The Big Stone Gap Post.

"KEEPING EVERLASTINGLY AT IT BRINGS SUCCESS."

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How the World's Fair Will be Lighted.

A sight more beautiful than the World's Fair at Jackson Park will be at night cannot be conceived, so liberal will be the use of electric lamps and so artistically are they arranged. For illuminating the grounds and entrances to the buildings lamps to the number of 1550 are placed at intervals of from sixty-five to seventy-five feet, except at the extreme south-eastern part of the grounds where distances between some of the posts is increased to 125 feet. Around the main entrances to the principal buildings clusters of lamps will be placed. The arc lamps employed for exterior illumination will be supported on ornimental posts, designed to receive one, two, or three lamps, and where expedient to have arm-supporting incadescent lamps of high candle power, inclosed within colored glass lanterns that will afford a richly decorative effect. A problem of different character was presented when the question of ailse lighting with arc lamps came up, owing to the varied nature of the exhibits, the character of the enclosures, the height of show cases, proximity of suports, and these have not yet been determined, owing to the withdrawals and changes in the various locations of exhibitors.

In the final allotment of lamps in round numbers 1200 were assigned to the manufacturers building, 500 to the agricultural building and annex, 250 to the transportation building proper; horticultural building, 250; mines and mining, 200; the fisheries, 50, and the Illinois builig, 57. These will all be supplied with current by the exposition company from the power plant, as will also some 250 arc lamps required in machinery hall. In addition to this last 250 there will be a greater number supplied by a few of the leading exhibitors under contract, who will also supply the arc lamps required in the annex to the transportation building, in the forestry building, pumping plant, and the choral building. Special lighting effects will be secured in the great glass dome of the horticulture building by suspending from the trusses fifty arc lamps in three circular rows, having ten in the upper and twenty each in the lower rows.

A problem of different nature was encountered in lighting the mammoth manufacturers building, owing to the unusual height of the arches and the great area requiring illumination. The plan deemed the most practical promising the best results includes five circular electroliers, four of which are sixty in diameter, and the center one one seventy-five feet, built of an angle iron and suspended from the arches. Here the lamps will be 140 feet above the floor and forty to sexenty feet below the roof. The electroliers are suspended by means of a steel shaft securely bolted to a bridge passing across the center of the circle, bridge and circle having a footpath three feet in width and guarded by a suitable railing, along which the carbon timmer travels when carbonizing the lamps, the trimmer ascending one of the big arches to the supporting shaft and then descending by means of a ladder attached to the latter. The four smaller electroliers seventy-five arc lamps will be suspended, and to the large centerpiece 100 arc lamps, the lamps being hung in pairs and sustained by cords passing over insulated pulleys, each balancing the weight of its mate.

Electricity "On Tap."

[New York Sun.]

Electricity, once a playing, then a scientific study, is now a commercial product. Twenty years ago electrical energy was generated in the laboratory for experimental purposes by a few physicians as a medicine of somewhat questionable repute, and in weak currents by those who applied it to the use in the arts. From the cylender of the glass or mastic, excited by friction to the set cork manikins or pitch balls a dancing, to the dynamo that runs from one to a dozen powerful engines is a long step, but one that has been taken within the memory of men who call themselves young.

Electricity as a commercial product is to those that deal in it as common-place an affair as eggs or butter. The conditions and costs of its production are positively known, and that the product may be measured almost as the clerk with his yerdstick measures dry goods. You may buy your electricity by specified quantities, and, if you have the conveniences, may carry it home with you as you would carry any other purchase. It can be sent you by express or delivered by messenger, or it may be served out over a wire in measured quantity, as gass and water are served through pipes. All this seems mysterious to those not technically educated, because the electricity shops do not count their products by dozens or measures it by yards or gollons, but use outlandish denominations and a puzzling scientific nomenclature. Nevertheless the shop keepers are at home with the mysterious limber thing in which they deal, and they never stop to think about its mystery, although just beyond the small field which their knowledge covers there lies an unknown area of conjecture.

