CATALOGUE “E”
AND PRICE LIST
EXPERIMENTS WITH EDISON INCANDESCENT LAMPS
1890

CATALOGUE "E"

AND PRICE LIST

EXPERIMENTS

WITH

EDISON INCANDESCENT LAMPS

AND

HOW TO MAKE A CHEAP BATTERY

EDISON LAMP CO.

HARRISON, N. J.

NEW YORK:
C. G. BURGOYNE, 146 CENTRE STREET.
1890.

very cheap battery, and, if a more elaborate battery is employed, there are many practical uses to which these lamps may be put; for instance, lamps can be placed in dark closets and lighted at any moment by touching a button. A lamp may be fixed in the cellar and lighted by a switch before going down, or lamps could be placed in a hall or upstairs, so that a person coming in at night could, by pressing a switch, have a light immediately.

Wires could be run from a house to a barn and lamps placed there so that the barn could be lighted before leaving the house. In fact, there are so many ways of putting these small Edison lamps to practical use, that they are too numerous to mention and will naturally occur to the experimenter.

It should be remembered that these lamps consist of a filament of carbon enclosed in a glass globe which is exhausted of air, consequently there is but a very little heat, and, therefore, they can be used where it would not be possible to use gas, lamps or candles. There is, therefore, no danger of fire; in fact, there is so little heat from them that these miniature electric lamps are largely used by physicians for examinations of the mouth, nose, ear, &c.

It is, also, well to add that for the lamps mentioned in this pamphlet, the force of the electric current required is so small that it cannot possibly be felt by the naked hands. Thus, they furnish a safe, amusing and instructive study for any one who desires to learn something of electric lighting on a small scale.

Many enquiries have been made as to whether these miniature lamps can be used for lighting a house throughout in place of gas or oil lamps. It may, therefore, be well

to state, that while this is possible, the batteries required are numerous and costly, and few persons are willing to incur the trouble and expense necessary to accomplish this purpose. For the small lights for occasional use, such as mentioned above, the miniature Edison lamps, with the batteries which will be presently described, will be found practicable and useful.

Batteries.

Batteries for the production of the electric current may be divided into two classes, called "Open Circuit" and "Closed Circuit" batteries. The former are generally used for telephones, electric call bells, medical coils and many other purposes where the service required is only for a few seconds or minutes at a time. The latter, or closed circuit, batteries are used where the current is required continuously, as, for instance, in electric lighting or in operating electric motors.

Open circuit batteries, such as the Le Clanché and other sal-ammoniac cells, are not suitable for use in connection with electric lamps. For this purpose the closed circuit batteries (in which is usually employed a solution of bi-chromate of potash and sulphuric acid) are the most suitable. Many persons enquire if the small incandescent lamps can be used with gravity cells. While, as a matter of fact, it is possible to do so, this battery is not adapted for the purpose, and the great number of cells required for the purpose make it somewhat expensive and cumbersome to carry on experiments with this class of cells.

The number of cells required for Edison lamps depends upon the kind of lamp it is desired to light. The lamps are made of different candle powers, requiring various degrees in strength of current to make them give their proper amount of light. For instance, two cells of closed circuit battery are sufficient to light a lamp of one-half or one-candle power.

It will probably assist the experimenter to state that each cell of closed circuit, or bi-chromate of potash battery, will give an intensity of about two volts (the volt being the practical unit of measurement of electric pressure or force). Thus, in ordering any of the Edison lamps mentioned in the price list at the end of this pamphlet, it will be seen that for every two volts required by the lamp, one cell of bi-chromate or storage battery should be provided; for instance, if a six-volt lamp were wanted, three cells of battery would be needed, or for an eight-volt lamp four cells, and so on. It will save time and trouble to state that there are no two-volt lamps made, and none of the small Edison lamps can be run with less than two cells of battery.

A Cheap Battery.

There are many persons who desire to conduct experiments with electric lamps, but who do not wish to go to much expense for batteries until they have learned more about this interesting subject. For their benefit, and also for the benefit of all our customers, we give below directions for making a battery, which is so simple that

it can be made at home by any person possessing ordinary ingenuity. It is, at the same time, cheap and efficient. A battery of this kind should not cost more than about twenty cents per cell.

The materials for one cell would be as follows :

Two pieces of carbon pencil, about four inches long by one-half inch diameter.

One piece rod zinc, same length and diameter.

About eighteen inches No. 20 copper wire. This should be in two pieces, one twelve and the other six inches in length.

One ordinary tumbler.

A piece of wood, one-quarter to one-half inch thick, one inch wide, and long enough to reach a little further than across the tumbler.

The most important of these materials is the carbon, which should be of good quality. All carbon rods are not suited for the purpose, and it has been found that the carbon pencils manufactured by the National Carbon Co., Cleveland, Ohio, give the best results for making these batteries. These carbons can be obtained from any dealer in electrical goods.

