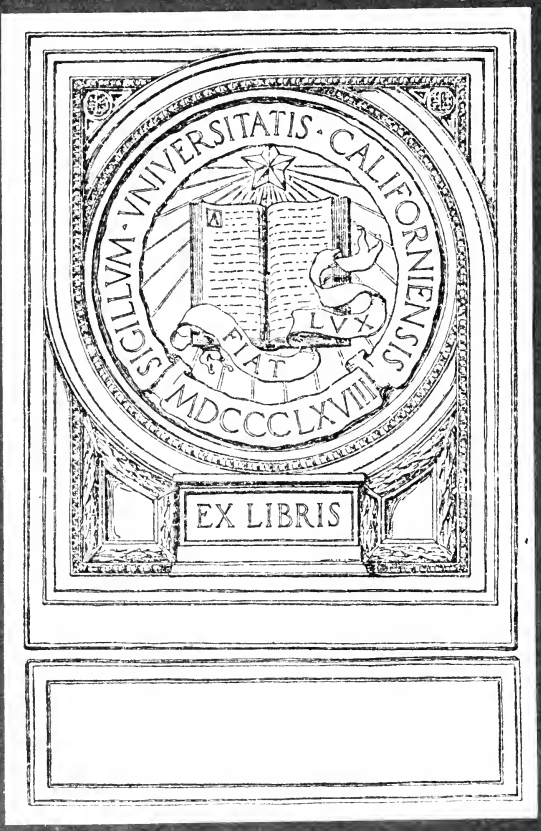
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ORNAMENTAL STREET LIGHTING

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STREET LIGHTING

ORNAMENTAL STREET-LIGHTING

A MUNICIPAL INVESTMENT AND ITS RETURN

by
W. B. Kaempffert

NEW YORK, NINETEEN HUNDRED AND TWELVE
TWENTY-NINE WEST THIRTY-NINTH STREET
NATIONAL ELECTRIC LIGHT ASSOCIATION
COMMERCIAL SECTION

Designed and Written by
Waldemar Kaempffert

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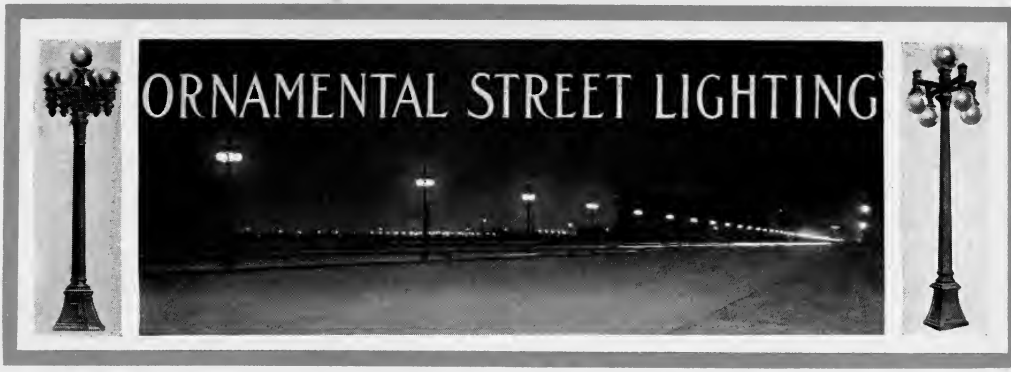


In Michigan Boulevard, Chicago has probably the most beautiful stretch of "white way" lighting in the world

The Business Side of Street-lighting

CONSIDER the case of Minnesota Street, between 4th and 7th Streets in St. Paul. In 1910 it was a gloomy thoroughfare, flanked by dreary buildings, most of them dilapidated. In 1912 it is a prosperous street in which new buildings are taking the place of the old.

The case of Minnesota Street.—From gloom and stagnation to light and activity.

Good street-lighting and nothing else did that.

A hundred towns in the United States and Canada can point to dead Minnesota streets that have been electrified by light into life. Their myriad lamps mean civic pride, prosperity, cleanliness, health, safety, enterprise—everything that a business man expects of the town in which he lives.

Good street-lighting pays in dollars and cents—pays tremendously in attracting business, pays in greater real estate values, pays in animating avenues that would die after sunset. It is light that has made Broadway, in New York, the most talked-of street in

"Undoubtedly this method of lighting has been one of the influences contributing to an increase of population. It has given the city wide advertising and been an attractive force."

W. G. NYE
Secretary Dept. of Public Affairs
Commercial Club
Minneapolis, Minn.

At Charlottenburg, Germany, may be seen a remarkably successful effort to harmonize the street-lighting installation with monumental structures. Note how admirably the monumental lighting pillars accord with the triumphal portal in the background. This is ornamental street-lighting carried to a wonderful pitch of perfection, a model for larger American cities to follow.

North and South America and the most prosperous avenue in the world; light that causes newspapers to advertise it gratuitously as the "Great White Way."

Good street-lighting means higher commercial values proven by higher real estate values.

So markedly does light influence business that property on one side of a street is often worth more than on the other, simply because of the difference in lighting. Several Cleveland business men, whose stores are on the north side of Euclid Avenue, between East 55th and East 66th Streets, installed a block of ornamental street fixtures. A few years ago the north side of the street had a practical monopoly of the business. Five walked on that side to one on the other. People crossed the street in order to walk on the north side. Why? Because that side was brightly illuminated, and the other was not. All that is changed now, simply because both sides are equally well lighted. Property along Euclid Avenue is worth just as much on one side as on the other, where the new system has been installed.

A man is judged by the clothes he wears, the house he lives in, the business in which he is engaged. He creates the impression that he makes; therefore the impression is an index of his character.

So, too, a city is judged by impressions. It may have the finest climate in the world; it may be fortunately situated near rivers and railways; it may have every natural advantage that a business man may desire. Yet, if it be unattractive, dirty and gloomy, its development will be slow. When it does develop, the first impetus will be given by changing its appearance for the better; and in that change street-lighting will play an important part.

"The effect of this has been the very great increase in the use of the street at night. The increase in realty values along the street has been nothing less than admirable."

FRED A. OLDS
Secretary, Chamber of Commerce
Raleigh, N. C.

