

THE GREAT GERMAN SEARCH LIGHTS AT THE WORLD'S COLUMBIAN EXPOSITION.

Among the exhibits at the World's Columbian Exposition which are prominent in the evening are to be found the search light projectors, whose far-reaching arms of light tip different objects of interest in the grounds, with occasional flashes upon vessels, buildings and other prominent objects many miles distant, illuminating them with all the splendor of sunlight, thus exhibiting in times of peace one of the most valuable implements of modern warfare.

Prominent among large search lights at the Fair may be seen the exhibit of Schuckert & Co., of Nuremberg, comprising four of these monster search lights, placed on the four corners of the middle roof of the Manufactures building at a height of 240 feet above the ground. Owing to the failure of the electric department of the Fair to furnish cables and current, only two of these lights are at present in operation. Our illustration shows one of them as it appears high above the Exposition grounds, the Wooded Island in the foreground, Horticultural Hall in the middle distance and the Ferris Wheel and buildings of the Midway Plaisance further away. By comparison of the search light and the figure, a good idea of the size of the projecting apparatus may be obtained. The top of the apparatus stands $8\frac{1}{2}$ feet above the platform and the diameter of the projector is 5 feet. The mirror, which is of silvered glass, has a clear working diameter of 5 feet, with a thickness of about $\frac{3}{8}$ of an inch. It is carefully ground and polished on both sides, the labor requiring over five months for its completion. The back of the mirror is provided with a heavy coat of silver, protected by a specially prepared paint. The training of the projector can be effected either by hand or by means of the electric motor placed under its base. When the electric motor is used, it can be operated from any distance. The large projectors are intended especially for coast defense, and the apparatus for controlling the projectors must necessarily be near the commander.

It is said that the light from this projector can under favorable conditions be seen from Milwaukee, 85 miles distant, and a person standing eight miles away can read a newspaper illuminated by the light of the projector. A person standing at the side of the projector can, by the aid of a good field glass, distinguish the vessels of an enemy twenty miles away.

Our second engraving shows the search light beam projected on the Ferris Wheel, and it is said by those who have seen it that although the Ferris Wheel is dark in color, under this illumination it appears at a distance as if it were painted a glistening white.

The peculiarity of this projector, aside from employing a parabolic mirror, consists in using an arc light having the carbons parallel with the axis of the projector, the positive carbon lying outermost, with the crater in the direction of the mirror.

The lamp used in the projector requires a current of 150 amperes at 50 volts, and consumes about 10 electrical H. P. The surface intensity of the light in this mirror is 194,000,000 candle power. The ends of the carbons are shown full size in Fig. 3, and in Fig. 4 the relation of the

arc, F, to the mirror, A, is shown. The carbons may be adjusted to project either a convergent or a divergent beam, moving them inward toward the mirror producing the divergent beam, and moving them in the opposite direction producing the convergent beam. The average intensity of the rays received by the mirror is 45,600 candle power, and the mirror takes up a beam having an angle of 140° . This angle includes the most intense rays, which lie between 40° and 60° from the normal.

The various points here given in relation to this in-

teresting exhibit were furnished by Mr. Fred W. Tische-doefer, representative of Schuckert & Co. at the Chicago Exposition.

Our artist correspondent describes his adventures in witnessing the practical working of one of these great lights as follows: "In order to make my sketches it was necessary to do some climbing, owing to the new rule of not allowing the elevators to be run. I called around one evening about the time Mr. Tische-doefer's assistant goes up, to show me the way. Going up two flights of stairs, walking a short distance through the gallery, we came to the foot of a ladder forty-two feet in height. He started up, I followed

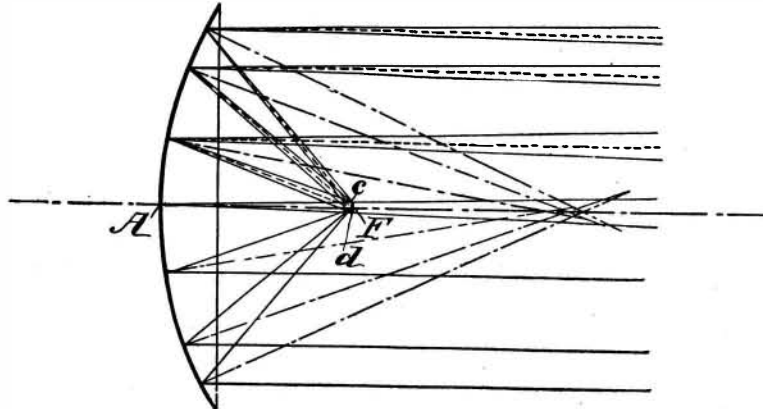


Fig. 4.—THE COURSE OF THE LIGHT IN THE PROJECTOR.

