INAUGURAL ADDRESS OF PRESIDENT L. B. MARKS.

My first word to the members of the Illuminating Engineering Society is one of thanks. I am deeply appreciative of the honor you have conferred on me in electing me to the office of President during this, the first year of the Society's existence, and I shall earnestly endeavor to do my full share in the work that we have set out to accomplish.

The movement to bring about the formation of this Society was started only a few months ago, and the opinion of those who attended the meetings preliminary to organization was practically unanimous that the time was ripe for the formation of a separate society devoted to the advancement of the science and art of illumination. The interest taken in the cause from the start has been most keen, and the fact that in the course of a month over 150 members have been enrolled and that applications for membership are coming in daily unsolicited from various parts of the country, is evidence that there is a demand, I might even say a thirst, for the information which it is believed this Society will be the means of disseminating.

PRESENT STATE OF THE SCIENCE AND ART OF ILLUMINATION.

Applying the term illumination to the *use*, in contra-distinction to the *production* of light, it may be truly said that while great strides have been made in recent years in the development of almost every detail concerned with the production of light, illumination, particularly from an economical standpoint, has been sadly neglected.

Broadly speaking, the electrical engineer has concerned himself with improving the efficiency of the generating apparatus and cutting down losses in the transmission of power, but after his wires have reached the point at which the electric current is to be transformed into light, his engineering skill has not, as a rule, been applied. Similarly, the gas engineer has been busy with questions involved in the manufacture and distribution of gas, while the problem of obtaining the maximum value or most ef-

fective use of the illumination delivered at the burners has been relegated to a secondary position.

So far as interior illumination is concerned, the lighting layout has been left largely to the architect. It is he who usually prescribes the number and location of outlets for the light sources, specifies the number and candle-power of the lamps and designs or selects the lighting fixtures and accessories. Very often these specifications are completed before the color-scheme of the interior has been decided upon, with the result that the degree of illumination obtained may fall far short of what is needed in cases of dark colored interiors, or be excessive in the case of light tinted rooms.

The natural tendency of the architect is to make the economical side of illumination subservient to the aesthetic, while on the other hand the tendency of the engineer is to consider only the question of economy. It is an encouraging sign of the times that the architect and the engineer are gradually drawing closer together in dealing with problems involving both the scientific and the artistic side of illumination.

Though much attention has recently been given to the subject of globes, shades and reflectors, the fact still remains that unshaded or inadequately shaded lamps are the rule rather than the exception. In considering the present status of the science and art of illumination, there is perhaps no question that is in need of more immediate attention than this one. The practice of placing lights of excessive intrinsic brightness within the ordinary field of vision is so common as to cause grave apprehension among those who have studied the question from a physiological point of view, that our eyesight is suffering permanent injury. That the percentage of children with defective eyesight is growing year by year, is a well-known fact. According to oculists, the strain on the eye caused by bright lights is in a large measure responsible for this condition. Those who have been subjected to the painful glare of the bare lamps used for illuminating our electric cars, will attest to the visual discomfort caused by the subjection of the eye to an unshielded source of light even as small as a 16 candle-power lamp.

Much of the trouble due to this cause would be removed if the light sources were screened or concealed, and the illuminating

power from them derived from reflected rather than from direct rays. Happily the tendency of modern illumination is in this direction.

From an economical standpoint the correct disposition of the light sources and the use of the most suitable reflectors, are of commanding importance. It is not uncommon to find instances in which adequate consideration of these two questions would result in largely increasing, and often more than doubling, the useful illumination, without increasing the cost.

Both electric and gas supply companies are alert to this situation and are now giving these questions more serious consideration than ever before. The far-sighted manager of the supply company sees that it is to his ultimate advantage to assist the consumer in obtaining the very best illumination of his premises at the least expenditure of money for electricity or gas. In view of the above, it is extremely desirable that complete and authoritative data be obtained as to the amount and character of illumination best suited for individual conditions. At the present time there is a lack of really valuable up-to-date information on this subject, at least so far as published records go; moreover, much of the information that is available is widely scattered and often inaccessible.

