, and the fierce, frightfully realistic, full discharges of lightning occur with a frequency that is tremendously appalling. It is so weird, so fascinating, so grand, that one becomes accustomed to the sharp flashes of lightning and the thunder peals and in fancy feels the wind sweeping, roaring, along, uprooting sturdy oaks by their stormy blasts. Surely this artificial thunder and lightning will demonstrate thoroughly how Niagara has electrified the Pan-American Exposition.

SEARCHLIGHT SIGNALING.

From the Electric Tower of the Exposition to the Observation Tower at Niagara.

Recent wars have brought searchlights prominently before the people, and they have read how in both the army and the navy projectors have been successfully used for transmitting messages across land and water. To many no doubt the manner in which this is accomplished has been more or less of a mystery, but through the operation of the great and wonderful searchlights to be used in connection with the electrical display of the Pan-American Exposition much that heretofore has been mysterious will be made clear, and the public will marvel at the present day facilities for casting powerful beams of light many miles on missions of peace or to pick out from the darkness the lurking place of a hidden enemy.

During the months in which the Pan-American Exposition is to be held on the Niagara frontier the Niagara-Buffalo region is to be the scene of the greatest searchlight exhibition ever witnessed. This display will have a material tendency to educate the visitors to the Exposition in regard to the wide field in which searchlights may be

ing facilities, but with the coming of the twentieth century the artificial lighting has attained such wonderful prominence that enthusiastic persons are found who predict that the Pan-American Exposition will be far more wonderful by night than by day. With the sinking of the summer sun in the west the vast power supply of Niagara will be called into service, and as the light of the sun becomes dim the light of Niagara will intensify in brilliancy. It will be the greatest transformation scene the world has ever known upon this change from day to night at the Pan-American, and it will be welcomed with somewhat the same delight and spirit as the inhabitants of the arctic zone greet the aurora borealis, or northern lights, during the winter of the northern hemisphere, when their long and dreary night is made brighter by this strange light.

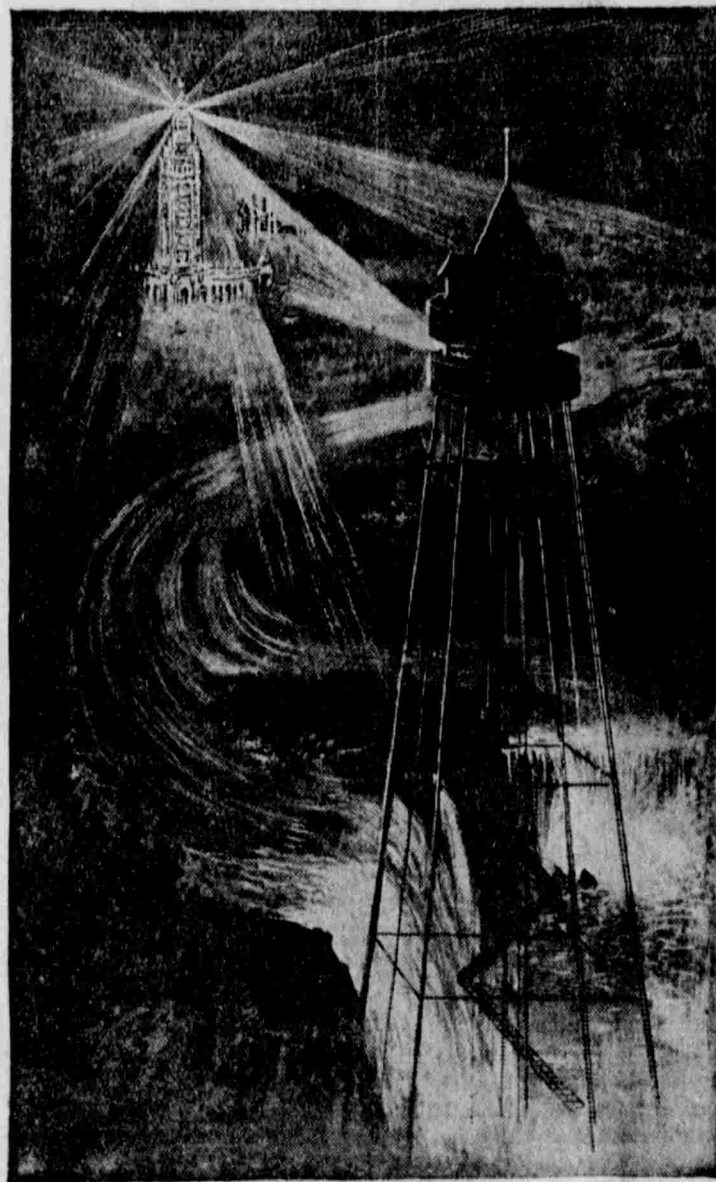
Throughout the Exposition grounds and on the various beautiful buildings hundreds of thousands of electric lights will be burning in all their beauty, and high over the entrancing, favored spot will rise an auroral arch that will command attention miles away. Like the luminous arch of the aurora borealis, it will remain visible for several hours of the night, and from its crown there will shoot forth rays that will meet responding rays many miles distant. These pronounced and brighter rays will come from the two powerful 30 inch projectors to be placed on the 200 foot level of the Electric Tower, while the rays that will be met miles away from the Exposition grounds will come from a projector of similar ca-