close behind; at the top we crawled through a scuttle, walked along the eaves of the gallery roof about 200 feet, where we came to a second ladder, which was about fifty-five feet high. We climbed this, coming to the third ladder, which was about 125 feet. I have read of Jack and his bean vine, it may be a nice story, but this was reality, as I climbed away, not daring to look behind me, one step after another, at last reaching the top of the long ladder. The last ladder to climb was ten feet in height, bringing me on the cornice of the building, two hundred and forty feet from the ground.

"The effect down below was beautiful. Thousands of electric lights glittering. The electric fountains throwing up purple, red, yellow and green streams of water, which added to the scene. A storm was coming up in the distance, and I must say I felt lonesome upon that roof, a thousand feet in length. But I had come to see the search light and was very anxious to see it and get down as soon as possible. When the switch was

object must smoke in a few seconds. Swinging the light on the battleship Illinois, it appeared brighter then when seen in full sunshine. The electric launches and gondolas looked like toothpicks floating around in the lagoons. People walking along the avenues looked about the size of small tacks. As it commenced to sprinkle, the light was shut off and covered up, and then the journey down commenced, with steady step by step, until I reached the ground in safety. It was a rare experience."

Homemade Celluloid.

The following formula makes a substance as transparent as pure glass at the same time very pliable and strong: Dissolve four to eight parts of gun cotton in a mixture of alcohol and ether, in proportion of 1 of gun cotton to 100 of the combined liquid, after which add 2 to 10 per cent of castor oil, or any other oil unsjccative, and 4 to 10 per cent of Canada balsam. Flow this mixture on to a glass plate, and dry in a current of air at 50° . The result is a leaf of hard substance as transparent as glass, and very nearly unbreakable, resisting perfectly the action of all salts, acids, and alkalis.

Lysol, a New Antiseptic.

Lysol, says Dr. Eric Vondergoltz, of New York, is obtained by dissolving in fat and saponifying with the aid of alcohol the fraction of tar oil which boils between 190° and 200° C. It is a brown, oily-looking, clear liquid, with a feebly creosote-like odor. It contains 50 per cent of cresols. It forms clear mixtures at once, in every proportion and at all temperatures, with water. It possesses the properties of a saponaceous solution in addition to its germicidal power. While as valuable as bichloride of mercury, it is without any toxic property—a point to be considered when it is used in cavities, and especially in gynecology and obstetrics. In the latter, and especially in emergency cases, lysol is of the highest value.

The Holy (Cholera) Well at Mecca.

Mr. E. Frankland, writing to the London *Times*, on the condition of the water of the holy well of Zem-Zem, used by the Mahometan pilgrims at Mecca, says: A sample of the water came to me through the India Office. It was full of dead microbes and contained, in an equal volume, considerably more animal matter

than is found in average London sewage. In addition, it afforded evidence of previous pollution with an amount of such matter at least six times as great as that contained in an equal volume of average London sewage. The water has been again, quite recently, analyzed by Colonel Bonkowski Bey, consulting chemist to his Majesty the Sultan of Turkey. His results confirm my own analysis. They show that the water is still abominably polluted by excrementitious matters. The surroundings of this well are such as would be likely to impart to the water these dangerous ingredients. Mecca appears to have no sewerage system; all foul matters being buried in the earth within or near the city. Hence the foulness of the water percolating into the well through this mass of