Electricity is a commercial product and a handy tool, appicable to anything that mechanical power can accomplish, it is a thing approximately of only the last ten years. Before that time its cost made it mostly, a matter of splendid practical possibilities. Now, with conditions given, a skilled electrician can estimate to a hair the cost of producing the amount of electricity necessary to yield a specified power. It is chiefly a question of the cost of coal.

The existence of two simple laws makes electricity a practical power for the world's work. One is that when an armature is caused to rotate within the magnetic field a current of electricity is existed in the armature and may be taken up, carried out over a wire, and returned to the place of beginning. That is what the electricians call the law of the dynamo. The other law is that when a current of electricity is passed through an armature inclosed within the magnetic field the armature is caused to rotate. That is what the electricians call the law of the moter. By the first law the current of electricity is set up, and by the second that current is enabled to establish mechanical motion. When these two laws became known the problem of applying electricity to the world's work mainly needed for solution only a cheapening of processes, such as should make it possible to produce a current at commercial rates. Every dynamo, whatever its form, as regards the communication of electrical energy is essentially an electro-magnet with a core of soft iorn, the armature inclosed within the magnetic field, which is the space between the two poles of the electro magnet. Every moter, whatever its form, is essentially the same thing, with the core revolving under the influence of the magnetic field, is a shaft, the current generated is the belt communicating power to another shaft, the core of the moter. It is this transference of power by the invisible belt from the dynamo to the moter that makes the trolley cars run, the electrical engine revolve, or any other mechanism perform its work under the influence of electricity thus generated. The storage battery is simply an insulated reservoir of electrical energy, for the time being independent of the generating source, as if a user of water should prefer to fill a tank in the top of his house once a week rather than draw from faucets directly connected with the main source of supply.

RATES TO THE WORLD'S FAIR.

The Railroad Companies Finally Come to an Agreement.

The presidents of all the Chicago roads met and setteled on the World's Fair rates. The matter was ostensibly left in the hands of the special committee of the Western Passenger Association, which is to report at another meeting of the association, but the presidents took the matters in their own hands, settled the rates and will hand their conclusions over to the passenger agents who will approve them, and they will then be formally adopted as the regular rates to the Exposition. It is not definitely known just what rate will be adopted, but it will either be one and one-third or one and one-half, with the probabilities in favor of the former. The presidents have been compelled to take the question into their own hands, because of the impending danger of a general demoralization of passenger rates, which would have been the legitimate outcome of a delayed decision on the subject.

Many of the roads were quietly preparing to handle excursions at their own figures, and it would have been only a short time before there would have been a general scramble for business, which the presidents were afraid would bring rates too low for prafits.

SEARCHING THE HEAVENS.

Something About The Gigantic New Telescope Now in Progress of Construction.

Kirchoff and Bunsen wrought a revolution when they perfected the essentials of spectrum analysis in 1860, and the application of the Photography on an extensive scale within the last dozen years has marked an era in the science. These two discoveries transformed the old into the new, the lesser into the greater astronomy, and out of its needs has come the perfection of the magnificent Lick equatorial, which crowns Mt. Hamilton, Cal.

The old telescope, like the old astronomy, was comparatively simple. Spectroscophy and photography multiplied its functions by thee. The old telescope, every one in fact, prior to the Lick, was capable of but one function. If used in regular observation it could not be readily charged for use in spectroscopic study, and if fitted for work with the spectroscope it was difficult to arrarnge for photography. Indeed, an instrument was usually built for one of the three uses; the Lick was buil for all three, the first of the kind ever constructed. It was so successful and its advantages were so great and obvious that the United States Government at once threw away the old mounting of the fine 26-inch equitorial in the naval observatory at Washington, which cost $20,000 no longer ago than 1870, and entered into a contract with Messrs. Warner & Swasey, the Cleveland builders, who achieved such a triumph in the Lick, for a telescope new throughout, and similar to the Mt. Hamilton instrument. It has just been completed, and all that remains from the old telescope are the lenses.