The zinc may be the ordinary rod to be obtained from electrical goods dealers or in hardware stores. It should be amalgamated. This is done by dipping in weak acid and then rubbing on a little mercury by means of a cloth or rag. This gives the zinc a bright, silvery appearance. If it is purchased from an electrical goods dealer it may be ordered ready amalgamated.

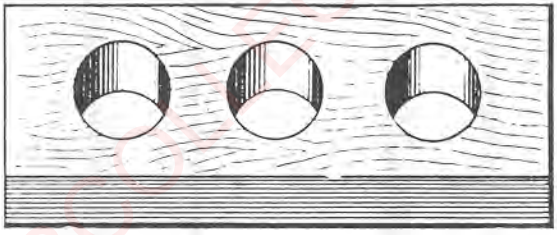
The wire may be either bare copper wire or the ordinary covered (or insulated) annunciator or bell wire, and

can be obtained at nearly all hardware stores and from dealers in electrical goods. We give in the end of this pamphlet for the benefit of customers, the names of a number of dealers in electrical goods in various parts of the country.

The articles named in this pamphlet can be obtained from any of these dealers, including any of the Edison lamps shown in the price list. The lamps can also be obtained from us direct.

To put this cell together, proceed as follows:

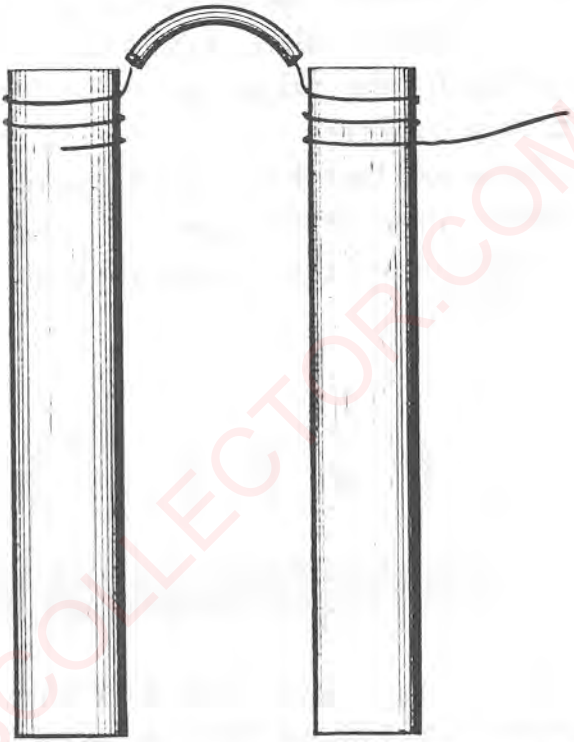
Bore three holes in the piece of wood, making them large enough to allow the carbons and zinc to pass through easily, as shown below:



If insulated wire is used, scrape off the insulation from one end so as to get about three inches of the bare copper, then leave on three inches of the insulation and scrape the insulation off the remaining length. When this is done the wire will present the following appearance, viz.: three inches of bare copper wire, three inches insulated and six inches bare. The bare wire should be well cleaned so as to have a bright surface.

Now, wind the three inches of bare copper wire tightly around the end of one of the carbons, and around the end of the other carbon wind a similar number of turns as on

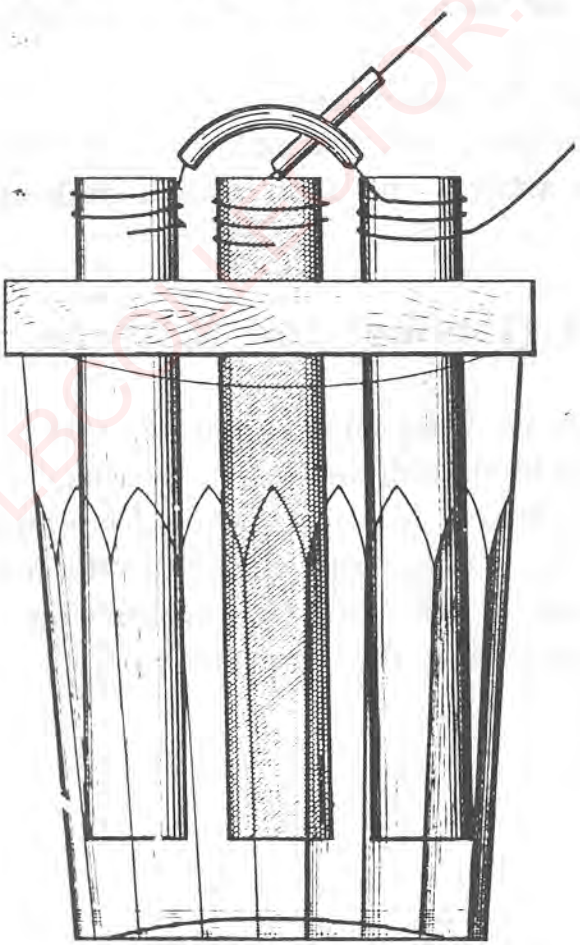
the first carbon. There will then be three inches of insulated wire between the two carbons and a similar length of bare wire projecting from the end of one of them, thus :