capacity and brilliancy to be installed on top of the great Observation Tower at Niagara Falls, more than 22 miles away.

Through the sky these wonderful beams of light will flash with the rapidity of lightning. There will be no fading to their brightness, but they may flutter like a ribbon in the wind when being changed from point to point about the locality. At the zenith of the sky, midway between Niagara Falls and Buffalo, the two great beams of light will meet as though in apparent effort to pierce the celestial sphere. Thus placed they will form a crown of light for the Pan-American Exposition, which is to be a marvelous demonstration of the prosperity, the influence and the greatness of the American people.

In this spectacle of the sky there will also be presented a remarkable junction of the forces of the two great power plants of Niagara. The searchlights of the Electric Tower will be operated by electricity generated in the central station of the Niagara Falls Power company at Niagara Falls and transmitted over miles of cable to the Exposition grounds, while the searchlight of the Observation Tower will be operated by electricity supplied by the central station of the Niagara Falls Hydraulic Power and Manufacturing company of Niagara Falls. Thus a long distance from both Buffalo and Niagara the forces of these two power plants will meet high in the sky, signaling the perfect unity with which the people of the Americas acted to make the Pan-American Exposition a success and a truthful portrayal of their progress.

It is the expressed opinion of experts that the beams of these powerful searchlights can be thrown from 50 to 75 miles. This is indeed a long distance, but the penetrating power of the lights will be increased by the fact that they



searchlight can be utilized in the same manner, a combination of movements making letters. It is known that the commanding officer of the Fourth brigade, national guard, state of New York, has had his attention directed to the opportunity presented by the Pan-American searchlights for conducting signal operations, and the officers may avail themselves of these facilities to obtain practice in the transmission of signals and messages, while at the same time they may gain much experience and information as to the distance such signals can be transmitted.

A valuable feature of the searchlights in connection with the Exposition will be that they can be used to illuminate details of sculpture in and about the grounds, while their rays may be concentrated at any spot desired in the grounds during unusual and special occasions.

The projectors to be used on the Electric Tower of the Pan-American grounds as well as the one to be installed on the Observation Tower at Niagara Falls will be of the General Electric company make. They will be of the latest design and will combine all the very latest improvements. In general appearance they will be compact and graceful, but built to withstand more than ordinarily hard usage. Their simplicity of construction, efficiency of operation and durability of service will be very pronounced. They will be fitted with the Marmor ground glass silver plated mirrors, which type of mirror has two spherical surfaces of different radii, and the reflection and refraction of the glass will cause the rays of light to be projected in parallel beams when the arc is in focus. The lamps of a searchlight are designed to throw the greatest possible amount of light on the reflector, and screen shutters are provided to prevent the direct rays from leaving the projector, so that all the rays of light are reflected and sent out parallel. The 30 inch projectors consume 30 amperes of current with from 49 to 53 volts at the arc. The searchlights to be used in the display in question will be hand operated, so the beam of light can be trained vertically or horizontally by the operator, who will stand close beside the projector and move the barrel in any direction he may desire. In the case of electrically controlled projectors the apparatus may be operated at a distance. This is accomplished by having electric motors mounted in the base of the projector, one motor operating a train of gears controlling the vertical movement and the other motor operating another train of gears controlling the horizontal movement of the projector. The movement of the beam of light corresponds to the movement of the handle of the controller, and both horizontal and vertical movement can be obtained at the same time. When the handle of the controller is released, it is brought back by a powerful spring to the neutral position. It is worthy of note that all projectors are very accurately balanced and that when it is desired to have a beam of light covering a wide area a front or divergent drum made up of strips of glass ground plane convex, each strip being a lens, with the convex side outward, is placed in position, which diverges the beam, but does not increase its height.

