

NEW YORK, DECEMBER 2, 1916



Liberty Enlightening the World

THIS INSTALLATION OF FLOOD LIGHTING OCCU-PIES A PERMANENT PLACE AMONG THE WORLD'S MOST REMARKABLE ELECTRICAL ACHIEVEMENTS

The

Republic's Goddess revealed in a white glow of electric radiance made possible by voluntary contributions of the people of the United States of America on the thirtieth anniversary of its dedication.

Arising in a flood of light out of the darkness of New York's harbor it flashes a warm welcome to all Nations to the "Land of the Free and the Home of the Brave" and amply typifies the upbuilding of the Liberty of Man.



The Entire Electric Lighting Equipment Installed by the W. B. PERRY ELECTRIC CO. BROOKLYN, N. Y.



NEW YORK. DECEMBER 2, 1916

MODERN USES OF ELECTRICITY IN CONNECTION REALTY WITH BUILDING INTERESTS AND

By F. C. MYERS, Society For Electrical Development, Inc.

A S business is carried on today, what would we do without electricity? We should have no telephones, no telegraphs, no modern street cars, no electric streetlighting, store-lighting, or factory light-ing, no automobiles. The "modern" spirit of the age would disappear and we should be forced back to the slow unsanitary days of the past, when it was actually difficult to get about, and do business with others business with others.

the enlightenment of all who now bene-fit or might benefit by the use of elec-tricity, in its countless forms. The cover design of this issue is the official emblem of America's Electrical Week. This is a nation wide movement to bring before the great mass of people living in the United States the benefits of electricity in the home, in the fac-tory and in the office. The old story of Aladdin and his wonderful lamp is known Aladdin and his wonderful lamp is known the world over. You will remember that the world over.

that the conditions governing lighting that the conditions governing lighting effects are well understood and a candle power nowadays is made to do more work than formerly. Thus wasted light has been materially reduced. Specialists have come to the front, prepared to solve lighting problems so that users will get the most for their money and will not be obliged to pay for needless equipment or service. The many kinds and sizes of lamps together with the great variety of reflectors permit endless combinations. reflectors permit endless combinations,



STATE HOUSE, BOSTON, ILLUMINATED BY FLOOD LIGHTING.

Electricity has brought about changes even in the manufacture of clothes and food products, as well as accomplishing wonders in the modern home. Every-thing nowadays depends to some extent, upon the operation of electricity. It is an electric age.

upon the operation of electricity. It is an electric age. A few years ago, men prominent in the development of electric service, engi-neers, commercial and operating men, foresaw the possibilities of concerted ac-tion by the entire electrical industry to make electric service, now at a point of perfection, aproaching the fondest dreams, better understood by the nation. It was seen that by co-operating to prove the increasing value of electricity to all, it would be possible for each to win a greater share of prosperity. This enthusiasm has grown until there are now more than 1.300 electrical firms and corporations enlisted under the title of The Society for Electrical Develop-ment. This society, actuated only by a desire to disseminate knowledge contrib-uting to the greater use of electric ap-pliances and services, last year succeeded in securing a wide national observance of "Electrical Prosperity Week." The event was an overwhelming success last December from coast to coast. This year, December 2 to 9, will be ob-served "America's Electrical Week," for

this magic lamp had but to be rubbed and a genii would appear. A sign from the lamp's owner brought anything wished for.

To-day, not unlike Aladdin, we push a button or turn a switch and a modern genie, electricity, grants our desires. We have eliminated the rubbing of the lamp and replaced it with the button or switch. and replaced it with the button or switch. The genii does not come to us for or-ders when we turn the switch. He goes to work immediately and our wish is gratified. Thus we have gone Aladdin one better. In the past there was only one Aladdin and one lamp. Nowadays each of us is an Aladdin and each of us has a genii at his command. It is generally conceded that the first commercial application of electricity was

It is generally conceded that the first commercial application of electricity was electric lighting. At first the apparatus was crude and wasteful of current. Lab-oratories have been at work and the ef-ficiency of incandescent lamps has been improved until a candle power is obtained from approximately 1.2 watts in small and $\frac{1}{2}$ watt in large sizes. This is three times the light obtained with the same amount of current used in the usual 16 candle power size of the old style carbon lamp. The new lamp also gives longer service and gives a better whiter light. A great deal of study has been devoted to illuminating questions. The result is

so that almost any requirement has its especial lamp. Wall colors have an important influ-

Wall colors have an important influ-ence on lighting effects and on the amount of current necessary to illumin-ate a given space. It is well known that light colored walls and ceilings make a lighter, brighter room. This is due to the fact that these colors reflect the light rays striking them, while dark walls, whether dark from the color of paint or dirt absorb light

rays striking them, while dark walls, whether dark from the color of paint or dirt, absorb light. Extensive investigation has developed certain fixed rules for determining the amount of illumination best suited to various kinds of work and the amount is represented by foot-candles. In this article the figures for foot-candles will be called simply the factor of illumina-tion. For fine bench work the factor is 5 to 10, for rough bench work the fac-tor is 3 to 5. In rooms for general work the factor is usually 3 to 6. The table herewith will give detailed information. The following table gives the watts to each square foot of floor surface with lamps of 1.0 watt per candle power to produce an intensity with a factor of 1.0. If lamps of higher efficiency are installed the number of watts will be proportion-ately less. This table is from the Na-tional Electric Light Association sales-man's hand book.

WATTS PER SQUARE FOOT NECESSARY AT ONE W. P. C. TO PRODUCE AN IN-TENSITY OF ONE FOOT CANDLE.

	Areas or la Light (30x30 rger. Ceiling.	Small Light	Areas. Ceiling.	
Lighting Unit. Prismatic Heavy Density Op Light Density Op Semi-Indirect Totally-Indirect	Light V alls 0.19 al* 0.40 al* 0.24 0.29 0.32	Dark Walls 0.21 0.21 0.27 0.35 0.37	Light Walls 0.27 0.26 0.34 0.43 0.50	Dark. Walls. 0.30 0.29 0.37 0.53 0.62	

White Gla

With this information, owners or lessees can roughly estimate their re-quirements. It is very desirable, however, to have an experienced man recom-mend.

An example. Find the number of watts necessary to properly illuminate a 100 by 100 bench room of a shoe factory. The walls and ceilings are painted white. Prismatic lighting units are to be used. This is to be an especially well-lighted room to permit high grade work at the highest possible speed. Taking the factor as 5. proceed as fol-lows: $5 \times 100 \times 100 \times .19 = 9,500$ watts. This is the total amount of current that will be required and may be distributed as desired. 190 50-watt lamps. An example. Find the number of watts

190 50-watt lamps. 95 100 watt lamps. 63 150-watt lamps.

47 200-watt lamps.