In order to make a better contact of the wire with the carbon, it is well to pour a little melted lead over the ends of the carbons where the wire is wound. This binds the wire to the carbon, and makes a firm contact, preserving the wires from being attacked by the acid when the battery is in use. The melted lead will adhere to the carbon more firmly if the carbon is first made rough by file or other tool.

The next thing is to take a piece of bare wire about six inches long, and wind half of it around the end of the zinc rod, same as was done with one of the carbons. This

can also be made a firm contact by pouring a little melted lead over the part where the wire is wrapped around. After this is done, put the two carbons through the holes at each end of the piece of wood, and the zinc through the middle hole. Now, nearly fill the tumbler with the battery solution, for which a formula is given below, and place the piece of wood across the top of the tumbler so that the carbons and zinc will be in the fluid. The battery will then be ready for work. When completed, the battery will present about the following appearance :



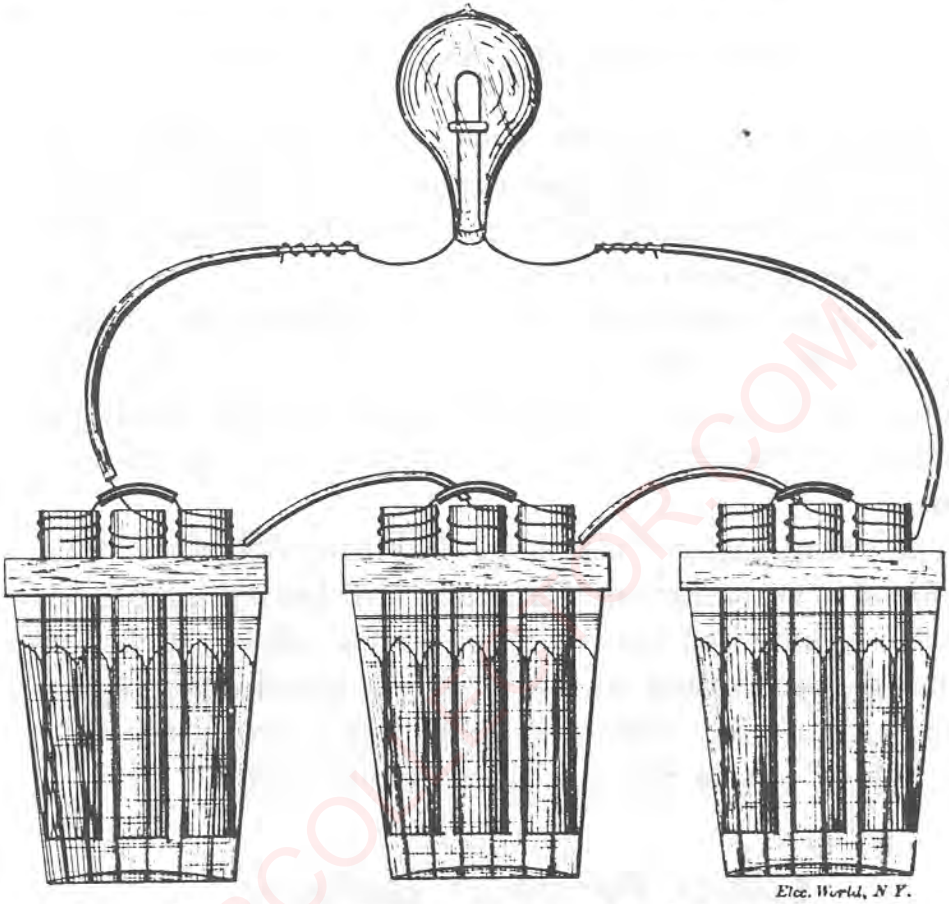
The formula for making the battery solution is as follows:

Dissolve four ounces of bi-chromate of potash (commercial) in one quart of hot water, and after it is cold add *very slowly and gradually* four ounces of common sulphuric acid, stirring with a glass rod meanwhile. When cold it is ready for use, and gives the best results when it has not been kept too long. Any druggist will make up this solution, if desired.

Care should be taken not to spill the solution on clothing or carpets, as it will stain and rot wherever it touches such articles, the acid used in making it being strong.

To Connect the Battery.