Despite the amount of light already provided by other sources in Oklahoma City, this municipality of seventy thousand people proceeded to install ornamental street-lighting systems to which large extensions are being planned. The photograph was taken in 1909 before the ornamental street-lighting was put in. It is a view of Broadway from a high building. Who can doubt that crowds flock to this blaze of light like moths?

There is a right and wrong way of lighting a city. Experience has shown that. Good taste and the limitations of the eye are now considered where once they were ignored.

Light is made to see by, not to look at.

Lighting—Right and Wrong

Take the mere matter of "glare," for example. Glare is the result of looking at a light instead of seeing by it. Better than any man, the motorist knows what glare is. When he drives from a dark spot toward an intense light, he finds that he cannot see beyond the light; accordingly he sits back and trusts to luck that there is no person or obstruction beyond. The illuminating engineer—the man who specifies the kind of lights you ought to use and where they are to be placed—now knows that glare is produced by hanging an excessively bright light so low that the rays enter the eye nearly horizontally, with the result that every image on the retina is drowned. Therefore he avoids it so far as he can.

So, too, a flickering light is bad. It compels the eye to adjust itself continually to ever-changing intensities. The incandescent lamp was never open to that objection. In recent years the arc-lamp has been so vastly improved that it no longer flickers annoyingly.

Uniformity of illumination, not high candle-power in spots, is the ideal to be attained.

The placing of lights in the right way to obtain the most uniform illumination offers problems of its own. Twenty-five years ago cities began to use the arc-lamp extensively. But the lamps, besides flickering, consumed much current. Hence they could be used only sparingly at wide distances apart. Because of their

"I consider the general advertising value to the community at large has been very good. It has had the effect of adding both to the artistic beauty and cleanliness of my city."

J. G. HENDERSON
Commissioner of Industries
Hamilton, Ontario

The ornamental street-lighting system of Puebla, Mexico. The standards used have commended themselves to many municipalities. The selection of a standard is not easy. What will it cost? Is it really practical in form? Is it well-designed? These three questions must always be answered by those who are commissioned to select electric-light standards. This type happens to meet the requirements of many communities.

high candle-power there were intensely bright spots immediately around the lamps and great dark spaces in between. If one of a string of lights failed the conditions were still worse. Moreover, the lamps had to be hung high above the ground, so that shade-trees in residential districts cut off part of their light.

These difficulties are nowadays avoided by lamp-posts properly arranged. The posts may be planted either in a straight line on one side of the street or in the middle; or they may be staggered, in other words so placed that a post on one side lies midway between two posts on the opposite side. The straight line method is the cheaper; but the staggered arrangement distributes the light more evenly.

Every city has its business section, its residence district, and its public parks and drives. For each a different system of lighting is usually required.

The merchant in the business section wants much light to attract people to his street. The house-owner in the residential district is not concerned so much with the attainment of exceedingly bright illumination as with the proper distribution of the lights allotted to his section; in other words he must illuminate the greatest possible area with a given amount of money. In public parks and drives ornamental fixtures are required that give comparatively high illumination, so that the roads and paths can be seen. Everywhere the police value of lighting must be considered.

How Business Sections Should be Lighted

Business considerations govern lighting in business sections.

The lighting of a business section must be governed by business considerations. It must be brilliant, so that people will be

"Well-lighted streets naturally lead to the necessity for cleaner streets, better store-fronts and other progressive tendencies. Realty values are enhanced by this more modern system of street illumination."

W. O. HODGDON
Industrial Agent
Industrial and Publicity Committee
Joliet, Ill.

Race Street, Cincinnati, Ohio. The standards are unusually graceful and the harmony of proportions lastingly attractive. The installation consists of sixteen five-light standards spaced parallel, approximately fifty feet apart. They are equipped with tungsten lamps aggregating one hundred and sixty candle-power. The artistic effect is most pleasing. In the base of each post is a cut-out and switch. The lamps burn from dusk until midnight. In this installation, the uniformity of illumination is almost perfect. See page fourteen for the effect at night.

attracted to the business streets; yet it must be uniform to give the best results. The equipment must be decorative by day, so as not to mar a fine street.

Some business men maintain that the front of a building should be illuminated as well as the street. That is true, but ordinarily only within limits. The proper and adequate lighting of the street should not suffer. Good effects can be obtained by employing pendent lamps, that throw most of their light downward and outward, and enough upward to illuminate the front of a building, particularly if an upright lamp be employed in combination with the pendents.

How Residential Sections Should Be Lighted

The amount of money available for a residence section usually determines the character of the illumination. One of two methods may be followed: Either a few arc-lamps of great candle-power are placed at considerable distances apart; or many incandescent lamps are strung along the roadway fairly near one another.

The amount of money available governs the character of a residential section's lighting.

The problems that confront the illuminating engineer in lighting a residential quarter are various. Usually there are trees. Accordingly, the lights must be so hung that the foliage will not interfere with the proper illumination of the street. The choice of lights, too, may be difficult because the funds with which the engineer can work are usually limited. Again, the character of the lamp-posts must depend upon the amount of money available. Still, it is astonishing what remarkably artistic results can be achieved even with small funds.

"The lights prompt us all to brush up and keep our premises cleaner. The tendency of the installation is to improve real estate values, for it attracts people and thereby increases sales."

E. E. EGAN
Secretary and Treasurer
Commercial Exchange
Burlington, Iowa

Night view of Race Street, Cincinnati. The standards are surmounted with special shades fitted with glass reflectors and are spaced approximately fifty feet. This particular design will appeal to many; for it is highly efficient in illuminating the street surface. The wiring of the standards consists of duplex lead-covered wire, connected with Edison tube-feeders by lead-covered cable in pipes.

A park is a municipal ornament. Therefore its lighting must not only be adequate but decorative. A row of ugly lamp-posts is no more appropriate in a park than a red four-in-hand tie in a ballroom.

Well-designed posts, well arranged, are needed in parks.

To illuminate a park or drive adequately, so that automobiles and carriages can see their way, so that paths and walks may be safe, and so that the best decorative effect is obtained is no easy task. What is more, the task is not completed with the selection of a suitable post and globe.

The lights must be placed with the good judgment of a skillful landscape gardener. The topography of the park must be considered. If the boulevards and drives are curved, the lights must be placed to emphasize the curve. Not only is the effect good, but the automobile driver knows which way he must steer in order to keep to the road. Glare, of course, must be avoided to make the road safe at night, which means that a few high candle-powers placed far apart and low would be dangerously inappropriate.