There is no doubt that visitors to the Pan-American Exposition will gain a vast amount of information about searchlights and their beautiful effects. In fancy we can picture the turbines of the deep Niagara wheel pit in full operation, giving life to the generators in the dynamo room above. We can see the current passing to the transformer station at the Falls and then speeding at increased voltage to Buffalo, there to be reduced in voltage before passing to the Exposition grounds. We can imagine still further reductions in the voltage at points on the grounds and then witness the bright and wonderful beam from the searchlight. Another picture to look upon in fancy is the station at the water's edge at the Niagara gorge, where the current of the Niagara searchlight is generated. It passes from the station to the projector, and the answering beam flashes across the country to meet the beam impelled to brightness by the turbine in the mighty pit, a great, grand and glorious demonstration of the wonders of the electric age.

NIAGARA ILLUMINATED.

The Energy Generated by the Waterfalls Will Serve to Light Them For the Pleasure of Visitors.

The Falls of Niagara are to be illuminated by searchlights during the coming summer. This will make a beautiful spectacle. Sixteen years ago, when a private company owned and controlled the land in Prospect park, on the American side of the Falls, efforts were made to light the Falls by arc lamps. The result was only partially successful, but even under the unsatisfactory conditions of those days the public enjoyed the casting of the lights upon the falling waters. Colored glasses were used to create changes in color, and the effect obtained was such that big excursions ran to the Falls nightly to witness the illumination. A fountain in Prospect park added to the enjoyment of the visitors, and it was generally agreed that there was no disappointment in the scene.

The years that have passed since then have wrought numerous changes in the locality of the Falls. The lands all about, on both sides of the river, have been opened as free parks, and the people of the world have perfect freedom there night and day. Niagara has been redeemed and restored to its original and primeval beauty, and a spirit of glad welcome is found everywhere. Every possible view of the Falls is free to all mankind, and one may worship the sublimity of the grandeur of it all to the heart's content. By day the Falls of Niagara form a wondrous spectacle, and now the world is to be called upon

to express a verdict on how the great waterfalls look when lighted by electricity, so gloriously plentiful at Niagara.

The years above referred to have been years of wonderful progress in the electrical field. In fact, they mark the period of surprising progress, and what

known heights by the mist. Place this spectacle, this spot of glorious illumination, in a frame of the darkest density, and, oh, what a picture it makes! Compare it with the frame of beautiful green with which nature surrounds the Falls in glad summer time, and then you will understand the change that is to be wrought at Niagara.

What a tribute this illumination of the Falls of Niagara is to be to the Pan-American visitors! On the part of the Falls there will be no extra labor; no extra touching up to make it appear at its best, for Niagara is ever glorious. The piercing of the darkness of night will simply be significant of the progress of the age, showing how this wonderful scenic feature may be placed on exhibition night and day for the gratification and elevation of all that is good in humanity, and people who look upon it and enjoy its rare beauty cannot fail to be impressed with the conviction that the American people enter the twentieth century fortified and aided by a spirit of energy and enterprise that is wonderful in its resources.



was impossible of accomplishment 16 years or so ago has now been perfected in every part. Electric lighting was in its infancy 16 years ago, and the great, powerful beams of the beautiful searchlight of today were unknown. The progress of these years is now about to announce and display itself at Niagara, to the delight of all who visit that beautiful spot this summer, and for the first time in the history of the great and mighty cataract it will be fully illuminated by night under the bright and brilliant beams of modern projectors.

For a century or more man watched the waters of the Niagara pour over the precipice and hungered for a plan whereby they might be harnessed for his benefit, and finally it was developed and perfected. Ever since the Falls were first viewed by a human being they have been objects of awe, inspiration and admiration. To many the longest days have been far too short for a full enjoyment of the spectacle, but the coming of night forced a cessation of observation until morning should come again, and thus for half of man's life these beautiful waterfalls were pouring, plunging, tossing on in deep darkness, unnoticed and unadmired. Humanity has ever been bounteous in its expressions in regard to the glory of Niagara and no doubt will welcome the new conditions under which the heart and the mind may continue their worship well along into the night.

There is no doubt that the illumination of the cataract of Niagara will be the greatest feature of the kind in the world. There is only one Niagara by day, and there will be only one Niagara by night. To look upon the greatest waterfall in the world under searchlight illumination will be to experience new pleasure in a spot most gracious in its pleasure giving qualities. It has been said, and well said, that those who have seen Niagara only in summer have but half seen it, intimating that the winter beauty is equally delightful. Now this saying must be changed to read, "Those who have seen Niagara only in daylight have but half seen it, for the Falls by night, under these new conditions, will be full of fascination and weird entrancing magnificence."