As stated above, there are no lamps made which can be properly lighted with one cell of battery, and when two or more cells are used, they should be connected together as follows: To connect one cell to the other, twist together the end of the wire leading from the carbon of one cell and the end of the wire leading from the zinc of the next cell.



Elec. World, N Y.

There will then be two ends of wire left free, and to these should be attached the wires of the lamp. This method of connection is called connecting in "series," and the result is that the intensity, in volts, of each cell is added to the others connected. For instance, if there are three cells, each giving two volts, they will give six volts when thus connected together. It will be seen, therefore, that for every two volts required by the lamp, one cell of battery should be provided; thus, for a one-candle power lamp of four volts two cells will be sufficient, while for a two or three-candle lamp of five or six volts three cells would be necessary.

Instead of twisting the ends of the wires together, in connecting up the cells, connectors may be used. These cost only a few cents each, and may be obtained from any dealer in electrical goods.

Care must be taken that the zinc does not touch either of the carbons when the battery is in use, as that will short-circuit the cell. This may be avoided by putting a small rubber band around the bottom of each of the carbons.

The cheap battery, which has just been described, will be found a very efficient form, and will keep a lamp brilliantly lighted for two or three hours, after which the cells may be emptied out, refilled with solution and operated again. The only part that wears out is the zinc rod, which can be renewed from time to time.

Other Forms of Battery.

The cheap form of battery above described is one that is well adapted for experimental and temporary purposes, for the reason that the current must be used at once, as the action goes on whether the lamp is lighted or not. If it should be desired to place lamps in closets, hallway, cellar or other places, and light them at any time without being obliged to fill up the battery afresh, it would be necessary to use a different type of battery. This should be either a porous cup battery or a storage battery, either of which can be obtained of any dealer in electrical goods.

The porous cup is a form of primary battery in which is used carbons and zincs and a solution of bi-chromate of potash or chromic acid. It differs from the simple one above described because it has, in addition, a porous cup, which usually contains the strong acid, which keeps the battery from running down as quickly as the simpler form. All these are called primary batteries because they make their own current in the first instance.

A storage, or secondary, battery consists of lead plates immersed in acidulated water and does not create its own current. The energy of the electric current from another battery or source of electricity is carried into it and stored, and can be used at any time to light electric lamps, operate electric motors or do other useful work. While the cost of storage batteries and the primary batteries to charge them are greater in the first place, they can be operated with great satisfaction and small cost, and need scarcely any attention whatever.

Let us suppose, for instance, that it were desired to place a dozen three-candle power Edison lamps in closets, hallway and other parts of a house, so that they could be lighted for a few minutes' use at any moment without any further trouble than pressing a button. To do this, there would, in the first place, be required the lamps; then three cells of storage battery (each cell giving about two volts), and about twelve cells of gravity, or bluestone, battery with which to charge the storage cells. The batteries can all be placed in the cellar, from whence the wires could be run to the lamps. The bluestone batteries should be connected in series, as above explained, and the two end wires from the bluestone batteries should

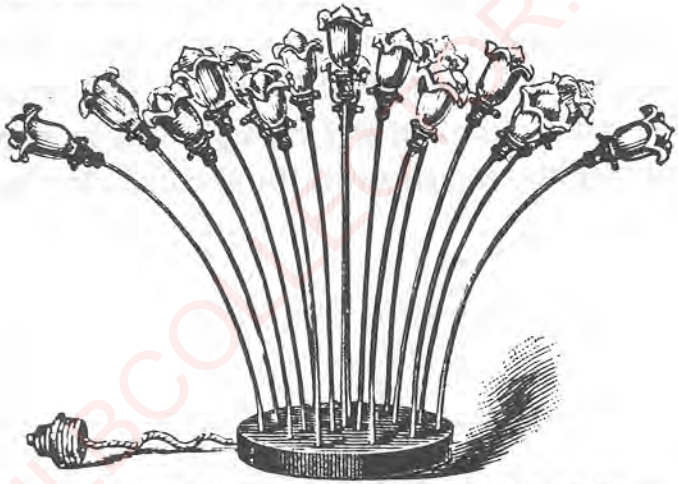
be attached to the storage batteries (they also having been connected in series). In twenty-four hours there will be sufficient charge in the storage batteries to operate the lamps for a short time, and after that the lamps could be used at any time, while the batteries would need no more attention for, probably, three or four months.

The above will probably be sufficient to show that the miniature Edison lamps can be put to practical use even by those who are unacquainted with electrical science, as well as being adapted for amusing and instructive experiments.

It is scarcely possible to say which is the best form of storage or other battery, but it will be found that most of the existing types now on the market will give good results, and any of them may be obtained from the makers or from dealers in electrical goods. For the information of customers it may be stated that the miniature Edison lamps can be operated from Grenet, Bunsen, Grove or other similar forms of primary battery, as well as from gravity, or bluestone, cells, but where the latter are used a large number is required and it is advisable to use the current frequently as they are designed to be frequently short circuited.