How Electric Signs and Window-lighting Affect the Street

The blaze of light that marks the course of every enterprising city's main thoroughfare comes not only from the lamps in the street, but also from brilliant window displays and from signs. Sometimes, as in New York, the street-lights are all but blotted out. Why, then, waste time, money, and thought on ornamental posts?

"It has been our experience that our lighting system has called for considerable favorable comment throughout the United States, and we consider it a very valuable asset from an advertising point of view, and it has certainly added greatly to the general appearance of the city."

FRANK M. MOORE
Secretary Local Division
St. Paul Association of Commerce
St. Paul, Minn.

Boulevard lighting according to the Washington plan. This is possibly as good an example of handsome, safe and efficient boulevard illumination as can be found. In wide drives the strip of parking is by no means essential. To illuminate a park or drive effectively, so that automobiles and carriages can see their way, so that paths and walks may be safe, and so that the best decorative effect is obtained, is the problem to be solved in all ornamental park-lighting.

In the first place street-lighting is necessary to attract business. Without it no "Great White Way" can be created. When stores have been opened or improved because business men have been drawn to the highly illuminated street they are naturally tempted to outdo one another in devising ways of attracting attention to their goods. But at the beginning of the street's development stands the ornamental street-light. Window display-lighting and the electric sign are essentially advertising agencies. Sign-lighting attracts attention to the store; window-lighting to the goods displayed.

Window-lighting attracts the passer-by; street-lighting the whole country.

Properly placed, electric signs draw people to a street, particularly if they tower high above some roof and are seen from a distance. But the roof signs will neither illuminate the street nor induce people to pass directly by the particular stores over which they are mounted. On the other hand, if they are placed low enough to illuminate the street they cannot be seen from a distance. Hence they lose in advertising value. All of which shows that electric sign-lighting cannot take the place of street-lighting. Each serves its own purpose.

Window display-lighting will attract people if they are close to it. It has no distant influence. It is intended to arrest the passer-by and to induce him to look at the wares displayed.

Neither sign nor window-lighting can serve the purpose of street-lighting.

Post-lighting attracts people to a street; electric signs emphasize certain stores or buildings; window-lighting leads to the inspection of goods in a window. Each method helps the other. But the basis of all is post-lighting.

"There can be no question that these lights advertise a community most favorably. They attract attention on the part of the train patrons passing through the city at night. They attract from the smaller surrounding towns connected with Joliet by trolley."

W. O. HODGDON
Industrial Agent
Industrial and Publicity Committee
Joliet, Ill.

Arc-lamp posts in Toledo, Ohio. There are many varieties of beautiful arc-lamp standards to be found throughout the United States. Some companies and cities have spent large amounts perfecting posts of this kind. They are familiar to all who visit the large population centers. The style, spacing, and height of posts vary with the service expected and the equipment desired. Ranging as it does from fifty to one hundred feet, the size and number of lamps used per post and the degree of illumination desired govern the spacing.

Electric signs vary in size with their position. When low they are small; when high they are large. A sign may be simply a small rectangle just above the door; or it may be an immense and wonderful structure on the top of a skyscraper. Between these two extremes is an endless variety of illuminated signs. Big or little, signs cannot be relied upon for uniform lighting of the street.

Window-lighting illuminates the street, but only that part of the street in front of the window. Although it may be brighter than the street-lighting it will not illuminate the thoroughfare as a whole.

Systems of Ornamental Street-lighting

Ten years ago it was the fashion to string electric-light wires overhead. Consequently there was nothing for it but to hang arc-lamps along the center of the street.

Ornamental street-lighting in the modern sense was introduced with the underground conduit. A post in the shape of a shepherd's crook proved to be an effective means of holding the lamp; and the curb came into its own.

Why posts are better than festoons.

When the incandescent lamp was first introduced for street-lighting someone started the fashion of hanging festoons of incandescent lamps across streets. The festoon system is good as a method of illumination at night; but in broad daylight it is an eyesore. At first the festoons were mere ropes of lights. Later, safer and more substantial steel arches took their place. But whether ropes or arches are employed it is difficult to clean and renew the bulbs.

"Where the installation is already in, merchants tell me the loafers and undesirable citizens have been driven away. The light is not sought by this class of people. Approval of the use of the system is universal in Burlington."

E. E. EGAN
Secretary and Treasurer
Commercial Exchange
Burlington, Iowa

Seven and one-half miles of Washington's streets are now embellished with single-light standards, set along the curb, bearing high efficiency tungsten lamps. The view shown is Pennsylvania Avenue, the White House grounds lying to the right. In public parks and drives ornamental fixtures are required that give comparatively high illumination, so that the roads and paths may be seen. Everywhere the police value of lighting must be considered.

Next came the truly decorative system of street-lighting with posts that are efficient, ornamental and lasting and that are equipped with "Mazda" or tungsten lamps or with the new arc-lamps. More than two hundred and fifty American cities have installed systems of ornamental post-lighting, the fixtures being of various types and designs.

What it Costs to Light a Street

Factors that enter into the cost of an installation.

Like everything else in the world the cost of lighting varies with longitude and latitude. The price of labor, the material employed, the way the current is distributed to the lamps—all these factors must be considered, besides many others in determining costs. One city will approve expensive standards and bury the distributing lines in clay or fibre conduits, embedded in concrete. That method is not cheap. Another city will adopt a lower-priced standard and use iron piping without concrete. Then, too, the price of material varies in different cities with the cost of transportation. Lastly, the city's contracting power also affects the cost.

The local electric lighting companies and all lamp manufacturers as well as makers of reflectors, globes and posts, are willing to give sound technical advice free on the character of an installation needed. The city engineer need not, therefore, engage expert counsel and thus add to the cost, unless, indeed, there is some special reason for engaging an outside illuminating engineer.

The character of the distribution affects the amount of the expenditure. There are two ways of

"I am sure that the White Way lights have made the city more attractive and drawn business to those streets thus lighted. This is shown by the fact that the property owners and merchants of other streets are trying to get the lights established there."