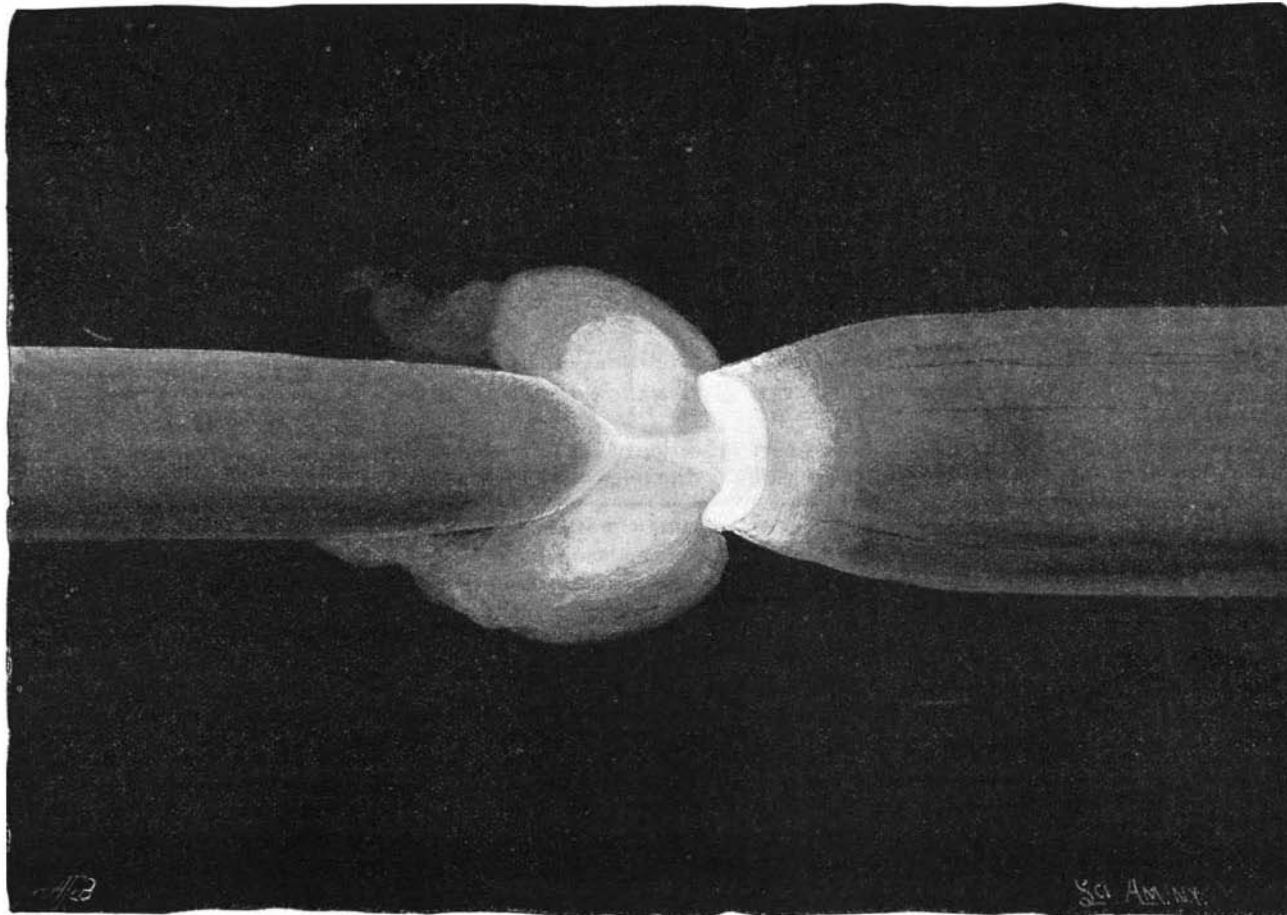


Fig. 3.—CARBONS OF THE GREAT GERMAN SEARCH LIGHT, FULL SIZE, SHOWING ARC AND FLAME.

thrown, the beam of light shot forth and the scene was more dreamy than ever. Gnats, flies, and thousands of vermin flying through the rays looked like bright pieces of metal. The power of the light being so great, when it was thrown on the Ferris Wheel, about two miles distant, the structure appeared to be like white enamel, although it is a dark object, the outline of which was very sharp and clear. Smaller details were distinctly seen. When the beam was thrown on a white object close by, the effect was surprising. It was like the focus of a sunglass, and seemed as if the

corruption. Colonel Bonkowski Bey informs me that Mecca is supplied with water of excellent quality; but, of course, the pilgrims are bound to drink at the holy well. Tens of thousands of pilgrims continue to die of cholera at Mecca and to spread the disease elsewhere; but, so far as I know, no measures have been taken to prevent pollution, and Mecca continues to be a cholera center.

PONTON bridges, with copper pontoons, were invented by the French about 1672.