The performance of lamps for street lighting and illumination of large open spaces has not been adequately recorded in papers bearing on this phase of the science of illumination. In view of the lack of complete data on this subject, there is a wide difference of opinion to-day as to which of several illuminants is best suited for certain cases of street and country road lighting, illumination and economy both being considered.

The progress of invention in lamps and lighting apparatus has been so rapid that engineers have found it difficult to keep abreast of the times in the question of illumination. Only a comparatively few years ago the carbon filament incandescent electric lamp, the arc lamp (open or enclosed) and the ordinary gas flame were the only illuminants with which we had to deal. To-day we have besides these among electric lamps, the incandescent lamp of the Nernst type, the tantalum lamp, the mercury arc of the Cooper-Hewitt type, the vacuum tube lamp of the Moore type, the impregnated carbon and the magnetite or "flame" arcs, and others;

and among the gas and oil lamps, the mantle burner lamps of the Welsbach and allied types, the oil lamps with forced air draught, the acetylene flame, and several others.

The amount of light and especially of electric light used in the United States has grown by leaps and bounds. The consumption of gas for illuminating purposes has also largely increased, the introduction of the mantle burner having given a great stimulus to the gas lighting industry. The place of the acetylene light has been firmly established, and the extended introduction of acetylene plants in the past few years is worthy of special note. The approximate amount of money spent by the consumer for illumination by the electric light, gas and oil in the United States for the year 1905 is as follows:[1]

Electric light.....	Between	$100,000,000.	and	$120,000,000.
Coal and water gas...	"	35,000,000.	"	40,000,000.
Natural gas.....		1,700,000.		
Acetylene.....	"	2,500,000.	"	3,000,000.
Oil.....		60,000,000.		

At a conservative estimate the consumer is spending a total of over $200,000,000 a year for lighting by electricity, gas and oil, in the United States. Of this amount I venture to say that he wastes fully $20,000,000 by reason of his failure to properly util-

[1] In the U. S. Census Report on Central Electric Light and Power Stations, issued 1905, Mr. T. C. Martin gives the following data: — Income derived from central stations in U. S. for year 1902 for sale of current for electric lighting, $70,138,147. of which $25,481,045. are for arc lighting and $44,657,102. for incandescent lighting. The number of arc lamps reported is 419,561. The number of incendescent lamps. 18,194,044. I estimate that there are about 300,000 arc lamps in use in isolated plants. On the basis of 3½ hours per day or 1,100 hours per year average use per arc at an average cost of 3c. per lamp-hour, the cost of lighting per annum by arcs in isolated plants would amount to $9,900,000.

Of the 45,000,000 or more incandescent lamps sold in the U. S. in 1905 it is estimated that about 70% or 31,500,000 were 16 C. P. lamps: about 7% or 3,150,000 more than 16 C. P. and the balance less than 16 C. P. On the basis of the data submitted in the Census Report above referred to, I compute that there were in service last year in isolated plants about the equivalent of 20,000,000-16 C. P. lamps. At 1-⅓ hours a day or about 400 hours per year average use per lamp, at an average cost of $^3/_{10}$ of a cent per lamp hour, the cost of lighting per annum by incandescent lamps in isolated plants would amount to $24,000,000.

According to the Census Bulletin on Manufactures issued Jan. 3, 1902, the value of coal and water gas manufactured in the U. S. in the year 1900 was $69,432,582. The proportion of fuel gas to illuminating gas is not stated in the Report but is estimated at about 50%. In the Census Report on Natural gas, the value of natural gas produced during the year 1902 in the U. S. is given as $30,867,863. Only a very small percentage of the total consumption was used for lighting purposes. According to Mr. H. L. Doherty, the value of natural gas used for illuminating purposes during the year 1905 did not exceed $1,700,000.

The figures for acetylene gas were estimated from data received from the Union Carbide Co. The figure for oil was obtained from the statistical department of the Standard Oil Co.