W. G. COOPER
Secretary Chamber of Commerce
Atlanta, Ga.

Faribault, Minnesota, is an example of what a town of nine thousand can do by co-operative effort. It has one hundred and six ornamental standards in the business district bearing three high-efficiency incandescent lamps, each as shown in the photograph. The city contracted for the service for ten years and the electric light company bore the initial expense. The posts are grouped, about twelve being controlled from one switch in the base of a post. A galvanized one-inch pipe serves as the conduit. A patrol turns the lights on and off. The color of the posts is olive green.

supplying current to lamps—the "multiple" and "series" methods. Usually the multiple system is the cheaper, but not always.

Why current costs are not always the same.

The price charged for current is not the same in different cities, simply because the conditions under which current is generated are hardly ever the same. The cost of fuel, the size and character of the electrical market supplied, the way in which the current is supplied (overhead or underground), depreciation of plant (it varies with the climate), the load-factor (the ratio of average load during any certain period to the total power the station could have generated during that time), the magnitude of the investment—all these must be considered in comparing the cost of current of two communities.

Obviously it is utterly impossible to set down cost figures that will apply to every community. Costs, however, can always be discussed on the basis of average figures. Here they are, based on installations of *five-light standards* only and determined from data secured from fifty odd installations of ornamental posts equipped with incandescent lamps in cities in all parts of the United States:

Average installation cost per post	$100.77
Average cost of operation and maintenance per post per year	59.90
Average spacing of standards	70 ft. and 9 inches

This average installation cost includes such items as standards, lamps, sockets, globes, concrete bases, switches, lead cables, conduits, post-wiring and installation labor. The average cost of operation and maintenance per post per year here given is the average

"So far as adding to the realty values, there is no doubt in my mind but lighting has been a great factor in enhancing them, and it has certainly increased the business of the merchants along the illuminated streets."

FRANK M. MOORE
Secretary, Local Division
Saint Paul Association of Commerce
St. Paul, Minn.

An example of effective park-lighting at Newark, Ohio. Note how well the walks and ground are illuminated, shadows being negligible. The placing of lights in the right way to obtain the most uniform illumination offers problems of its own. There is a right and wrong way of lighting a city. Experience has shown that. Good taste and the limitations of the eye are now considered where once they were ignored.

revenue received by central stations. Therefore it is not applicable to any certain city. Maintenance includes lamp renewals, globe renewals, cleaning and the painting of the posts once each year.

Posts for Ornamental Municipal Lighting

An object is seen at night because it is a source of light in itself; because the light falls directly upon it; or because it is silhouetted against a light or a lighted background. It is the silhouette principle that must be utilized in most street-lighting. The lighted background against which objects are silhouetted is usually the street surface. Consequently, the amount of light that falls on that street surface must be carefully considered. It is by no means necessary that the intensity of illumination be great. Rather should it be uniform. The full moon casts no very bright light; yet it illuminates the earth so uniformly that the impression of soft brightness is produced. The full moon, not the blazing sun, is to be emulated in street-lighting.

The silhouette principle must be utilized.

To meet these requirements a number of manufacturers, whose names will be found at the end of this book, have designed street-lighting apparatus which is both efficient and artistic. The following illustrated descriptions will serve as a guide to those types which have commended themselves to many municipalities.

Standards—Old and New

The old conventional lamp-post, so long used with gas, still finds a limited place in present-day systems of ornamental lighting. Old gas-lamp posts have been reconstructed for incandescent lamps by providing them with suitable reflectors.

"The store-keepers take pride in their decorations and endeavor has been made under the glare of light toward keeping the streets as clean as possible."

J. G. HENDERSON
Commissioner of Industries
Hamilton, Ontario

A novelty in ornamental street-lighting is found in Bloomington, Indiana, where the one hundred and twenty standards were hewn from limestone, extensively quarried in the vicinity. Concrete lamp posts are durable and familiar, but natural stone standards are out of the ordinary. This system is an advertisement in more ways than one. It shows, among other things, that almost any material, handled with good taste, can be used to fashion a lamp-post. Standards are made nowadays to meet any appropriation, big or little.

Almost any durable material, handled with good taste, produces a good post.

For new installations, no one would dream of using anything that resembles a gas-lamp post. More decorative designs of many styles and materials can easily be obtained. Cast iron has found a keen competitor in pressed steel, copper and bronze and concrete. Concrete has been extensively utilized for parks and boulevards. Latterly it has been introduced with excellent results in business sections as well. Even wrought-iron pipe has been employed to produce inexpensive but neat designs.

Posts are made to suit any taste and any appropriation.

The choosing of a proper standard is not easy. What does it cost? Is it really practical in form? Is it well designed? These three questions must always be answered by those who are commissioned to select electric light standards; and they must be answered differently for almost every community. Because of the different considerations that govern the adoption of an ornamental street-lighting system, manufacturers have placed on the market post designs to suit any taste and any appropriation.

The style, spacing and height of posts vary with the service expected and the equipment desired. In smaller cities three-light and five-light standards are most common—the five-light standards at street intersections and the three-light between streets. In larger cities the five-light post is found almost exclusively.

The spacing of posts varies. Ranging as it does from fifty to one hundred feet, the size and number of lamps used per post and the degree of illumination desired govern the spacing. The wider the street,

"Of course, anything that makes a street attractive and draws people to it will increase the value of property, which is regulated by the number of purchasers who pass a given point."

W. G. COOPER
Secretary of the Chamber of Commerce
Atlanta, Ga.

Portland, Oregon, has more than eight hundred ornamental lamp-posts bearing high efficiency incandescent lamps. This view shows the lighting of Alder Street, which for years was a dark and gloomy thoroughfare by day as well as night. Since the cluster posts were installed it has become a popular and thriving street. Portland's system dates practically from July, 1910. Several different styles of posts are used throughout the city. The most popular are those with five lights. According to Charles K. Henry, President of the Portland Realty Board, "Realty values in the down-town district have increased twenty-five per cent. as a result of the light furnished for illumination upon these avenues."

the closer should the posts be. If luminous arcs are the chief elements in the ornamental system, the posts are staggered and separated from eighty to ninety feet on a side. It is preferable, however, to arrange the posts parallel rather than to stagger them, because, in a truly ornamental system, the appearance of the installation is much improved.

Generally a post is twelve to fourteen feet high to the center of the pendent lamps. The standards should be placed just inside the curb line. On the corners it is best to place the units opposite the building line, thus making eight units, one at each intersection.