Any of these number of lamps. efficiency of 1 watt to a candle power will give the approximate proper illum-ination. If lamps of higher efficiency are employed the number or size of lamps will be reduced in the same ratio as the efficiency is increased. The location of the lights will, of course, depend upon the requirements.

efficiency is increased. The location of the lights will, of course, depend upon the requirements. The amount of illumination depends largely on the reflector installed. The value of illumination cannot be judged by the glare of the lamps. The essen-tials of good illumination are (1) suffi-cient light of proper quality, (2) mod-erate intensity of light on the walls and adiacent to the work, (3) no glare on the eves, (4) a reliable easily operated sys-tem economical in current consumption. Where operators are working with black or dark colored goods on high speed ma-chines it is frequently advantageous to have lamps, shaded to protect the oper-ator's eves, close to the operations. How-ever, there are many instances where all the illumination is derived from over-head with perfect satisfaction. There are four methods of using elec-tric motor drive. (1) a large motor fill-ing the aportion of a power generating

There are four methods of using elec-tric motor drive. (1) a large motor fill-ing the position of a power generating plant using line shafts, etc.. (2) individual motor drive on each machine. (3) group drive—driving several machines from a short line shaft with one motor. (4) com-bination individual and group drive

short line shaft with one motor. (4) com-bination individual and group drive. The first method has all the bad fea-tures of a plant with all machines driven from a main line shaft with belt drive for all machines except that the power gen-erating equipment is eliminated. The losses of belts and long line shafts are still present as well as the heavy up-keep charges and dirt and oil. A saving may be effected because the losses of the steam boiler and engine or an inefficient steam boiler and engine or an inefficient gas engine are not present. Some larger power users find the installation of their private generating plants satisfactory, but use them for generating electricity that is used throughout their plants for lights and electric motors which drive machin-

erv. Individual motor drive will be found Individual motor drive will be found most economical in current consumption. but high in installation or first cost. It does away entirely with line shafts and belts, except in some cases where the motor is belted to the machine. There is very seldom any overhead works and thus all light obstructions are eliminated. There is no danger of oil, grease or dirt drooping on work in process. This makes individual motor drive of especial value in plants working with products of a delicate or easily soiled nature, such as shoe plants making white or other light colored shoes. This method is especially well adapted to those establishments using large heavy machines which are large power consumers, large power consumers,

The third method or group drive has a wide application and under certain condi-tions will be found the most economical to install and to operate. In group driv-ing several machines are operated from one motor driving a short line shaft. The line shaft may be hung from the ceiling or secured to the floor or even suspended under benches. There is a certain amount of attention demanded by this under benches. There is a certain amount of attention demanded by this equipment not called for in the individual drive. In consider the individual In considering this arrangement drive. a certain saving in motors may be effected.

Suppose ten machines each requiring 2 horse power when full of work are to be operated by one motor. The natural be operated by one motor. The natural inclination would be to install a 20 horse-power motor. This may be necessary, but usually the maximum power con-sumption of the ten machines is not co-incident. Therefore, a 20 horsepower motor is not required; a 15 horsepower motor may be sufficient. An expert should be consulted before making any purchase. purchase.

The combined group and individual drive will be found to have the widest

Decem	ber 2	2, 19	16

application. There are few plants that do not have some machines that can be equipped with individual motors to advantage.

The use of any of the last three meth-The use of any of the last three meth-ods permits great freedom in locating machinery. The most flexible installa-tion is the individual motor drive, the combination system follows, while the group is less subject to changes and is more rigid, approaching the old belt and line shaft system, the main difference being that no attention need be given to the location of the source of power. Each style of drive has its peculiarities and adaptations and only an experienced man after thorough investigation can deermine which will give the most satisfactory results. The latest development in the utiliza-

The latest development in the utiliza-tion of electricity to practical use is for heat. At first small devices such as irons, percolators, toasters and other house-hold utensils were developed until the housewife can now do all of her house-work from the serving of tea in her par-lor to doing the week's washing in the (Continued on page XV.)

RECOMMENDATIO	ONS FOR	VARIOUS CLA	SSES OF SERVICE.	
	Foot-	Watts per	Two of Deflector	Size of
Room.	Intensity.	Foot.	Type of Kenector.	Lamp, Watts
Armory or Drill Hall	2.0	.50	Dome Steel	200-1000
Armory (Cavalry): Tan-bark Floor	3.0	.75	Dome Steel	200 1000
Ballroom	2.0- 3.0		Special Lighting-	200-1000
Barroom	2.0- 5.0	.50-1.25	Bowl Glass or Decorative	25-300
Dressing Rooms	1.0- 1.5	.2540	Bowl	25-100
Swimming Pool	1.5- 2.0	.4050	Bowl or Dome Steel	60-200
Café (General Illumination only)	2.0- 4.0		Ornamental	25-500
Tables)	1.0- 2.0		Ornamental	95 900
Card Room	2.0- 3.0	.5075	Bowl	25-200
Court Room	2.0-4.0	.50-1.00	Bowl or Ornamental	25-500
Dance Hall	2.0- 4.0	.50-1.00	Bowl	100-300
Alarm turned in	3.0	.75	Bowl or Steel	25-200
At other Times	1.0	.25	Bowl or Steel	25-200
Garage	2.0- 4.0	.50-1.00	Bowl or Dome Steel	60-200
Handball Court	7.0-10.0		Angle Steel	60-300
Hotel:	01 00	50-1.00	Dami	
Dining Room	(See Café)		Bowl	25-400
Writing Room	. 2.0- 3.0	.5075	Bowl	25-200
Corridors	15-20	30- 50	Bowl or Enclosing Glass	25- 60
Lavatory	1.5- 2.0	.3050	Bowl	25-100
Laundry	. 2.0- 3.0	.5075	Bowl or Steel	25-100
Lunch Room	2.0-4.0	.50-1.00	Bowl	60-200
Market	Approxim	ately 0.2-1	Bowl or Dome Enam. Steel	40-500
Moving Picture Theater	ft. candles	at front	Totally Indirect	100-500
interning a result of	of house a	nd 1.0-It		100 000
Museum	. 2.0- 6.0	.50-1.50	Bowl	25-500
Reading (Ordinary Print)	. 2.0- 4.0		······	
Reading (Fine Print)	. 3.0- 5.0			
Rink Skating	. 1.0- 3.0	.2575	Bowl or Dome Steel	60-500
Sewing-Hand			Conoral Illumination	
(Light Goods)	. 3.0- 5.0		Localized General Illumin	ation
Sewing—Machine	. 1.0- 0.0			a crossi
(Light Goods)	. 4.0- 6.0		Localized General Illumina	ation.
Squash Court	. 7.0-10.0	20- 30	Bowl or Dome Steel	25-200
Stock Room	5- 1.5		Bowl Steel or Glass	25-100
Stores:			Deal	100 500
Book	. 3.0- 5.0	.75-1.25	Bowl	60-200
Eaker	4.0- 6.0	1.00-1.50	Bowl	60-200
Clothing	. 4.0- 7.0	1.00-1.75	Bowl	100-500
Confectionery	. 3.0- 5.0	.75-1.25	Bowl	60-200
Dry Goods	4.0- 7.0	1.00-1.75	Bow1	100-500
Furniture	. 2.0- 4.0	.50-1.00	Bowl	100-200
Grocery	. 2.0- 4.0	1 25-1 75	Bowl	100-200
Haberdasher	. 4.0- 6.0	1.00-1.50	Bowl	60-200
Millinery	. 4.0- 6.0	1.00-1.50	Bowl	60-200
Shoe	2.0- 4.0	.50-1.00	Bowl	60-200
Telephone Exchange:	2.0- 1.0	.00 1.00	Children in the line	
Operators	. 2.0- 3.0	.5075	Bowl	25-200
Theater:	25-50	Store States	Ornamental	25-500
Auditorium	. 1.0- 2.5		Ornamental	25-500
Warehouse	5- 1.5	.1040	Bowl or Dome Steel	60-300
Wharf		.1040	Bowl or Dome Steel	00-300
NOTE.—A bowl lighting fixture	may be e	either semi-dire	ect or totally indirect.	
MISC	ELLANEO	US INDUSTRI	ES.	and a state
NOTE It is impossible to cover	the differ	rent industries	in the space available, so o	only a few
typical illustrations are incorporat	ed.	(Comonol)		
	Fac	tory (General).	Powl or Domo Steel	40-500
General Illumination (Supplement	3.0- 0.0 it-	.10-1.00	Dowl of Dome Steel	10-000
mented by Localized Light)	1.0- 2.0	.2550	Bowl or Dome Steel	40-200
Shipping	1.5- 2.5	.4060	Bowl and Bowl Glass or St	eel 40-200
Stock Room		.1040	Dome Steel	40-200
warenouse	For	ge and Blacksn	nithing.	
Smithing (Ordinary Anvil Work)	. 2.0- 4.0	.50-1.00	Dome or Bowl Steel	60-200
Machine Forging	. 2.0- 3.0	.5075	Dome or Bowl Steel	60-200
Tool Forging	3.0- 5.0	.75-1.25	Dome or Bowl Steel	60-200
	Pair	nt Shop.	Dama an Dami Staal on Glas	E 60 100
Fine Work, Finishing	4.0- 8.0	1.00-2.00	Dome or Bowl Steel or Glas	s 60-300
Coarse Work, First Coats, etc	2.0- 4.0	Pattern Shop	Done of Don't Steer of Glub	
	10 00	1 00-1 50	Dome or Bowl Steel	60-300
Metal	4.0- 0.0 Por	ver-House	Source of Bourt Broot	
The second se	20.20	50-1 25	Dome or Bowl Steel	25-500
Boiler Room		.2040	Dome Steel	25-500
Supple	mented by	Individual Gar	uge Lights	25-000
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			