The Washington instrument was not yet out of the shops, before working drawings being made for another and vastly greater one—the new Yerkes telescope for the University of Chicago. The Lick has a 36-inch object glass, the largest ever mounted; the Yerkes will have one forty inches in diameter. The Lick complete weighs forty tons, the Washington equatorial thirty tons; the Yerkes will almost if not quite, equal the weight of the two. The lenses for this great instrument were ground several years ago by the Clarks for the University of Southern California, but the instrument was never built, and when Mr. Yerkes, the Chicago street railway millionaire, hit upon the splendid gift of an observatory to the great University of Chicago, he was able to secure these lenses without dificulty. The Cleveland builders will accordingly be able to complete the great seventy-ton telescope, an instrument 25 per cent. more powerful than the Lick, and nearly 50 per cent. more powerful than any other in the world, within a year. The vast size of this magnificent star-searcher is best conveyed perhaps, in the fact it would require a six-story building for its construction as a whole, and that it will accordingly be impossible to set it up until it reaches the observatory, the location of which has not yet been decided. The construction will be in sections, and even to do that the second and third floors of the large shops of the builders will be partially removed. The tube which holds the lenses will alone weigh six tons.

The mere mention of these great weights and dimensions givos a faint idea of the greatness of such a telescope, but it is only when we begin to analyze the fact that we really appreciate something of the difficulties met and the wonderful niceties of construction and adjustment involved. Such an instrument with its complex functions is in fact a great machine combining the ponderous weight of the locomotive with the delicacy of a watch. For this reason it is that the Cleveland builders have made such a notable success. Prior to their embarking in the work, it had been largely in the hands of instrument maker who were much better qualified to judge of the manufacture of flint glass for the lenses and the proper grinding of the great object glass than the application of the best mechanical principles to the difficult task of constructing a proper mounting. Yet to mount a fine lens well is hardly less important than its optical perfection. Unless the great tube can be handled easily and directed quickly to any desired point in the heavens, if it is constructed so as to avoid deflection, as far as possible, through changing tempatures, and except it be free from jar or tremor, its usefullness is greatly discounted. A variation of a tenth of an inch from perfection in a tube thirty inches in diameter and thirty feet or more in length is a grave fault that must be allowed for in all the elaborte circulations, and render it almost useless in many important respects. The sheet steel for the tube, therefore, must have its strength and resistance calculated as carefully as the girders, beams, and braces of a great bridge, and its quality must be beyond question. In the case of the Washington equatorial for the naval observatory, the sheets are about one-twelfth of an inch thick at the end of the tube and increase in thickness as they approach the center, where they are over one-tenth of an-inch. Steel is now used in all great telescops, because it meets all requirements best. It is as plain and free from ornamentation as the surface of a sleam boiler. The instrument is for use, not for ornament, and fancy brass-work or polished steel surface would simply increase the labor of caring for it with no gain in unity. Besides the expansion and contraction of brass is too great to permit its use in any quantity.

The mechanical problem of the tube appears in different guies in every part of the instrument. The resistance of the forty-ton wrought iron pier on which the instrument is mounted, must be calculated, means must be devised for taking up as much as possible of the thrust which comes upon the polar axis, in order that the movement of the tube may be easy. This is done by a necklace of anti-friction rolls at the upper end of the polar axis, while below the weight is born by hardened stell ball bearings similar to those in use in the best bycicles but larger. Then, too, it is a matter of no small delicacy to so balance a tube weighing five tons, as does the Lick, or six, as will the Yerkes, that it can be moved readily by the touch of the hand, and the whole instrument be operated by one man for hours at a time. These are all the problems of the mechanical engineer, yet strangely enough they had hardly been approached from that standpoint until the Cleveland builders began in constructing a small instrument for their own use eight years ago.