Globes and Reflectors

A single upright lamp with from two to four pendent lamps gives the best results.

In some installations all the lights are upright. More frequently there is but one upright lamp fitted with a sixteen-inch glass ball and two or four pendent lamps encased in twelve-inch glass balls—more frequently, because the single upright lamp illuminates the front of a building and the pendent lamps throw the major part of the light down upon the street. With either pendent or upright installations, opal shades, fitted with inside prismatic reflectors, may be used instead of the globes. The upright glass ball should enclose a hundred-watt lamp. The lamps within the pendent glass balls should be at least sixty watts. While the filament of a lamp must not be visible through the balls, yet the absorption must be less than twenty per cent. of the light. With single-light units, such as "Mazda" or tungsten lamps in the residence sections, the light ordinarily radiated upward must be directed

The wonderfully effective park installation of Puebla, Mexico. To illuminate a park, the lights must be placed with the good judgment of a skillful landscape gardener. The topography of the park must be considered. Glare of course, must be avoided to make the roads and paths safe at night, which means that a few high candle-powers placed far apart and low would be dangerously inappropriate.

down on the street. For that purpose reflectors are advocated. There are a number of excellent types of both glass and metal reflectors.

A new use for old gas lanterns.

Very effective and ornamental conversions have been made from gas to electricity in residential sections by retaining the old gas-lanterns, but modifying them. The best examples for such conversions are to be found in Germany; but our own communities are not behindhand. In the suburbs of Boston, for example, gas-lanterns have given place to ornamental electric lanterns mounted on the old iron posts. In a court along the Charles River embankment, such fixtures are used with pleasing effect.

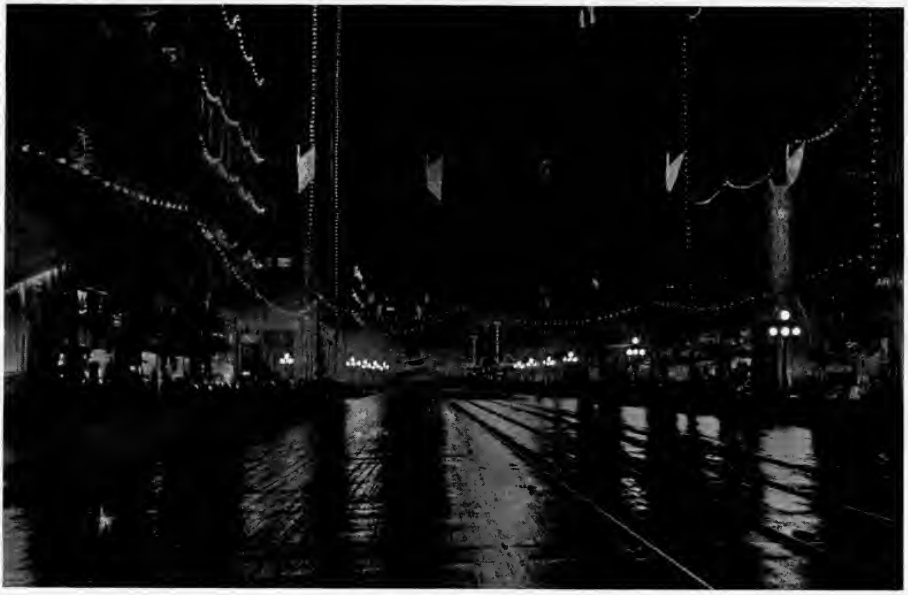
Accessory Apparatus

The kind of distribution affects the cost of the installation.

The system of distribution used materially affects the cost of installation. Usually the multiple system is the cheaper to install. In the first place the cost of lamps is less; in the second place, series-sockets with film-cutouts are more expensive than the socket which is designed for multiple lamps. The cost of wire, cable and labor is practically the same. But where the series system is installed the necessity of providing some means of current regulation is required; and that is expensive. If constant-current transformers, regulators and similar forms of regulating apparatus are already installed and their capacity is large enough to take care of the increased load, which results from the installation of an ornamental system, the expense of providing regulation does not apply. In the multiple system the lamps must be extinguished either singly or in groups with regard

"Merchants in other parts of the city have been so impressed with the virtue of the system that we have been able to secure contracts for its extension so as to cover our entire business district."

E. E. EGAN
Secretary and Treasurer
The Commercial Exchange
Burlington, Iowa



One of the earliest forms of ornamental street-lighting was of a spectacular character for special occasions. The picture shows an example at Spokane, Washington (Riverside Avenue). Business men of that city say it has produced hundreds of thousands of dollars in trade. Spectacular lighting for festivals and celebrations can be combined with curb post lighting with splendid effect.

to the posts; in the series system they may be controlled as a unit from a distant point.

When series incandescent lamps were first introduced they were usually placed upon the circuit with the arc-lamp, and they received the current directly from the generators. Later the "bankboard" method of regulation and the dimmer reactance-coil were both used. Later still, the shunt-box was introduced, to be superseded by the constant-current reactance-coil. Finally the constant-current transformer, which is in extensive use at the present time, was placed on the market.

Constant-current transformers to compensate for increased voltage when a lamp burns out or breaks.

A great number of transformers are manufactured. They vary in design, but accomplish the like result of compensating for increased voltage when a lamp burns out or breaks on the circuit. A number of constant-current regulators are also manufactured, which, used in connection with a constant-potential transformer, answer the same purpose. With these systems various compensating resistance and reactance-coil arrangements are combined, which tend to keep the proper voltage impressed across the terminals of the lamps. All of these systems regulate well to nearly short circuit, so that any number of lamps upon the circuit may be out without disastrous effects to those remaining.

In order that the entire circuit may not be broken when a lamp burns out some device is required to establish the circuit around the break. "The film-cutout" is the most common device of that kind. This consists of a very thin piece of mica or other insulating

"The down-town streets, where the lights have been installed, seem to have taken on new life, and no doubt, with the opening of spring and the extension of the system in Joliet, the present satisfactory results will be greatly enhanced."