FOR BUILDING CONSTRUCTION ELECTRICITY

By the Use of Electricity Builders Can Reduce Cost-Time and Labor Saved By Application of Modern Methods

By J. P. MALLETT, Society For Electrical Development, Inc.

THE up-to date building contractor is ever seeking ways and means by which he can erect a building at a lower cost or in a more satisfactory manner than he did the last one. Assuming the kind and amount of material to be used throughout a building is specified by the architect so that all contractors bidding on a proposition to erect a building, have in the cost of the material to be fur-nished, the successful bidder must be able to erect the building either in a more sat-isfactory manner or at a lower price than his competitors in order to obtain the contract. His advantage must be in his method of perform-

ing the various operations of construc-tion. He must have the equipment to erect the building and have it in operative condition at the Time is a most im-portant factor as it determines the be-ginning of receipts. of A certain amount of manual labor must be employed. No form of power can entirely elimican entirely elimi-nate the human ele-ment. There must be some directing mind, but the great-est amount of power estimation with train 4 a single well-trained specialized mind can efficiently control and direct, the better the result and the greater amount of power so con-trolled and directed in some form of mechanical power, the greater the possibil-ity of reducing the cost as it increases the amount of work performed in a given

time by one person with an untiring source of power at his command.

Now the important question arises, which form of power can be most effec-tively used, that can be used for the greatest number of purposes and opera-tions efficiently, with best control and results.

It is the purpose of this article to forth some of the various uses to which electricity may be used by the building contractor, believing there is no other form so adaptable to his use and there-fore so well worth his most careful consideration.

sideration. In preparing for the foundation of the building, electrically driven shovels may be used for removing dirt. If there is any drilling necessary an electrically driven drill requiring only from one to two horsepower per drill to operate or if preferred an air drill may be used with an electric motor to drive the necessary air compressor, which might be of suf-

an electric motor to drive the necessary air compressor, which might be of suf-ficient capacity to drive three or four drills and later possibly some riveting machines or to furnish compressed air for various other purposes. Frequently there is some pumping of water required either to unwater the necessary excavations for foundations or to furnish water as required for various purposes, a small motor driven pump for such purposes cannot be beaten with its automatic float switch control. Con-crete is one of the most common matecrete is one of the most common mate-rials used from foundation to roof and a motor driven mixer is almost a necessity.

Electrically driven hoists are needed all the time at every stage of construc-tion. The builder can do almost every-thing with them but talk, and with the possible electrical signalling systems you can do that.

The illustration shows an electrically The illustration shows an electrically driven hoist erected on the roof of the United Engineering Societies' Building, 29 West 39th street, New York City. This hoist is being used in hoisting from the street to the roof, then lowering into position the huge steel supports for the three additional stories being erected on the top of the above building. It is also interesting to note the electric lighting of the four shafts which it was necessary to construct from the roof down through floors as needed.- This work may be facilitated by the use of electrically driven industrial trucks, driven by storage batteries, which can be used to move material to any part of any floor, and by being able to run on and off an elevator, reach any floor with little labor, but with great speed and convenience. A small electric furnace by means of which var-ious tools can be heated for dressing and proper hardening might be very use-ful and a great time saver. and a great time saver ful

tul and a great time saver. The lighting required during all stages of the construction can without doubt be of greater convenience and safety when done electrically than by any other method. Sometimes when overtime work is required, flood lighting can be made equal to or even better than davlight in adding to

daylight in adding to the efficiency of such overtime work.

Electric operation invariably means quick action and quick results. When the button is pushed you get light, power or heat without de or heat without de-lay. That means sav-ing of time also more accomplished in a given time, both mean a possible reduction of cost, without a reduction in quality. No dirt, smoke or noise necessary to obtain the power, no com-plaints on that ac-count from adjoin-ing property holders

or tenants. The number of electrical applica-tions possible there-will depend tions possible there fore will depend upon the kind and size of building to be crected and the be erected and the amount of electrici-ty used. The horsety used. The horse power capacity of each motor applica-tion may vary with the size and type of building, but when

ELECTRIC DRIVEN HOIST IN OPERATION.

the various obstacles to a firm foundation in the basement, in which the new supporting beams were to be placed and tied in with the present framework. Such an operation would have been nearly im-

possible without the use of electricity. It is frequently found desirable when erecting some of the larger buildings to install a special temporary passenger hoist or elevator for the rapid and safe handling of the men working on the upper floors. The steel for the frame upper floors. The steel for the trained may require drilling in some places to meet the requirements of necessary changes. A small electrically driven drill changes. A small electrically driven drill either of the portable or stationary type can be very conveniently used. An electrically operated riveter for riveting the various parts may be used. Even rivets can be heated if desired by electricity. The electric welding machine either of the spot or butt welding type might be of special service.