A telescope mounted equatorially has the polar axis, directed exactly to the pole of the heavens, that center about which the North star circles in its small orbit. The tube is mounted parallel with the celestial equator. These axes are arranged with gearing so that the tube can swing around them to almost any angle. As it revolves about the polar axis it changes in celestial longitude, or right ascension, and its movement on the declination axis marks its celestial latitude, or declination. The graduate circles fitted to these axes enable the astronomer to measure exactly the point in the heavens to which his instrument is directed. The large coarse scale is shown on the outside and does for rough calculation, but the utmost acuracy, down to fractions of a second must be secured, and for this a much finer scale of silver is fitted inside the other and graduated so delicately that it must be read with a microscope. By a very ingenious contrivance this fine scalt is illuminated as necessary by a small incadescent electric light. These inner circles require the most careful and delicate workmanship, comparing in some respects with the mechanism of a watch and are the other extrem from calculating the strength of steel and the necessary weight and dimension of the wrought iron pipe.

Within the great pier is the driving clock, another remarkable piece of mechanism. By its power the great tube is swung in precisely the motion of the sun, moon or stars under observation and the object kept directly in the center of the field of vision. Solar time differs from lunar, and both from stellar, and the clock is accordingly fixed to move the instrument in whichever time the observer wills. In the new Wasington telescope when the weights reach a certain point and the clock is almost run down, they switch on an electric current which winds the clock again. This clock alone in the new Yerkes instrument will weigh a ton. When the tube is once clamped in place on polar and declination axes, the clock swings it like a great arm across the sky, the effect in an instrument where the tube is seventy-five feet in length, as it will be the case in the new Yerkes when all accessories are attached, being most striking and impressive.

The observer at the eyepiece of the instrument in the Lick or Washington telescope has almost everything close at hand to give him complete command of the great machine. With new Yerkes this will be still better, as electric moters will be used for more purposes. The great object glass is, of course, only a light gatherer. Strictly speaking, all this magnifying power is in the microscopic eyepiece, the great lense serving to focus a large amount of light from the object and thus make it possible to use higher magnifying powers successfully. The larger the object glass, as a rule, the smaller the field covered. One can sweep a wide area with an opera glass, and from that to the Lick telescope the field of vision grows regularly smaller. In the new Yerkes instrument it will be impossible to see all the moon at one time. Because of this characteristic the small telescope, or finder, is attached to the tube and used to get the object located fairly in the field of vision. Close at hand are the thumb screws, by a twist of which the observer at the eyepiece in effect reaches 30 feet in the Lick telescope and clamps the tubes to the axes so that the driving clock will keep it continuously on the stars. Besides this, the harnessed forces of nature are at the bidding of the astronomer to minister to his convenience. When a star, far down toward the horizon, is under observation, the eyepieces is brought high above the floor, and it was formerly necessary for the astronomer to perch on a broad ladder or erect a platform. Now the touch of an electric button, while standing at the eyepiece, sets hydraulic rams in operation and the great floor itself is slowly raised to suit the needs of the operator, if necessary as high as the balcony. This most unique and remarkable appliance was first put in operation in the Lick observatory and is a feature of both the Washinton and the Yerkes instrument.

Stockholders' Meeting.

The annual meeting of the stockholders of the Big Stone Gap Electric Light and Power Co., for the purpose of electing officers for the ensuing year, and to transact any other business that may be brought before them, will be held, Thursday, May 4, 1893, in the office of said company, at Big Stone Gap, Va.

Jos. L. Kelly, Sec.

Stockholders' Meeting.

The annual meeting of the Stockholders of the Central Land Company will be held in the Directors room of the Appalachian Bank, Big Stone Gap, Va., on Thursday, May the 4th, 1893, at two (2) o'clock p. m. Officers for the ensuing year and all other general business of the company will be transacted.

Jas. W. Gerow, President,
R. T. Irvine, Secretary.

Stockholder's Meeting.

The annual meeting of the stockholders of the Big Stone Gap and Powell's Valley Railway Co., for the purpose of electing officers for the ensuing year, and to transact any other business that may be brought before them, will be held Thursday, May 4th, 1893, in the office of said company, at Big Stone Gap, Va.

W. C. Harrington, Sec.

Stockholders' Meeting.

A special meeting of the stockholders of the Big Stone Gap Building & Investment Company is hereby called to meet at the Appalachian Bank, Big Stone Gap, Va., on Wednesday, May 3rd 1893, at 2 o'clock p. m. The object of this meeting is to elect officers, supervise the accounts and condition of the company, and adopt such measures as may be deemed best for the general welfare of the company.