W. O. HODGDON
Industrial Agent
Industrial and Publicity Committee
Joliet, Ill.

South Salina Street, Syracuse, New York, is a typical American business street equipped with five-light curb standards. Dozens of pictures could be shown but none more representative of this particular form of ornamental street-lighting as at present developed in America. The equipment of the posts of the Syracuse installation here shown consists of forty-watt high-efficiency incandescent lamps, fitted with four twelve-inch opal balls and one sixteen-inch opal ball. The lamps burn from dusk to midnight. To cover the cost of installation and maintenance, the merchants are assessed monthly according to the foot frontage.

material, so placed in the series-socket that the ordinary lamp voltage is applied across the film. Because a much higher voltage is required to break down this film than that impressed across the lamp, the film does not puncture until the burn-out occurs. Hence the total voltage of the circuit is impressed across the insulating material, so that it breaks down and closes the circuit.

Another form of automatic cut-out shunts a high-resistance coil of such value around the lamp that about 0.01 of an ampere flows when the lamp is burning. When the lamp fails, the total current is sent to this coil, which, in turn, exerts a pull on an armature, closing the circuit, through a compensating resistance equivalent to that of a lamp. With such a cut-out the line may be fed from a constant-potential transformer.

"It has been enthusiastically accepted by our people and has become very popular. It has even been suggested that some of our most beautiful residence avenues install this system of lighting. I do not believe that our people could be induced to go back to the old system of lighting."

P. N. BERNARD
Secretary Chamber of Commerce
Kalispell, Mont.

New Haven has a remarkably successful system of magnetite arc lamps on ornamental single-light posts. The system is a staggered one, the seventy-eight lamps being spaced eighty-seven feet apart on a side. The lamps give a wonderfully uniform illumination. They are of the six and six-tenths-ampere type; the posts are eleven feet and five inches in height.

AFTER WORD

Ornamental street-lighting is not an experiment. Three hundred cities in the United States and Canada have tried it and approved it; three hundred cities whose inhabitants have worked together whole-heartedly in the effort to make their streets more attractive; three hundred cities that have found that every dollar invested in an ornamental lighting system for business sections, residential districts, and parks is not only returned manifold in higher real estate values and in greater prosperity, but returned in prestige, in heightened civic pride, and in better citizenship. In the following pages you will find a list of these cities. Is your city among them?

Dayton, Ohio, has thirteen thousand five-hundred feet of ornamental street-lighting. For this service the local lighting company supplies power to three hundred and five five-light standards. The top light burns all night; the other lights from dusk to midnight. One post is located at a point on the curb line, opposite the building line, thus making eight standards at each crossing. Four intermediate posts are then placed on each side of the street, so that the distance between standards is approximately eighty feet.

These Cities Have Ornamental Street-lighting Installations

Aberdeen, South Dakota.
Ackley, Iowa.
Adel, Iowa.
Akron, Ohio.
Albert Lea, Minnesota.
Albia, Iowa.
Alexandria, Louisiana.
Algona, Iowa.
Alhambra, California.
Alton, Illinois.
Altoona, Pennsylvania.
Ames, Iowa.
Anniston, Alabama.
Ashland, Oregon.
Atlanta, Georgia.
Atlantic City, New Jersey.
Auburn, New York.
Aurora, Illinois.

Baltimore, Maryland.
Battle Creek, Michigan.
Beloit, Wisconsin.
Belvidere, Illinois.
Billings, Montana.
Binghamton, New York.
Bloomington, Indiana.
Boston, Massachusetts.
Boone, Iowa.
Bowling Green, Kentucky.
Brooklyn, New York.
Buchanan, Michigan.
Bridgeton, New Jersey.
Buffalo, New York.

Canton, Ohio.
Carroll, Iowa.
Cedar Rapids, Iowa.
Central City, Iowa.
Champaign, Illinois.
Charles City, Iowa.
Charlottetown, Prince Edward Island, Canada.
Chariton, Iowa.
Cheyenne, Wyoming.
Chicago, Illinois.
Clarinda, Iowa.
Clarion, Iowa.
Clear Lake, Iowa.
Cleveland, Ohio.
Clinton, Iowa.
Columbus, Georgia.
Columbus, Ohio.
Coon Rapids, Iowa.
Creston, Iowa.

Dallas, Texas.
Danville, Illinois.
Davenport, Iowa.
Dayton, Ohio.
Decatur, Illinois.
Des Moines, Iowa.
Duluth, Minn.

Eagle Grove, Iowa.
East Liverpool, Ohio.
Edgar, Nebraska.
Ellsworth, Iowa.
Elmira, New York.
Enid, Oklahoma.
Estherville, Iowa.
Eugene, Oregon.
Evansville, Indiana.

Faribault, Minnesota.
Fargo, North Dakota.
Forest City, Iowa.
Fort Arthur, Ontario, Canada.
Fort Atkinson, Wisconsin.
Fort Dodge, Iowa.
Fort Morgan, Colorado.
Fort Smith, Arkansas.
Fort Wayne, Indiana.
Fort William, Ontario, Canada.
Fort Worth, Texas.

The lighting of a business section must be governed by business considerations. It must be brilliant, so that people will be attracted to the business streets; yet it must be uniform to give the best results. The equipment must be decorative by day, so as not to mar a fine street. Properly placed, electric signs such as that seen on the roof in the background, draw people to a street. But they neither illuminate the street itself nor induce people to pass directly by the particular stores over which they are mounted. Their function is to advertise and not to illuminate.

Frederick, Maryland.
Fremont, Nebraska.

Galesburg, Illinois.
Galveston, Texas.
Gary, Indiana.
Geneva, Nebraska.
Glenwood, Iowa.
Grand Forks, North Dakota.
Grand Rapids, Michigan.
Grant's Pass, Oregon.
Great Falls, Montana.
Green Bay, Wisconsin.
Green Field, Iowa.
Grinnell, Iowa.
Grosse Pointe Farms, Michigan.

Hamilton, Ohio.
Hamilton, Ontario, Canada.
Hankinson, North Dakota.
Hannibal, Missouri.
Harlan, Iowa.
Hartford, Connecticut.
Hillsboro, Texas.
Holland, Michigan.
Hoopeston, Illinois.
Houston, Texas.

Indianapolis, Indiana.
Indianola, Iowa.
Independence, Iowa.
Independence, Kansas.
Iowa City, Iowa.
Iowa Falls, Iowa.

Jacksonville, Florida.
Jacksonville, Illinois.
Jamestown, New York.
Jamestown, North Dakota.
Jefferson, Iowa.
Jewell Junction, Iowa.
Joliet, Illinois.