Edison Miniature Lamps on Electric Lighting Circuits.

Where a regular electric lighting circuit of low tension is available, the miniature Edison lamps can be more extensively used for decorative or other purposes than would be convenient if a battery had to be depended upon for the source of current. This field is a large one, and there is no limit to the extent of use of these lamps, from the lighting of one lamp of half candle power to the lighting of thousands in series.

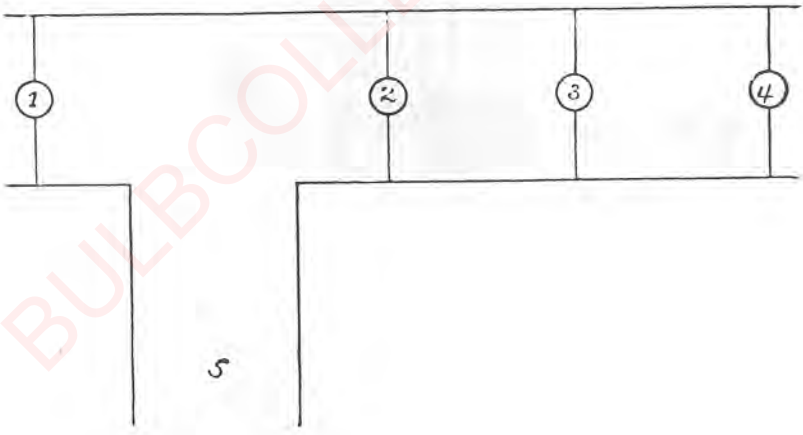


ORNAMENTAL SPRAY OF SMALL LAMPS.

There are few forms of decoration more beautiful and pleasing than miniature incandescent lamps placed among flowers, or interwoven in garlands or festoons; for decorating Christmas trees or conservatories, or, in fact, for any decorative and artistic effects. Many attractive and unique features can, by their use, be introduced into store windows or for signs, thus drawing the attention of the public and serving the purpose of an interesting display and advertisement.

All these possibilities are readily attainable where there is an electric lighting circuit at hand. Information on this subject can be supplied by the managers of electric light stations, or by us, and for any special forms of decoration we shall be pleased to furnish designs, suggestions, and estimates of cost.

It should also be borne in mind that physicians and dentists can make use of one or any number of small lamps, either from battery current or in connection with an electric lighting circuit. For the information of customers who may desire to experiment with one small lamp on a regular circuit from an electric light station supplying incandescent lights, we show in the sketch below how this may be done :



At the place marked No. 1 an attaching plug conveying the current can be screwed in. Numbers 2, 3 and 4 are regular 16, 32 and 50 candle power lamps, used for the purpose of regulating the amount of current which shall go through the small lamp. The small lamp should

be connected between the points where the circuit is open (5) then turn on the 16 C. P. lamp. If this does not light up the small lamp to its proper brilliancy, turn off the 16 C. P. and turn on the 32 C. P. lamp, and if this is not sufficient try the 50 C. P. In this way, any one of the miniature lamps may be operated from the circuit, from the small pea lamp to the 20 C. P. spiral, which takes between 30 and 40 volts. If greater variation of current is desired, a larger number of lamps of various candle powers can be used.

EDISON LAMP CO.,
Harrison, N. J.

PRICE LIST

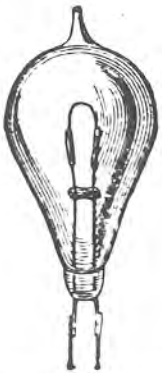
— OF —

Edison Incandescent Electric Lamps.

CUTS REPRESENT ACTUAL SIZES.

½-CANDLE LAMP.

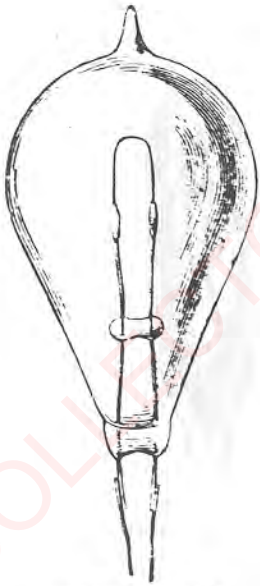
1-CANDLE LAMP.



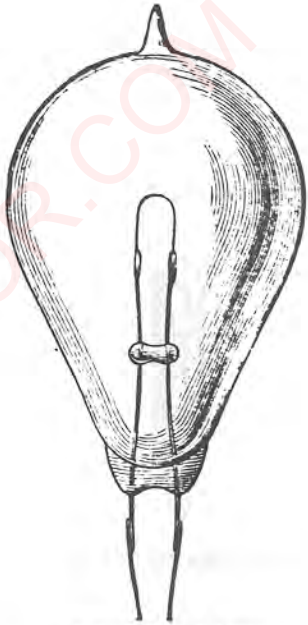
2-CANDLE LAMP.