Any kind of machine tool that might be desirable to have at hand could be in-dividually motor-driven. Emery wheels, grindstones and the like, also pipe fit-ters, cutting and threading machines, in fact any kind of a machine that it might be advisable to mechanically drive can readily and economically be electrically driven, plaster mixers, floor planers and polishers.

Nearly all elevators in modern buildings are electrically driven and it is consible during the construction of a build-ing and with a platform car aid in hoist-ing the various parts to the different carefully considered may be so stand-ardized for various purposes as to cover a very wide range of application with high efficiency in operation, and low cost of equipment. Electricity can be obtained for such

Electricity can be obtained for such purposes from the central station power plant in almost all cities in the country, and many of the central stations are eager to secure such a load and to make any reasonable line extensions necessary meet the requirements, either to to meet the requirements, either after-nating or direct current may be used as all such electrical apparatus for light, power or heat has been developed for the use of both kinds of current. Electricity is the power that is always ready for use when you want it and can

supply all the power required at once, no waiting around for the fire to come up, or steam to be generated to the neces-sarv pressure. Close the main switch and then you can obtain just the amount and then you can obtain just the amount of current you want to perform any par-ticular operation by adjusting the con-troller of the equipment to be operated. There is no large boiler to move around and set up with its coal, ashes, smoke, dirt and noise. Such an outfit has served as an important link in the darin of do as an important link in the chain of development, whereby man has been given more power to accomplish the great things in the building world and it must still be used in some places where power is not generated at some central point and distributed throughout the community as electricity. It is simply taking the next step forward.

III



The Master Workman-

The great builder is Electricity. With its aid your engineers are daily accomplishing new feats of construction and operation. Enormous bridges, great dams, immense ships, docks, dikes and tunnels are carried to their swift completion-Electrically.

The cloth of your suit was undoubtedly woven by an electric loom, and put together on an electric sewing machine. In an ever widening field this greatest of SERVANTS is performing man's labors.

In the development and improvement of the ways of applying the forces of Electricity, it has been the distinction of the General Electric Company to play a leading part. Through its great Research

Laboratories, engineering organization and extensive manufacturing plants ALL that has been learned in each field of electrical endeavor has been applied to the furtherance of every other field.

When any of the conveniences or comforts of electricity make your day's work lighter, brighter and more enjoyable, remember the part the General Electric Company has had in making these things possible.

And when you have any problem of light, heat, power or transportation, or when you buy any piece of electrical apparatus -remember the experience and knowledge summed up by the monogram G-E and that it stands for

"The Guarantee of Excellence on Goods Electrical"

GENERAL ELECTRIC COMPANY SCHENECTADY, NEW YORK

ILLUMINATION OF BUSINESS STRUCTURES

Special Problems Presented in the Arrangement of Lighting Devices-Tenancy of Building Creates Unique Conditions

By A. R. DENNINGTON, Westinghouse Lamp Co.

OFT buildings consisting of a num-L OFT buildings consistency ber of floor spaces which are undivided, but which are intended to be partitioned to suit tenants, by means of sectional partitions or light walls, present a special problem in the arrangement of the lighting devices. Different floors

Certain portions of loft buildings, such as entrance halls, stairways, elevator landings, toilet rooms, etc., must usually be kept lighted during the time that the building is open. The entrance hall or lobby should be well lighted, as the ad-vertising value of a well-lighted entrance is much greater than the cost of produc-



GOOD EXAMPLE OF STORE ILLUMINATION.

may be put to entirely different uses and these uses cannot be predetermined when the building is constructed. One floor may be entirely open and devoted to the manufacture of coats or suits, where the operators are working on dark tex-tile materials and require special high intensity illumination. The next floor may be taken up by one or a number of printing establishments; the next by en-gravers or by the manufacturers of white goods. The lighting conditions are there-fore completely indeterminate and the only logical thing to do is to plan the wiring and outlets so as to be as nearly universal as practicable. The method and arrangement of the these uses cannot be predetermined when

The method and arrangement of the wiring depends upon the materials and construction of the building, but in prac-tically every case the wiring must be permanently installed in conduit imbedded in concrete or plaster. Local dis-tribution may in some cases be provided by surface conduit or metal molding systems, but such makeshifts should be eliminated as far as possible. Buildings of the steel frame construc-

Buildings of the steel frame construc-tion with hollow tile floors can be pro-vided with outlets for electric service at the center of each ceiling bay and on opposite sides of each column near the floor. In this way provision is made for lighting units and small motor service, regardless of the partitions, as in prac-tically all cases the partitions follow the lines of the columns. The arrangement of the wiring of re-inforced concrete buildings may be the same as described, or the floor outlets may be from chases left in the floor and closed with metal covers. The circuits should be so divided that any of the space which is rented as a unit may be supplied from independent circuits. After all has been done to render the

After all has been done to render the wiring as useful as possible, considering the varied nature of the work done in the building, the matter of illumination must be given careful attention if the charges incident to changing tenants is to be kept a minimum and the profit side to be kept a minimum and the profit side of the account made attractive.

For the entrance some form of ing it. semi-indirect lighting is usually most suitable. Special attention should be given to securing fixtures and glassware which will harmonize with the design and finish. Side brackets may be used in connection with the ceiling lights in the Co. stair treads are usually dark in color the walls and ceilings should be white or light, in order to make the lighting as efficient as possible. A single lamp placed over the center of each landing gives a good arrangement for practical-ly all cases. A simple reverse stairway can therefore be lighted more economic-ally than one which is built around a central shaft. The intensity supplied should not be less than one foot candle at the edge of the landing if the floor and stair treads are dark in color. If the intensity is low the danger of acci-dent is greatly increased, as anyone hurrying out may not clearly distinguish the edge of the landing is of great value in marking the boundary of the level floor. The lamp, whether placed on the side wall or ceiling, should be provided with a deep reflector or a diffusing globe or bowl, which keeps the be provided with a deep reflector or a diffusing globe or bowl, which keeps the direct radiation of the filament out of the eyes of a person descending to the land-ing from the floor above. The imporeyes of a person descending to the land-ing from the floor above. The impor-tance of eliminating glare in stairways has never been sufficiently emphasized. The effect of undiffused light from a lamp filament may render that illumina-tion ineffective which would otherwise meet every requirement. The lighting of hallways and elemeter

The lighting of hallways and elevator landings should meet the requirements outlined for stairways. The intensity at the threshold of elevator shafts should be such that the edge of the landing can be quickly and clearly distinguished. In-sufficient lighting regults in loss of time be quickly and clearly distinguished. In-sufficient lighting results in loss of time for the elevators in receiving and dis-charging passengers and freight. This loss of time is due, not only to the slow movement of the passengers in stepping off an elevator car into a dimly lighted hallway, but also to the difficulty which the operator experiences in bringing the car to a stop accurately at the floor level. With good illumination the operator With good illumination the operator soon acquires skill in registering the floor of the car with the floor of the hallway, the passengers can step out



REFLECTOR EMPLOYED IN AUTOMOBILE FACTORY

entrance lobby for enhancing the light-ing effect and adding to the attractiveness.