Kalamazoo, Michigan.
Kalispell, Montana.
Kankakee, Illinois.
Kansas City, Missouri.
Knoxville, Tennessee.
Kokomo, Indiana.

La Crosse, Wisconsin.
Lancaster, Pennsylvania.
Lansing, Michigan.
Laramie, Wyoming.
Leavenworth, Kansas.
Lenox, Iowa.
Lincoln, Nebraska.
Long View, Texas.
Los Angeles, California.
Louisville, Kentucky.

Macon, Georgia.
Manchester, Iowa.
Manila, Philippine Islands.
Marion, Iowa.
Marshall, Michigan.
Marshalltown, Iowa.
Mason City, Iowa.
McKeesport, Pennsylvania.
Medford, Oregon.
Miles City, Montana.
Milwaukee, Wisconsin.
Minneapolis, Minnesota.
Mishawaka, Indiana.
Mobile, Alabama.
Montgomery, Alabama.
Monticello, Iowa.
Moorehead, Minnesota.
Morristown, New York.
Mount Clemens, Michigan.

Nashville, Tennessee.
Nashwauk, Minnesota.
Nevada, Iowa.
Newark, New Jersey.
Newark, Ohio.
New Britain, Connecticut.
New Hampton, Iowa.
New Philadelphia, Ohio.
New Sharon, Iowa.
New Ulm, Minnesota.
New York, New York.

1 2 3 4

1—A beautiful single-lamp standard which has been used with remarkable success in the city of New Haven, Connecticut. The light is a magnetite arc, which burns with a fine steady flame and gives uniform illumination

2—A two-lamp standard of simple and graceful design, used in Euclid Avenue, Cleveland, Ohio. Thanks to these lights, property along Euclid Avenue has increased remarkably in value. On page seven of this book will be found the story of that increase.

3—Six lamps on a tall, slender post.

4—An old gas-post can be equipped with tungsten or Mazda lamps. This shows the pleasing effect of the transformation to be found in a court along the Charles River embankment, Boston.

Niagara Falls, New York.
Niles, Michigan.
North Yakima, Washington.

Oakland, California.
Ogden, Utah.
Oklahoma City, Oklahoma.
Omaha, Nebraska.
Osage City, Kansas.
Oskaloosa, Iowa.
Ottawa, Ontario, Canada.

Parkersburgh, West Virginia.
Pasadena, California.
Pasco, Washington.
Paulina, Iowa.
Pella, Iowa.
Pensacola, Florida.
Peoria, Illinois.
Perry, Iowa.
Peru, Illinois.
Phœnix, Arizona.
Pine Bluff, Arkansas.
Pittsburgh, Pennsylvania.
Portland, Maine.
Portland, Oregon.
Portsmouth, New Hampshire.
Poughkeepsie, New York.
Pueblo, Colorado.

Racine, Wisconsin.
Raleigh, North Carolina.
Redlands, California.
Red Oak, Iowa.
Regina, Saskatchewan, Canada.
Richmond, Indiana.
Richmond, Virginia.
Rochelle, Illinois.
Rochester, New York.
Rochester, Minnesota.
Rockford, Illinois.
Roseland, Illinois.
Roseburg, Oregon.

Sac City, Iowa.
St. Catherines, Ontario, Canada.
St. Paul, Minnesota.
Salem, Ohio.
Salem, Oregon.
San Antonio, Texas.
San Diego, California.
Sandusky, Ohio.
San Francisco, California.
Sault Ste. Marie, Michigan.
Savannah, Georgia.
Scranton, Pennsylvania.
Seattle, Washington.
Seneca Falls, New York.
Seymour, Iowa.
Shawnee, Oklahoma.
Sherman, Texas.
Shreveport, Louisiana.
Sigourney, Iowa.
Sioux City, Iowa.
South Bend, Indiana.
Spencer, Iowa.
Steubenville, Ohio.
Spirit Lake, Iowa.
Spokane, Washington.
Springfield, Missouri.
Springfield, Illinois.
Stony City, Iowa.
Superior, Wisconsin.
Syracuse, New York.

Tampa, Florida.
Terre Haute, Indiana.
Texarkana, Arkansas.
Tipton, Iowa.
Toledo, Iowa.
Topeka, Kansas.
Toronto, Ontario, Canada.
Tulsa, Oklahoma.

Urbana, Illinois.

Vancouver, British Columbia, Canada.
Victoria, British Columbia, Canada.
Vinton, Iowa.
Virginia, Minnesota.

1 2 3 4

1—A type of five-light post which has been widely used for the ornamental lighting of many communities.

2—The advance in ornamental street-lighting for non-business thoroughfares developed by the District of Columbia (the central station co-operating) is admirable. This post has a single light, a transparent street sign, and a fire-alarm box. Other posts have police-alarm boxes.

3—Poughkeepsie, N. Y., has one and a quarter miles of street lighted by such combined standards and trolley poles. This style of installation is sometimes desirable in narrow streets and where the initial cost is otherwise prohibitive.

4—The city of Washington has developed a commendable system of ornamental street-lighting. The standards and globes harmonize with the architecture of private and public buildings. This is one of several standard designs used. Note the name-plate and the arrow above it to indicate the direction of the street.

Waco, Texas.
Walla Walla, Washington.
Warren, Ohio.
Washington, D. C.
Waterloo, Ontario, Canada.
Watertown, South Dakota.
Wausau, Wisconsin.
Webster City, Iowa.
Wichita, Kansas.
Wilmington, Delaware.
Winnipeg, Manitoba, Canada.
Winterset, Iowa.
Wymore, Nebraska.

Cities That Have Decorative Arch-lighting in Their Streets

Appleton, Wisconsin.
Birmingham, Alabama.
Butte, Montana.
Canton, Ohio.
Charleston, North Carolina.
Charlotte, South Carolina.
Columbia, South Carolina.
Columbus, Ohio.
El Reno, Oklahoma.
Fond du Lac, Wisconsin.
Grand Rapids, Michigan.
Green Bay, Wisconsin.
Hobart, Oklahoma.
Lancaster, Pennsylvania.
Macon, Georgia.
Marinette, Wisconsin.
Menominee, Michigan.
Mobile, Alabama.
San Francisco, California.
South Bend, Indiana.
Tacoma, Washington.
Wilkes-Barre, Pennsylvania.
Wilmington, North Carolina.