Candle Power.	Resistance. — Ohms.	Electro-Motive Force. — Volts.	Current Required. Approx. — Amperes.	Price Each.	Per Dozen.
½ Candle.....	1.3 to 2	3.0 to 4.5	1 to 1.50	$1 00	$10
1 Candle.....	2.9 to 4.5	3.5 to 5.5	1 to 1.50	1 00	1
2 Candles..... ...	3.3 to 5	4.5 to 5.5	1 to 1.50	1 00	10

3-CANDLE LAMP.



4-CANDLE LAMP.



6-CANDLE LAMP.

Candle Power.	Resistance. Ohms.	Electro-Motive Force. Volts.	Current Required. Approx. Amperes.	Price Each.	Per Dozen.
3 Candles.....	3.6 to 4.5	5.5 to 7	1 to 1.50	$1 00	$10
4 Candles.....	5 to 6.5	7 to 9.5	1 to 1.50	1 00	10
6 Candles.....	6 to 7	9 to 12	1 to 1.50	1 00	10

SPECIAL DENTAL LAMP.

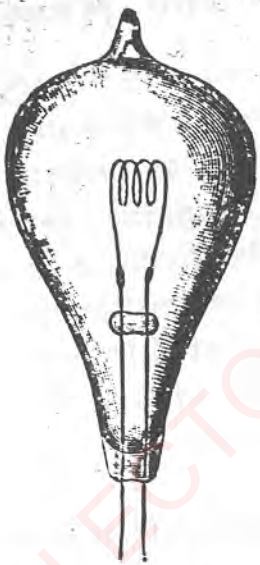
DENTAL LAMP.

PEA LAMP.

Description.	Candle Power.	Resistance. Ohms.	Electro-Motive Force. Volts.	Current Required. Approx. Amperes.	Price Each.	Per Dozen.
Dental Lamp...	½ Candle..	1.1 to 3.5	3 to 4	1.30	$1 00	$12
Special Dental.	½ Candle..	1.7 to 2.3	3 to 4	1.20	2 00	18
Pea Lamp.....	½ Candle..	1.2 to 2	3 to 4	1.40	2 00	18

The Edison Spiral Lamp.

20-CANDLE POWER.



20-CANDLE POWER SPIRAL LAMP.—ACTUAL SIZE.

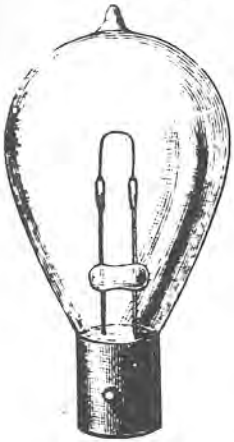
The carbon of this lamp is made in spiral form, as shown in the cut, and is therefore adapted for special purposes, where a brilliant light is required and concentration is desirable, as in the case of a magic lantern or stereopticon. It requires from 16 to 20 cells of battery.

Three or four of these spiral lamps are just right for one series in an Edison circuit; and the effect for ornamental purposes is brilliant beyond description, as this lamp gives full 20-candle power, and is like a spot of sunlight.

The resistance of the carbon is about 34 ohms. Electromotive force required is from 30 to 38 volts, and a current of from 1 to 1.75 amperes.

Price, each - - - - - $2 50

Sockets and Receptacles.

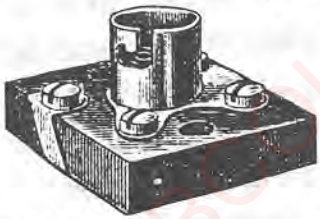


When it is desired, we will supply our customers with any of the small lamps, socketed as shown in the sketch. We would suggest that as much time as possible be given us in advance of the actual needs of customers, as all small lamps are socketed to order.

Extra charge for socketed lamps, 10 cents each.

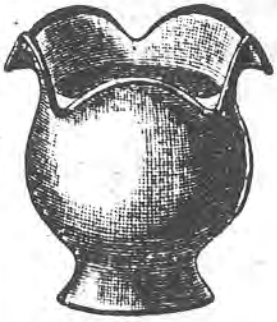
Receptacles.

The receptacle shown in the sketch is designed to receive the socketed lamp in the above cut. The base of this receptacle is made of a hard fibrous material, the connections being of polished brass. It is shown of actual size in the sketch. This receptacle is neat and its size makes it readily adaptable to nearly all conditions for decorative work.



Price, each 40 cents.

Shades.



We can furnish fancy glass shades in red, white, blue and green colors, for use with small lamps.