By order of the Board of directors.
R. T. Irvine, President,
C. H. Berryman, Secretary.

Stockholder's Meeting.

The annual meeting of the stockholders of the Appalachian Bank, of Big Stone Gap, Va., for the purpose of electing officers for the ensuing year, and to transact any other business that may be brought before them, will be held at 4 o'clock p. m., Monday, May 8th, 1893, in the offices of said bank.

W. A. McDowell, President.

Statistics of mortality in the South show that the death rate is 2½ colored to one white.

LIGHT WITOUT HEAT.

The Discoveries Nikola Telsa Is Giving the World.

[From the Baltimore Sun.]

Almost from the time that the vibratory theory of the light was accepted scientific men have looked forward to the day when it would be possible to produce light without heat. For it is an unfortunate fact that so far every effort to produce light has been accompanied by an enormous wast of energy due to the production of useless heat. The simplest way of producing light is by means of the combustion of some compound of carbon. It does not matter whether the carbon compound is solid, as in a candle, or a fluid as in a lamp, or is a gas, as in ordinary illuminating gas—the process is the same. The union of the carbon of the substance with the oxygen of the air produces the rapid vibration that the eye recognizes as light. Carbon though the element usually employed, is not a necessary factor, for magnesium, potassium, iron—indeed, almost any of the elements—will take its place. Neither is oxygen a necessary part in the production of light. Chlorine will produce an even more brilliant light with certain substances. It is evident, therefore, that the rate of vibration and not the element employed is the principal factor in producing light. Unfortunately all methods of producing light by means of chemical combinations (such as the union of the corbon of the candle with the oxygen of the air) are accompanied by a very large production of heat waves, which in the majority of cases, are utterly useless, if not absolutely troublesome. The old simile of a musician desiring to produce a certain high note being compelled to press down all the keys of his instrument is an apt one. The lower notes are not merely useless, but they are positively annoying.

Singularly enough, the first solution of the problem that was attempted successfully was by the aid of heat. A very small amount of light waves are required for recognition by the wonderfully developed special sense which man possess. It is intensity, not quantity, that is wanted to use a technical term. Consequently if a very small particle is heated to incadescence the light which it throws out bears a far greater ratio to the amount of heat required than it does if a large mass is similarly heated. This is one of the radical bases of utility of the incadescent electric light. An extremely filament is heated to incadescence through the resistance which it offers to the flow of an electric current. It generates heat, it is true, but the amount of heat thus produced, however, is amply sufficient for all ordinary purposes.

This solution, however, is highly unsatisfactory to scientists, however, useful it is to the public at large. Light apart from heat together was wanted. The firefly, the phosphorescent sea animalcules and even the exhausted tubes of Geissler furnished the hope that yet there was some method of reaching the high note without pressing down the whole keyboard.

Recently an extraordinary genius has appeared in this country who seems upon the verge of discovering, if not have actually discovered, a method by which this might be done. Nicola Tesla, a man of indipendent fortune and most briliant mind, who was for a time connected with Edison, has dared to experiment with rapidly alternating electric currents. The result has surpassed the widest dreams of the theorizers. He has succeed in producing light of comparatively high intensity without the production of heat and apparently directly by the use of electricity. The halls of the Royal Society of London and the Franklin Institute, of Philadelphia, have been illuminated by means of light radiated from bare copper wires in the open are carrying these so-called Tesla currents. The wires were not hot, but they radiate from their surface light and sent from one to another bands and streamers of the mysterious light which we see in the aurorar borealis. The effect must be seen to the thoroughly appreciated, but when it is stated that the experimenter without difficulty succeeded in radiating light not only from an exhausted glass tube held in his hand, but also from his thumb, his nose and other features, the enthusiasm which swept over his audience in London and in Philadelphia may be appreciated. As yet no useful application has been found for these wonderful new developments in electrical science, but they should be welcomed as a harbinger of further progress.