Stairways in loft and business build-ings are to be considered as emergency exits and should be lighted so that em-ployees in the building can pass out easily and quickly. As the landings and

quickly and with assurance, and the en-

The lighting of the lofts proper must be arranged so that the special require-ments of any tenant can be met without disarrangement of the original plans. F the general illumination, any one of the (Continued on page XV.)



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POWER USES IN BUSINESS BUILDINGS

What Electricity Has Done Toward Making Modern Business Methods Possible-It is the "Master Workman"

By CHARLES M. RIPLEY, E. E., General Electric Co.

O UR great cities would be impossible in their present development were it not for electricity. New York and vicinity requires almost two million horse power of electricity continually. The central business section of Chicago is actuated by nearly seven hundred and fifty thousand horse power. Business men accomplish more because of elec-tricity. Electricity is the ally of the busi-ness man—the tool with which he has created the modern metropolis. Just so with "big business"—electricity is its progenitor—not its progeny. In the work shops as well as in the offices of Amer-ican industry the very air is saturated with electricity. To such a great extent are industrial plants equipped with motors, cranes, rail-ways, lights, telephones, signaling and other electrical devices, it might truly be said that the great modern plants are vicinity requires almost two million

said that the great modern plants are not mere contemporaries—but success-ors of electricity. They are founded upon the "condition precedent"—electric-

upon the "condition precedent"—electric-ity. Electricity is the cause of the great plant—not the result. Precisely so with the homes of big business—beautiful towering edifices— the gift of the electric elevator. Elec-tricity is the "master workman" by which are wrought the homes of our captains of industry. From foundation to super-structure, be it digging, hoisting, or riv-eting—it is electricity which furnishes the power. the power.

And as these lofty structures are built,

And as these lofty structures are built, so also are they operated, electricity fur-nishing a hundred helping hands in ex-pediting the transaction of business. The precious human freight is lifted by electricity to the busy offices which honeycomb our great cities. Electricity summons the elevator, the office boy, the messenger boy, the stenographer, the secretary and the detective. Appeals for help to fire and police departments are sent electrically, and electric bells an-nounce danger and guests alike. Letters are dictated to phonographs, conversations are witnessed to by dicta-phones, messages are recorded by the



CRANE FOR HANDLING HEAVY CASES.

telautograph --all electrically operated. Electric clocks indicate the time of departure of electric trains, time stamps record the precise minute at which im-portant documents are received, adding machines and multigraphs—all these

machines and multigraphs—all these electric appliances reduce an army of clerks to a mere score. Electric fans, ventilating and refriger-ating systems supply pure tempered air in the hame of big business and the vacuum cleaner further promotes the health of our captains of industry and their lieutenanst. And in the basement electric pumps supply cold drinking wa-ter and other electric pumps stand guard against the flood, preventing interrup-tions. How farsighted our architects have been in construction, appropriating



FOWER PLANTS IN NEW YORK CITY AND THE METROPOLITAN DISTRICT WHICH FURNISH APPROXIMATELY 2,000,000 HORSE POWER DAILY.
Key to power houses on the above map: 1- New York Edison Co.; 2-Edison Electric Il-luminating Co. (Brooklyn); 3-United Electric Light & Power Co.; 4-Westchester Light-ing Co. (Mt. Vernon); 5-Bronx Gas & Electric Co.; 6-Flatbush Gas Co. (Electrical Department); 9-Richmond Light & Railroad Co. (Staten Island); 10-Queens Eorough Gas & Electric Co.; 11-Rockland Light & Power Co. (Nyack, N. Y.); 12-Northern Westchester Lighting Co. (Ossining); 14-Nassau County Light & Power Co.; 17-Inter-borough Rapid Transit Co.; 17-New York Railway Co.; 18-Brooklyn Rapid Transit Co.; 19-New York, Central Railroad; 20-New York, New Haven & Hartford Railroad; 22-Pennsylvania Railroad Co.; 23-Hudson & Manhattan Railroad; 25-New York & North Shore Railroad Co.; 27-New York & Long Island Railway Co.; 37-Public Service Corporation of New Jersey.

for electric facilities close to 20 per cent.

for electric facilities close to 20 per cent. of the entire building's cost. The routine of commercial life is rap-idly being electrified. The mailing di-visions of great corporations fold 4,000 bills per hour, by electricity—six times as fast as by hand. They seal and stamp 8,000 pieces of mail per hour—eight times as rapidly as could be done by hand. Even the mail is opened electrically. Electric automatic typewriters make five times as many copies per hour as those operated by human hands. The highly efficient Hollerith System is used in bill-ing and other departments—operated by electric motors. electric motors. The success of a business man is in

The success of a business man is in direct ratio to the extent to which he em-ploys and mobilizes these facilities in ascertaining facts, and transmitting and executing orders—regardless of distance. One is reminded of Herbert Spencer's little-quoted but prophetic remark in the Nineteenth Century, that:— "Organization is the ability to bring all available knowledge and all available energy to bear upon par-

available energy to bear upon par-ticular problems in hand at the pre-cise time when needed."

Is this not confirmation for the state Is this not confirmation for the state-ment that the existence of our great or-ganizations is directly attributable to electricity? For how else could "all available knowledge" be collected,—How else could "all available energy" be brought to bear,—"At the precise time when needed"—were it not for elec-tricity. The conclusion is obvious that without facilities for gathering facts from, and rapidly dispatching instruc-tions over territories unlimited, the scope of an organization would be correspondof an organization would be correspond-ingly curtailed.

of an organization would be correspond-ingly curtailed. Permit me to suggest an interesting and unique line of research. Let some active mind investigate whether the cor-porations which today are greatest availed themselves of the improved facil-ities offered by electricity, at an earlier date or to a greater extent than was general during the period of their in-ception and early development. The writer prophesies that this would be found to be the case. For by the military analogy, that commander who employs engineering improvements in troop movements, in the transmission of messages and other phases of his campaign, obtains and often maintains a tremendous strategical superiority over his less scientific adversary.



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ELECTRIC SERVICE IN APARTMENTS AND HOMES

Hundreds of Innovations Made Possible Through the Use of Electricity in Multi-Family Structures-"Cook By Wire" Becoming Popular

By G. T. HADLEY, Society For Electrical Development, Inc.

THE modern apartment house or mul-tiple home building tends to be finely proportioned with little ornamentation on the exterior, but marvelously equipped on the inside to meet the increasing de-mands of modern living. It is said that there are in existence or under con-struction at least a dozen apartment buildings in New York in which the sep-arate apartments will rent for \$25,000 or This second the apartment more a year. This seems to be a large sum for rental, but when one reflects that this city is the temporary home of a larger number of wealthy families than any other city of the country, it is doubt-less more economy in the end than maintaining a very large separate establishment.