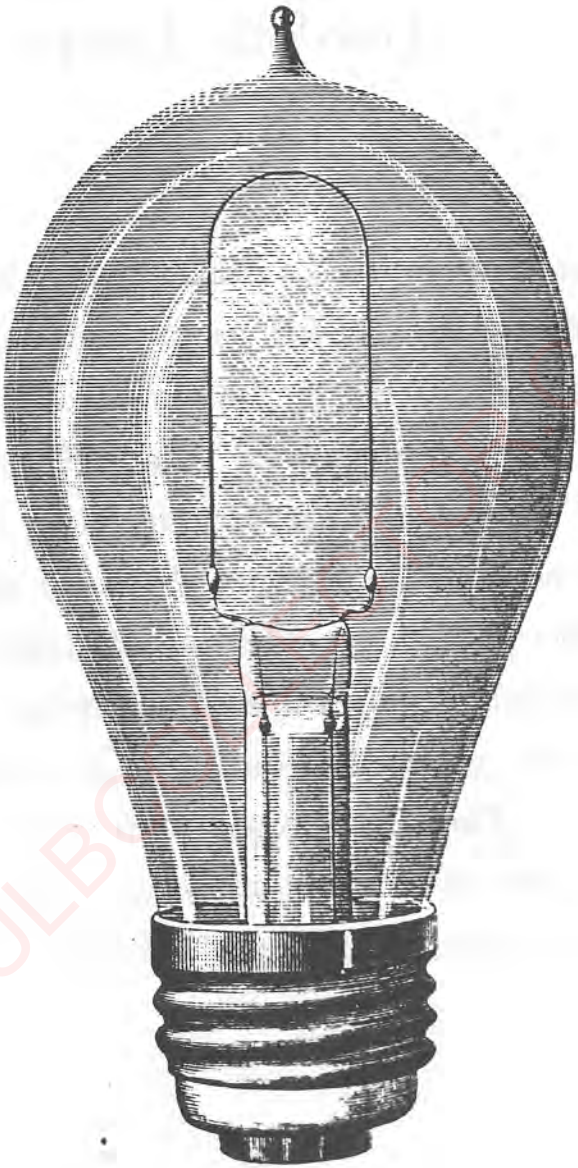
Price, 30 cents each.

Edison Low-Volt Lamps.

FROM 20 TO 40 VOLTS.

These lamps are made to fill a demand which has grown very rapidly during the past few years. There are a large number of primary batteries on the market, and these low volt lamps are used with many of them. They are also used by many persons who are experimenting with batteries of various kinds, and do not desire to set up too great a number of cells to obtain a sufficient electromotive force to light a standard high volt lamp.

These lamps are of excellent quality, and a large number are in use. They have bases to fit the standard Edison socket, and all the other appliances of the Edison system may be used with them, same as with the higher volt lamps.



The above cut shows the type of Edison Low Volt Lamps. The lamp shown in the cut is one of about 50 volts. The length of carbon becomes shorter in lamps of lower volts, but the style of lamp remains the same.

Lamps 20 to 40 Volts at 3.1 Watts per Candle Power.

VOLTS.	12 Candles.		16 Candles.		21 Candles.		28 Candles.	
	AMPS.	OHMS.	AMPS.	OHMS.	AMPS.	OHMS.	AMPS.	OHMS.
20	1.80	11.1	2.40	8.3	3.15	6.3	4.20	4.7
21	1.71	12.3	2.29	9.2	3.00	7.	4.00	5.3
22	1.63	13.6	2.18	10.1	2.85	7.7	3.81	5.8
23	1.56	14.8	2.09	11.	2.72	8.4	3.65	6.3
24	1.50	16.	2.00	12.	2.62	9.1	3.50	6.8

VOLTS.	12 Candles.		16 Candles.		21 Candles.		28 Candles.	
	AMPS.	OHMS.	AMPS.	OHMS.	AMPS.	OHMS.	AMPS.	OHMS.
28	1.28	21.	1.71	16.3	2.25	12.6	3.00	9.3
29	1.24	23.	1.65	17.5	2.18	13.4	2.90	10.0
30	1.20	25.	1.60	18.7	2.10	14.2	2.80	10.7
31	1.16	27.	1.55	20.	2.03	15.2	2.71	11.4
32	1.12	29.	1.50	21.3	1.96	16.5	2.62	12.1

VOLTS.	12 Candles.		16 Candles.		21 Candles.		28 Candles.	
	AMPS.	OHMS.	AMPS.	OHMS.	AMPS.	OHMS.	AMPS.	OHMS.
36	1.00	36.	1.33	27.	1.75	20.5	2.33	15.6
37	.97	38.	1.29	28.5	1.70	21.6	2.27	16.4
38	.94	40.	1.26	30.1	1.66	22.8	2.21	17.2
39	.92	42.	1.23	31.7	1.61	24.1	2.16	18.1
40	.90	44.	1.20	33.3	1.57	25.4	2.10	19.0

PRICES.