Free your imagination. Let it run riot for the time being. Conceive, if you can, the beam of a searchlight so divergent that it lights up the full contour of the Horseshoe Fall and gently falls upon the rapid, dashing waters, just as they are about to make the terrible leap into the gorge. Follow the beam as it penetrates the spray constantly rising from the foot of this body of falling water and is carried aloft to

Such wonderful headway has been made in improving the apparatus used in these displays that the results to be achieved at the Pan-American Exposition will far surpass any possible expectations. Each succeeding change will seem so much more beautiful than the last that there will be no end to the enjoyment.



GLORIOUS ILLUMINATION.

Half a Million Incandescent Lamps and More Than a Hundred Powerful Searchlights to Be Used.

Surpassing anything of the kind ever attempted will be the illumination of the Pan-American Exposition at night. When the sun no longer lends its light to reveal the beauties of the Rainbow City, the transmitted energy of the great dynamos at Niagara will be turned into half a million incandescent lamps and more than a hundred searchlights.

From the lamp crowned posts or columns placed in great numbers all about the grounds a light soft and strong will illuminate the grounds. These posts or columns will number about 1,500, and each of them will carry from 25 to 100 incandescent lamps. Certain posts will carry lamps that will be used for the all night lighting service, for the proper patrol of the grounds, while the lamps on other posts will only burn until the Exposition gates have been closed for the night. The majority of the posts are nine feet high, and they will be covered in a beautiful manner by staffs. The entrances to avenues will be accentuated by columns 27 feet in height and of a different design.

At every point efforts will be made to have the lighting aid in defining the architectural beauty of the Exposition, and the question of utility will be ever kept in mind. All the supports for lights will be so designed as not to obscure on the picture of the day or be out of harmony with the general setting. All areas of the Exposition will be nicely lighted, and the decorative and spectacular features will win the admiration of every visitor. Wherever possible advantage will be taken of the detail in the staff to produce an effect of transiency.

The Electric Tower is the point at which the water and light effects of the Exposition are to reach a climax. This climax will surpass in magnificence anything of the kind ever seen. From the Government buildings on the one side and the Horticultural group on the other the water and light effects will increase in beauty until the Electric Tower is reached.

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JOTTINGS ABOUT THE EXPOSITION.

At Niagara Falls there is power unlimited with beauty unimpaired, and this great spectacle of force and beauty will be one of the sights in connection with the Pan-American Exposition.

With his new means of communicating across the ocean, Dr. Pugin is full in the public eye. The mere intimation that it will soon be possible to telephone across to Europe has aroused

great public interest, a fact that will cause many to be very careful in the study they will make of the Pan-American exhibits along this line of possibility. It would seem as though Tesla and Pugin are about to establish new bonds of friendship between Europe and America.

There is a movement on foot at Deadwood toward having a Black Hills Mineral exhibit at the Pan-American Exposition next summer.

Ontario's mineral resources will be adequately exhibited at the Exposition. The Bureau of Mines is now collecting specimens and is receiving hearty cooperation from the various quarters from which requests for assistance have been made. It is intended to cover not only the metalliferous and the useful nonmetalloid substances, such as graphite, talc, mica and so on, but also

structural material, including building stones, cements and clay products.

The Republic of Argentina is sending to Buffalo 210 samples of Argentine wool, 100 samples of cereals, 150 samples of minerals, as well as a lot of statistical tables, to be included in the republic's exhibits at the Pan-American Exposition.

Canton Victoria, No. 5, I. O. O. F., of St. Thomas, Ont., will visit Buffalo next summer for the purpose of participating in the prize drill and attending the Pan-American Exposition.

The famous Victor Herbert Pittsburgh orchestra has been engaged to give concerts at the Exposition next summer for three weeks in October. Newspaper men in great numbers will be at the Pan-American Exposition next summer. Many State Editorial Associations and numerous press clubs have arranged for trips to Buffalo. The members of the Toledo Teaching

association have under consideration plans for a big squadron sail to the Pan-American next summer.

The Volunteer Firemen's Association of the State of New York has appointed a committee to arrange for a trip to Buffalo during Firemen's week in August.

The Ohio State Historical and Archaeological Society has decided to make an exhibit at the Pan-American Exposition. The Society will show Indian and prehistoric relics as well as a burial ground with exhumed remains, with an illustration of the methods employed in exhuming remains.

An exhibit to represent the petroleum interests of California at the Pan-American Exposition is being collected. The Arkansas editors will visit the Exposition. They expect to reach Buffalo the day before the meeting of the National Editorial association, which is scheduled for June 10.