These modern apartments often boast of conveniences not to be obtained else-where. They combine the luxury of the handsome hotels with all the privacy of separate homes. A passing glance into



HEATING BY ELECTRICITY.

massive entrance halls reveals a ground mass of warm cream-white with striking veining of color that makes a pleasing and artistic contrast, with large well-matched wall panels and perhaps the graceful balustrade of marble. There are color notes supplied by a rich rug, tapestries, and lovely lamps. The multiple homes are reached by swift, noiseless elevators electrically driven, and of course there is all night elevator service. The electrical installa-

driven, and of course there is all night elevator service. The electrical installa-tion of these multiple home buildings may be broadly classified under two heads—that part serving all parts of the building and that part serving the separ-ate apartments. Electric service enters more and more into the complete equip-ment of each separate apartment. Such service now includes the electric range in the kitchen. the kitchen.

In Boston, the "Cook by Wire" idea is In Boston, the "Cook by Wire" idea is spreading rapidly. Boston now recog-nizes the practicability of the electric range and many of the finest apartments and dwellings in that city are electrically equipped throughout. A good illustra-tion of this is the Gilbert Apartments, consisting of eighteen suites equipped with electric ranges and in the Colonna Apartments the electric range is the only cooking appliance that, meets the de-

Apartments the electric range is the only cooking appliance that meets the de-mands of the kitchenettes. Space in such buildings is usually lim-ited. Hot water and heat are supplied from the basement and as a range is necessary for cooking only, the advan-tages of the electric range are apparent

at a glance. The very cleanly nature of the electric range with its freedom from soot, smoke, dirt, fumes makes it special-ly desirable and the fact that the cooking utensils are bright and untarnished by flame and its by-products, makes the kitchen work easier for tenants or their servants. As refinement of living in creases electric cooking solves the probcreases, electric cooking solves the prob-lem of easy control, of elimination of waste, and in some cases of automatic control of time and temperature. In electric ovens the heat can be controlled and regulated with a precision impossible heretofore with other fuels

heretofore with other fuels. Within each of the separate apart-ments, electric service is becoming more ments, electric service is becoming more and more complete, the lighting require-ments receiving the first attention. The living room, library and dining room should each receive individual treatment according to their uses. Greater flexi-bility as to switching facilities is now ob-tained by the installation of suitable gang switch boxes, easy of access to allow change of wiring connections. Plenty of outlets for electric devices in dining room, pantry and kitchen, in fact, all rooms, are a necessity. Flush recep-tacles for power and heating appliances are of sizes depending on capacity, but are of sizes depending on capacity, but the standard 600 watt receptacle and plug are satisfactory in the majority of

cases. Electrical refrigeration offers a decided improvement upon the moist, near-cold chunk of ice coming up every day or so upon the lift; by contrast safe, clean electric refrigeration costs less in the long run than the very questionable sloppy ice cake it supplants; a more even temperature is maintained and automatic refrigeration is taking its place to day in refrigeration is taking its place to day in the vast realm of improvements in mod-ern apartments.

Electric Service in the Home.

Electric Service in the Home. When planning a home, foresight is better than future regrets. The thor-ough enjoyment of electric service in all its phases depends largely upon the completeness of the installation itself, the thoughtfulness with which it has been planned. The following fittings for convenience do not entail costly equipment and they add that touch of ease and refinement that gives charm and comfort to the home. A liberal use of room switches in a residence invites economy by favoring

A liberal use of room switches in a residence invites economy by favoring the putting out of lights when leaving rooms. They soon pay for themselves. For hall and stairs it is customary to arrange lights so that they may be turned on or off from any one of the different floors by switches. It is often desirable to light an upper hall before going upstairs. Large rooms with numerous outlets Large rooms with numerous outlets should be controlled by more than one switch and in long rooms it is a good plan to place the lights of each end of the room on a different switch control, both for convenience and economy. Master switches may be placed in the

Master switches may be placed in the owner's bedroom and so connected that the switch will control the first, second and the third floors, main hall and stairs lights, independent of local switches. In arranging the location of the bath-room lights, very few people think of the shadows they throw on the window shade if not properly placed. Never

shade if not properly placed. Never have the lights opposite the window. In the bedroom never have the dresser be-

tween light and window. In the living room, requirements for illumination are quite severe. It is there-fore essential that there be several side-wall outlets, a ceiling outlet and two or more baseboard receptacles to provide connection for electroliers, piano lamps or heating devices. It may be advisable, in some cases, to provide a wall switch which will control whatever piece of ap-paratus is used in connection with the baseboard receptacle. In the illumina-tion of a library soft light of harmonious tone is essential. Baseboard receptacles tone is essential. Baseboard receptacies should be provided at several sides of the room to permit the use of portable reading lamps, without having long cords extending under foot, or under the

rugs. Turn-down lamps are indispensable in bath rooms, bedrooms and upper hall. The convenience of a night light is a lux-ury with little expense, for this baby filament consumes practically no current.

filament consumes practically no current. Electrical decorations of many kinds are now available for decking the home for festivities. Christmas trees are danger free when adorned with the small electric lamps that take the place of the wax candle with its constant menace. Streamers of light may be twined through the banisters. Small lamps may be hung inside of Japanese lanterns. Artificial roses in baskets with each blos-som enclosing a tiny lamp are becom-



COOKING BY ELECTRICITY.

ing popular. In wiring a home pro-vision should be made for such decorative equipment.

The enjoyment of electric service in its fullest sense is largely dependent on the flexibility of the wiring system. The installation of extra outlets is of the greatest importance. There are many cases where the lamp socket is the logcases where the lamp socket is the log-ical point for connecting a fan, toaster or heating pad, but as a rule these ap-pliances displace illumination and be-sides being inconvenient, the hanging cord is unsightly. Moreover where a lack of outlets makes it necessary to carry wires across the floor, there is danger of their being stumbled over. The sole object of these devices being to provide convenience, this object is defeated if their use is made awkward and inconvenient. For the larger ap-paratus consuming over 500 watts, the ordinary lamp socket should not be used, but separate outlets employed, each con-trolled by a separate switch in the same trolled by a separate switch in the same room.

Electric wiring has a certain definite capacity. If an installation is made upon the basis of the least amount of equip-ment possible, any appreciable additions to that equipment means overload upon the circuits circuits. the

The sensible thing to do, therefore, is to provide ample capacity in the original installation and to plan this installation in such manner that the future expansion will be taken care of at the minimum cost.

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ELECTRICITY AND REALTY RENTING VALUES

Convenience, Safety and Efficiency Result From Use of Electricity-Matches, Cause of So Many Disasters, Eliminated

By F. C. MYERS, Society For Electrical Development, Inc.