12, 16 and 21 candle power, - - - 75 cents each.
28 candle power, - - - - - $1.00 each.

Special discounts in large quantities.

Lamps 20 to 40 Volts at 2½ Watts per Candle-Power.

These Lamps will last only one-third as long as those at 3.1 Watts per candle-power.

VOLTS.	16 Candles.		21 Candles.		28 Candles.		36 Candles.	
	AMPS.	OHMS.	AMPS.	OHMS.	AMPS.	OHMS.	AMPS.	OHMS.
20	2.00	10.	2.62	7.6	3.50	5.7	4.50	4.4
21	1.90	11.	2.49	8.5	3.34	6.3	4.28	4.9
22	1.81	12.1	2.36	9.3	3.18	6.9	4.10	5.3
23	1.73	13.3	2.27	10.	3.04	7.5	3.91	5.8
24	1.69	14.4	2.18	10.8	2.91	8.2	3.75	6.4

VOLTS.	16 Candles.		21 Candles.		28 Candles.		36 Candles.	
	AMPS.	OHMS.	AMPS.	OHMS.	AMPS.	OHMS.	AMPS.	OHMS.
28	1.43	19.5	1.87	15.	2.50	11.2	3.21	8.7
29	1.38	21.	1.81	16.	2.41	12.	3.10	9.4
30	1.33	22.5	1.75	17.	2.33	12.8	3.00	10.
31	1.29	24.	1.69	18.1	2.25	13.7	2.90	10.7
32	1.25	25.6	1.64	19.4	2.18	14.6	2.81	11.4

VOLTS.	16 Candles.		21 Candles.		28 Candles.		36 Candles.	
	AMPS.	OHMS.	AMPS.	OHMS.	AMPS.	OHMS.	AMPS.	OHMS.
36	1.11	32.4	1.46	24.6	1.94	18.5	2.50	14.4
37	1.08	34.3	1.41	26.1	1.89	19.5	2.43	15.2
38	1.05	36.2	1.37	27.7	1.84	20.6	2.37	16.
39	1.02	38.1	1.34	29.1	1.79	21.7	2.31	16.8
40	1.00	40.	1.31	30.5	1.75	22.8	2.25	17.7

PRICES.

16 and 21 candle power, - - - 75 cents each.
28 and 36 candle power, - - - - $1.00 each.

Special discounts in large quantities.

LIST OF ELECTRICAL GOODS DEALERS, FROM WHOM SMALL EDISON LAMPS CAN ALSO BE OBTAINED.

CONNECTICUT,

NORTHFORD—J. L. Nott.

DISTRICT OF COLUMBIA,

WASHINGTON—Royce & Marean.
C. W. Messner.

ILLINOIS,

CHICAGO—Electrical Supply Co.
Nat'l School Furnishing Co. (lamps only).
Western Electric Co.
Central Electric Co.

LOUISIANA,

NEW ORLEANS—William Oswald (lamps only).

MARYLAND,

BALTIMORE—Viaduct Mfg. Co.

MASSACHUSETTS,

BOSTON—Perry Mason & Co.
Thomas Hall.
Codman & Shurtleff (lamps only).

BOSTON—Holtzer-Cabot Electric Co.
Electric Gas Lighting Company.

LOWELL—L. A. Derby & Co.
WORCESTER—Chas. H. Page & Co.

MICHIGAN,

DETROIT—Markle Engineering Co. (lamps only).
Detroit Electrical Works.

MISSOURI,

ST. LOUIS—A. S. Aloe & Co.
Southern Electrical Supply Co.
St. Louis Electrical Co.

KANSAS CITY—Gate City Electric Co.

NEBRASKA,

OMAHA—Nebraska Electric Co.

NEW YORK,

NEW YORK CITY—The E. S. Greeley & Co.
J. H. Bunnell & Co.
Meyrowitz Bros.
F. G. Otto & Sons (lamps).
Otto Rauda.
Pearce & Jones.
Empire City Electric Co.
Gibson Electric Co. (Storage Batteries).
Electric Accumulator Co. (Storage Batteries).
Julien Electric Co. (Storage Batteries).

BROOKLYN—James H. Mason.
ALBANY—Hamilton Electric Works.

OHIO,

CINCINNATI—C. E. Jones & Bro.
Max Wocher & Co. (lamps).

PENNSYLVANIA,

PHILADELPHIA—James W. Queen & Co.
Novelty Electric Co.
Walker & Kepler (lamps only).
Partrick & Carter.

PITTSBURGH—Union Electrical Construction Company.