Cities With Decorative Arc Installations

Baltimore, Maryland.
Boston, Massachusetts.
Buffalo, New York.
Chicago, Illinois.
Cleveland, Ohio.
Council Bluffs, Iowa.
Detroit, Michigan.
Louisville, Kentucky.
Newark, New Jersey.
New Haven, Connecticut.
New York, New York.
Philadelphia, Pennsylvania.
Pittsburg, Pennsylvania.
Pueblo, Colorado.
Reading, Pennsylvania.
Rochester, New York.
St. Louis, Missouri.
San Francisco, California.
Syracuse, New York.
Toledo, Ohio.
Washington, District of Columbia.

Manufacturers of Ornamental Standards

The following manufacturers make street-lighting apparatus of the kind that has been most successful. They will be pleased to forward catalogues and price-lists and to give free of charge information on street-lighting not contained in this book.

Adams-Bagnall Electric Company . . . . . Cleveland, Ohio
American Concrete Pole Company . . . . . Richmond, Ind.
American Steel and Wire Company . . . . . Chicago, Ill.
American Woodworking and Machinery Company . . Aurora, Ill.
J. G. Birtness Sons Company . . . . . Davenport, Iowa
Butte Engineering and Electric Company . . . San Francisco, Cal.
The George Cutter Company . . . . . South Bend, Ind.
Dearborn Foundry Company . . . . . Chicago, Ill.
Electric Railway and Equipment Company . . . Cincinnati, Ohio
J. W. Fiske Iron Works . . . . . New York City, N. Y.
Flour City Ornamental Iron Works . . . . . Minneapolis, Minn.
Hollow Concrete Pole Company . . . . . Oklahoma City, Okla.
Independent Foundry Company . . . . . Portland, Ore.
Joshua Hendy Iron Works . . . . . San Francisco, Cal.
Kramer Brothers Foundry Company . . . . . Dayton, Ohio
Love Brothers . . . . . Aurora, Ill.
McDonnel Iron Works . . . . . Des Moines, Iowa
Minneapolis Steel Machinery Co. . . . . Minneapolis, Minn.
Morris Iron Company . . . . . Frederick, Md.
J. L. Mott Iron Works . . . . . New York, N. Y.
Ornamental Lighting Pole Co. . . . . New York, N. Y.
Paxton and Vierling Iron Works . . . . . Omaha, Neb.
Pettyjohn Company . . . . . Terre Haute, Ind.
Phœnix Iron Works . . . . . Portland, Ore.
Smith and Watson Iron Works . . . . . Portland, Ore.
Union Metal Manufacturing Company . . . . . Canton, Ohio
United Iron Works . . . . . Oakland, Cal.
Wallace Machine and Foundry Company . . . . Lafayette, Ind.
Western Gas Construction Company . . . . . Fort Wayne, Ind.

Manufacturers of Transformers, Regulators and Compensative Apparatus

Adams-Bagnall Electric Company . . . Cleveland, Ohio
General Electric Company . . . . . Schenectady, N. Y.
J. H. Hallberg, 36 E. 23d St. . . . . New York, N. Y.
Helios Mfg. Co. . . . . Bridesburg, Philadelphia, Pa.
Maloney Electric Company . . . . . St. Louis, Mo.
Packard Electric Company . . . . . Warren, Ohio
Pittsburg Transformer Company . . . . Pittsburg, Pa.
Western Electric Company . . . . . Chicago, Ill.
Westinghouse Electric & Mfg. Co. . . . Pittsburg, Pa.

Write to these firms for catalogues and information.

Glassware for Ornamental Standards

Gillinder & Sons . . . . . Philadelphia, Pa.
Haskins Glass Company . . . . . Wheeling, W. Va.
Jefferson Glass Company . . . . . Follansbee, W. Va.
Macbeth-Evans Glass Company . . . . Pittsburg, Pa.
Nelite Works of the General Electric Co., Cleveland, Ohio
Opalux Company . . . . . New York, N. Y.
Phœnix Glass Company . . . . . New York, N. Y.

Write to these firms for catalogues and information.

Steel Reflectors for Street-lighting

Adams-Bagnall Electric Company . . Cleveland, Ohio
Benjamin Electric Manufacturing Co. . . Chicago, Ill.
George Cutter Company . . . . . South Bend, Ind.
Federal Sign System (Electric) . . . . . Chicago, Ill.
General Electric Company . . . . Schenectady, N. Y.
Philadelphia Electric Company . . . . Philadelphia, Pa.
Westinghouse Electric & Mfg. Co. . . . Pittsburg, Pa.
Wheeler Reflector Company . . . . . Boston, Mass

Write to these firms for catalogues and information.

Manufacturers of Incandescent Electric Lamps

Franklin Electrical Manufacturing Company . . Hartford, Conn.
General Electric Company (Lamp Works) . . . . Harrison, N. J.
National Electric Lamp Association

Composed of the following Works of the General Electric Company:

American Electric Lamp Works . . . . Central Falls, R. I.
Banner Electric Works . . . . . Youngstown, Ohio
Brilliant Electric Works . . . . . Cleveland, Ohio
Bryan-Marsh Electric Works . . . . Central Falls, R. I. / Chicago, Ill.
Buckeye Electric Works . . . . . Cleveland, Ohio
Buckeye Electric Works, S. A. . . . . Mexico, D. F.
The Colonial Electric Works . . . . . Warren, Ohio
Columbia Incandescent Lamp Works . . . . St. Louis, Mo.
Fostoria Incandescent Lamp Works . . . . Fostoria, Ohio
General Incandescent Lamp Works . . . Cleveland, Ohio
Monarch Incandescent Lamp Works . . . . . Chicago, Ill.
Munder Electric Works . . . . . Central Falls, R. I. / Chicago, Ill.
Packard Lamp Works . . . . . Warren, Ohio
The Peerless Lamp Works . . . . . Warren, Ohio
Shelby Lamp Works . . . . . Shelby, Ohio
Standard Electric Works . . . . . Warren, Ohio
The Sterling Electric Lamp Works . . . . . Warren, Ohio
Sunbeam Incandescent Lamp Works . . Chicago, Ill.
Westinghouse Lamp Company . . . . . Bloomfield, N. J.