MATCHES are going out of vogue. They are looked on as "undesirable citizens." Electricity has been wielding the whips of efficiency, safety and convenience with telling effect. A look around you will be proof of this statement. The reasons are easily understood when a comparison is made of the electric way of doing work and illuminating and the other available ways. Modern men and women are seekers

after convenience, safety and efficiency. They want results without undue effort, without waste, and without taking un-necessary chances. Lighting a match, prove their work and at the same time accomplish more in a day. The modern way is the electric way and business has long been convinced of this truth. It is also worthy of note that the use of elec-tricity is being continually extended so that no one can foretell what new use will be found, perhaps to-morrow. For this be found, perhaps to-morrow. For this reason suitable provision should always be made in all wiring plans for future development.

All real estate, improved or unim-proved, has a greater value if electricity is available. Buildings, of any kind and for any purpose, are more valuable if wired for electric current. In fact one of the Improved business property that is not provided with electric lights and power cannot be called modern and in these days it is the modern structures which have the highest selling and renting value. A cursory inspection of any city will show the truth of this statement. Even modern buildings unfavorably lo-cated have a much better chance of be-ing sold at a favorable price or rented to advantage than out-of-date buildings more favorably situated. In planning the erection of a business or factory building, careful considera-tion must be given to the requirements of the prospective occupant or occupants. Improved business property that is not

of the prospective occupant or occupants.



ELECTRICITY HAS MADE POSSIBLE THE PROLONGATION OF THE WORKING DAY, THEREBY INCREASING THE REVENUE DE-RIVED FROM SPACE IN OFFICE AND INDUS TRIAL STRUCTURES.

turning on the gas and then touching the match to the gas seems an inconvenient and wasteful procedure when simply and wasteful procedure when simply pressing a button or turning a switch will suffice. Then, too, there is always the danger of matches becoming ignited through accident or mishandling and the

the danger of matches becoming ignited through actident or mishandling and the possibility of serious results following. Electric switches are permanently lo-cated, usually near the entrance of a room or building, so that they can be found readily in the dark and quickly in case of need. Matches are frequently misplaced or the supply exhausted, in either case causing inconvenience. In comparing electricity with kerosene lamps, the difference is even more mark-ed in favor of electric current. In recent years the development of de-vices that help the housewife in her du-ties have brought to the fore uses for electricity in the home other than for illumination. Electric ranges, vacuum cleaners, toasters, grills, etc., have taken the drudgery out of housework and re-duced the time required for household duties so that there is more time for play and recreation.

duties so that there is more time for play and recreation. Business men have been interested in electricity from the first, because it meant increased factory output, improved fac-tory conditions, has facilitated the move-ment of goods, enabled executives to im-

first questions asked by prospective buy-ers or tenants is whether or not elec-tricity can be had. If the answer is "yes," the first step toward a successful and favorable transaction has been taken. Location has an important bearing on property values, but good locations are practically always within reach of elec-

tric current. Unimproved property or vacant prop-erty has a value based on what can be done with it in case the owner or lessee wishes to improve it. Here, again, enters the question of whether or not electricity can be had, for the value of improvements rests largely on their modernity and no building can be called modern if provi-sion is not made for electricity at least for lights. It is as important as ample

In protection. Unimproved real estate is always more salable when electricity is available. This salable when electricity is available. This is verified by the actions of experienced sub-division promoters. Their first move on obtaining control of a tract is to lay out streets, install sewers, sidewalks, and make provisions for electric lights. Then these features are carefully called to the attention of prospective buyers. Here are demonstrated the three necessi-ties of modern life easy access good ties of modern life, easy access, good sanitation, safe and economical light and power.

The needs of an office building will be different from a factory building and light manufacturing requirements differ from heavy manufacturing. Just as the frame and structure will differ for var-ious purposes so also must the electric requirements vary to meet different con-ditions ditions.

Old structures may be brought up-to date by proper alterations and these will successfully compete with new buildings. Electrical contractors have developed in-stallation methods so that the wiring can stallation methods so that the wiring can be done with but little inconvenience and when the job is done, electric cur-rent can be used as safely as if installed when building. It costs a little more for electric wiring in a building already erected, but the added value for renting or sale will more than compensate the owner.

owner. Residence property is fully as suscep-tible to the benefits of electric current as any other type of property. Time was when electric lights were only for the well-to-do. Now, however, even the poor man uses electric current not only for lighting, but for many household devices designed to lighten the labors of the housewife and make home more comfort-able. The cost of everything connected able. The cost of everything connected with household expenses has steadily in-(Continued on page XV.)



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COST OF LIGHTING CENTURY A AGO

Electric Light is Sold Today for One-Twenty-Fifth the Cost of Candles a Hundred Years Ago

ONE hundred years ago the sperm whale furnished nearly all of the illuminating oil used in the average household. Hundreds of whaling vessels left the Atlantic coast and returned laden with cargoes of sperm oil that piled up vast fortunes for their owners. But, contrary to the popular idea, the cost of illuminating the home in those days with the dim glimmer of a smelly sperm oil lamp or tallow candles was twenty-five times as costly as the elec-tric lamp today, while the brilliancy of illumination found in any modern town or hamlet was impossible at any price. Kerosene in its refined and commercial form first came into use about the mid-

Kerosene in its refined and commercial form first came into use about the mid-dle of the last century. The primitive candle and sperm oil lamp with its smoky flame gave way to the new pe-troleum product. The kerosene flame was cleaner and brighter than that of the sperm oil and less distasteful to the nostrils in its raw state. The use of kerosene grew steadily and it sold read-ily at 80 cents a gallon, a price which puts to shame even the highest prices charged for gasoline today. The cost of 1,000 candle-hours of light a century ago was about \$2.50 when the candle and sperm oil lamp were the only available illuminants. The coming of kerosene cut the cost to \$2, and along toward the latter half of the nineteenth century the same amount could be purchased for a dollar. Com-petition between kerosene and gas fur-

could be purchased for a dollar. Com-petition between kerosene and gas fur-ther reduced the cost until in the last quarter of a century a thousand candle-hours cost less than 50 cents. With the present efficiency of the Mazda lamp the cost of the same unit is about 10 cents, or one-twenty-fifth of the original cost a century ago

a century ago. How this reduction in the cost of a household necessity has been turned to

BUSINESS BUILDINGS. (Continued from page V.)

three usual systems of interior illumination may be successfully used. These systems are designated as direct, semi-indirect and indirect, and their relative effectiveness depends upon the conditions

indirect and indirect, and their relative effectiveness depends upon the conditions existing in the building. The direct lighting system is the one most commonly used for industrial light-ing. It is the one which gives great-est economy in watts per unit area to produce a given intensity of illumina-tion. With direct lighting the color and condition of the ceiling has much less effect on the illumination delivered on the working plane than with semi-indi-rect or indirect lighting. If the ceilings are low the lighting units should be placed as high as possible, while if the ceilings are high it may be advisable to drop the lighting units a short distance below it in order to get the best effects from the reflectors. In general, the lamps should not be placed less than eight feet from the floor and it is advis-able to make this distance ten or twelve feet.

feet. The horizontal spacing of direct light-ing units should not be much greater ing units should not be much greater than the distance above the floor if a fairly uniform intensity of illumination is to be obtained. Wide spacing results in areas of low intensity between lamps and produces a condition which must be supplemented by local lighting, even though the average intensity may be suf-ficient for the work to be done. Owing to the spacing requirement mentioned it to the spacing requirement mentioned it may be necessary to provide more than a single outlet in the ceiling of each bay

a single outlet in the celling of each bay if direct lighting is contemplated. Reflectors for direct lighting units should be of a shape that covers the lamp, as it is impossible to have satis-factory lighting with bright light sources within the field of vision. Experiments have shown that visual fatigue occurs in a very short time where the light sources

improve conditions of living is shown in the tendencies of the times, a ten-dency to use more light in the home, the office and the factory. It is estimated that the average household today receives eighteen times as much light as the homes of a century ago. No other single necessity of the household has been so cheapened and at the same time improved as electric light. At the same time that the modern householder has been so cheapened and at the same time improved as electric light. At the same time that the modern householder is today living in a better lighted home than Egyptian kings of a century ago, he is also profiting from the fact that the cost of electric lightning per family has been lowered about one-third. What the electric light has done for the home is reflected in the change in the cost of street lighting during a simi-lar period of time. One hundred years ago the city of Philadelphia paid \$20,000

the cost of street lighting during a simi-lar period of time. One hundred years ago the city of Philadelphia paid \$20,000 a year, about 33 cents per capita. The approximate cost per 1,000 candle-hours was 57 cents. But again this was at a time when the sperm oil street lamp was the only type available and the "street illumination" of a hundred years ago is not comparable with even the gas ago is not comparable with even the gas lighted streets of a few years ago. With the growth of the city electric

With the growth of the city electric arc lamps appeared, and it was not long after this that Edison began experi-menting with bamboo and paper fibre as a filament for his first incandescent lamp. The modern Mazda lamp, a more highly perfected type of Edison lamp, is now rapidly superseding the older sys-tem of arc lighting. Philadelphia with the modern system of lighting its streets today pays nearly two and one-half million dollars annually for electricity, or about \$1.35 per capita. The cost per 1,000 candle-hours, however, has dropped $3\frac{1}{2}$ cents while the population of the city has increased to thirty times its size a century ago and the amount of street lighting has increased 2,000 times. times.

are exposed and only slightly out of the usual line of sight. Reflectors of steel, opal, glass and prismatic glass are on the market and the shapes are made to suit any ordinary condition. The semi-indirect and the indirect light-ing systems are used to advantage only if the ceiling is light in color, is free from obstructions and has a surface which is a fairly good diffusing medium. Since the greater part of the light is re-flected from the ceiling to the working plane, it is evident that a ceiling of dark color absorbs too much of the light di-rected upon it to make an indirect or semi indirect system economical. It is also a fact that the accumulation of dust also a fact that the accumulation of dust on the ceiling and on the reflecting sur-faces of the fixture very greatly reduces the reflecting power. Regular and frequent cleaning of the glassware is essen-tial with any system of lighting if good results are to be obtained, but especially is this true of semi-indirect and indirect

systems. The horizontal spacing of lamps with the systems under consideration may be twice as great as the distance from floor twice as great as the distance from floor to lamp without seriously affecting the uniformity of distribution. The lighting units should be spaced symmetrically with respect to ceiling beams. Parti-tions placed along the line of beams or between columns will include a central lighting outlet within the enclosed space. Lamps can be chosen of such a size that the intensity is brought to the desired the the intensity is brought to the desired value in any section. If the space is un-divided, all the lamps should, of course, be of the same size

Lighting Statue of Liberty.

One of the features of the Electrical Week will be the inauguration of the permanent flood lighting of the Statue of Liberty. Secretary Daniels has assigned a battleship fleet to the week-end in New York Harbor for the occasion. New York City will officially participate

through a committee named by Mayor Mitchel. Instead of an isolated plant installa-

tion, the Statue will be illuminated by a central station service, the Public Ser-vice Corporation of New Jersey furnish-ing the current. More projectors will be used on the Statue than have been re-quired to flood-light any building or palace up to the present time, according to the Society for Electrical Development. Because of the pressure for time, and the difficulties in obtaining materials, en-gineers from the General Electric Com-pany and Governors Island have been busy assembling this vast equipment for the last month.

RENTING VALUES.

(Continued from page XIII.) creased except in the case of electric cur-rent. This reduced cost, together with improved efficiency in all electrical ap-paratus, explains in part the constantly increasing demand for electricity in the home

Home building plans should have the closest scrutiny because the value of a residence depends on the comfort and ease of the occupants. Full considera-tion should be given to the electric wir-ing as electricity for light, heat and power will provide the home with its greatest conveniences and comforts. The selection of the lighting fixtures to blend harmoniously with the room decorations and also to give the proper light intensity calls for more than passing attention. First impressions have a strong influ-ence on prospective buyers or lessees. If the first glance creates a favorable sen-sation, the first step toward a profitable transaction has been taken. Houses were formerly wired only for

transaction has been taken. Houses were formerly wired only for lights with inconvenient switches. The latest practice calls for the switches placed in the walls near the doors, so that the lights may be turned on or off when the room is entered or vacated. Other uses have developed and now elec-tric lights alone will not suffice to make a house strictly modern. Means must be provided for connecting the many house-hold appliances such as vacuum cleaners. provided for connecting the many house-hold appliances such as vacuum cleaners, toasters, percolators, grills, as well as ranges. washers and irons. These call for outlets in baseboards, in the floors, under dining room and center tables, on porches, in fact in any place that will fa-cilitate the use of electrical devices. Owners and managers of all kinds of realty must bear in mind the increasing demand for comfort, efficiency and safety. The approach to ideal conditions is de-

The approach to ideal conditions is de-pendent more and more on how and to what extent electricity is put to work.

USES OF ELECTRICITY.

(Continued from page II.) basement with the aid of electricity. Home life has been much lightened and made pleasanter. Owners and builders of homes should realize that these con-veniences are sought after and residence property equipped so that electric cur-rent is available and will be of great as-sistance in selling or renting.

Several installations of electric heat-ing in place of the usual furnace have been made with most satisfactory results. Where convenience and close regulation are of more importance than the minimum cost such installations will

meet with great appreciation. In industrial establishments the use of electric heat in processes of manufacture has become ouite common and every building should be so wired that tenants can install electric heating equipment if can install electric heating equipment if they should so desire. Some of the com-moner uses of electric heat to industrial application follow: Electric welding, enameling ovens, baking ovens. solder-ing, shoe machinery, tempering furnaces, drying ovens, babbitt and glue melting pots, laundry machines, steel manufac-turing. There are many other uses. The preceding table of recommenda-tions for lighting is republished from Sweet's Architectural Catalogue, 1916, page 1317, being a part of the electrical information and data furnished by the So-ciety for Electrical Development to that

ciety for Electrical Development to that publication.

December 2, 1916





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